Hierarchical Morphological Structure and Ambiguity

1. Introduction

English has a number of adjectives of the type unXable, adjectives that contain the prefix un- and the adjectivising suffix -able, e.g. unlockable or undoable. Many of these adjectives are ambiguous. If a door is unlockable, it may either mean that it cannot be locked (it is not lockable), as expressed in Danish, French and German by ulåselig, inverrouillable and unverschließbar, or it may mean that it can be unlocked, as expressed in Danish, French and German by opåslæg, déverrouillable and aufschließbar.

Following a long series of discussions, ranging from introductory textbooks like Stewart & Vaillette (2001: 121) over theoretical articles like Larson & Ludlow (1993: 317) to psycholinguistic treatments like Almeida & Libben (2005: 374), we will take the two different interpretations of unlockable to be the result of the adjectives in question having two different possible structural analyses, viz. one in which the immediate constituents are un- and lockable, (1a), and another one where the immediate constituents are unlock and -able, (1b):

(1) a. un-lockable = [un- [lock-able]] = that cannot be locked
   Da. ulåselig
   Fr. inverrouillable
   Ge. unverschließbar

   b. unlock-able = [[un-lock] -able] = that can be unlocked
   Da. opåslæg
   Fr. déverrouillable
   Ge. aufschließbar

1 Thanks to Gunnar Hrafn Hrafnbjargarson for help and comments, and thanks to Henning Nølke for never being unwilling to talk about negation, linguistics or life in general.
To clarify, here are the same structures illustrated by means of tree diagrams:

(2) a. Adj
    unlockable
    Aff
    un
    Adj
    lockable

b. Adj
    unlockable
    V
    lock
    Aff
    able
    un
    V
    lockable
    unlock

In McGregor (2003: 59–61), it is argued that such analyses in terms of different hierarchical structures are not motivated, and that instead, morphological structure is “string concatenation without hierarchy”. He further says:

It is difficult to construe un- as serving in a constituency relation to the larger unit unlock in [2b] – as serving a function within that whole (what would that function be?) – or to the larger unit unlockable in [2a]. (Adapted from McGregor (2003: 60)).

In this paper, we will argue that the different hierarchical structures are indeed motivated, that morphological structure is not just “string concatenation without hierarchy”, and that un- is a function. In (2a), un- is a function that takes the adjective lockable as its argument and has the adjective unlockable as its output, and in (2b), it is a function that takes the verb lock as its argument and has the verb unlock as its output.

2 We fully realise that this use of “function” differs from McGregor’s use above. Our use of “function” here is the one that is current in mathematics and formal semantics, cf. e.g. Partee, ter Meulen, Wall (1990: 30) and Cann (1993: 94). This difference in terminology, however, should not obscure the fact that un- has a function also in McGregor’s sense within unlockable, comparable e.g. to the “grammatical function” that a sentential negation has within a clause (cf. e.g. Nølke 1992: 48).
2. Morphological analysis

In the following, the actual morphological analyses will only be sketched out. We will therefore simplify the formalisation as much as possible, in order to be able to focus on the aspects that are crucial to our discussion.

2.1 Hierarchical morphosyntactic analysis

We would like to capitalise on some facts that have often been noticed, namely that it is a property of the affix which word class it may combine with, and that it is a property either of the affix or of the stem what the resulting word class is. For instance, the suffix 
-ity
combines only with an adjective, and the result is always a noun: [Adj legal] + [ity] → [N legality]. Thus, morphemes may be partitioned in morpheme classes according to their distributional properties. Such morpheme classes we will designate by their subcategorisation frame (cf. Lieber 1980: 63 and Selkirk 1982: 5, 61 for morphology and e.g. Haegeman 1994: 42 for syntax). A morpheme like 
-ity
will be associated with a lexical entry containing the categorial information shown in (3):

(3)  
-ity : Aff, [N Adj ___ ]

The frame notation [N Adj ___ ] means that the entity in question (here 
-ity
) may be inserted at the place indicated by the underscore (i.e. immediately following an adjective) and that Adj + 
-ity
makes up a new unit belonging to the class N.

