Universität Konstanz, 16.07.2008

Hierarchical Morphological Structure and Ambiguity

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(This is joint work with Carl Vikner, cf. Vikner & Vikner 2008 in the bibliography.)

1 Introduction

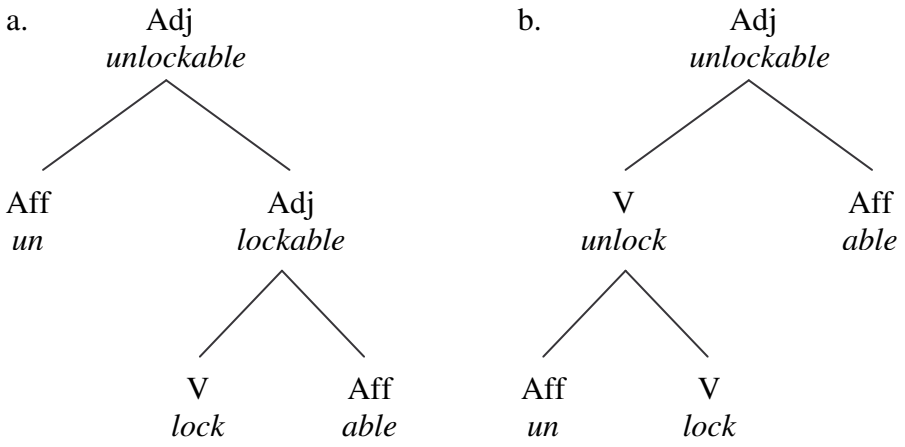
English has a number of adjectives of the type *unXable*, adjectives that contain the prefix *un-* and the adjectivising suffix *-able*, e.g. *unlockable* or *undoable*. Many of these adjectives are **ambiguous**. If a door is *unlockable*, it may either mean that it cannot be locked (it is not lockable), or it may mean that it can be unlocked.

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)/(2a), and another one where the immediate constituents are *unlock* and *-able*, (1b)/(2b):

(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. *oplåselig*
Fr. *déverrouillable*
Ge. *aufschließbar*

(2)



Other examples with the same properties (from Almeida & Libben 2005:390-394): *unbendable*, *unbucklable*, *unbuttonable*, *uncoilable*, *uncorkable*, *undoable*, *undressable*, *unfastenable*, *unfoldable*, *unhookable*, *uninstallable, unloadable*, *unpackable*, *unpluggable*, *unrollable*, *unscrewable*, *unscramblable*, *unsealable*, *untieable*, *untwistable*, *unwindable*, *unwrapable*, *unzipable*.

Bill McGregor (2003:59-61) argues 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 *un-lock* in [2b] – as serving a function within that whole (what would that function be?) – or to the larger unit *un-lock-able* 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[1]. In (1a)/(2a), *un-* is a function that takes the adjective *lockable* as its argument and has the adjective *unlockable* as its output, and in (1b)/(2b), it is a function that takes the verb *lock* as its argument and has the verb *unlock* as its output.

2 Morphological analysis

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 notation [$_{N}$ Adj ___] means that the entity in question (here *-ity*) may be inserted 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. *-able*$_{V}$: Aff, [$_{Adj}$ V ___]
b. *-able*$_{N}$: Aff, [$_{Adj}$ N ___]
c. *-ify* : Aff, [$_{V}$ N ___]
d. *re-* : Aff, [$_{V}$ ___ V]
e. *un*$_{A}$*-* : Aff, [$_{A}$ ___ 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):

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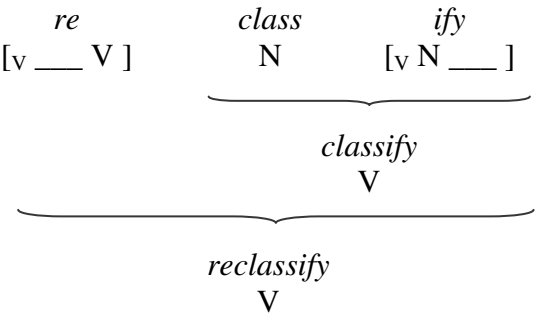
[1] We fully realise that this use of "function" differs from McGregor’s use above. Our use of "function" here is the one that is current in mathematics and formal semantics, cf. e.g. Partee, ter Meulen, Wall (1990:30) and Cann (1993:94). This difference in terminology, however, should not obscure the 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).

