Glossa a journal of general linguistics

De Belder, Marijke. 2020. A split approach to the selection of allomorphs: Vowel length alternating allomorphy in Dutch. *Glossa: a journal of general linguistics* 5(1): 42. 1–40. DOI: https://doi.org/10.5334/gjgl.899

RESEARCH

A split approach to the selection of allomorphs: Vowel length alternating allomorphy in Dutch

Marijke De Belder
Carl von Ossietzky Universität Oldenburg, Oldenburg, DE
marijke.de.belder@uni-oldenburg.de

In this article it is argued that the selection of allomorphs is distributed over two modules, viz. Vocabulary Insertion and Phonology. This is done on the basis of a case study of vowel length alternating allomorphs in Dutch. The data show a split pattern: some empirical domains can be fully captured by phonological principles. For these cases, the phonologically most optimal allomorph will be selected. In other empirical domains, phonological principles still account for many of the attested data. Yet, one attests lexicalised exceptions as well, which are clearly phonologically non-optimal. The data echo opposing views in the literature: some proposals attempt to reduce allomorph selection to phonology, others focus on the fact that many examples are simply not phonologically optimal and suggest that allomorph selection should not be done by Phonology. I argue that the opposing nature of these two types of data is actually indicative of the way the selection of allomorphs is organised. More specifically, both Vocabulary Insertion and Phonology can determine the selection of allomorphs. Vocabulary Insertion is responsible for stored information, Phonology is responsible for phonologically optimising patterns.

Keywords: allomorphy; ambisyllabicity; Vocabulary Insertion; Dutch; Distributed Morphology

1 Introduction

Stem allomorphy may occur when for a single root two (or more) variants have been stored. These variants are thus available. Yet, the mere fact that an allomorph is available does not necessarily imply it will be put to use. In order for the allomorph to surface, it should be selected. This article is an investigation into the selection mechanisms that determine the insertion of stem allomorphs, the order in which these conditions operate and their place in the Y-model.

Hypothetically, various principles may select an allomorph. Firstly, the allomorph may be selected to satisfy phonological requirements (Paster 2006; Anderson 2008; Kager 2008; Wolf 2008; Nevins 2010). Secondly, lexicalised contexts may determine the use of an allomorph, as its use may be associated with a specific idiom, collocation or other lexical context. Finally, syntactic contexts may select an allomorph; it may spell out specific syntactic features (cf. Lowenstamm 2007; Acquaviva 2008; Hermans and Postma 2009; Kramer 2009; Bye and Svenonius 2010) or the allomorph may simply be associated with a specific syntactic context, without spelling out a specific head (Harley 2014).

In this article I discuss an instance of allomorphy in Dutch. I show that both lexicalised insertion conditions and phonological conditions may determine the selection of an allomorph with a long vowel instead of one with a short vowel. I argue that these conditions are ordered and belong to their own designated module: lexical insertion conditions belong to Vocabulary Insertion and precede phonological ones which belong to Phonology. As such, theoretically, this article is an investigation into the mechanics of

allomorphy selection within the framework of Distributed Morphology. The proposal is contrasted with existing proposals in the literature.

Empirically, the proposal allows one to understand variation in the distribution of allomorphs. More specifically, I discuss varying patterns in vowel length alternation in Dutch nominal and verbal inflection and derivational affixation. I will argue that the distribution of the allomorph with the long vowel is often determined phonologically. The phonological patterns appear to be quite regular; when an appropriate allomorph with a long vowel is available and when its appearance would satisfy a phonological requirement to optimise syllabic structure, it will often be selected. Yet, the pattern is distorted by the lexicalized selection of allomorphs, which is, of course, by definition irregular. The article present a model which captures precisely this state of affairs and by doing so, it contributes to the field which struggled to reconcile precisely these two empirical patterns in a single model.

To be entirely clear, the term vowel length alternation refers to allomorphy and not to a phonological process. Given that stems with long and short vowels are alternating for a single lemma, one may have the impression that an underlying short vowel has lengthened and this is indeed what happened in Middle Dutch due to a process called Open Syllable Lengthening (see Lahiri & Dresher 1999 for a detailed discussion). Yet, vowel lengthening as a phonological process ceased to be productive in Dutch and what we merely see is that those stems that showed an alternation between a short and a long vowel due to the earlier phonological process acquired and kept this stem alternation. It is therefore improbable that the vowel actually lengthens in contemporary Dutch. It is more probable that two stem allomorphs, i.e. one with a short vowel and one with a long vowel, alternate.

The article is structured as follows. In the next section I discuss background literature. I give an overview on the state-of-the-art of theoretical proposals on the distribution of allomorphs. In Section 3 I illustrate the regular patterns of allomorphy in the domain of Dutch vowel length alternation. I show that these regular patterns follow from phonological principles that condition allomorphy to optimise syllable structure. Section 4 discusses irregular patterns of allomorphy which are ascribed to lexicalised uses of allomorphs. Section 5 discusses, for good measure, why certain patterns for allomorphy are excluded. The theoretical consequences of the data are discussed in Section 6. Section 7 sums up.

2 Existing theoretical proposals on the distribution of allomorphs

2.1 Introduction

In the empirical part of this paper, which is laid out in parts 3 and 4, it is argued that Dutch vowel alternating allomorphy is subject to both phonological principles and lexicalisation. As such, it presents a subset of the hypothetical factors that may determine allomorphy, which would also include syntactic contexts. The existing literature mainly focuses on syntactic and phonological factors and the current section presents this state-of-the-art of the theoretical and technical functioning of allomorph distribution.

As pointed out by Bonet and Harbour (2012: 220), there is little agreement in the literature as to which mechanism is responsible for the selection of an allomorph. Indeed, proposals range from stipulations or rankings at Vocabulary Insertion to phonological constraints in OT-based models. Bonet and Harbour point out that the source of the theoretical dispute probably stems from the disparity in the data (see also Bye 2007). Indeed, sometimes the distribution of allomorphs seems to be completely random, whereas other cases of allomorphy seem to follow phonological principles in a fully predictable and optimising fashion. Given this state of affairs, any approach that attempts to capture all data by means of a unified account therefore seems to be doomed to be a less than elegant or satisfying account for at least some of the data.

On top of the fact that there is disagreement on which module should regulate the selection of allomorphs, there is the more basic question on how many modules are

involved in allomorph distribution. The mere disparity of the data set might in fact indicate that the corresponding mechanisms and modules are disparate as well. The present paper follows this line of reasoning. In sections three and four I present a Dutch data set that indicates that a specific case of allomorphy shows simultaneously clearly optimising and predictable behavior and random idiosyncrasies. I argue that this state of affairs is actually indicative of the way allomorph selection is organised: it is split over two modules, resulting in two types of empirical patterns. More specifically, I argue that Vocabulary Insertion stipulates the lexicalised, idiosyncratic occurrences of allomorphs. In the absence of lexicalised selection, the competing allomorphs are sent to Phonology as disjunctive exponents of a single vocabulary item. Phonology will subsequently select the phonologically most optimal candidate. This position is supported empirically in later sections. The present section argues for this approach on theoretical grounds by reviewing the pros and cons of existing proposals.

2.2 Syntactic insertion contexts in Distributed Morphology

Distributed Morphology is a late insertion model; Syntax merges abstract features and all vocabulary insertion takes places post-syntactically at Vocabulary Insertion, which is an operation at PF. Hence, no exponents are present at Syntax. At the position of the root node (i.e. the lexical node), Syntax contains (at most) an index that refers to the relevant stem at Vocabulary Insertion, other nodes contain bundles of morphosyntactic features (Halle and Marantz 1993; 1994; Harley and Noyer 1999; Harley 2014).

When a syntactic cycle is complete, it is spelled out to PF and LF. At the PF-side, the structure may be subject to certain well-defined morphological operations before it is sent to Vocabulary Insertion. These morphological operations should not concern us here. Vocabulary Insertion is an operation that matches vocabulary items with the syntactic tree. The vocabulary items are acquired items that are stored in a list. At the LF-side, the compositional meaning of the syntactic features is computed. The compositionally derived denotation is combined with information from the Encyclopedia, another acquired list, which contains stored lexical semantics and instructions for (idiomatic) interpretation.

Since Distributed Morphology's seminal papers (Halle & Marantz 1993; 1994), the insertion of functional (i.e. non-root) vocabulary items is assumed to be subject to competition. It adheres to the Subset Principle, which is *in se* an Elsewhere Principle, giving priority to more specific rules over more general or default rules. These rules are often based on feature sets: vocabulary items are specified for the features they may realise. The vocabulary item of which the feature specifications are the best matching subset of the features on the syntactic node will be selected to realise the node. However, as allomorphs are mere variants of a single vocabulary item, they are usually specified for exactly the same features. As such, in the context of allomorphy, these rules typically do not depend on features, but on insertion contexts. More complex contexts are then given priority over less complex contexts. For example, the English tense suffixes ∅, *-t* and *-d* cannot be distinguished featurally as they all realise the same feature [+past]. What sets them apart is the type of verb with which they co-occur (example taken from Halle and Marantz 1993: 123–124):[1]

(1) *Tns*
[+past] ↔ ∅ / [+strong] _____
[+past] ↔ /-t/ / [+strong] _____
[+past] ↔ /-d/

[1] I merely adopt the example from Halle and Marantz (1993) to illustrate their views on the technical distribution of allomorphs. Not everyone would endorse the view that *-t* and *-d* are allomorphs for example: Kayne (2016) derives them both phonologically from an underlying *-t*. However, this discussion should not concern us here.

The exponent for which no context is given is the elsewhere form.

The insertion of lexical vocabulary items (also known as stems, roots or lexemes) was assumed to be subject to free choice rather than competition. As a result, competition between allomorphs was assumed to be restricted to the functional domain (Marantz 1997), as only functional vocabulary items compete for insertion in the first place. Instances of stem allomorphy were then postulated to result from readjustment rules, which can be understood as rules that guarantee some phonological readjustments of a stem at Spell-Out.

The theoretical distinction between functional and lexical allomorphy was motivated empirically by the observation that strong suppletion tends to be limited to the functional domain and stems only tend to show weak suppletion (see Marantz 1997 for discussion). However, Harley (2014) puts forward instances of strong suppletion amongst lexical verbs in Hiaki (see also Veselinova 2006). Having falsified the empirical distinction between allomorphy amongst functional and lexical vocabulary items, it becomes pointless to maintain the theoretical and technical distinction. Consequently, she proposes competition at Vocabulary Insertion for roots as well: lexical vocabulary items contain instructions to match an index with a phonological form, as illustrated in (2) (the example is based on Harley 2014). The example illustrates a Hiaki verb ('to run') that has two allomorphs, one of which is inserted in a plural context. The vocabulary item, which was merged at Syntax as an abstract index (e.g. the root with index 231) stipulates that the exponent *tenne* should be matched with this index in a plural context and with *vuite* in all other contexts:

(2) √231 ↔ /tenne/ /[DP_{pl} _____]
/vuite/ Elsewhere

As the example shows, vocabulary items may contain information on the availability and the distribution of allomorphs. What may determine the use of an allomorph is a stipulation on the vocabulary item that a certain allomorph is the more specific candidate for a certain context. For the example above, the selection mechanism is the stipulation that *tenne* is a closer match for plural contexts. Note that the two allomorphs spell out the same index and their selection solely depends on an insertion context. Note further that the so-called *syntactic* selection of allomorphs is strictly speaking not determined by the module Syntax itself: allomorphy is determined at Vocabulary Insertion. It is *syntactic* in the sense that Vocabulary Insertion takes syntactic contexts into account.

To summarise, in Harley (2014) lexical selection depends on features for functional items and on an index for roots. Once the relevant vocabulary item is selected, the selection amongst its various allomorphs (if any) depends on insertion contexts stipulated at the vocabulary item. Richer insertion contexts precede less specified ones. In other words, allomorph selection still functions as in Halle and Marantz (1993), albeit extended to root allomorphy.