Examples of partial lexical entries for other types of morphemes:

(4)  
a.  
-ableV : Aff, [Adj V ___ ]
b.  
-ableN : Aff, [Adj N ___ ]
c.  
-ify : Aff, [V N ___ ]
d.  
re : Aff, [V ___ V ]
e.  
un, V : Aff, [V ___ A ]
f.  
un, V : Aff, [V ___ V ]

The word formation processes involving the affixes mentioned in (3) and (4) may be described by the rewrite rules in (5):
(5) a. Adj Aff → N
   b. V Aff → Adj
   c. N Aff → Adj
   d. N Aff → V
   e. Aff V → V
   f. Aff Adj → Adj

With this machinery, we can illustrate the morphological build-up of a word like *reclassify* as shown in (6):

(6) re- + classify

\[
\begin{array}{c|c|c}
\text{re} & \text{classify} & \text{reclassify} \\
\hline
\text{N} & \text{V} & \text{V} \\
\end{array}
\]

The conditions of the subcategorisation frames for -ify and re- are satisfied, so class and -ify may combine to form the verb *classify* (in accordance with the rule (5d)), and re- and classify may combine to form the verb *reclassify* (cf. rule (5e)). In other words, -ify is a function that here takes the noun class as its argument and has the verb classify as its output, and re- is a function that takes the verb classify as its argument and has the verb reclassify as its output.

We can also describe why a morphological combination like the one found in a nonsense word like *reponkity* does not constitute a possible English word³:

(7) a. reponkity

\[
\begin{array}{c|c|c}
\text{re} & \text{ponk} & \text{-ify} \\
\hline
\text{V} & \? & \text{N Adj} \\
\end{array}
\]

³ This example is adapted from Libben (2003: 223–224).
Hierarchical Morphological Structure and Ambiguity

(7) b. reponk + -ity

\[
\begin{array}{c}
\text{re} \\
\text{[v ___ V]} \\
\hline
\text{ponk} \\
\text{V} \\
\hline
\text{ity} \\
\text{[N Adj ___]} \\
\end{array}
\]

reponk: 
\text{V}

(7) c. re- + ponkity

\[
\begin{array}{c}
\text{re} \\
\text{[v ___ V]} \\
\hline
\text{ponk} \\
\text{Adj} \\
\hline
\text{ity} \\
\text{[N Adj ___]} \\
\end{array}
\]

ponkity: 
\text{N}

Even though we are free to assign to the non-existing creation *ponk* any class we want, e.g. either V or Adj, the whole formation will not result in an acceptable English word. If we choose to interpret *ponk* as a verb, as in (7b), *reponk* will form a verb, but this does not satisfy the subcategorisation frame of -ity, which demands an adjective, and, *vice versa*, if we interpret *ponk* as an adjective, as in (7c), it may now combine with -ity to form the noun *ponkity*, but this time there will be a conflict between the noun and the subcategorisation frame of re-.

2.2 Morphosemantic analysis

In order to assign correct meanings to the results of the morphological processes, the lexical entries for the affixes and the base words should be associated with appropriate semantic representations. This can be done in a very precise way in formal semantics, as has been demonstrated e.g. by Dowty (1979: chapter 6). For a different formal approach, see Lieber (2004). However, to avoid the formal apparatus necessary to formulate these analyses accurately, we will limit ourselves to an informal presentation.

Consider again the example *reclassify* with the morphological structure [re- [(class) -ify]]. The base is *class*. In the following, B stands for the meaning
of the base in an affixation process, and \( P \) stands for the patient. The affix -ify is polysemous and has among its meanings one that may be glossed as “make \( P \) go to/in/on \( B \)” (Lieber 2004: 77). This is a function that takes the meaning of \( \text{class} \) as argument and has as value the semantic structure that underlies the meaning “arrange in classes” of \( \text{classify} \). Now, such a verbal meaning implies that someone causes a certain state to come about, namely the state of \( P \) being arranged in classes. That is, this result-state should be a part of the semantics of a verb like \( \text{classify} \).

It is precisely this state that is relevant to the interpretation of the prefix re-. We now consider the formation of \( \text{reclassify} \), where the base is formed by \( \text{classify} \). The meaning of re- may be glossed something like “make the result-state of the event described by \( B \) obtain for a second time” (cf. Dowty 1979: 256).