(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, we can illustrate the morphological build-up of a word like *reclassify*:

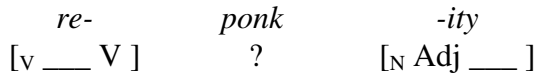
(6) *re-* + *classify*



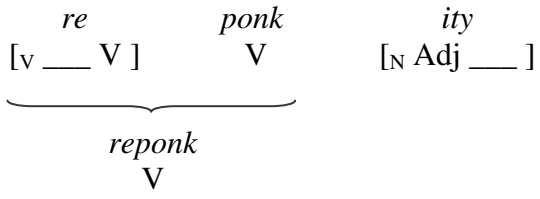
The conditions of the subcategorisation frames for *-ify* and *re-* are satisfied, so *class* and *-ify* may combine to form the verb *classify* (in accordance with the rule (5d)), and *re-* and *classify* may combine to form the verb *reclassify* (cf. rule (5e)). In other words, *-ify* is a function 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 word (example adapted from Libben 2003:223-224):

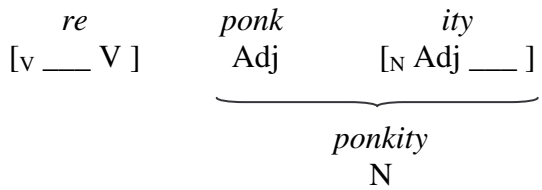
(7) a. *reponkity*



b. *reponk* + *-ity*



c. *re-* + *ponkity*



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

The lexical entries for the affixes and the base words should be associated with appropriate semantic representations. This can be done in formal semantics or similar frameworks, as demonstrated e.g. by Dowty (1979: chapter 6), cf. also 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 *class* as argument and has as value the semantic structure that underlies the meaning "arrange in classes" of *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 *classify*.

It is precisely this state that is relevant to the interpretation of the prefix *re-*. We now consider the formation of *re[classify]*, where the base is formed by *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 *yawn* or *push* do not imply result-states, and therefore there is no **reyawn* or **repush*. Similarly, there is no **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 *classify* as argument, not the meaning of *class* and not the meaning of *-ify*. In other words, *re-* is on the same level as *classify*, and *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 [$_{\text{Adj}}$ ___ Adj] and a negative meaning;
- un_V has the subcategorisation frame [$_{\text{V}}$ ___ V] and a reversative meaning.

Examples of un_A are *untrue*, *unclean, unclear, uncomfortable*, and their meanings[2] 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 [$_{\text{Adj}}$ N ___] and means something like "the thing in question is full of N".
- $able_V$ has the subcategorisation frame [$_{\text{Adj}}$ V ___] and means something like "it is possible to V the thing in question", or even in some cases "it is necessary to V the thing in question" (cf. Klinge 1997).

Examples of $able_N$ 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 $able_V$ 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 $able_V$ 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 $able_V$, and hence $able_N$ will not be directly relevant.

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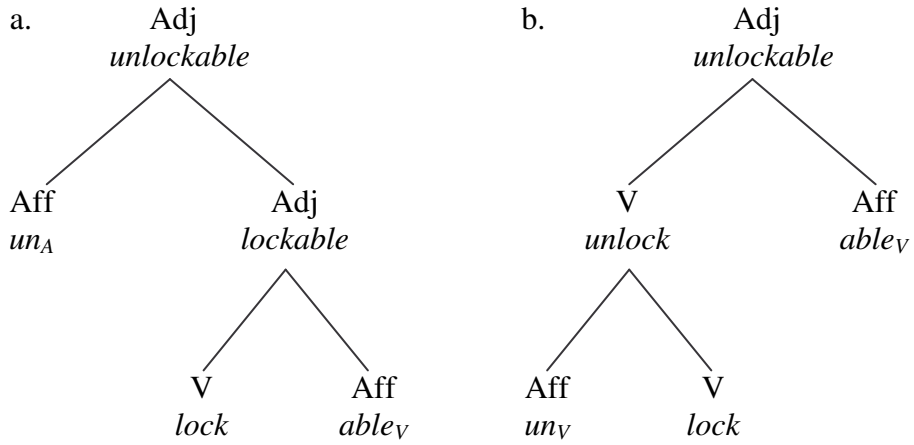
[2] It is well-known that derived words that are lexicalised often have their original meanings changed or extended, a sort of semantic drift (cf. Lieber 2004:10-11). Thus, adjectives on *un-* are found both with a contradictory negation as in *untrue* (i.e. a statement must be either true or untrue) 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).