2.3 Allomorphs spelling out a syntactic head

In the previous section we have seen examples of allomorphs that depend on a given syntactic context, without assuming that the allomorph indeed spells out a specific syntactic feature itself. Yet, this possibility also seems to exist. It is, for example, well-known in the literature that syntactic plurality may trigger allomorphs or other irregular exponents. Yiddish, for example, shows allomorphy in plural contexts (Lowenstamm 2007). In the following example the root *kind* 'child' alternates with its allomorph *kinder:*

(3) a. kind
child
'child'

b. kinder
children
'children'

c. kind-l
child-DIM
'little child'

d. kinder-l-ex
child-DIM-PL
'little children'

An irregular exponent may thus be found in syntactically plural contexts. There is a strong tendency in the literature to analyze these irregular markers as instances of noun class markers of plurality. It is often proposed that the noun class marker is an instance of n°, which merges above the root and which is selected by the plural context. Versions of such a proposal have been endorsed by Lowenstamm (2007) for Yiddish, by Kramer (2009) for Amharic and by Acquaviva (2008) for Breton. In the same vein, Hermans & Postma (2009) have proposed that Dutch vowel length alternation and a Dutch allomorph pattern resembling the Yiddish data in (4) are instances of noun class marking in plural contexts as well, a proposal to which I briefly come back in Section 5.2. In all these proposals, the alleged irregularity of the stem is in fact the spell-out of a syntactic head, viz. a noun class marker. It is thus argued in the literature that a difference in form in such cases reflects difference in structure. Hence, it is referred to as *pseudo*-allomorphy.

Technically, pseudo-allomorphy can be captured in three ways. Firstly, it can be argued that the instances should be aligned with the cases presented in Harley (2014): the allomorphs are systematically triggered in the presence of a given syntactic head and, as such, they *seem* to spell out this head, but technically, they do not. They simply systematically appear next to this head, which may be realised by a silent exponent in itself. Secondly, it can be argued that the allomorph is technically not an allomorph, but a concatenation of two lexical items. For example, under such a proposal *kinder* is not an allomorph of *kind*, but the spell-out of *kind* and *-er*. Under such a proposal, these data do not instantiate allomorphy and they become irrelevant to the discussion. Thirdly, one might argue that a form such as *kinder* indeed spells out both the root and little n simultaneously. Given that *kind* and *kinder* then spell out different feature sets, their selection is subject to the subset principle. Such proposals have to adopt a version of phrasal spell-out and are incompatible with approaches in Distributed Morphology that adhere to the original idea of piece-based realisation. I will come back to this idea in Section 2.8.

A thorough discussion of this issue lies beyond the scope of the present paper. It will become clear that I argue that the data presented in this paper are not to be analysed as syntactic allomorphy.

2.4 Lexicalised insertion contexts

Lexicalisation may be responsible for allomorphy selection. For example, the participle of the verb *uitverkiezen* 'to select' is *uitverkozen*, as can be seen in (4):

(4) Jij bent uitverkozen.
you are selected
'You are selected.'

Yet, there is an idiomatic reading in which a different form is used:

(5) het uitverkoren volk
the selected people
'the Chosen People (i.e. the Jews)'

There is nothing systematic to be mentioned about the exceptional use of *uitverkoren* in the example above. A connection has been stored between an irregularity in form and an irregularity in meaning in a specific collocation. The use of an irregular form has simply been listed as the conventionalised form to express a specific idiomatic meaning. The selection of the allomorph is then an arbitrary convention, a conventionalised irregularity. An allomorph may thus be selected in a specific context despite the fact that there are no principled, i.e. phonological or syntactic, grounds to do so (see also Section 2.5).

The mechanics presented in Harley (2014) on syntactic allomorphy can be straightforwardly extended to incorporate such examples of lexical allomorphy. Just as syntactic insertion contexts can be stipulated on a vocabulary item, so can lexicalised insertion contexts. In fact, there is a good reason to group them technically. The information both types of insertion contexts rely on can be read off from the syntactic tree. This is obvious for allomorphy based on syntactic insertion contexts. But also for lexical contexts the tree does contain all the necessary material to recognise a relevant collocation, as its nodes contain the indices or features of the other lexical items referred to. Furthermore, both for lexical and syntactic insertion contexts, no systematic rule is at work (beyond locality). The distribution of the allomorph simply depends on a listing associating the use of a specific allomorph with neighbouring material in the tree.

2.5 Rich subcategorisation frames

As described above, Harley (2014) argues that the syntactic selection of an allomorph can be understood technically as a stipulation on the vocabulary item, determining in which syntactic context a certain allomorph should be inserted. *Mutatis mutandis*, if the selection of an allomorph is phonological, one could stipulate a phonological context on the vocabulary item, as in the following abstract example:

(6) √index ↔ allomorph 1 /specific phonological context
allomorph 2 Elsewhere

Again, in such a scenario it is not the module Phonology in itself that may select the allomorph, it is rather a phonological context stipulated on the vocabulary item that will ensure the insertion of the phonologically more optimal candidate.

An approach such as the one sketched here is presented in Paster (2006). Discussing suppletive forms of affixes, she proposes that all conditions determining allomorphy are simply part of the subcategorisation frame of the vocabulary item, *in casu* the affix. As a result, vocabulary items in her model may have an elaborate subcategorisation frame, including both syntactico-semantic and phonological insertion criteria (see, for example, Paster 2006: 12).

From a descriptive point of view, such subcategorisation frames successfully capture all the facts. It suffices to adequately list all insertion contexts with an appropriate ranking. Model-wise, the proposal dovetails in general with Distributed Morphology, as it extends ideas already present in the seminal papers (cf. example 1 in Section 2.2). However, even though, technically, the stipulations on the vocabulary items will derive the desired results, we may be reluctant to adopt these adjustments as the final say on the organisation of vocabulary insertion for two reasons. Firstly, stipulating the relevant phonological context on the vocabulary item does capture the observation that a specific form will

be inserted in a specific phonological context, but it does not express the insight that such phenomena are often motivated. In fact, one could stipulate just anything (that respects locality conditions) as an appropriate phonological context for insertion for a given allomorph. In this sense, it is a brute force solution. The insight that the insertion of an allomorph often actually happens to optimise the phonological make-up of the word is lost and not expressed by the current mechanism.

Admittedly, according to Paster (2006) this result is actually an advantage of the approach. She points out that not all phonologically-driven cases of allomorphy are actually optimising. She presents twelve examples from various languages in which the distribution of suppletive forms of affixes is clearly determined by phonological properties of the lexical item involved (Paster 2006: 76–98). Yet, the use of these suppletive forms is at best neutral; their occurrence does not optimise the word phonologically.

Given the existence of these facts, note the following. As rightfully pointed out by Paster, any account dealing with the distribution of allomorphs has to be able to capture phenomena that are irregular, arbitrary or lexicalised in nature. A theory in which the most optimal candidate invariably wins is simply empirically inadequate. Note that it follows in particular, as Paster (2006) points out, that trying to capture phonologically motivated types of allomorphy by solely relying on Optimality Theory will therefore be an ordeal, given that it is easy to find non-optimal instances of phonological allomorphy, a point to which I come back below.

Nevertheless, Paster's approach asks us to throw the baby out with the bathwater. There is no contradiction in fully recognising the existence of counterexamples, which certainly should be captured one way or another, and adhering to the insight that a general phonological principle may determine other instances of allomorphic distribution. There are cases in which phonologically conditioned allomorphy does show regular optimising behavior and Paster's (2006) subcategorisation-frame based approach does away with the tools to capture them, given that all phonologically motivated suppletion is technically reduced to idiosyncratic properties of vocabulary items.

The second reason because of which we may be reluctant to adopt Paster's (2006) approach fully is the fact that phonologically-driven allomorphy may show uniform behaviour over various vocabulary items. From a phonological point of view, this phenomenon is not hard to understand; all vocabulary items that share a relevant phonological feature may be subject to the same phonological condition. Yet, under a subcategorisation-frame based proposal, such a natural grouping becomes a coincidence. The fact that the linguist understands why certain vocabulary items may show similar behaviour cannot be expressed in a model that merely relies on stipulations on individual lexical items.

In sum, subcategorisation-frame based proposals have strong descriptive force; all conditions determining allomorphy can be stipulated on the lexical item. Furthermore, it does recognise and capture the existence of non-optimising counterexamples. The disadvantage is that these stipulations are indeed mere stipulations, which fail to express insights. Another disadvantage is that the approach is lexical item based, which fails to express patterns generalising over various lexical items. It appears that the approach has not much to offer when it comes to phonologically driven patterns, but it does offer us the tools to deal with exceptions.

2.6 Phonological rules as insertion contexts

Just as Paster (2006), Nevins (2010) stipulates phonological conditions for allomorphy selection at Vocabulary Insertion. Yet, he takes a slightly different approach. He simply specifies the phonological rule as a contextual condition for insertion on the vocabulary item, as in the following example (taken from Nevins 2010: 22, his example (38)):

(7) INDEF↔ /æn/ if it removes a violation of ONSET

The advantage of incorporating a rule rather than a phonological context is clear; the vocabulary item expresses an insight rather than an arbitrary mechanism. It may seem like we have addressed the concern.

However, consider the following problem. If one allows both syntactic and phonological conditions to be specified on the vocabulary item, we define Vocabulary Insertion as a hybrid operation. It should be able to read both syntactic and phonological conditions simultaneously. In this respect the stipulation that an allomorph may be sensitive to a specific phonological context, as in Paster (2006), is the more conservative stipulation; Vocabulary Insertion simply must be able to check surrounding syntactic and phonological features. However, if we adopt Nevins' proposal, Vocabulary Insertion must be able to actually interpret a phonological rule. It defines Vocabulary Insertion as an operation that is able to execute quite some phonology. Yet, simultaneously, we want it to be able to check for adequate syntactic conditions as well, following Harley's proposal. In sum, it defines Vocabulary Insertion as a two-headed dragon.

Note, furthermore, that a single lexical item may be subject to both insertion contexts and phonological stipulations. Such stipulations are ranked according to the Elsewhere Principle and one of them will precede the other one. Now, given that stipulations are still related to lexical items, the approach is ill-fitted to capture more general patterns over various lexical items. More in particular, we will see that insertion contexts systematically win over all phonological constrains (see Sections 2.8 and 2.9). This systematic ordering over various lexical items are technically nothing but instances of coincidence.

Finally, one might consider the fact that phonological constraints are ideally understood as universal constraints. Vocabulary Insertion, in contrast, is a list of acquired information. As such, it is odd to assume that Vocabulary Insertion hosts phonological principles.

In sum, it is advantageous to incorporate a phonological rule rather than a phonological context as an insertion context. However, it implies that Vocabulary Insertion can execute phonology and that it hosts both innate and acquired insertion principles. The relation between Vocabulary Insertion and Phonology proper becomes unclear: if Vocabulary Insertion can handle Phonology, is it then defined as the module Phonology or does it still co-exist with a separate module called Phonology?

2.7 Proposals within Optimality Theory

Optimality Theory (McCarthy and Prince 1993) defines morphological and phonological conditions for allomorphy selection as constraints. As such, morphological conditions and phonological conditions are evaluated in the same module. OT thus relies on a hybrid module as well. Older work in OT assumes that these conditions are ordered: one can formulate a general constraint that stipulates that all phonological conditions are to precede all morphological requirement (McCarthy and Prince 1993) or the other way around (Yu 2003: 108).

There is of course the well-known general problem that it is hard to see how these original proposals can be adopted by a realisational model such as DM (and see Paster 2006 for a thorough critical discussion). Distributed Morphology cyclically matches vocabulary items to syntactic nodes from the root outwards and the match is evaluated for each node within each cyclic step by the Elsewhere Principle. As such, it is principally incompatible with a model that maps a surface representation to an underlying representation for a phonological word without taking into account its internal structure (as discussed at length in Embick 2010).

Apart from this theoretical objection, there are two empirical objections. Firstly, as pointed out by Paster (2006: 77) in the domain of phonological allomorphy non-optimising examples can be found easily. They are challenging to OT, to say the least. Secondly, OT evaluates input candidates to derive surface forms. There are no grounds for underlying representations to trigger phonological allomorphy. Yet, underlying representations may trigger allomorphy, as will become clear in Section 3.3.

Wolf (2008) presents a serial version of OT to deal with phonological allomorphy (Candidate Chains, McCarthy 2007). In such an approach, candidates may improve incrementally. As such, the theory opens up the possibility to integrate underlying requirements into intermediate steps. Wolf's main proposal is that morphological insertion criteria and phonological insertion criteria are evaluated in the same module, i.e. Phonology. Wolf rewrites the subset principle as a series of constraints that guarantee that the candidate of which the features are the closest subset of the syntactic node will outrank less optimal matches. However, unlike the older versions of OT, he does not assume that there is an intrinsic ordering between constrains guaranteeing feature matching and those guaranteeing the application of phonological principles: morphological and phonological constraints can interleave. Just as Nevins (2010), he thus assumes that a single module hosts both universal phonological principles and acquired information, i.e. the link between exponents and the feature sets they realise.