As shown in Lieber (2004: 147), this analysis explains why re- only combines with verbs that imply a result, and that this result may not be “finite, fixed or permanent”. Verbs like \( \text{yawn} \) or \( \text{push} \) do not imply result-states, and therefore there is no *\( \text{reyawn} \) or *\( \text{repush} \). Similarly, there is no *\( \text{reeat the apple} \), because the result-state cannot be obtained again.

It is worth stressing that such an analysis only works if the morphological elements are parts of a hierarchical structure. The meaning of re- is a semantic function that takes the meaning of \( \text{classify} \) as argument, not the meaning of \( \text{class} \) and not the meaning of -ify. In other words, re- is on the same level as \( \text{classify} \), and \( \text{class} \) and -ify are one level further down.

In this section (section 2), we have illustrated a morphological analysis both on a morphosyntactic and on a morphosemantic level. We argued that affixes have subcategorisation properties and that morphological structure is hierarchical, and these two assumptions were shown to be essential both for how morphemes may be combined and for how they may be interpreted.
3. The ambiguity of un-X-able

3.1 The two prefixes un-

English has two affixes of the form un-. We will distinguish between them by means of the indexes $A$ and $V$ (mnemonic for adjective and verb): un$_A$ has the subcategorisation frame $[\text{Adj} \_ \_ \text{Adj}]$ and a negative meaning; whereas un$_V$ has the subcategorisation frame $[\_ \_ \text{V}]$ and a reversative meaning.

Examples of un$_A$ are untrue, unclean, unclear, uncomfortable, and their meanings are obtained by negation of the base adjective, i.e. “not true, not clean, not clear, not comfortable” (cf. Marchand 1969: 201–204).

Examples of un$_V$ are unlock, unload, unwind. Their meanings are reversative, that is, like the prefix re-, the meaning of un$_V$ operates on the result-state of an event deriving the meaning “make the result-state of the event described by the base verb cease to obtain” (cf. Marchand 1969: 205–206, Dowty 1979: 257–258, Lieber 2004: 116–117). For instance, when lock the door means “cause the door to be in the state fastened”, unlock the door means “cause the door to cease to be in the state fastened”. As in the case with re- (cf. section 2.2 above), the semantics of un$_V$ implies that it only combines with verbs denoting an event that yields a result which is not permanent. This is why there is no *unyawn, *unpush or *uneat the apple.

3.2 The two suffixes -able

As was the case with un-, there are also two affixes of the form -able (cf. e.g. Aronoff 1976: 48). We will distinguish between them by means of the indexes $N$ and $V$ (mnemonic for noun and verb): able$_N$ has the subcategorisation frame $[\text{Adj} \_ \_ \text{N}]$ and means something like “the thing in question is full of N”. On the other hand, able$_V$ has the subcategorisation frame $[\text{Adj} \_ \_ \text{V}]$ and means something like “it is possible to V the thing in question”.

---

4 It is well-known that derived words that are lexicalised often have their original meanings changed or extended, a sort of semantic drift (cf. Lieber 2004: 10–11). Thus, adjectives on un- are found both with a contradictory negation as in untrue (i.e. a statement must be either true or untrue) and a contrary negation as in unhappy (i.e. a person may be neither happy nor unhappy, and thus unhappy is stronger than “not happy”), cf. Dowty (1979: 257) and Lieber (2004: 112).
or even in some cases “it is necessary to V the thing in question” (cf. Klinge 1997).

Examples of ableN are comfortable, fashionable, profitable and reasonable, and their meanings may be rendered as “which may yield comfort, which is full of fashion, which may yield profit”, and “which is full of reason”.

Examples of ableV are readable, admirable, acceptable and questionable, and their meanings may be rendered as “which can be read, which should be admired / accepted / questioned”. The semantics of ableV thus requires that the verb with which it combines must have an agent and a patient, hence the impossibility of *sleepable, *ripenable or *witherable.

Whereas both of the un-prefixes are relevant for the ambiguity of unlockable to be discussed in further detail below, this is not the case for the two -able-suffixes, in that both senses of unlockable utilises ableV, and hence ableN will not be directly relevant.