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)



In (8a), where *unlockable* means "which cannot be locked" (*un-lockable*), the verb *lock* first combines with $able_V$, 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 un_A, satisfying its subcategorisation frame [$_{\text{Adj}}$ ___ 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 un_V, satisfying its subcategorisation frame [$_{\text{V}}$ ___ V], and yielding a reversative 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 $able_V$, 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 we saw 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'. 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*[3]. These derivations are structurally ambiguous in a way similar to English *unlockable*:

in-filtrable 'unfilterable' (cf. (9a) below)
infiltr-able 'infiltratable' (cf. (9b) below)

in-gérable 'unadministrable'
ingér-able 'ingestable'

in-versable 'unoverturnable'
invers-able 'invertable'

The *unXable* cases in English are characterised by the systematic opposition between negative un_A and reversative un_V. This bipartitition 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[4], 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*:

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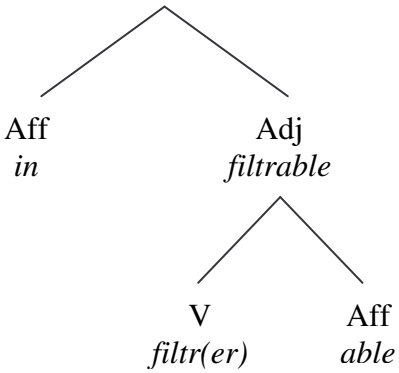
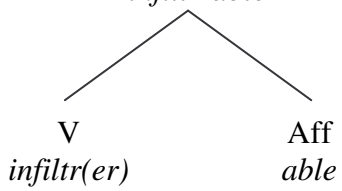
3 Dal & Namer (2000) mentions the following examples of this type of words: *importable*, *imprécisable*, *inactivable*, *incitable*, *infiltrable*, *infléchissable*, *informable*, *ingérable*, *inhumable*, *intaillable*, *insonorisable*, *invalidable*, *inversable*.

4 And so are their English cognates *infiltrate*, *ingest* and *invert*.

(9) a.



b.



In (9a), where *infiltrable* means "unfilterable" (*in-filtrable*), the verb *filtrer* first combines with $able_V$, satisfying its subcategorisation frame [$_{Adj}$ 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 [$_{Adj}$ ___ 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 $able_V$, satisfying its subcategorisation frame [$_{Adj}$ 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 *in-* is both a productive adjectival prefix and a Latin-based verbal prefix.

5 Lack of ambiguity in Danish and German

There are many languages, e.g. Danish and German, where the equivalents of *unXable* words are not ambiguous, that is, these languages have two distinct words each corresponding to one of the two senses of the ambiguous English *unXable* words.

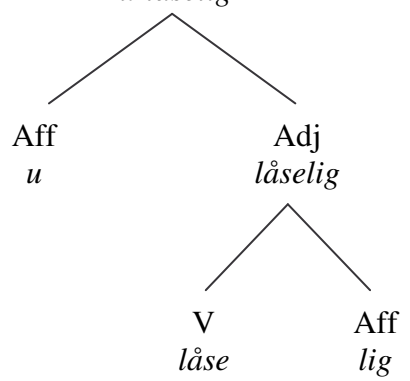
This fact is easily accounted for in terms of the structural properties of the affixes concerned. In Danish and German, what corresponds to the two different morphemes un_A and un_V (with their distinct subcategorisation properties and different meanings) are realised in two clearly distinct ways: un_A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

(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 un_A may combine with the adjective *lockable*, and that un_V 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 (*låse* '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 un_A, Danish *u-* is characterised by the subcategorisation frame [$_{\text{Adj}}$ ___ Adj]. On the other hand, the Danish affix *-lig* resembles English $able_V$ both combinatorially and semantically, and, like $able_V$, it has the subcategorisation frame [$_{\text{Adj}}$ 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.