Now, it is important to note that the discussion in his thesis is limited to two particular types of allomorphy. Firstly, he addresses instances of true phonological allomorphy, i.e. data which can be fully captured on phonological grounds as they show regular, optimising behavior. Secondly, he presents instances of phonologically motivated lexical item selected which, arguably, would not even be called allomorphy in Distributed Morphology. For example, he discusses the distribution between the determines *el* and *la* in Spanish. As is well-known, *la* is selected in feminine NPs, *el* is selected in masculine ones. However, *el* may also be selected by feminine nouns that begin with stressed [á]. Clearly, the distribution between *el* and *la* is thus partially phonologically motivated. However, strictly speaking, *el* and *la* may not be allomorphs of a single lexical item, but simply two lexical items competing for insertion. This example characterises his approach: allomorphs are distinguished featurally and the selection is then done by a morphological constraint that will select the closest matching feature set.

Wolf is forced to invariably assume featural distinctions between allomorphs. A first problem is pointed out by Bonet & Harbour (2012: 227): the featural distinction may be entirely stipulative. The second problem is that the approach is at odds with the essence of how allomorphy is understood in Distributed Morphology. Recall from Section 2.2 that allomorphy in DM is not understood as competition based on feature sets; it is based on ranked insertion contexts. Wolf does integrate Vocabulary Insertion in Phonology by rewriting the subset principle as constraints, but he remains silent on those data that are a central aspect to the understanding of allomorphic distribution in DM, i.e. the ranking of insertion contexts. In sum, it is unclear how Wolf's proposal can be applied to instances of allomorphy that are not to be distinguished featurally, as discussed in Section 2.2 and 2.4.

The empirical domain discussed in this article does not match Wolf's approach very well. We will see that allomorph selection for Dutch vowel alternating stems is both based on phonological principles and on stored, lexicalised information. Because some of the data are lexicalised, rather than being based on a selection mechanism relying on syntactic features, the data are at odds with Wolf's proposals. I will therefore not come back to this approach in later sections.

2.8 Split proposals

Booij (1998) discusses instances in Dutch morphology where phonological principles clearly seem to regulate the distribution of strong and weak allomorphs, but the application of these phonological principles are not without exception. For example, he discusses the by now well-known fact that the two competing Dutch plural affixes *-s* and *-en* are subject to syllabic well-formedness: *-en* is favoured if it transforms the root into a trochee (with right directionality). Hence, the Dutch plural of *kat* 'cat' is *katten*, but the plural of *dokter* 'doctor' is *dokters*. Even though this tendency is undeniably present in Dutch, counterexamples and examples of regional variation are not hard to find. For example, as Booij points out, speakers in the Netherlands favour the phonologically less optimal plural form *tests* 'tests' for the noun *test*, whereas Belgian speakers will use the phonologically expected form *testen*. Speakers in the Netherlands simply conventionalised the unexpected form.

To account for such examples, Booij (1998) proposes that stems and affixes are marked with subcategorisation features which may be of any kind (phonological, syntactic, …). These features regulate morpheme concatenation in morphology. Morpheme concatenation acts as a generator that generates possible candidates which are then sent to Phonology for evaluation in an OT fashion. As subcategorisation features precede phonological principles in the proposal, Booij can guarantee that phonology will operate within the language's morphological boundaries and he can make sure that phonology -and nothing but phonology- indeed takes place at a designated module, viz. Phonology.

Mutatis mutandis, the proposal can be adopted in Distributed Morphology. Subcategorisation features can be understood as being part of Vocabulary Insertion, as in Paster (2006) and Harley (2014). The output of Vocabulary Insertion, which can include various candidates for the spell-out of a single node, are then shipped to Phonology for further evaluation. It will become clear in the next section that the present proposal adopts exactly this idea.

Bye and Svenonius (2010; 2012) formulated a proposal that shows similar features, but which differs in important aspect. They propose to split Vocabulary Insertion into two different operations, which they call Match and Insert. Match precedes Insert; Match's output is Insert's input.

Match can see syntactic features and syntactic structure, such as dominance, movement and phase boundaries and it matches lexical items to the syntactic tree. As in Distributed Morphology, it is assumed that those lexical items are chosen that realise a maximum of features present in the tree. Domains for insertion are not terminal nodes, as in Distributed Morphology, but rather Spell-out domains, i.e. phases. As such, a lexical item may realise a span of terminal nodes (cf. Williams 2003).[2] Such a span is understood as a segment of an extended projection. For example, the noun plus number marking is understood as a phase and thus may be realised as a span in the noun's extended projection, i.e. the DP. In the English noun phrase, the noun will incorporate into the plural head, due to the fact that English number marking is suffixal. This type of linearisation is characteristic of the proposal: all linearisation that can be done in syntax will be done in syntax. The suffixal nature of the English plural thus does not need to be stipulated as a property of the suffix, as it is already derived at syntax. This cyclic domain is sent to Match, where a portmanteau morpheme, such as *geese* and *mice*, or several lexical items, such as *ballerina-s*, may realise this span. A form such as *mice* will be given preference over a form such as **mouses* or *mice-*∅ due to a principle called *Minimize Exponence*: using less exponents to

[2] In this respect, the approach differs from Distributed Morphology, in which the spell-out of terminal nodes is assumed. Approaches that rely on spans can be reformulated into a terminal node approach by relying on fusion and null affixes and thus can be made compatible with Distributed Morphology.

match the syntactic features are better than using more exponents. Note that the model thus has a mechanism to capture allomorphs that disjunctively realise different syntactic feature sets: *mouse* and *mice* are allomorphs and their distribution is regulated by postulating that they realise different features. The model allows for a different type of allomorph selection as well: the model allows various disjunctive forms to be selected by Match. The choice between these exponents is postponed. As such, allomorph selection can be assigned to a later module.

Match's output are candidates for insertion and are sent to the module Insert. Insert has the following tasks: it selects allomorphs on phonological grounds in case of disjunctive exponence, it linearizes the structure and it builds an underlying phonological representation. Of particular interest to us, is that the module thus contains an allomorph selection mechanism. Bye and Svenonius (2010: 14) provide the following example. The lexical item of the English indefinite article contains the following disjunction:

(8) {ən} / ___ V ↔ <INDEF>
{ə} ↔ <INDEF>

Given that the choice between *an* and *a* is based on phonological criteria, the selection is not established by Match, which can only take into account syntactic criteria. The disjunctive candidates are thus both sent to Insert, which picks the best candidate on phonological grounds.

An important advantage of the split approach presented here is that the insertion mechanism is able to take both syntactic and phonological requirements into account, while it does not require a single operation to interface with both syntactic and phonological insertion contexts. However, note that the phonological selection in (9) is based on an insertion context rather than on a principle. This is a missed opportunity. In Section 2.6 we argued that if a phonological selection can be formulated as a principle, one misses a generalisation by reducing it to a context. We thus end up with a separate module for phonology that does not really execute phonology with full force.

Bye (2007) explicitly discusses allomorphy in yet another split approach. He concurs with Paster (2005) that many examples of allomorphy are not phonologically optimal. He points out that these examples, which he labels *morpholexical* are language-specific and inviolable. If these rules are not respected, they lead to ungrammaticality. In contrast, phonologically selected examples of allomorphy are selected on the basis of universal, violable principles that guarantee the selection of an optimal candidate. According to Bye the process of Eval precedes a Morpholexical Control mechanism: the output of Phonology is checked by Control and results that are not compatible with language-specific morpholexical criteria are rejected. Bye's (2007) split approach model thus succeeds in capturing both phonological and morpholexical selection. The mechanics of his proposal fit the data: phonological selection is done in a *bona fide* phonological module that operates on the basis of universal phonological principles. Morpholexical selection, on the other hand, works on the basis of language-specific, listed and and inflexible information. Bye (2007) thus presents a model that successfully and strongly captures the disparate data. He argues to acknowledge that both types of data exist and he gives them an appropriate place in the model. The present article aims to contribute to the same goal. Bye himself points out that a possible objection against the model might be that OT is complemented with a set of declarative constraints (in the control mechanism). In the following section I propose not to adopt the control mechanism. I argue that it suffices to let Vocabulary Insertion precede Phonology (as we assume in Distributed Morphology anyway) to accommodate for both data and both selection mechanisms.

2.9 Candidate sets

Let us take stock of the data and the ideas presented in the previous sections. Empirically, we have encountered four different types of allomorphy: some allomorphs are sensitive to a syntactic context (Section 2.2), some are sensitive to a lexical context, which is possibly phonologically non-optimal (Section 2.4), some allomorphs disjunctively realise different syntactic feature sets (Section 2.3 and the discussion on Wolf 2008 in Section 2.7) and some differ qua phonological optimality (Section 2.7). Approaches that attempt to unify allomorphy into a single module will either ignore some of the data and be observationally inadequate (cf. the critique in Paster 2006 and Bye 2007 on Wolf 2008) or they will have to rely on rich subcategorisation frames (as in Paster 2006), which is a brute force solution to achieve observational and descriptive adequacy.

Now note that three of the four types of allomorphy can be captured by Vocabulary Insertion. We have seen that Vocabulary Insertion sees information present in the tree and it can deal with disjunctive feature sets and disjunctive insertion contexts via the Elsewhere Principle. As such, it can successfully deal with allomorphs realising different syntactic feature sets and it can take into account allomorphy sensitive to a syntactic context. Given that Vocabulary Insertion is in itself a list of lexical items, it also can see lexicalised information stipulating stored irregularities on those lexical items. Such lexical items will have the following, familiar format:

(9) √539 ↔ allomorph1 /specific insertion context
allomorph2

Let us thus assume that Vocabulary Insertion occupies its familiar spot in the Y-model and that it regulates the selection of these three types of allomorphy, relying on no other basic mechanisms than those that were already proposed in Distributed Morphology's seminal papers.

I now adopt the idea proposed by Bye and Svenonius (2010) that the output of a Vocabulary Insertion mechanism may be a set of candidates. To do so, we do not have to alter our assumptions on Vocabulary Insertion drastically. We simply have to allow a tie between candidates that seem to be equal options at Vocabulary Insertion and which can only be distinguished on the basis of phonological criteria. It is a minor modification of Vocabulary Insertion as we know it. I propose that a lexical item may be marked for a set of unranked exponents, i.e. allomorphs, at Vocabulary:

(10) √539 ↔ {allomorph1, allomorph2}

Such a situation will only occur if there are no lexical or syntactic criteria to distinguish between the allomorphs. This candidate set is then shipped to Phonology, which will select the best candidate on the basis of universal phonological constraints. The possibility of lexical items, such as the one proposed in (11), which may exist alongside familiar lexical items, such as the one in (10), is basically the only innovation here, but its effect is considerable. Note that the fact that the allomorphs are not ranked is not a problem. Stipulating an elsewhere form is not necessary, given that one of the forms will always be more optimal than the other one phonologically.

It is important to note that nothing prevents us from mixing the ingredients presented in (10) and (11). As such, a morpholexical stipulation at the vocabulary item can block a richer set of candidates right from the start, as illustrated in the abstract example in (11):

(11) √539 ↔ allomorph1 / specific insertion context α
{allomorph1, allomorph2}

(12) says that one allomorph will always be inserted in context α, in all other contexts the decision is up to Phonology. We have seen that any approach to allomorphy selection should be as successful in capturing the phonological patterns as in capturing the pervasive irregularities. As such, having a mechanism that can give priority to exceptions is an important addendum.

In sum, the purpose of this article is to defend a split approach to allomorph distribution which sets apart allomorphy based on stored insertion contexts from allomorphy based on phonological principles, and as such it argues against proposals that group all criteria together in Vocabulary Insertion (e.g. Paster 2006) or Phonology (e.g. Wolf 2008). It argues that both types should be assigned to their own designated module: insertion contexts are part of Vocabulary Insertion, phonological criteria belong to Phonology. As such, the approach takes advantage of the strength of both modules: Vocabulary Insertion, by definition a stored list, captures irregularities and stored insertion contexts, Phonology, based on universal constraints, provides for phonologically optimising patterns. Furthermore, these modules are ordered: Vocabulary Insertion precedes Phonology. The main reason to assume this order is the logic of the Y-model. Vocabulary Insertion interfaces with the morphosyntactic features and indices present in the syntactic tree. Hence, its input must be the syntactic tree. Phonology, on the other hand, derives a surface representation from an underlying representation, hence it must be fed the underlying representation of the exponents, which follows immediately if it follows Vocabulary Insertion.

A proposal on the exact nature of Phonology lies outside the scope of this article beyond the assumption that it is some kind of optimising model (see Bye 2007 for a discussion). It will become clear that the data in the present article suggest that also underlying representations can be subject to phonological principles determining allomorph distribution. This criterion is a desideratum for a phonological module in my opinion.