3.3 The ambiguity

We are now in a position to describe the ambiguity of unlockable in more detail. Consider again the analyses in (2) above, repeated here as (8):

(8) a. Adj unlockable
    Aff
     \textit{nm}_A

    Adj lockable
     V

    Aff
     \textit{nm}_V

    V

b. Adj unlockable
    Aff
     \textit{nm}_A

    V

    Aff
     \textit{nm}_V

    V

Almeida & Libben (2005: 390–394) lists the following 24 English ambiguous unXable words: unbendable, unbreakable, unbuttonable, unsailable, unserviceable, unsuitable, unfashionable, unfaddable, unbookable, unsuitable, unlockable, unpluggable, unscramblable, unscrewable, unsailable, untensilable, unsuitable, unlockable, unpluggable, unscramblable, unscrewable, unsailable, untensilable, unsuitable, unlockable, unpluggable, unscrewable.
In (8a), where unlockable means “which cannot be locked” (un-lockable), the verb lock first combines with ableV, satisfying its subcategorisation frame \([\text{Adj V } \_\_\_]\), and yielding the meaning for the resulting adjective lockable “which can be locked”. On the next higher level, the resulting adjective lockable combines with unA, satisfying its subcategorisation frame \([\text{Adj } \_\_\_ \text{ Adj}\)], and yielding the negative meaning for the resulting adjective unlockable “which cannot be locked”.

In (8b), where unlockable means “which can be unlocked” (unlock-able), the verb lock first combines with unV, satisfying its subcategorisation frame \([\_\_\_ \text{V } \text{V} ]\), and yielding a reverse meaning for the resulting verb unlock, i.e. “cause the door to be in the state not fastened”.

On the next higher level, the resulting verb unlock combines with ableV, satisfying its subcategorisation frame \([\text{Adj V } \_\_\_]\), yielding the meaning for the resulting adjective unlockable “which can be unlocked”.

In this section (section 3), we have thus shown not only that -able has a function in both (8a) and (8b), but also what that function is, and that it is the same function in both cases. We have further shown not only that un- has a function in both (8a) and (8b), but also what those functions are, and that the function of un- in one case is different from the function of un- in the other case.

4. The case of French inXable

As can be seen from the glosses in (1), French has two distinct words corresponding to the two senses of English unlockable, namely inverrouillable “not lockable” and déverrouillable “that can be unlocked”, and both of these are unambiguous.

However, as noted by Dal & Namer (2000), certain French words in inXable do have two distinct meanings, and here a situation close to, if not entirely identical to, that of English unlockable arises. Examples of ambiguous inXable words in French are infiltrable, ingérable and inversable. These derivations are structurally ambiguous in a way similar to English unlockable. Thus infiltrable may be structured in-filtrable “unfilterable” (cf. (9a) below) or infiltr-able “infiltratable” (cf. (9b) below), ingérable may be structured in-gérable
“unadministrable” or *ingér-able* “ingestable”, and *invers-able* may be structured *in-vers-able* “unoverturnable” or *invers-able* “invertable”\(^6\).

The *unXable* cases in English are characterised by the systematic opposition between negative *un* and reversative *unV*. This bipartition is partly mirrored in French in that the formations with the structure *in-Xable*, like the English words in *un-Xable*, regularly have the meaning “not Xable”.

However, where the English words with the other structure, *unX-able*, regularly have the reversative meaning, the regularity of the French words with the structure *inX-able* breaks down. As a matter of fact, none of the French ambiguous *in*-words have a reversative meaning. The predominant reversative prefix in French is *dé-*, as exemplified by *déverrouiller* in (1) and by other examples like *décommander* “cancel”, *démonter* “dismantle, dismount”, *dépaqueter* “unpack, unwrap”. The prefix *in-* found in French verbs is not productive, almost all the verbs in this group, e.g. *infiltrer* “infiltrate”, *ingérer* “ingest”, *inverser* “invert”, are wholesale loans from Latin, borrowed into French centuries ago, e.g. the first attested instance of *infiltrer*, which is from about 1370, according to the French national dictionary “Trésor de la langue française” (1971–1994, http://atilf.atilf.fr/tlf.htm). They are clearly not felt to be related to the simplex verb any longer, so in a synchronic analysis *infiltrer*, *ingérer* or *inverser* cannot be meaningfully decomposed into *in-* + *filtrer* / *gérer* / *verser*. Thus, instead of the uniform reversative picture with English *unX-able* words, the French *inX-able* words are much more heterogeneous, due to the lexicalisation of the verbs *inX*. Therefore the two analyses of ambiguous French words on *in-* are not exactly parallel to the analyses given in (2) and (8). As may be seen in (9b), the French tree structure of one of the two interpretations of *infiltrable* lacks a third level as compared to the English *unlockable*.

