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## **Morphological considerations concerning the nationalisation of medical terms**

### **Abstract**

The Danish medical terminology, part of which used to be in pure Latin and Greek, is characterized by an increasing degree of nationalisation, due mainly to the decreasing knowledge of the classical languages. At the same time, the terminology is influenced by English, this century's medical *lingua franca*. The present situation calls for an overall language policy including both the status and the corpus of the language for medical purposes. Hopefully, the future Danish Medical Language Advisory Board, which has been in the melting pot for a couple of years, will be able to act as a decision- and consensus-maker concerning these questions. In this article, the types of morphemes involved in the construction of the so-called neo-classical compounds are considered. Indeed, it may be assumed that a clear view of the morphological characteristics of the Danified neo-classical terms, the hybrids, could be a help in connection with setting up some general guidelines for their construction and spelling which might eliminate the confusion now prevailing in the area.

### **1. Classical terms and hybrids in medical terminology**

Today's young medical doctors and students often do not possess any knowledge of the classical languages and since 1992, knowledge of Latin is no longer an admission requirement for Danish medical students. Simultaneously, the importance of possessing a certain proficiency in English has become more and more obvious, and the linguistic effort is put into English rather than Latin or Greek. Therefore, purely Latin/ Greek terms are less used and hybrid terms, i.e. terms based wholly or partly on classical (Latin/Greek) word elements but adapted to Danish grammar, are likely to gain further ground in Danish medical terminology in the future.

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### 1.1. Hybrids are good quality terms!

The increased use of hybrids is a result of a combination of the evolution in the language teaching area and the users' own preferences. Hybrids not only allow the users to avoid being confronted with the complicated grammatical and syntactical problems with classical terms, they also meet some of the most essential requirements put forward by the medical doctors themselves. Most of the hybrids are potentially

- unambiguous,
- linguistically economical,
- internationally recognizable (i.e. based on well-known classical word elements),
- psychologically acceptable to the users.

Although these demands are also given top priority by most terminologists when it comes to describing "good quality terms" (*Høy 1998: 179*), a few other linguistically inspired characteristics are desirable as well: hybrids also ought to be

- linguistically correct,
- motivated (self-explanatory),
- productive (like *alcohol/alcoholic/alcoholism*).

It should be added that when the above mentioned criteria are taken into account, it becomes obvious why translation of classical terms into all-Danish terms is not desirable. Furthermore, because of the analytical character of Danish as opposed to the synthetic character of Latin (*Lyons 1968*), the terms would often have to be changed into whole sentences; they would no longer be internationally recognizable; and they would be psychologically unacceptable because they would deprive the users of their special language and their feeling of belonging to a discourse community (*Swales 1990:21-32*). For all these reasons the use of hybrids is a good solution.

If a set of clear, simple rules could be set up for the construction and spelling of the hybrids, it would no doubt be much easier for the editors of textbooks and lexical works and other text producers to reach a consensus, which would prevent further confusion and misunderstandings from arising.

## 1.2. The transformation of classical terms into Danish hybrids

Hybrids are compounds or derivatives, i.e. combinations of several free or bound morphs. They are always based wholly or partly on Latin and/or Greek lexemes or roots (some of which are admittedly of e.g. Arabic or Persian origin), but they have been syntactically, grammatically, and orthographically adapted to Danish. The basic recipe goes as follows:

- Take the necessary number of Latin or Greek lexemes or roots, prefixes, and suffixes, Danify the spelling (replace e.g. ch by k, x by ks, ae by æ, etc.), and adapt the term to the Danish language by using the relevant inflectional suffixes and, whenever applicable, reversing the order of the head and the modifier.

This is how the classical terms *thyreotoxicosis*, *pneumonia*, and *fractura tibiae* become *tyreotoksikose*, *pneumoni*, and *tibiafraktur*, hybrids that satisfy most important demands and that are easy to deal with in a textual context.

On the face of it, this all seems quite reasonable, but difficulties quickly arise if one tries to define more precisely the elements which according to the recipe are involved in the formation of these hybrids: are these terms compounds or derivatives - i.e. to what extent are roots and affixes, respectively, involved in their formation? As an introduction to this discussion, an overview of the word elements in question is given in the following paragraph.

## 2. The morphological structure of the medical terms

For the sake of clarity, a schematic summary of the basic units and word elements in question has been drawn up, see Fig. 1 (based on *Jacobsen & Skyum-Nielsen 1996:182*).