In the following sections I discuss a data set from Dutch that shows how the proposed model is beneficial. The field has gone back and forth on concentrating on either irregular, phonological non-optimal allomorphy or fully phonologically optimising allomorphy, rather than acknowledging that both instances co-exist (as emphasised in Bye 2007). Dutch contains a data set which illustrates exactly this point: within a single data set, both patterns clearly co-exist.

3 The fully regular phonological patterns

The objective of the empirical part of the paper is to show that there are vowel alternating stems in Dutch that are simultaneously subject to a fully regular, optimising pattern and to stored stipulations. The current section presents the first half of the facts: it discusses the phonological motivation to select an allomorph with a long vowel. It presents those syntactic domains in which the phonological rule is applied without any exception, viz. nominal number inflection and verbs.

3.1 The phonological motivation for vowel length alternation

Van der Hulst (1985) contains a proposal on why vowel length alternation might optimise Dutch syllable structures. Consider the following examples of vowel length alternation in Dutch from the domain of derivation (Van der Hulst 1985: 63). They show an alternation between stems with a short vowel in morphologically simplex contexts and forms with a long vowel in derived forms.

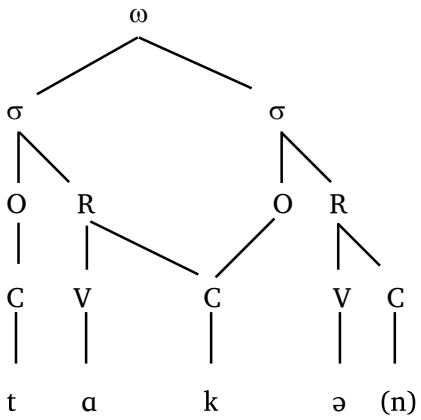
(12)	a.	dem**o**n	[ɔ]	‘demon’	dem**o**nisch	[o]	‘demonic’
	b.	sat**a**n	[ɑ]	‘satan’	sat**a**nisch	[a]	‘satanic’
	c.	Isra**e**l	[ɛ]	‘Israel’	Isra**e**lisch	[e]	‘Israelic’

Van der Hulst (1985) provides a phonological account: he proposes that the stem with the long vowel is selected to avoid ambisyllabicity. The proposal goes as follows. A Dutch minimal rhyme is at least bimoraic. The hypothetical forms in (13) are therefore excluded by Dutch phonology:

(13) a. *[nɔ]
b. *[dɑ]

As a result, short vowels create a context of ambisyllabicity in Dutch. To avoid a rhyme which is monomoraic, Van der Hulst (ibidem) proposes that a consonant in the onset of a following syllable may function simultaneously as the coda of the previous syllable. In other words, the consonant may be ambisyllabic. This is illustrated in the example in (15) in which the /k/ is shared due to the fact that the short vowel /ɑ/ only occupies a single moraic position.

(14) tak-en ['tɑkə(n)]
branch-PL
'branches'



Ambisyllabicity, of course, does not occur in closed syllables or if the rhyme of the first syllable contains a long vowel. Both closed syllables and long vowels occupy two moraic positions. As such, they fulfil the requirements of the minimal Dutch rhyme on their own.

Van der Hulst (1985) does not only argue for ambisyllabicity, he also proposes that spreading of the vowel is preferred in Dutch over spreading of the consonant. In other words, vowel length alternation is preferred over ambisyllabicity. Hence, if a stem allomorph with a long vowel is available for the root, this allomorph will be selected to fulfil the phonological requirement of the minimal rhyme. Whether such an allomorph is available is a stored property of the root. This leads us to the following phonological rule:

(15) i) *Van der Hulst's ambisyllabicity:*
To avoid a rhyme which is monomoraic, a consonant in the onset of a following syllable may function simultaneously as the coda of the previous syllable.
ii) *Van der Hulst's vowel spreading, adapted:*[3]
To avoid a rhyme which is monomoraic, a stem allomorph with a long vowel may be selected, if available.
iii) *Van der Hulst's ordering:*
Vowel spreading is preferred over ambisyllabicity.

[3] Strictly speaking, Van der Hulst (1985) argues in favor of vowel length alternation, but he does not mention the fact that it may go back to stem allomorphy.

Van der Hulst's proposal shows similarities with Lahiri & Dresher's (1999: 706–710) account of the productive process of Open Syllable Lengthening in Middle Dutch.[4] They propose that there was a pressure to maximize the main stressed foot. In other words, monomoraic stressed open syllables, i.e. open syllables with a short vowel, have shifted to bimoraic open syllables, i.e. open syllables with a long vowel. The authors point out that stressed light syllables have to be bound together with a second syllable in order to acquire the needed second mora as the head of a foot must dominate at least two morae. It is not pointed out explicitly by the authors, but an immediate side-effect of the pressure to maximize the main stressed foot is that they no longer require being bound to the second syllable. As such, the account is similar to Van der Hulst's proposal.

Lahiri & Dresher (1999) and Van der Hulst (1985) thus have a similar process in mind, the main difference being that Lahiri & Dresher (1999) formulate the principle as motivated by the foot, preferring a bimoraic head, whereas Van der Hulst (1985) formulates it as a requirement of the syllable, preferring vowel lengthening over ambisyllabicity. Lahiri & Dresher's (1999) proposal was formulated for Middle Dutch, but it is interesting to check whether it fares better for contemporary Dutch than Van der Hulst's (1985) proposal. Both proposals make a different empirical prediction when it comes to vowels in open syllables, followed by a second syllable, in non-stressed positions in those stems that show the relevant vowel alternating allomorphy. In short, we should look at words in which the relevant vowel occurs in an environment that is subject to the syllabic configuration relevant to Van der Hulst's proposal, without being the head of the foot, which is the main criterion in Lahiri & Dresher's (1999) proposal. Such contexts can be created by adding stress-bearing suffixes to those nouns in which the relevant vowel is not in a stressed position, as in (17). The suffixes serve to provide a second syllable in the configuration. In the examples, main stress is indicated by a superscripted accent, secondary stress is indicated by a subscripted accent, the vowel that changes under allomorphy is given in bold. The secondary stress corresponds to the main stress of the stem when it would not bear a suffix. The transcriptions are based on Heemskerk & Zonneveld (2000).

(16)	a.	professoraal	[prɔˌfɛs**o**r'al]	'professoral'
	b.	professoraat	[prɔˌfɛs**o**r'at]	'professorate'
	c.	satanisme	[ˌsat**a**n'ɪsmə]	'satanism'
	d.	pastoraal	[ˌpɑst**o**r'al]	'pastoral'
	e.	pastorie	[ˌpɑst**o**r'i]	'vicarage'
	f.	demonie	[ˌdem**o**n'i]	'demonism'
	g.	demonisme	[ˌdem**o**n'ɪsmə]	'demonism'

Despite the absence of stress, the stem allomorph with the long vowel does appear in the examples in (17), even though the vowel is not the head of the foot. It thus appears that the relevant syllabic context suffices to trigger the allomorph with the long vowel. Given the data in (16), it seems that Van der Hulst's proposal has better empirical coverage for contemporary Dutch than Lahiri & Dresher's (1999) proposal (which has been formulated for Middle Dutch). As such, we will proceed with Van der Hulst's proposal as formulated in (15).

It is clear that Lahiri & Dresher's (1999) account of the Middle Dutch facts and Van der Hulst's (1985) account of Dutch are similar in nature. It is interesting to note that, as such, it is reasonable to assume that the underlying prosodic pressure that motivates the stem alternation in contemporary Dutch is probably the same as the one that motivated the original

[4] Yet another account can be found in Lahiri & Dresher (1991). As Lahiri and Dresher themselves reject the proposal in favor of Lahiri & Dresher (1999) (see Lahiri and Dresher 1999:fn47), I limit the present discussion to the more recent work.

productive phonological process in Middle Dutch. Dutch may have lost a phonological process, but it did not lose its settings on what constitutes an optimal prosodic configuration and we still see it kicking in as soon as it has a stem allomorph to satisfy its demands.

3.2 The phonological pattern for nominal number inflection

Standard Dutch has two plural markers, viz. *–en* and *–s*. In general, they do not give rise to any changes in the stem. This is illustrated in (17)–(20):

(17) a. een kat [kɑt]
‘a cat’
a cat

b. twee kat-en [kɑtə(n)][5]
two cat-PL
‘two cats’

(18) a. een zoon [zon]
a son
‘a son’

b. twee zoon-en [zonə(n)]
two son-PL
‘two sons’

(19) a. een otter [ɔtər]
an otter
‘an otter’

b. twee otter-s [ɔtərs]
two otter-PL
‘two otters’

(20) a. een oom [om]
an uncle
‘an uncle’

b. twee oom-s [oms]
two uncle-PL
‘two uncles’

However, there are around thirty to forty irregular nouns which do show a stem alternation (see also Booij 1995: 72). The root’s vowel lengthens in the plural and it may lengthen in the diminutive. An example is given in (21):

(21) a. een vat [vɑt]
a barrel
‘a barrel’

b. twee vaat-en [vatə(n)]
two barrel-PL
‘two barrels’

c. een vaat-je [vatʲə]
a barrel-DIM
‘a small barrel’

[5] The pronunciation of the final /n/ of the plural marker is optional and depends mostly on the speaker’s dialect and the phonological context.

d. twee vaat-je-s [vatʲəs]
two barrel-DIM-PL
'two small barrels'

I mention the diminutive forms here for good measure, but I postpone a discussion of these forms till Section 4.1.

For the relevant stem alternating nouns, the vowel length alternating pattern for number inflection in the non-diminutive forms is fully regular: in non-diminutive forms singular nouns select the allomorph with the short vowel, plural nouns select the allomorph with the long vowel. The data thus allow for the following empirical generalisation:

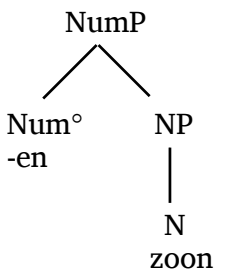
(22) If, for a Dutch stem, both an allomorph with a short vowel and one with a long vowel are available, the allomorph with the short vowel will be selected in a non-diminutive singular NP and the allomorph with the long vowel will be selected in a non-diminutive plural NP if the plural marker is realised as *-en*.[6]

The data in this respect thus do not show some irregular behaviour that is specific to some vocabulary items. They allow for a generalisation. The fact that it is possible to generalise over data suggests that a rule is at work, rather than some stipulations at Vocabulary Insertion. Indeed, in what follows I discuss the fact that it is possible to account for the generalisation in (22) on the basis of the phonological rules in (15).

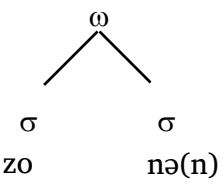
Van der Hulst (1985) pointed out that his approach to vowel length alternation presented in (15) captures the occurrence of the long vowel in non-diminutive plurals. When the plural marker *–en* attaches to a root the plural marker will occupy a separate syllable. Due to the Syllable Contact Law (Venneman 1988) which results in maximal onsets, the onset of this syllable contains the root's final consonant, as in (23).

Example (23) shows the plural of the noun *zoon 'son'*. Its stem has only one allomorph, which contains a long vowel. The example in (23)a represents the morphological structure,[7] (23)b shows the syllable structure.

(23) a.



b.



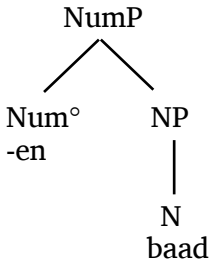
If the root's rhyme consists of a short vowel followed by a single consonant the syllable structure of the plural form creates a context of ambisyllabicity. Hence, an allomorph

[6] See (25) on why the plural marker *-en* is mentioned in this generalisation.

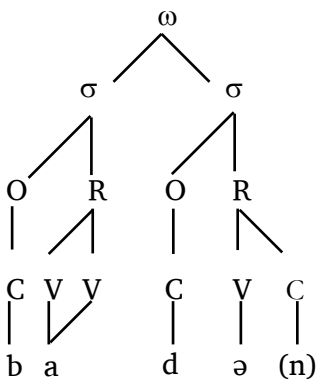
[7] For ease of exposition, I have represented the morphological structure in a conventional generative tree. It does not reflect my theoretical understanding of the noun phrase (see, for example, De Belder 2011).

with a long vowel is selected when available to avoid it, as proposed in (16).[8] The structure in (24)a is the morphological structure of *baden* 'baths', the one in (24)b is the phonological one.

(24) a.



b.