---

\(^6\) Dal & Namer 2000 mentions the following examples of this type of words: *importable, imprécisable, inactivable, incitable, infiltrable, infiltrichisable, informable, ingérable, inhumable, invaillable, insonorisable, invalidable, inversable.*

\(^7\) And so are their English cognates *infiltrate, ingest and invert.*
(9) a. \[ \text{Adj} \] infiltrable
   \[ \text{Aff} \]
   \[ \text{in} \]
   \[ \text{Adj} \]
   \[ filtrable \]
   \[ V \]
   \[ filtrer \]
   \[ \text{Aff} \]
   \[ able \]

b. \[ \text{Adj} \] infiltrable
   \[ \text{Aff} \]
   \[ \text{V} \]
   \[ infiltrer \]
   \[ \text{Aff} \]
   \[ able \]

In (9a), where "infiltrable" means “unfilterable” (in-filtrable), the verb filtrer first combines with ableV, satisfying its subcategorisation frame \([\text{Adj} V \_\_\_]\), and yielding the meaning for the resulting adjective filtrable “which can be filtered”.

On the next higher level, the resulting adjective filtrable combines with in, satisfying its subcategorisation frame \([\_\_\_\_ \text{Adj}\_\_\_]\), and yielding the negative meaning for the resulting adjective infiltrable “which cannot be filtered”.

In (9b), where "infiltrable" means “which can be infiltrated” (infiltr-able), the verb infiltrer (“infiltrate”), which is unanalysable, combines directly with ableV, satisfying its subcategorisation frame \([\text{Adj} V \_\_\_]\), yielding the meaning for the resulting adjective infiltrable “which can be infiltrated”.

The data discussed in this section thus show that the structurally-based ambiguity found in English unXable words may also be found in other languages, provided the right conditions are present. This is the case in French, where \textit{in-} is both a productive adjectival prefix and a Latin-based verbal prefix.
5. Lack of ambiguity in Danish and German

It is worth noticing that there are many languages, e.g. Danish and German, where the equivalents of unXable words are not ambiguous, that is, in these languages we find two distinct words each corresponding to one of the two senses of the ambiguous English unXable words, as illustrated in (1) above.

This fact is easily accounted for in terms of the structural properties of the affixes concerned. In Danish and German, what corresponds to the two different morphemes unA and unV (with their distinct subcategorisation properties and different meanings) are realised in two clearly distinct ways: unA corresponds to Danish u- and German un-, whereas unV corresponds to Danish op- and German auf.

Consider the Danish equivalents of unlockable:

(10) a. ulåselig (= that cannot be locked)
    b. oplåselig (= that can be unlocked)

What makes possible the ambiguity in English unXable words is first that unA may combine with the adjective lockable, and that unV may combine with the verb lock, and second that both the adjective and the verb can be detected inside lockable. Also in Danish låselig, it is possible to detect both a verb (läse “lock”) and an adjective (låselig “lockable”). However, the prefixes u- and op- have combinatorial and semantic properties that exclude the ambiguity of the results.

Thus the Danish prefix u-, which has a negative meaning, may only combine with an adjective, and does not combine with a verb to form a new verb in modern Danish (there is no possible verb *ulåse). Thus, like English unA, Danish u- is characterised by the subcategorisation frame [Adj ___ Adj]. On the other hand, the Danish affix -lig resembles English ableV both combinatorially and semantically, and, like ableV, it has the subcategorisation frame [Adj V ___]. So there is only one analysis possible for ulåselig, the one shown in (11a), which is completely parallel to the structure in (2a), (8a) and (9a).
(11) a. Adj
   u-låselig
   Aff
   V
   låse
   b. Adj
   *ulåselig
   Aff
   V
   *läse
   Aff
   V
   låse

The structure in (11a) is possible because on the lowest level the verb *läse combines with the suffix -lig, satisfying the latter’s subcategorisation frame [Adj V ___], and yielding the adjective låselig with the meaning “that can be locked”, which on the next level combines with the negative prefix u- with the subcategorisation frame [Adj ___ Adj]. This last combination gives rise to the adjective ulåselig with the negative meaning “that cannot be locked”.