Fig. 1. Units and word elements

lexeme		
complex word		Simple word
compound (only free morphs are involved)	derivative (free and bound morphs are involved) (= derivational affix + base or base + derivational affix)	
root + root e.g. <i>drain</i> / <i>pipe</i>	prefix + root e.g. <i>dis</i> / <i>like</i>	root + suffix e.g. <i>blood</i> / <i>y</i> base + suffix e.g. <i>writ</i> / <i>ing</i>
The grammatical content of any word may be changes by the addition of an <b>inflectional affix (suffix)</b> as in <i>drainpipe</i> / <i>s</i> , <i>writing</i> / <i>s</i> , <i>dislike</i> / <i>d</i> , <i>write</i> / <i>s</i> .		

Morphs, “*the smallest, indivisible unit[s] of semantic content or grammatical function which words are made up of*” (Katamba 1993:20), are either free morphs which can stand alone or bound morphs which depend on a root.

The root is a free morph with a specific semantic content; it can form a word on its own and as such it is often referred to as a lexeme. Bauer (1995:11) puts it this way: “*Any morph which can realise a lexeme and which is not further analysable ... is termed a root*”.

One or more affixes may be added to a root or a lexeme to form a new word. If they are placed in the beginning of the word, they are called prefixes; their function is to modify the semantic content of the word. If they are placed at the end of the word, they are called suffixes; their function is either to change the part of speech or the grammatical content of the word.

Affixes are either derivational or inflectional: the derivational affix “*produces a new lexeme*” (Bauer 1995:12); it changes the part of speech by the means of a suffix (e.g. noun  $\Rightarrow$  adjective: *blood*  $\Rightarrow$  *blood* / *y*) or it changes the semantic content by the means of a prefix (e.g. *adjust*  $\Rightarrow$  *re* / *adjust* / *like*  $\Rightarrow$  *dis* / *like*); the inflectional suffix does not produce a new lexeme, but changes the grammatical content of the word - it denotes e.g. plural in the case of a noun (*horse*  $\Rightarrow$  *horse* / *s*) or past tense in the case of a verb (*print*  $\Rightarrow$  *print* / *ed*).

The part that remains when the affix is taken away is called a stem, a stem base or just a base: “*When a derivational or functional [= inflectional] affix is stripped from the word, what remains is a stem (or a stem base).*” (Arnold 1973:12). “*We can call anything we attach affixes to, whether it is just a root or something bigger than a root, a base.*” (Bauer 1995:12). In the following, this word element will be referred to as the base.

Words may be simple words or they may be complex words composed of several elements, i.e. compounds or derivatives. Compounds consist of two or more free morphs (roots), which may or may not be glued together by a linking element. Derivatives consist of at least one free morph (a root), which forms the base of the derivative, and one or more bound morphs (affixes) (Jacobsen & Skyum-Nielsen 1996; Bauer 1995).

Seen from a morphological view, almost any word in Danish may be described along these lines. However, as in English, there is a category of words, represented in large numbers especially in scientific terminologies, which cannot be subjected to the usual distinction between compounds and derivatives. They are based on originally Latin or Greek word elements and they are usually referred to in English literature as neo-classical compounds.

## 2.1. Are neo-classical compounds really compounds?

Numerous linguists have pointed out that scientific terms in which word elements of classical origin are involved can hardly be defined as either compounds or derivatives. Examples of such terms are *bio|logy*, *geo|metry*, *hydro|meter*, *an|aemia*, *contra|ception*, *peri|cyst|itis*, *tubercul|osis*, *dys|pnea* (Danish *bio|logi*, *geo|metri*, *hydro|meter*, *an|æmi*, *kontra|ception*, *peri|cyst|it*, *tuberkul|ose*, *dys|pnø*).

Thus, Guilbert (1971:IX) remarks: “*Encore faut-il souligner que les éléments de composition d’origine grecque ou latine échappent à cette classification*”.

Bauer (1995:38) says about the neo-classical compounds that “*Their status and the rules governing their formation are not clear at the moment, and they are something of a linguistic oddity*”.

In a chapter on composition and derivation, Katamba (1993:323-4) chooses to treat these word formations in a separate section, and he

describes them as “...words ... which appear to straddle the borderline between compounding and affixation”.

In his work on technical and scientific French, Kocourek (1991:113 & 127-9) divides the elements used for the formation of scientific terms into four types, one of which is called “confixes”, a kind of bound roots which he describes as “*racines savantes antérieures (ex. logo-) ou postérieures (-logie [-logy])*”. Consequently, he distinguishes between “confixation” and “composition” but he admits that terms like *phonol gramme*, *biol sphère*, and *pédol logie* have more in common with compounds than derivatives and therefore he is not quite satisfied with the term “confixation” which incorrectly suggests “affixation”.