The phonological approach immediately captures why the allomorph with the long vowel occurs if the root is string adjacent to the plural marker *-en*. In other words, it accounts for the omni-presence of the allomorph with the long vowel in the non-diminutive plural form. The stem allomorph with the short vowel, on the other hand, is selected when there are no phonological grounds to prefer a long vowel, as is the case in a singular NP, and it thus appears to be the elsewhere form.[9] Consider, in this respect, a vowel length alternating noun that may select both the plural marker *-en* and *-s*. As expected, the vowel will only lengthen in the phonologically relevant context, i.e. in front of *-en* (Booij 1998):[10]

(25) a. professoren [prɔfɛ's**o**rə(n)]
professor-PL
'professors'

b. professor-s [prɔ'fɛsɔrs]
professor-PL
'professors'

In the context of non-diminutive number inflection, the distribution of the stem allomorphs is thus fully and without any exception regulated by means of the phonological rules in (16).

[8] Nothing hinges on the number of positions assigned to the schwa in the structure (see Trommelen 1984 and Van der Hulst 1985 for the debate on the number of moraic positions realised by the Dutch schwa).

[9] The term *elsewhere* form is merely meant to describe the facts for now. In already indicated in Section 2.9 and as will be repeated in Section 6 it is actually not an elsewhere form from a technical point of view, but rather an unmarked form.

[10] A reviewer asked in which order Vocabulary Items are selected: do we first select the appropriate plural morpheme and then the appropriate stem allomorph or vice versa? The data in (26) suggest that the plural morpheme is selected first.

3.3 The phonological pattern for verbs: Lengthening due to an abstract open syllable

Zonneveld (1976, 1981–1982) points out that when stems for which an allomorph with a long vowel is available occur as weak verbs, the long vowel can be attested throughout the inflectional paradigm, even though the singular forms are not open syllables:

(26)	ik baad	'I bathe'	[bat]
	jij baadt	'you bathe'	[bat]
	hij baadt	'he bathes'	[bat]
	wij baden	'we bathe'	[badə(n)]
	jullie baden	'you bathe'	[badə(n)]
	zij baden	'they bathe'	[badə(n)]

Needless to say, the occurrence of the long vowel in the singular forms is unexpected based on their surface phonological forms; at least for the singular forms there does not seem to be a second syllable present that could trigger a problematic context of ambisyllabicity. At first sight, one might therefore guess that these patterns are irregular. However, there is no denying that the data behave in a strictly uniform pattern, which, indeed, allows for an empirical generalisation:

(27) Morphologically simplex, weak verbs will select throughout the inflectional paradigm a stem allomorph with a long vowel, if available.

The issue has been addressed by Zonneveld (1976; 1981–1982). He captures these data by arguing that the underlying representations of these verbal forms do contain a second syllable, i.e. a schwa which functions as the verb's theme vowel. Interestingly enough, he argues that the postulation of such a theme vowel does not only capture the presence of the long vowel, but also other, seemingly unrelated, unexpected phonological phenomena in the domain of Dutch verbs, such as d-weakening and schwa-deletion. For all these phenomena it is known independently that they occur in the presence of a vowel in Dutch. Taken together, these phenomena will allow the language acquiring child to assume the presence of such a theme vowel in the context of verbs (and only in the context of verbs!), even though it never surfaces. If one accepts Zonneveld's conclusions, the exception-less presence of the long vowel in the verbal forms in (26) follows immediately. For the plural forms the overt number inflection provides the required phonological environment, for the singular forms the underlying schwa provides the phonological context that triggers vowel length alternation, as summarized in (28).

(28) Morphologically simplex, weak verbs will select throughout the inflectional paradigm a stem allomorph with a long vowel, if available, to satisfy the preference of vowel spreading over ambisyllabicity.

Note that for the singular forms the phonological allomorph selection takes into account the underlying representation.

3.4 Past tense plural forms

Zonneveld (1976; 1981–1982) noted that the past tense of some strong verbs in Dutch may show lengthening in the plural forms, i.e. those forms which receive an onset-less following syllable through number agreement. They show a short vowel in the singular.[11] Yet, a long vowel appears in the plural as the stem is followed by the plural inflectional marker *-ən*. Again, the data adhere to the same phonological principle:

[11] It seems to follow that strong verbs do not select a theme vowel at the underlying representation.

(29) Morphologically simplex, strong verbs with a plural agreement affix will select a stem allomorph with a long vowel to satisfy the preference of vowel spreading over ambisyllabicity.

This pattern is exception-less: all stems for which an allomorph with a long vowel is available are subject to the generalisation, which is illustrated in (30)–(32).[12]

(30) a. ik at [ɑt]
I ate
'I ate'

b. wij aat-en [atən]
we ate-PL
'we ate'

(31) a. ik sprak [sprɑk]
I spoke
'I spoke'

b. wij spraak-en [sprakən]
we spoke-PL
'we spoke'

(32) a. ik zag [zɑx]
I saw
'I saw'

b. wij zaag-en [zaɣən]
we saw-PL
'we saw'

In short, the past tense of strong verbs shows the pattern which is expected on phonological grounds due to overt agreement affixes.

3.5 Conclusion

In the present section I have presented Van der Hulst's insight. Using a long vowel, when available, optimises syllable structure. It avoids ambisyllabicity in the presence of a following onset-less syllable. Three empirical domains are subject to this phonological condition, viz. plural non-diminutive nouns, Dutch morphologically simplex weak verbs and past tenses of strong verbs. For plural nouns, weak plural verbs and strong past plural verbs the following syllable is an overt inflectional morpheme, *-ə(n)*. For singular weak verbs the following syllable is an abstract, underlying schwa.

Note that the principle is not only clearly optimising, but the same phonological principle has a predictable result across lexical items and across syntactic contexts. It should be clear that an approach that merely stipulates the occurrence of the stem allomorph as an insertion context at the level of the individual lexical items fails to capture the true nature of the phenomenon. The data rather suggest that the allomorph selection in this section is regulated by a phonological principle.

[12] The exhaustive list of past tense stems for which a vowel length alternating allomorph is available, is: *at* 'ate', *beval* 'ordered', *bad* 'prayed', *brak* 'broke', *genas* 'healed', *gaf* 'gave', *kwam* 'came', *las* 'read', *lag* 'lied down', *mat* 'measured', *nam* 'took', *sprak* 'spoke', *stak* 'put', *stal* 'stole', *trad* 'went', *vergat* 'forgot', *vergaf* 'forgave', *vrat* 'hogged', *was* 'was', *zag* 'saw', *zat* 'sat'.

4 Irregular patterns

In the previous section we have seen domains for which a phonological principle determines the distribution of the stem allomorphs in an exception-less manner. The present section presents morphosyntactic domains for which this regularity breaks down. It will become clear that the phonological pattern still can be attested, yet it is subject to pervasive irregularities. These domains are diminutive forms and morphologically derived forms.

4.1 Diminutives

4.1.1 The attested patterns of the diminutive forms

Dutch has one diminutive marker, viz. *–tje*.[13] It may surface as *–etje, –tje*, *–pje*, *–kje* or *–je* through phonological allomorphy (see Cohen 1958; Van Zonneveld 1978; Trommelen 1984; Van Oostendorp 1995; Van der Hulst 2008 and references therein).[14] Crucially, it generally does not give rise to any changes in the stem, as shown in (33).

(33) a. een kat [kɑt]
a cat
'a cat'

b. een kat-je [kɑtʲə]
a cat-DIM
'a small cat'

However, those nouns which do show a stem allomorph with a long vowel in the plural form, as presented in Section 3.2, may also show this stem allomorph in the diminutive form (see also Booij 1995: 72). The example is repeated in (34).

(34) a. een vat [vɑt]
a barrel
'a barrel'

b. twee vaat-en [vatə(n)]
two barrel-PL
'two barrels'

c. een vaat-je [vatʲə]
a barrel-DIM
'a small barrel'

d. twee vaat-je-s [vatʲəs]
two barrel-DIM-PL
'two small barrels'

Interestingly, there are two patterns; the diminutive forms may or may not select the long vowel. These patterns are illustrated in Table 1, in which "S" refers to a stem with a short vowel and "L" refers to a stem with a long vowel.

Nouns are distributed unevenly over these patterns. There are nine to ten SLLL nouns.[15] They are listed in (35):[16]

[13] Non-standard Dutch has the diminutive marker *-ke*.

[14] The choice of the diminutive allomorph depends on the final consonant and the stress pattern of the root it attaches to, see Section 4.1.2 for more details.

[15] The noun *lot* 'lot' is an SLLL noun in Northern Dutch. It is an SLSS noun in Belgian Dutch.

[16] In (56) it is pointed out that *proton* 'proton', *elektron* 'electron' and *demon* 'demon' contain a vowel alternating suffix *-on*. As such, all nouns containing this suffix will show this pattern. The claim that there are ten nouns is strictly speaking thus inaccurate. A reviewer further mentions nouns ending in *-ol*: fenolen 'phenols', *alcoholen* 'alcohols'. I assume *-ol* is a vowel alternating suffix as well.

Table 1: SL-patterns.

	BASE FORM SG	BASE FORM PL	DIM SG	DIM PL
SLSS *bad* 'bath'	bad [ɑ]	baad-en [a]	bad-je [ɑ]	bad-je-s [ɑ]
SLLL *vat* 'barrel'	vat [ɑ]	vaat-en [a]	vaat-je [a]	vaat-je-s [a]

(35)

blad	'leaf'	*glas*	'glass'	*pad*	'path'	*vat*	'barrel'
demon	'demon'	*gat*	'hole'	*proton*	'proton'		
elektron	'electron'	%*lot*	'lot'	*schip*	'ship'		

All other vowel length alternating nouns are SLSS nouns. They clearly constitute the largest group:[17]

(36)

bad	'bath'	*gebrek*	'deficiency'	*lid*	'member'	*staf*	'rod'
bedrag	'amount'	*gen*	'gene'	*literator*	'writer'	*smid*	'smith'
dag	'day'	*god*	'god'	% *lot*	'lot'	*stad*	'city'
dak	'roof'	*graf*	'grave'	*oorlog*	'war'	*tred*	'pace'
dal	'valley'	*hertog*	'duke'	*pastor*	'priest'	*verbod*	'ban'
gebed	'prayer'	*hof*	'court'	*professor*	'professor'	*verdrag*	'treaty'
gebod	'command'	*hol*	'hole'	*slag*	'stroke'	*weg*	'road'

Nouns thus fall in two different groups. For good measure, note that these groups and the nouns they contain only represent the judgments of the majority of speakers. The facts are certainly subject to idiolectal variation.

The SLSS group is not only the largest group, it also seems to be the more regular group. A reviewer pointed out that if a neologism acquires a stem allomorph with a long vowel, it seems to belong to this pattern, as shown in (37).[18]

(37)

a. een gen [ɣɛn]
a gene
'a gene'

b. twee geen-en [ɣenə(n)]
two gene-PL
'two genes'

c. een gen-etje [ɣɛnətʲə]
a gene-DIM
'a small gene'

d. twee gen-etje-s [ɣɛnətʲəs]
two gene-DIM-PL
'two small genes'

[17] There is a noun, *satan* 'satan', which arguably belongs to the SLSS group as it has a short vowel in the diminutive forms. However, it selects the plural affix *-s* (*satans*) and therefore strictly speaking does not belong to this group, as its non-diminutive plural form does not select the stem with the long vowel either. As such, it is phonologically well-behaved. We do see the long vowel appear in derived forms, such as *satanisch* 'satanic'.

[18] I agree with the judgments of the reviewer presented in (39). Another reviewer, however, finds the forms with the long vowel acceptable as well. The diminutive forms of the word are too infrequent to occur in corpora. I conclude that the claim in (39) is uncertain.

Our task is thus twofold. Firstly, we have to account for the fact that there are two patterns, viz. SLLL and SLSS. Secondly, we have to capture the fact that the second pattern, viz SLSS, seems to be the more general pattern. In what follows I will discuss which patterns we would expect if phonology alone determined the distribution of the allomorphs in this domain. It will become clear that the empirical domain is hybrid: the majority of the cases can be captured on phonological grounds, but some diminutive forms show exceptional behavior and must simply have been lexicalised.

4.1.2 The diminutive affix

We have seen in Section 3 that stems with long vowels are selected to avoid ambisyllabicity. Ambisyllabicity occurs if the root contains a short vowel and its final consonant becomes the onset of the following syllabe due to the Syllable Contact Law. One thus predicts that if the root's final consonant(s) can become the onset of the following syllable, the allomorph with the long vowel will be selected and vice versa. In order to understand the consequences of these facts for the diminutive forms, let us check how a diminutive form is syllabified.