In contrast, the structure in (11b) is impossible. On the lowest level it is not possible to combine u- with the verb *läse, because the subcategorisation frame of u- is [Adj ___ Adj], and this cannot be satisfied by a verb. Thus the derivation of another meaning for ulåselig is made impossible.

Let us now consider the other Danish equivalent of unlockable, the adjective oplåselig, which means “that can be unlocked”. Here, the only possible analysis is oplåse-lig. In other words, the complex oplåselig has the verb oplåse as a constituent element. Now, verbs of this sort are formed from a particle op (literally “up”) and a simplex verb *läse (“lock”), where the particle normally occurs postverbally as shown in (12):

(12) a. Hun ville ikke låse op
     She would not (un)lock PRT
     b. Hun låste døren opp
     She (un)locked door-the PRT

In such constructions the particle op has the same reversative meaning as English unV, as can be seen from examples like binde op “untie, undo”,

Hierarchical Morphological Structure and Ambiguity
knappen op “unbutton”, pakke op “unpack”, etc. However, in formal language and in further morphological derivations, verbs of this type are realised with the particle incorporated as a prefix (cf. e.g. Vikner 2001: 42): oplåse “unlock”, oplåsning “unlocking”, en oplåser “an unlocker”, opknappet “unbuttoned”, oppakning “pack, kit”. As oplåselig “unlockable” is clearly a formation of this last sort, we will treat op- as a prefix on a par with un-, in-, u-, etc. above.

Like the other reversative prefixes discussed above, the reversative op-combines only with verbs to form new verbs, and must therefore be associated with the subcategorisation frame \[ V ___ V \]. This in turn results in the analysis given in (13b) below, to the exclusion of (13a).

\[(13)\]

\[\begin{array}{c}
\text{a.} \\
\text{Adj} \\
op\text{Adj}
\end{array} \quad \text{Adj}
\]

\[\begin{array}{c}
\text{Aff}
\end{array}\]

\[\begin{array}{c}
\text{V}
\end{array}\]

\[\begin{array}{c}
\text{Aff}
\end{array}\]

\[\begin{array}{c}
\text{Adj}
\end{array}\]

\[\begin{array}{c}
\text{V}
\end{array}\]

\[\begin{array}{c}
\text{Aff}
\end{array}\]

\[\begin{array}{c}
\text{Adj}
\end{array}\]

\[\begin{array}{c}
\text{V}
\end{array}\]

\[\begin{array}{c}
\text{Aff}
\end{array}\]

\[\begin{array}{c}
\text{Adj}
\end{array}\]

\[\begin{array}{c}
\text{V}
\end{array}\]

\[\begin{array}{c}
\text{Aff}
\end{array}\]

In the structure in (13b), the verb låse on the lowest level satisfies the subcategorisation frame of op, which is \[ V ___ V \], and the result is the verb oplåse with the reversative meaning “unlock”. On the next level, the verb oplåse combines with the suffix -lig satisfying the subcategorisation of the latter, which is \[ Adj V ___ \] as before. This combination yields the adjective oplåselig with the meaning “which can be unlocked”.

On the other hand, the structure in (13a) is out, because op- does not combine with adjectives in word formation processes in modern Danish, and therefore the combination on the middle level op-låselig is not possible.

Similar reasoning explains not only the lack of ambiguity in the German derivations unverschließbar, i.e. un-verschließbar, “that cannot be locked”, and
Hierarchical Morphological Structure and Ambiguity

aufschließbar, i.e. aufschließen-bar, “that can be unlocked”, but also in the French inverrouillable, i.e. in-verrouillable “that cannot be locked” and déverrouillable, i.e. déverrouill-able “that can be unlocked”.