Jarvad (1995:222-5), who is very much in agreement with Kocourek, has solved this terminological problem in a rather elegant way. Having admitted that “*certain affixes in some ways behave like roots and vice-versa*”, she divides roots into free roots and bound roots and calls the latter “kryptorødder” (crypto-roots) which she describes as follows: “*They have the same fixed meaning as a root, they may often be replaced by a root, cf. neo- and ny-kapitalisme, they sometimes appear alone but are most often combined with another crypto-root or a true root*” [my translation]. As examples, she mentions the Danish terms *etnol gruppe* and *frankol fil*.

The word elements which Jarvad has chosen to name “kryptorødder” (crypto-roots) seem to be identical to the word elements which in English are called combining forms. In his book on the morphological structure of the English word, Arnold (1973:34) describes the combining forms as follows:

“An affix should not be confused with a combining form. A combining form is also a bound form but it can be distinguished from an affix historically by the fact that it is always borrowed from another language, namely from Latin or Greek, in which it existed as a free form, i.e. a separate word, or also as a combining form. ... They [the combining forms] differ from all other borrowings in that they occur in compounds and derivatives that did not exist in their original language but were formed only in modern times in English, Russian, French, etc. Cf. polyclinic, polymer, stereophonic, telemechanics, television. Descriptively a combining form differs from an affix because it can occur as one constituent of a form whose only other constituent is an affix, as in cyclic”.

If, like Arnold, we agree that all classical word elements involved in the formation of these special terms may be called combining forms, there

is no problem in considering them as compounds. This is of course a quite uncomplicated and convenient way of dealing with the morphology of the hybrids but it implies, however, that some word elements which even in Greek act as affixes are suddenly reclassified as “combining forms” - word elements like *a-* or *dys-* or *-osis*. In other words: some of the word elements involved are indeed originally suffixes in Latin/Greek and are used as such also in Danish (or English) and therefore result in the formation of derivatives - not compounds! That is the case with some of the examples of hybrids mentioned in the beginning of this chapter, i.e.:

*pericystitis* = Greek preposition (*peri* = around) which functions as a modifier of the lexeme *cystitis* (*cyst* from *kystos* = “bladder” + *itis* = “inflammation”);

*anaemia* = Greek modifier *an* expressing “lack of” plus root (*aemia* from Greek *haima* = “blood”);

*contraception* = Latin preposition (*contra* = “against”) plus Latin lexeme (a noun formed from the verb *capere* = “to take”).

So the answer as to whether or not hybrids can be considered as compounds depends on the linguistic notions that are taken into consideration. From a mainly synchronic point of view, where the etymology is only superficially considered, we may consider all the original classical word elements involved in the formation of medical terms as roots or combining forms; this leads to the conclusion that the three above mentioned terms may be classified as compounds. From a diachronic point of view, i.e. when the etymology is taken into account, we are bound to distinguish between combining forms and affixes; this leads to the conclusion that some hybrids are compounds and some are derivatives.

## 2.2. How can combining forms be distinguished from affixes?

In his book on medical discourse, Ghazi (1985:8293) discusses the question of which criteria should be used to distinguish affixes from other word elements involved in the formation of complex words. He refers to other linguists who have used the reproducibility of a word element which functions as a modifier of another word element to decide whether it is an affix or a kind of root. A term like *electrocardiogramme* could e.g. be said to be a compound consisting of *electro-* and

*-cardiogramme*, but if the reproducibility of the first element is sufficiently high, this element might be considered to be no more than an affix and the whole term ends up as a derivative. As Ghazi points out, though, this decision would depend on an individual, subjective evaluation: how many times would the word element *electro-* have to be represented as a first element of the entries in a lexicon to be considered an affix: four, ten or fifty times? Thus, reproducibility cannot be used as a criterion.