Recall that the Standard Dutch diminutive affix has several allomorphs, viz. *–etje, –etje, –je, –pje* and *–kje* ([əᵗʲə], [tʲə], [jə], [pjə], [kjə]). Their distribution has been studied before (see Cohen 1958; Trommelen 1984; Van der Hulst 2008 and references therein) and the facts are rather intricate. For the data under discussion it is important to note that a short vowel followed by an obstruent will select *–je*, a stressed short vowel followed by a sonorant selects *–etje* and a non-stressed short vowel or a long vowel followed by a sonorant selects *–tje*. The [t] in *-tje* is probably not a /t/ at the underlying representation, but rather a stop unspecified for place (Van der Hulst 1984), its default value being coronal.[19] As such, it will assimilate for place with a stem's final nasal and surface as [tʲə], [pjə] or [kjə]. In short, it is clear that the root's phonological make-up will have an influence on the form of the diminutive affix. I therefore discuss roots with different final segments in different subsections.

Diminutives formed with the allomorph *–etje* show exceptional phonological behavior in various respects (Lowenstamm and van der Wilt 1982; Van der Hulst 2008). A discussion of these long forms would take us too far afield, even though the list of vowel length alternating roots does contain roots which do select *-etje*, viz. *dal* 'valley' and *hol* 'hole'. I will omit them from the discussion and I will restrict the present discussion to the other listed roots.

4.1.3 Stems ending in an obstruent other than /t/, /d/ or /p/

As I will describe in the following sections, there are reasons to consider the phonology of the diminutive of roots ending in a /t/, /d/ or /p/ separately. The current section discusses those vowel alternating stems that end in an obstruent other than /t/, /d/ or /p/. We will see that we expect the short vowel to occur and, indeed, the short vowel is most often attested in these diminutive forms, yet not without an exception.

As mentioned above, stems with a short vowel ending in an obstruent other than /t/, /d/ or /p/ select the diminutive affix *-je:*

(38) a. dak-je [dɑkjə]
roof-DIM
'small roof'

[19] Van Oostendorp (1995) proposes it is an empty consonantal root, which is also the representation of a glottal stop in his analysis.

b. dag-je [dɑxjə]
day-DIM
'short day'

Hypothetically, the final consonant of the stem could occupy the following positions in the syllabic structure: it could realise the coda of the final stem syllable, it could realise the onset of the following one or it could realise both, in which case it would be ambisyllabic. The data suggest that it only realises the coda of the final stem syllable. The first indication is that an underlying voiced final obstruent, which surfaces in the plural forms as shown in (39)a surfaces as a devoiced obstruent in the diminutive forms, as shown in (39)b:

(39) a. hov-en [hovə(n)]
garden/court-PL
'gardens/courts'

b. hof-je [hɔfjə]
garden/court-DIM
'gardens/courts'

It is well-known that Dutch has final devoicing at syllable boundaries (Booij 1995; Kooij & Van Oostendorp 2003). We therefore must conclude that the obstruents occupy (at least) the coda of the final stem syllable, where it would occupy a syllable boundary. An indication that the obstruent does not occupy the onset of the following syllable as well, is the fact that Cj/Cʲ-clusters do not seem to exist in Dutch (cf. Van Oostendorp 1995 for a careful and much more detailed discussion).[20] Admittedly, there is the occasional loanword which shows a Cj/Cʲ-cluster as an onset, both in Standard Dutch, as in (40), and in dialectal words, as in (41).

(40) a. garage [gaˈraʒə]
'garage'
(from French *garage*)

b. fjord [**fj**ɔrt]
'fjord'
(from Norwegian *fjord*)

c. sjaal [**ʃ**al]
'shawl'
(from English *shawl*, French *châle*)

(41) a. anzjoen[21] [ɑnˈ**ʒ**un]
'onion'
(from French *oignon*)

b. nondedju [nɔndəˈ**dʒ**y]
'goddamn'
(from French *nom de Dieu*)

A Cʲ-onset may equally occur in onomatopoeia's, as in (42).[22]

[20] The facts are much more complex as the present section suggests, as the underlying form of the diminutive is arguably /iə/ (see Van Oostendorp 1995). As a result, the /i/ present in the underlying representation can surface both as a vowel, realising the nucleus of the diminutive, and as a glide, realising the onset of the diminutive affix, in Dutch dialects. However, this complication is not relevant for the present discussion and I am therefore abstracting away from this issue for ease of exposition.

[21] See www.vlaamswoordenboek.be.

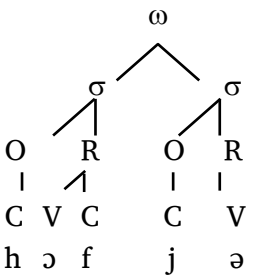
[22] The examples are restricted to non-standard Belgian Dutch.

(42) a. d(z)joeven [**d**ʒuvən]
'to whiz'

b. %djakken [**d**ʒɑkən]
'to swish'

Yet, apart from these exceptions, it does not seem to be part of Dutch phonology. I therefore assume that the onset of the diminutive affix syllable is solely realised by the glide contained in the diminutive affix, as represented in (43).

(43)



Note that the first syllable in the structure is a closed, bimoraic syllable and, as such, it is a well-formed Dutch syllable. Furthermore, there is no ambisyllabicity in the structure that is to be avoided. In short, the stem with the short vowel already fulfils the requirements of the syllable structure and there is no reason to select the stem allomorph with the long vowel. On phonological grounds, we thus expect the stem with the short vowel for all stems ending in an obstruent other than /t/, /d/ or /p/. In other words, for such stems, we expect nothing but SLSS nouns.

Let us now compare these expectations with the data. Indeed, most nouns of this format are SLSS nouns:

(44)

bedrag	'amount'	*graf*	'grave'	*slag*	'stroke'
dag	'day'	*hertog*	'duke'	*staf*	'rod'
dak	'roof'	*hof*	'garden'	*verdrag*	'treaty'
gebrek	'deficiency'	*oorlog*	'war'	*weg*	'road'

Yet, within this group, we also find an SLLL noun:

(45) *glas* 'glass'

The observation is remarkable. The group as a whole shows an expected pattern on phonological grounds and we understand why the majority of nouns selects which allomorph. Yet, undeniably, there is an exception. As discussed at length in Section 2 the field goes back and forth on focusing on the phonologically expected selection of allomorphs and on emphasising that phonology, in fact, fails to capture the distribution of allomorphs. The data, at this point, however suggest that we should acknowledge that both positions are equally valid: phonology does seem to influence the distribution of allomorphs, while clear exceptions exist as well. I argue that this observation is not problematic, but indicative of the way allomorph selection is organised in the Y-model.

4.1.4 Stems ending in a /d/, a /t/ or a /p/

In the previous section, we concluded that a final obstruent of a stem occupies solely the coda of the final stem syllable in diminutive forms. It is not possible to immediately adopt this insight for stems ending in a /d/ or a /t/. Firstly, notice that the coronal stops palatalise in diminutive forms:

(46) a. bad-je [bɑtʲə]
bath-PL
'baths'

b. lot-je [lɔtʲə]
lot-DIM
'lottery ticket' (Belgian Dutch)

In a discussion of the Dutch clitic *je* /iə/, which may follow verbal stems ending in a /d/ or a /t/, Van Oostendorp (1995: 259–261) proposes that the /i/ and the stem's final coronal stop merge into a single segment, which is realised as a palatalised coronal onset. The proposal can be adopted here as it accounts for the fact that the coronal and the glide are indeed realised as a single segment. We have to conclude that the coronal thus occupies at least the onset of the diminutive affix syllable.

Now, does it simultaneously realise the coda of the final stem syllable in an ambisyllabic setting? Well, it is clear that an underlying /d/is devoiced in the diminutive form, as can be seen in (48a). However, for these cases the devoicing does not necessarily result from final devoicing, which would indicate the presence of a syllable boundary. Van Oostendorp (1995: 266) argues that the mere process of palatalisation itself already causes the devoicing of the /d/. It is therefore hard to determine whether the /d/ and the /t/ occupy the coda of the final stem syllable as well in the examples in (48).

However, we do not even have be sure about whether /d/ and /t/ occupy the coda of the final stem syllable to formulate the phonological expectations. The mere fact that it does occupy the onset of the diminutive affix syllable suffices to expect the stem with the long vowel, either because the previous syllable ends up being an open syllable or because its final consonant ends up being ambisyllabic. Recall that we have seen in (16) that the selection of an allomorph with a long vowel trumps an ambisyllabic configuration. Given that for these stems such an allomorph is available, ambisyllabicity should be avoided. We thus expect the SLLL pattern on phonological grounds. Interestingly enough, this is not exactly what we attest: both types exist. The SLSS nouns ending in a /d/ or a /t/ are given in (47) and (48):

(47)

bad	'bath'	*god*	'god'	*stad*	'city'
gebed	'prayer'	*lid*	'member'	*tred*	'pace'
gebod	'command'	*smid*	'smith'	*verbod*	'ban'

(48) *lot* 'lot' (Belgian Dutch)

The SLLL nouns ending in a /d/ or a /t/ are given in (49) and (50):

(49) *blad* 'leaf' *pad* 'path'

(50) *gat* 'hole' *vat* 'barrel' *lot* 'lot' (Northern Dutch)

For the stems ending in a /d/, the SLSS pattern unexpectedly outnumbers the phonologically expected SLLL pattern. One might either take this as an indication that Van Oostendorp's analysis is on the wrong track. Alternatively, one has to conclude that speakers of Dutch are fully capable of storing nine nouns with exceptional behaviour in their lexicon. I adopt the second alternative.

On a final note, there is a single noun, *schip* 'ship' of which the stem ends in a /p/ and which is an SLLL noun. I have to admit that I am not even sure which pattern we expect for this noun on the basis of Dutch phonology. We have seen that Cj-clusters are not

attested in the phonology of Dutch. Yet, the clusters [pʲ] and [tʲ] clearly occupy onsets when they are the onset of a diminutive allomorph. This becomes clear through the fact that the allomorphs *–tje* and *–pje* may attach to roots which have maximal rhymes.[23] Dutch rhymes contain at most three positions (Trommelen 1984):

(51) a. ✓ *zoon* 'son' [zon]
b. ✓ *lamp* 'lamp' [lɑmp]
c. * *laamp* [lamp]

As such, one can deduce the fact that the syllable structure of the following diminutives is aligned with their morphological structure:

(52) a. zoon-tje [zon$_{\sigma}$-tʲə$_{\sigma}$]
son-DIM
'little son'
b. bloem-pje [blum$_{\sigma}$-pjə$_{\sigma}$]
flower-DIM
'small flower'

After all, if the initial consonant of the diminutive affix were part of the final stem syllable, this syllable would contain four positions, which is illicit. As such, we can conclude that [pj] and [tʲ] do occur as onsets in Dutch, at least for diminutives. As we have seen above, this is fully expected for the [tʲ] cluster due to the palatalisation of the coronal stop. However, it is a surprising observation for the [pj]-cluster. Outside of the domain of the diminutive, it is not attested as an onset and, at least in Standard Dutch, the /p/ does not palatalise. Yet, the example in (54b) clearly suggests the /p/ may occupy an onset position. As such, one might conjecture that the SLLL pattern of *schip* is the phonologically expected pattern. To the best of my knowledge, the fact in (52) has not been observed, let alone captured, before and I have nothing to add beyond the observation.

I can add to the observation that precisely those stops that show the pattern illustrated in (52), also disproportionally occur as the final segment of SLLL nouns. (53) shows all vowel alternating SLSS nouns that end in an obstruent, (54) shows all the SLLL ones.

(53)

bad	'bath'	*gebrek*	'deficiency'	**%*lot***	'lot'	*tred*	'pace'
bedrag	'amount'	*god*	'god'	*oorlog*	'war'	*verbod*	'ban'
dag	'day'	*graf*	'grave'	*smid*	'smith'	*verdrag*	'treaty'
dak	'roof'	*hertog*	'duke'	*slag*	'stroke'	*weg*	'road'
gebed	'prayer'	*hof*	'garden'	*stad*	'city'		
gebod	'command'	*lid*	'member'	*staf*	'rod'		

(54)

schip	'ship'	***vat***	'barrel'	*blad*	'leaf'
gat	'hole'	*glas*	'glass'	*pad*	'path'
%***lot***[24]	'fate/lottery ticket'				

A Fisher's exact test – a test which is designed to test data sets with a limited number of attestations- suggests that this pattern is significant ($p < 0.05$).[25] At this point, I fail to understand why this should be the case.

[23] The diminutive allomorph *–kje* does not attach to maximal rhymes.
[24] The noun *lot* 'lot' is only an SLLL noun in the Netherlands.
[25] It does not matter in which group one counts *lot*, the result is significant in both scenarios. I would like to thank a reviewer for suggesting this test.