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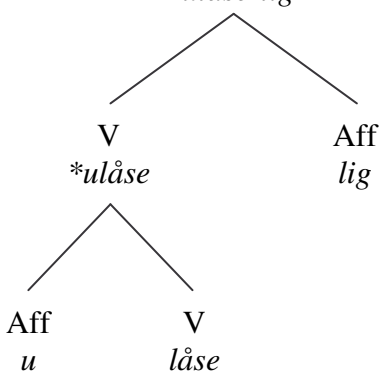


The structure in (11a) is possible because on the lowest level the verb *låse* combines with the suffix *-lig*, satisfying the latter's subcategorisation frame [$_{\text{Adj}}$ V ___], and yielding the adjective *låselig* with the meaning "that can be locked", which on the next level combines with the negative prefix *u-* with the subcategorisation frame [$_{\text{Adj}}$ ___ 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 *låse*, 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.

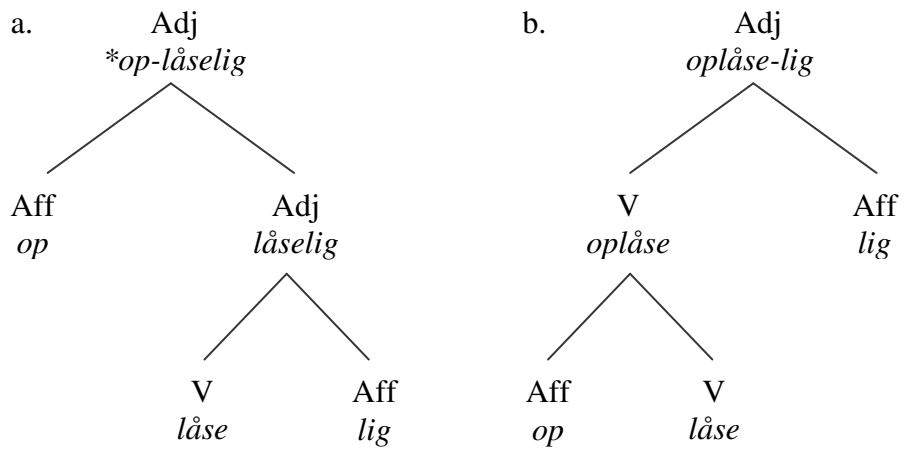
Consider now the other Danish equivalent of *unlockable*, the adjective *oplåselig*, which means "that can be unlocked". Here, the only possible analysis is *oplåse-lig*. In other words, the complex *oplåselig* has the verb *oplåse* as a constituent element. Now, verbs of this sort are formed from a particle *op* (literally "up") and a simplex verb *låse* ('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	op	
		She	*(un)locked*	*door-the*	*PRT*	

In such constructions the particle *op* has the same reversative meaning as English *un$_V$*, as can be seen from examples like *binde op* 'untie, undo', *knappe 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 and also p. 9 and p. 17 of the hand-out for my talk tomorrow, 17.07.2008): *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 results in the analysis in (13b) below, to the exclusion of (13a):

(13)



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 *aufschließbar*, i.e. *aufschließ(en)-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'.

It has to be admitted that native German reversative verbs tend to correspond to non-reversative verbs **with a different particle**:

auf*schließen*	- ***ver****schließen*	'unlock - lock',
auf*klappen*	- ***zu****klappen*	'unfold - fold',
aus*graben*	- ***be****graben*	'unbury/excavate - bury',

In order to obtain a German parallel to the above Danish examples, we may therefore have to cheat and turn to borrowings like *deinstallieren - installieren* 'uninstall - install', which yield the two different translations of *uninstallable:*

un-[installier-bar] (as in 10a and 11a),
[*de-installier]-bar* (as in 10b and 13b).

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 *u-* in the Danish expression *ulåselig* 'that cannot be locked' would only be able to see the next morpheme *låse* 'lock', but this could not possibly result in the right interpretation, cf. the discussion of (11b) above. Rather, *u-* 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, *u-/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_V, 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 un_V 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 / drunk", but only the meaning "that may not be brought into the state of being read / drunk".