Thus, the assumption of an underlying hierarchical morphological structure gives a key to understanding why the English word unlockable and the French infiltrable are ambiguous while their counterparts in Danish and German are not. If we were to assume that there was no hierarchical structure in morphology, and consequently that there were no differences in hierarchical structure between the two versions of unlockable/infiltrable, it would remain a mystery why exactly this ambiguity is not found in similar words in Danish and German.

Under the assumption that morphological structure is “string concatenation without hierarchy” (McGregor 2003: 61), one would expect that un- in the Danish expression ulåselig “that cannot be locked” would only be able to see the next morpheme læse “lock”, but this could not possibly result in the right interpretation, cf. the discussion of (11b) above. Rather, un- in ulåselig must be able to see the next two morphemes, in fact, it must even be able to see that these two morphemes together make up an adjective. Precisely the same is true for the English un- found in the unlockable which means “that cannot be locked”, cf. the discussion of (8a) above. In other words, un-/un- must have access to hierarchical morphological structure.

6. Unambiguous words on unXable

In this section, we will try to support our account by seeing what it has to say about cases in which derived words that resemble unlockable very closely and which in principle should be just as ambiguous as unlockable may nevertheless be completely unambiguous.

6.1 The verb denotes an event which is not reversible

Part of the derivation of unlockable in the sense “which can be unlocked” (unlock-able, (8b)), is that we start out with the verb lock meaning “cause the door to be in the state fastened” and then we combine this with un-, which
yields a reversative meaning for the resulting verb *unlock*, *i.e.* “cause the door to be in the state not fastened”.

It is thus crucial that the event denoted by the verb prefixed by *unV* must yield a result-state which is reversible and not permanent. This is not the case for *e.g.* *read* or *drink*, where a book can not be *unread* once it has been read and a glass of malt whisky can not be *undrunk* once it has been drunk. This account therefore correctly predicts *unreadable* and *undrinkable* not to be ambiguous, as they can not have the meaning “that may be brought into the state of *not* being read/drunken”, but only the meaning “that may *not* be brought into the state of being read/drunken”.

6.2 The verb does not denote an event which implies a result-state

It is necessary for *unV* to be combined with a verb that denotes an event that implies a result-state. \(^8\) Consider *to* *wrap*, where *she wrapped the present* implies that the state “the present is wrapped” comes about. On the other hand, *unV* does not yield a semantically acceptable result when it is combined with a verb which itself denotes a state directly, *e.g.* *to understand*. This is because states do not imply any result-state, *e.g.* *she understood the message* does not imply that the message ends up in a particular state. Thus there is no result-state to be reversed at all.

Therefore, it is actually not possible “to ununderstand someone”, “to unlike someone” or “to unbelieve something”, and it is consequently predicted that *ununderstandable*, *unlikeable*, and *unbelievable* are not ambiguous. They can not have the meaning “that may be brought into the state of *not* being understood/liked/believed”, but only the meaning “that may *not* be brought into the state of being liked/believed/understood”.

6.3 The same *un* cannot apply twice

If *unA* were to apply twice, one of them would – so to speak – cancel out the other, and this is presumably why this is not possible, (14a). It is not

---

\(^8\) This observation is due to Dowty (1979: 257). Events that imply a result-state correspond to what is called “accomplishments” in Vendler (1967) and Dowty (1979) and “complex events” in Vikner & Vikner (1997: 269–270).
even possible to get the pragmatically derived reading that ununX is slightly less than X, the way this is possible with not unX meaning somewhat less than X in (14b), cf. e.g. Horn (2001: 296–308).

(14) a. *Mary is ununhappy
   b. Mary isn't unhappy

The same holds for unV, if it were to apply twice, one would cancel out the other, and this is why (15a) is not possible, neither with the reading of (15b), nor with any other reading, e.g. Mary almost locked the door.