In this section we have seen varied behaviour. Nouns ending in a /d/ are predominantly SLSS nouns, whereas we expect them to be SLSS nouns. Nouns ending in a /t/ are expected to be SLLL nouns as well and they mostly seem to adhere to this pattern. Finally, the noun *schip* 'ship' is an SLLL noun as well and it is hard to tell whether this is expected as there is something about the behaviour of the [p] in the diminutive affix that we fail to understand.

It becomes clear that the diminutive forms readily allow for exceptions, which have to be listed as such in the speaker's lexicon. One may wonder if not simply all diminutive forms of vowel alternating stems are stored in the speaker's lexicon. Admittedly, on the basis of the data, it is impossible to tell. For mere reasons of parsimony, I will continue to assume that what can be derived on phonological grounds is derived as such: there is no need to store forms that are derivable.

4.1.5 Stems ending in a sonorant

I have discussed the syllable structure of diminutives of which the roots end in an obstruent. For good measure, I will briefly comment on roots ending in a sonorant with a non-stressed final syllable.[26] Such roots select the affix *–tje*:

(55) literator-tje [lite'ratɔr]
writer-DIM
'small writer'

There are no clusters such as [rtʲ] or [ntʲ] which function as onsets in Dutch. The /r/ therefore occupies the coda of the final stem syllable and there is no need to use the root's allomorph with the long vowel: we expect the SLSS ending. This is indeed what we attest for nouns such as *literator* 'literary author', *professor* 'professor' and *pastor* 'priest'.

A reviewer points out that several nouns ending in *-on* actually show the SLLL pattern:[27]

(56)

demon	'demon'	[ɔ]	demoon-tje	'small demon'	[o]
elektron	'elektron'	[ɔ]	elektroon-tje	'small electron'	[o]
proton	'proton'	[ɔ]	protoon-tje	'small proton'	[o]

I suggest that for these cases we are actually systematically dealing with one and the same suffix *-on*, which is recognisable as a suffix to the language learner by the fact that it has the following properties: it attaches to classic roots and it attracts stress in its non-diminutive singular form, whereas nouns ending in *-on* otherwise typically bear stress on the final syllable:

(57)

'demon	'demon'
e'lektron	'elektron'
'proton	'proton'

(58)

ja'pon	'gown'
kar'ton	'cardboard'
be'ton	'concrete'

[26] Roots ending in a sonorant with a stressed final syllable select the so-called long form of the diminutive, viz. *–etje*. I ignore these forms as they would take us too far afield (see van der Hulst 2008 and references therein for discussion).

[27] The diminutive forms of these nouns are actually not listed in any descriptive or prescriptive sources and they are not common in corpora such as *Neder-Lab* either. Yet, I agree with the native speaker's judgments of the reviewer. See further footnote 16 on the suffix *-ol*.

Rather than several exceptions, this class of nouns thus instantiates only a single exception, which happens to be a suffix. In sum, the phonologically expected pattern here is the SLSS noun, which is indeed attested in the majority of the cases.

4.1.6 Lexicalisation

Let us summarise what we have observed so far for diminutive forms. There is a phonologically expected pattern and, often, the majority of the nouns adhere to this pattern. More specifically, we understand why SLSS nouns in general outnumber the SLLL nouns. Yet, simultaneously, there are systematic exceptions. There is even a noun, *lot* 'lot', which is subject to regional variation. The group as a whole simply cannot be accounted for on purely phonological grounds. Note that the exceptions are even clearly non-optimal from a phonological point of view. As such, they echo Paster's (2006) observation that allomorph selection may undermine phonological requirements. She concluded that allomorph selection should be listed. For at least the exceptional examples we have encountered, I concur with Paster that stipulating the exceptional behaviour at Vocabulary Insertion is indeed what should be done.

There is thus another selection mechanism for allomorphy, apart from phonology, viz. listing. More generally, it is clear that the selection of an allomorph may simply be a lexically stored irregularity, also outside of the domain of vowel length alternation. We have seen that the participle of the verb *uitverkiezen* 'to select' is *uitverkozen*, as can be seen in (59):

(59) Jij bent uitverkozen.
you are selected
'You are selected.'

Yet, there is an idiomatic reading in which a different form is used:

(60) het uitverkoren volk
the selected people
'the Chosen People (i.e. the Jews)'

There is nothing systematic to be mentioned about the exceptional use of *uitverkoren* in the example above. A connection has been stored between an irregularity in form and an irregularity in meaning in a specific collocation. The use of an irregular form has simply been listed as the conventionalised form to express a specific idiomatic meaning. The selection of the allomorph is then an arbitrary convention, a conventionalized irregularity. An allomorph may thus be selected in a specific context despite the fact that there are no phonological or syntactic grounds to do so. I propose this is what is happening for the nouns which are not accounted for on the basis of phonology. The data in the following sections further support this view.

4.2 Derivations of vowel alternating stems

So far we have seen that many occurrences of the stem allomorph with the long vowel can be ascribed to phonology: if a following syllable causes the stem to be an open syllable, an allomorph with a long vowel will be selected, if available, to avoid ambisyllabicity. We have seen two domains in which this pattern is exception-less, viz. nominal plural marking and verbs. In contrast, we have also encountered a domain in which this phonological rule seemed to lead to a strong tendency rather than an empirical generalisation: the distribution of stem allomorphy for diminutive forms largely adhered to phonological generalisations, but not in an exception-less manner. Lexicalised exceptions seemed

to play a role in this domain. In the present section I discuss data from the domain of morphological derivation. They behave on a par with the diminutives: most often one attests the allomorphic distribution which is expected from a phonological point of view, yet not without exception.

In Section 3.1 I already cited the following paradigm noted by Van der Hulst (1985: 63), which shows stems merging with a derivational affix:

(61)	a.	dem**o**n	[ɔ]	‘demon’	dem**o**nisch	[o]	‘demonic’
	b.	sat**a**n	[ɑ]	‘satan’	sat**a**nisch	[a]	‘satanic’
	c.	Isra**e**l	[ɛ]	‘Israel’	Isra**e**lisch	[e]	‘Israelic’

I discussed that the long vowel appears in context that would otherwise cause ambisyllabicity. Similarly, in (62)a–b, vowel length alternating stems merge with the derivational affix *-elijk*, causing the stem to become an open syllable. Again, the stem with the long vowel is expected on phonological grounds. The examples contrast with the example in (62)c, a noun for which no stem allomorph is available:[28]

(62)	a.	dag	[ɑ]	‘day’	dagelijks	[a]	‘daily’
	b.	hertog	[ɔ]	‘duke’	hertogelijk	[o]	‘ducal’
	c.	bisschop	[ɔ]	‘bishop’	bisschoppelijk	[ɔ]	‘episcopal’

In short, we see again that, quite generally, if a stem occurs in a phonological environment that causes it to appear as an open syllable and if a stem allomorph with a long vowel is available, that stem allomorph will be selected in Dutch to avoid ambisyllabicity.

Yet, a few counterexamples are attested. Booij (1999: 88) mentions the following examples:

(63)	a.	schip-er ship-SUFFIX$_N$ ‘skipper’	[sxɪpər]
	b.	spel-etje game-DIM ‘game’	[spɛlətjə]
	c.	god-elijk god-SUFFIX$_N$ ‘divine’	[ɣɔdələk]
	d.	bad-er-en bath-SUFFIX$_V$-INF ‘to bathe’ (informal)	[bɑdərə(n)]

Another example worth mentioning in this respect is the following:

(64)	gebrek-ig deficiency-SUFFIX$_A$ ‘defective’	[ɣəbrɛkəx]

In all examples, the stem contains a single final consonant and it is followed by a vowel, making the stem an open syllable. Yet, an allomorph with a long vowel does not appear. In sum, derivational morphology shows instances in which allomorph selection is but a

[28] I would like to thank an anonymous reviewer for mentioning these data.

stored irregularity. As was the case for diminutives, these instances are clearly the exceptions and do not form the regular pattern. However, there is no denying they exist.

So far, I have discussed examples in which the allomorph with the short vowel appears while the one with the long vowel is expected phonologically. The reverse situation occurs as well. Allomorphs with long vowels may be attested in adjectives and adverbs that do not show the expected phonological structure at all; the stem is not an open syllable. Examples are shown in (65).

(65) a. van-daag [vɑndax]
of-day
'today'

b. daag-s [daxs]
day-SUFFIX$_{Adv}$
'daily'

The allomorph invariably stands in an environment in which the allomorph is selected on phonological grounds in earlier stages of Dutch. It is a reasonable assumption that, subsequently, they have been lexicalised as such. This applies to the forms in (65). They are both derived from forms which were inflected for case and as such contained an extra syllable (see *Woordenboek der Nederlandsche Taal*):

(66) *Modern Dutch*
a. van-daag
of-day
'today'

Middle Dutch
b. van-daag-e
of-day-DATIVE
'today'

(67) *Modern Dutch*
a. daag-s
day- SUFFIX$_{Adv}$
'daily'

Middle Dutch
b. daag-es
day-GENITIVE
'daily'

The occurrence of the allomorph in these environments further supports the claim that the distribution of the vowel alternating allomorphs may rely on lexicalisation.

5 Illicit patterns

I have discussed allomorphy in various domains: nouns, verbs and morphological derivations. We have seen on the basis of attested data that two factors are at play regulating the distribution of vowel alternating allomorphs in Dutch: phonology and lexicalisation. In this section I briefly come back to the nouns and I discuss what is not attested. They illustrate again that phonology is indeed at play in these matters. Furthermore, they indicate that syntactic insertion contexts or syntactic features are not relevant for this empirical domain in Dutch.

5.1 Principally excluded patterns

We have seen that vowel length alternation in Dutch shows two patterns, viz. SLSS and SLLL, as summarised in Table 1, which is repeated in this section (S: stem with a short vowel, L: stem with a long vowel).

It is striking that only these patterns exist. They certainly do not exhaust all hypothetical possibilities as listed in Table 2. The present section addresses this issue.

Let me start with a remark. One could argue that, in principle, any pattern could be stored as a lexicalised pattern and according to this logic no patterns should be excluded. Even though this is a fair point in principle, it is not a reasonable expectation. Lexicalised exceptions historically go back to forms that once were motivated. More specifically, they go back to forms that did contain the relevant phonological context to trigger the allomorph in the past, as we have seen in Section 4.3 (and see Lahiri & Dresher 1999 on Open Syllable Lengthening in West-Germanic). As a result, we do find lexicalised exceptions in narrowly defined domains, such as the diminutive or morphological derivations and they are systematically absent from other domains.

First consider the following hypothetical patterns: SSSL, SSLL and SSLS.[29] These patterns express that a hypothetical noun, for which a stem allomorph with a long vowel exists -as shown by a diminutive form- fails to select this allomorph for the non-diminutive plural. In other words, it fails to grasp the opportunity to optimise the non-diminutive plural phonologically. Such nouns are not attested.[30] Note that this observation strongly supports the claim that phonological optimisation is the main factor in the distribution of vowel alternating stem allomorphs in Dutch.

Table 1 (repeated): SL-patterns.

	BASE FORM SG	BASE FORM PL	DIM SG	DIM PL
SLSS *bad* 'bath'	bad /ɑ/	baad-en /a/	bad-je /ɑ/	bad-je-s /ɑ/
SLLL *vat* 'barrel'	vat /ɑ/	vaat-en /a/	vaat-je /a/	vaat-je-s /a/

Table 2: Exhaustive overview of SL-patterns.

	BASE FORM SG	BASE FORM PL	DIM SG	DIM PL
***SLLS**	short	long	long	short
***LSSS**	long	short	short	short
***LSLS**	long	short	long	short
***LSSL**	long	short	short	long
***LSLL**	long	short	long	long
***SLSL**	short	long	short	long
SSSS	short	short	short	short
LLLL	long	long	long	long

[29] Recall from Section 2 that Dutch has two affixes to mark plurality, viz. *–en* and *–s*. As such, the SSLL pattern could have existed if there had been a noun that selected the affix *–s* in the regular plural form and the long form in the diminutive forms.

[30] As noted above, there is the noun *satan* 'satan', which shows the short vowel in the plural form. Yet, this is expected, as it selects the plural affix *-s: satans*.

The SLLS pattern is phonologically inconsistent as both for the singular and the plural diminutive form the root is followed by the exact same diminutive affix. Hence, given that they share the same phonological context, it is predicted they should contain the same allomorph.