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

It is necessary for un_V to be combined with a verb that denotes an event that implies a result-state.[5] Consider *to wrap*, where *she wrapped the present* implies that the state "the present is wrapped" comes about. On the other hand, un_V 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 *unbelieveable* are not ambiguous. They cannot 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 un_A 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 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).

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[5] 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).

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

The same holds for un_V, 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*.

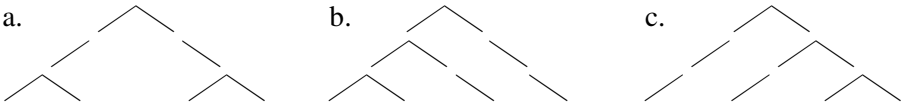
(15) a. *Mary ununlocked the door
b. Mary locked the door

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 un_A and un_V. 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:

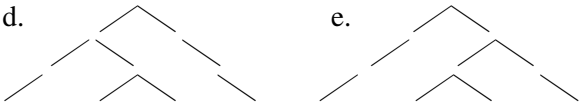
(16)

a.	*[$_A$ [$_{prf}$ un$_A$ - un$_A$][$_A$ lock - able]]	*un* cannot modify the prefix *un*
b.	*[$_A$ [$_V$ [$_{prf}$ un$_V$ - un$_V$] lock] able]	*un* cannot modify the prefix *un*
c.	*[$_A$ un$_A$ [$_A$ un$_A$ [$_A$ lock - able]]]	un_A cannot modify an adjective that is already prefixed by un_A
d.	*[$_A$ [$_V$ un$_V$ [$_V$ un$_V$ - lock]] able]	un_V cannot modify a verb that is already prefixed by un_V
e.	[$_A$ un$_A$ [$_A$ [$_V$ un$_V$ - lock] able]]	the only possible reading, i.e. "that cannot be unlocked"

(17) a. b. c.



d. e.



The point is that since both cases of *un-* are prefixes, they cannot change the word class, and so if one should apply directly to the output of the other, they would have to be the same *un-* (i.e. either un un_V- or un_A-), but this is not possible, cf. (14a). This leaves only one possible case, namely the one where one *un-* does not apply directly to the output of the other because a suffix intervenes, (17e).

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 *ininfiltrable* 'not infiltratable' is unambiguous, even though *infiltrable* is ambiguous, as discussed in section 4 above.

7 Lack of ambiguity in other multimorphemic words

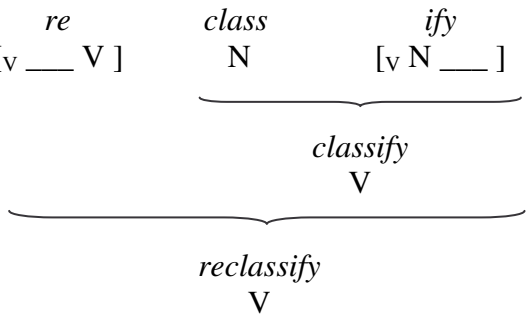
As structural ambiguity is an important part of the account presented in sections 1-4 above, it might seem at a cursory glance as if we would expect the vast majority of the world's multimorphemic words (words consisting of three or more morphemes) to be structurally ambiguous, i.e. as if all words of 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 *unlockable*-words. For instance, *reclassify* and *reloadable* are both unambiguous and have only one morphological structure each. Thus, *re-classify* and *reloadable* are possible, but *reclass-ify* and *re-loadable* are not.

This follows from the combinatorial properties of the morphemes concerned. For *reclassify* we have already shown the morphological structure in the diagramme in (6) in section 2.1 above, repeated here as (18).

(18) *re-* + *classify*



The two affixes *re-* and *-ify* have only the subcategorisation frames shown, i.e. [$_V$ ___ V] and [$_V$ N ___] respectively. So even though *class* may also be a verb, and there is thus the possibility of combining *re-* and *class* to form a new verb *reclass*, this element cannot combine with *-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 *reloadable*, which might have had a meaning something like "possible to be made loadable again"), and this leaves only the possibility of [$_{Adj}$ [$_V$ *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: in Danish and German correspondents of *unXable*, in English cases structurally similar to *unXable*, and in multimorphemic words in general.

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