(15) a. *Mary ununlocked the door
   b. Mary locked the door

It is therefore no surprise that in so far as we find two cases of un immediately adjacent, they have to constitute a combination of unA and unV. Although there are several words of the type ununXable, they are thus all unambiguous, even though they all in principle could have no less than five possible derivations:

(16) a. *[λ [V [un - un] lock] able] un cannot modify the prefix un
   b. *[λ [V unλ - unλ] [λ lock - able]] un cannot modify the prefix un
   c. *[λ [V unV [V unV - lock]] able] unV cannot modify a verb that is already prefixed by unV
   d. *[λ unA [λ unλ [λ lock - able]]] unA cannot modify an adjective that is already prefixed by unA
   e. *[λ unA [λ [V unV - lock] able]] the only possible reading, i.e.
      “that cannot be unlocked”

In this section (section 6), we have shown how the assumptions made previously are not only compatible with but also essential parts of the explanations for different unambiguous cases of unXable.

A parallel account will account for why also French infiltrable “not infiltratable” is unambiguous, even though infiltrable is ambiguous, as discussed in section 4 above.
7. Lack of ambiguity in other multimorphemic words

As structural ambiguity is an important part of the account presented in sections 1–4 above, it might seem at a cursory glance as if we would expect the vast majority of the world’s multimorphemic words (words consisting of three or more morphemes) to be structurally ambiguous, i.e. as if all words of the type \(abc\) should have two different readings corresponding to \(a[bc]\) and \([ab]c\). However, many if not most multimorphemic words are not ambiguous, and this is due to the fact that the affixes only combine with certain word classes, as shown in section 2.1 above.

In section 5 above, we have already seen cases of lack of ambiguity from Danish, German and French, and in this section we want to show how our account is compatible with the fact that most multimorphemic words in English do not show an ambiguity like the one found in \textit{unlockable}-words. For instance, \textit{reclassify} and \textit{reloadable} are both unambiguous and have only one morphological structure each. Thus, \textit{re-classify} and \textit{re-loadable} are possible, but \textit{reclass-ify} and \textit{re-loadable} are not.

This follows from the combinatorial properties of the morphemes concerned. For \textit{redassify} we have already shown the morphological structure in the diagramme in (6) in section 2.1 above, repeated here as (17).

\[(17) \text{ re- + classify} \]

\[
\begin{array}{c}
\text{re} \\
[v \_\_ V]
\end{array}
\begin{array}{c}
\text{class} \\
N \quad [v N \_\_]
\end{array}
\begin{array}{c}
\text{ify} \\
\end{array}
\begin{array}{c}
\text{classify} \\
V
\end{array}
\begin{array}{c}
\text{reclassify} \\
V
\end{array}
\]

The two affixes \textit{re-} and \textit{-ify} have only the subcategorisation frames shown, \(i.e. [v \_\_ V] \) and \([v N \_\_]\) respectively. So even though \textit{class} may also be a verb, and there is thus the possibility of combining \textit{re-} and \textit{class} to form a new verb \textit{reclass}, this element cannot combine with \textit{-ify}, which needs a noun stem.
In *reloadable* both the combination *reload* and *loadable* are possible, but because *re-* only combines with verbs, it cannot combine with an adjective like *loadable* (to give *re-loadable*, which might have had a meaning something like “possible to be made loadable again”), and this leaves only the possibility of `[adv] [v re [v load]] able]`, “possible to be loaded again”.

8. Conclusion

In this paper, we have shown how morphology has an important property in common with syntax, namely that the difference between close and less close connections between adjacent elements can be modelled by the elements being arranged in a hierarchical tree structure. We have thus tried to argue against the view that morphological structure is “string concatenation without hierarchy” (McGregor 2003: 61).

In section 2, we argued that affixes have subcategorisation properties and that morphological structure is hierarchical. These two assumptions were shown to be essential both for how morphemes may be combined and for how they may be interpreted. In section 3, we applied such an analysis to the ambiguity of *unXable*, showing how the ambiguity of the *un-* prefix was linked to the level at which the *un-* prefixation took place.

Section 4 demonstrated how these assumptions were able to deal with ambiguities similar to *unXable* in other languages (e.g. French *inXable*). Finally, sections 5–7 illustrated how the analysis could be prevented from overgenerating, *i.e.* how it could account for various cases of lack of ambiguity, first in the Danish and German correspondents of *unXable*, then in English cases structurally similar to *unXable*, and in multimorphemic words in general.
Bibliography