The illicit patterns LSSS, LSLS, LSSL, LSLL express that a vowel shortens in the regular plural. Such a process would be far from optimal by the principles of Dutch syllabification as it creates the dis-preferred ambisyllabicity in the non-diminutive plural form.[31] There is yet another aspect that we have not addressed so far that renders these forms far from optimal. Kager and Zonneveld (1985–1986) argue that the Dutch rhyme is bimoraic and that the final consonant of a trimoraic syllable occupies a position in the syllable's appendix. Empirical support for this claim comes from the fact that trimoraic syllables are restricted to word-final positions. Given that appendices by definition only occur word-finally, the observation is immediately captured by proposing that the Dutch rhyme is in fact bimoraic. It is therefore reasonable to assume that superheavy syllables are less optimal than heavy syllables. It now immediately follows why a long vowel will not appear in the non-diminutive singular. A short vowel results in a bimoraic rhyme, a long vowel would result in a more marked syllable, which has to assign one consonant to the appendix. We thus consequently expect the short vowel in the non-diminutive singular and this is exactly what we see. This observation is not trivial. Again, it indicates that phonological principles are an important factor in the distribution of allomorphs in this domain.

The fact that we have phonological reasons to assume the short vowel in the non-diminutive singular form implies that this form is not per se a *default* form at Vocabulary Insertion. It seems to be empirically incorrect to state that it occurs in elsewhere positions. It rather seems to occur in those positions where its moraic format is actually preferable.

Given this state of affairs, one can only choose for a long vowel in the non-diminutive singular if there is no allomorph with a short vowel available at all, i.e. LLLL. Note, trivially, that the LLLL pattern exists. Dutch has many stems with a long vowel for which no allomorph with a short vowel is available. Similarly, the SSSS pattern exists as well; Dutch has many stems with a short vowel for which no allomorph with a long vowel is available.

In sum, we actually understand on phonological grounds not only why some patterns do occur, but also why many patterns do not occur. These observations again strongly support the claim that Phonology does determine the selection of the allomorph for many of these cases. By now, we have a lot of descriptive adequacy to lose by assuming that all allomorph selection in Dutch simply happens to be listed. It is much more advantageous to propose that Phonology determines the allomorph distribution for the majority of cases, despite the fact that for some forms we have to assume listedness.

5.2 Accidentally excluded patterns: syntactic patterns

There is one pattern I have not discussed so far, viz. the SLSL pattern. The fact that this pattern is absent is not a theoretical necessity, but an accidental gap. As discussed earlier in Section 2.3 syntactic plurality in itself may select allomorphs or other irregular exponents. Yiddish, for example, shows allomorphy in plural contexts. In other words, it has an XYXY pattern (Lowenstamm 2007). In the following example the root *kind* 'child' alternates with its allomorph *kinder* in an XYXY fashion:

[31] A reviewer points out that s/he agrees that there is indeed no reason to assume vowel shortening for the Standard Dutch syllable. However, it should be kept in mind that closely related variants, which arguably have different syllabic requirements, do show vowel shortening. Relevant examples are Frisian (Tiersma 1985, Postma 1990), Low German (Stiebels 2013) and West-Flemish (as observed by the reviewer). The absence of vowel shortening in Dutch thus cannot simply be a universal (or West Germanic) tendency, but must be related to its syllabic structure.

(68) a. kind
child
'child'

b. kinder
children
'children'

c. kind-l
child-DIM
'little child'

d. kinder-l-ex
child-DIM-PL
'little children'

In short, an irregular exponent may be found in syntactically plural contexts. Similar data are found in Amharic (Kramer 2009).

Vowel length alternating nouns are not the only nouns that show stem allomorphy in Dutch. Just as in Yiddish, Dutch has stems that alternate between a simple form and an *–er* form.[32] As in Yiddish, these nouns actually show an XYXY pattern:

(69) a. kind
child
'child'

b. kinder-en
$child_{ALL}$-PL
'children'

c. kind-je
child-DIM
'little child'

d. kinder-tje-s
$child_{ALL}$-DIM-PL
'little children'

e. *kinder-tje
$child_{ALL}$-DIM

(70) a. ei
egg
'egg'

b. eier-en
egg_{ALL}-PL
'eggs'

c. ei-tje
egg-DIM
'small egg'

d. eier-tje-s
egg_{ALL}-DIM-PL
'small eggs'

e. *eier-tje
egg_{ALL}-DIM

[32] ALL is an abbreviation for allomorph.

(71) a. blad
leaf
'leaf'

b. blader-en[33]
leaf$_{ALL}$-PL
'leafs'

c. blad-je
leaf-DIM
'small leaf'

d. blader-tje-s
leaf$_{ALL}$-DIM-PL
'small leafs'

e. *blader-tje
leaf$_{ALL}$-DIM

Admittedly, these paradigms may sound slightly archaic to some speakers. Yet, crucially, it is very clear that even for these speakers the forms in the *e*-examples are illicit. The use of the allomorph in the singular diminutive is banned. This supports the claim that the allomorph is indeed determined by syntactic plurality for these examples.

Hermans and Postma (2009) argue that stem alternating words such as *kind* and vowel length alternating nouns belong to a specific noun class and that the additional morae in *kinder* and stems with long vowel express these noun classes in the presence of a syntactic plural head. Now, note, crucially, that vowel length alternating nouns never show the SLSL pattern, unlike the *kind-kinder* alternation. It is therefore unlikely that they should be analysed on a par. More generally, it is unlikely that the distribution of allomorphs is regulated by the syntactic plural head if the non-diminutive and diminutive plural forms do not show the same allomorph. I therefore set aside a syntactic account for the allomorphic distribution of vowel length alternating noun in Dutch, even though I concur with Hermans & Postma (2009) that the analysis is on the right track for the *kind-kinder* types. In short, syntactic plurality may determine allomorphy in Dutch. However, vowel length alternating nouns do not show this pattern.

6 Vowel alternating allomorphs in a split approach

In Section 2 I have argued that, from a theoretical point of view, a split approach according to which allomorphy selection is distributed over two modules, viz. Vocabulary Insertion and Phonology, is to be preferred. In section 3 to 5 I have discussed the facts for vowel alternating allomorphs in Dutch. I concluded that the data show a split pattern as well. I argued at length that considerable descriptive adequacy is to be lost if we do not recognise that Phonology is responsible for most of the data. Phonology alone allows us to understand the allomorph selection in non-diminutive nouns and verbs and it accounted for the absence of the unattested patterns. In the empirical domains of diminutive forms and morphologically derived forms, Phonology still allows us to capture many of the attested data. Yet, in these domains we have also encountered certain lexicalised exceptions. I argue to accept the data for what they are: the phonological pattern is real and the exceptions exist. The data echo opposing views in the literature: some emphasise on the phonological patterns (e.g. Wolf 2008), others warn that many examples are simply not phonologically optimal (e.g. Paster 2006). I argue, in contrast, that the opposing nature of these two types is not a theoretical embarrassment, but rather indicative of the way

[33] The vowel in *blader* is actually lengthened. Note that this allomorph contains the expected phonological pattern to select a lengthened vowel.

the selection of allomorphs is organised. More specifically, both Vocabulary Insertion and Phonology can determine the selection of allomorphs. Vocabulary Insertion is responsible for stored information, Phonology is responsible for phonologically optimising patterns. In this section I bring together these theoretical insights and the data that have been discussed in sections 3 and 4 and I illustrate how the mechanisms that I proposed in Section 2.9 allow us to derive the data.

Consider first a stem that shows nothing but phonologically expected behaviour, such as *hertog* 'duke', as shown in Table 3.

If we assumed a rich subcategorisation frame, as in Paster (2006), we basically would have to stipulate all information given in Table 3 under the relevant root at Vocabulary Insertion. The insight that this noun shows nothing but phonologically optimising behaviour is lost. However, under the split approach presented in Section 2.9, we could simply stipulate the following vocabulary item at Vocabulary Insertion:

(72) √4377 ↔ {/hɛrtɔɣ/, /hɛrtoɣ/}

The vocabulary item states that the root has two exponents which are members of a disjunctive set. Given that Vocabulary Insertion does not state which one to use in a given context, it does not establish a preference. Note, crucially, that none of these forms is a default form: they are equal members of the set of options. Vocabulary Insertion thus absolutely fails to establish a preference. Both forms therefore serve as input to Phonology, which will determine which form is the most appropriate form. For all the reasons described in detail in the previous sections, Phonology knows exactly what to do: it will select the allomorph with the short vowel in closed syllables and the allomorphs with the long vowel in open syllables. Its selection results in predictable, optimised syllables.

Now consider a root which shows phonologically expected behaviour, except in one lexical context, as shown in Table 4.

We want to make Phonology responsible for the selection of the allomorphs, unless the root is followed by the affix *-elijk*. This can be done by modelling the root as follows at Vocabulary Insertion:

Table 3: The noun hertog 'duke'.

word	surface form	translation	type	phonologically expected?
hertog	[hɛrtɔx]	duke	singular noun	✓
hertogen	[hɛrtoɣən]	dukes	plural noun	✓
hertogje	[hɛrtɔxjə]	small/cute duke	singular diminutive form	✓
hertogelijk	[hɛrtoɣələk]	ducal	morphological derivation	✓

Table 4: The noun god 'god'.

word	surface form	translation	type	allomorph phonologically expected?
god	[ɣɔt]	god	singular noun	✓
goden	[ɣodə(n)]	gods	plural noun	✓
godje	[ɣɔtʲə]	small god	singular diminutive form	✓
afgoderij	[ɑfɣodərɛi]	idolatry	morphological derivation	✓
verafgoden	[vərɑfɣodə(n)]	idolise	verb	✓
goddelijk	[ɣɔdələk]	divine	morphological derivation	*

(73) √692 ↔ /ɣɔd/ / ____ /-ələk/
{/ɣɔd/, /ɣod/}

The vocabulary item states that priority is given to the lexicalised fact that the vowel is short when the root precedes the affix *-elijk*. In all other contexts, the disjunctive set containing both allomorphs is sent as input to Phonology. At this point, we are making use of the advantage that stipulations at Vocabulary Insertion can enforce a phonologically less optimal form, as in Paster (2006). However, we are refraining from listing those forms that can be regulated by Phonology.

At risk of stating the obvious, in this model it is clear that Vocabulary Insertion precedes Phonology rather than the other way around. If we were to assume that Phonology precedes Vocabulary Insertion, a phonologically expected form would always win, as Phonology will rule out less optimal candidates. As I have pointed out in Section 2.8, the order presented here is also the only one that makes sense considering the design of the Y-model. The facts and the theoretical expectation thus go hand in hand. Furthermore, we do not have to stipulate a Control Mechanism that follows Phonology, as in Bye (2007), as all lexicalised selection is done by Vocabulary Insertion, the presence of which is postulated anyway in Distributed Morphology's Y-model.

7 Conclusion

In this article I have argued that the selection of allomorphs is done by two separate mechanisms: Vocabulary Insertion selects learned occurrences of allomorphs, Phonology regulates optimising allomorphic patterns. As is generally assumed in Distributed Morphology's Y-model, Vocabulary Insertion precedes Phonology and the lexicalised selection is therefore given priority over phonological selection. I have argued that this proposal does justice to the observations in the literature that both types of allomorph selection seems to exist: allomorphy may be clearly phonologically optimising and it clearly may not be so in other cases.

I proposed a minor modification at Vocabulary Insertion to execute the idea technically. I proposed that Vocabulary Insertion may be marked for a set of unordered exponents. All exponents are equal candidates for insertion.

I have presented a case study from Dutch, i.e. vowel length alternating nouns, which shows that, indeed, these facts co-exist. Non-diminutive nouns and verbs with such allomorphs show phonologically expected behaviour. Furthermore, Phonology allowed us to understand the systematic absence of certain allomorphic patterns. In the domain of diminutive forms and morphological derivations the clear pattern broke down and we encountered exceptions, the allomorphic distribution of which is clearly non-optimising from a phonological point of view. I concluded that the phonological patterns are real and the exceptions are real. I have argued that both types result from different mechanisms: Vocabulary Insertion is responsible for the exceptions, Phonology is responsible for the phonological patterns.

Abbreviations

ADV = adverb, ALL = allomorph, DIM = diminutive, INDEF = indefinite, INF = infinitive, L = form with a long vowel, PL = plural, S = form with a short vowel, ω = syllable, W = phonological word.

Acknowledgements

I would very much like to thank the anonymous reviewers and Gertjan Postma for many helpful comments and suggestions.

Competing Interests

The author has no competing interests to declare.

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How to cite this article: De Belder, Marijke. 2020. A split approach to the selection of allomorphs: Vowel length alternating allomorphy in Dutch. *Glossa: a journal of general linguistics* 5(1): 42.1–40. DOI: https://doi.org/10.5334/gjgl.899

Submitted: 21 January 2019 **Accepted:** 19 January 2020 **Published:** 01 May 2020

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