The semantic value or “weight” seems to be a more useful criterion. The word elements that Ghazi finally includes in his list of medical prefixes all act as modifiers that do not add a totally new semantic dimension to the term. They represent semantic categories like degree, space, or time and are originally Greek or Latin prepositions or negatory/contradictory elements. The reason that I said “almost all of” the affixes is that a few of them, *di-* (two/double) and *tri-* (three/triple), seem to fall outside the system: firstly, they have their origin in Greek numerals which fall into the category of adjectives; secondly, why are they the only numeric word elements to be included in the list; why are not e.g. *tetra-* (four) or *penta-* (five) included? From a purely semantic point of view, it might be argued that numeric elements should all be considered prefixes, since they merely represent a semantic category which one might call “volume”. On the other hand, one might also argue that they do add a new or different semantic value to the term and that they should thus be regarded as combining forms. This is apparently the view adopted by the editors of e.g. the Concise Oxford Dictionary (Allen 1990) who describe the entries *di-* and *tri-* as combining forms just like *tetra-* and *penta-*. Ghazi seems to go a step further, since he takes into account the etymological aspect and thus reaches the conclusion that these particular two word elements are different: indeed, even in Greek, *di-* and *tri-* only exist as prefixes, i.e. bound morphs, whereas the numerals *tetra-* and *penta-* are considered as adjectives, i.e. free morphs.

After having set up a list of medical prefixes, Ghazi proceeds to the question of the suffixes. Once again, reproducibility is rejected as a criterion for distinguishing between suffixes and rootlike word elements (combining forms), because it implies an individual decision. Some of the suffixes he finally decides to include are common derivational affixes like *-ement* and *-ation* or *-ator* and *-able*. Others are carriers of a

more specific semantic value like *-itis* (inflammation) and *-osis* (illness) and therefore, it would at first be tempting to consider them combining forms. However, when the etymology of e.g. *-itis* and *-osis* is considered, one must agree with Ghazi: these word elements are in fact Greek derivational suffixes used to change certain adjectives into subjectives.

So even though a semantic point of view may be useful, it is only by taking the etymology into account that one can really distinguish affixes from combining forms. It seems that combining forms may be considered word elements which have their origin in Greek or Latin nouns, adjectives, or verbs, i.e. bases, roots or lexemes with a specific semantic content. Affixes, on the contrary, may be viewed as modifiers which function as suffixes also in the classical languages.

### 3. A tentative analysis of some Danish medical hybrids

The following morphological analysis of some Danish hybrids is based on the results of the preceding discussions, i.e. that some “neoclassical compounds” should not be classified as compounds but as derivatives. For the sake of comparison, the English and the French version of the Danish term is indicated.

#### HYBRID DERIVATIVES:

Ex. 1 *atrofi* (Eng. *atrophia*, Fr. *atrophie*):  
prefix *a* (Greek negation = “without”) + combining form *trofi* (from Latin noun *trophia* from Greek noun *trofe* = “nourishment”).

Ex. 2 *tuberkulose* (Eng. *tuberculosis*, Fr. *tuberculose*):  
combining form *tuberkel* (from Latin noun *tuberculum* = “tubercle”) + suffix *ose* (from Greek suffix *osis* = “illness”).

#### HYBRID COMPOUNDS:

Ex. 3 *elektrokardiogram* (Eng. *electrocardiogram*, Fr. *électrocardiogramme*):  
combining form *elektro* (from Greek noun *elektron* = “amber”) + combining form *kardio* (from Greek noun *kardio* = “heart”) + combining form *gram* (from Greek noun *gramma* = “letter”).

Ex. 4 *termografi* (Eng. *thermography*, Fr. *thermographie*):  
combining form *termo* (from noun *therme* = “heat”) + combining form *grafi* (from Greek verb *graphein* = “to write”).

A large number of questions remain to be answered yet before it will be possible to set up a list of medical affixes, suffixes, and combining

forms used in Danish medical hybrids. Thus, one question which has not been discussed is whether a list of suffixes should include commonly used derivational affixes like *-ion* and *-ing* or whether only the semantically “heavier” suffixes like *-ose* (= *-osis*) and *-it* (= *-itis*) should be included.

Another question that remains to be answered is how the combining forms are glued together in Danish: in most cases (as in some of the examples above), two combining forms are glued together with an *o*; should this *o* be considered as part of the classical base or root or is it a linking element? Sometimes the *o* has “fallen out” both in Danish, English, and French as in the case of *neuralgia* as opposed to *neurology* (Danish *neuralgi* and *neurologi*; French *neuralgie* and *neurologie*), whereas in other cases, the linking *o* present in the English term may be left out in Danish, e.g. in the case of *psyk(o)analyse* (English *psychoanalysis*; French *psychanalyse*). One plausible explanation might be that for phonological reasons, there is a tendency to leave out one vowel if it is followed by another one.

Finally, although all the hybrids used in Danish medical language can be tracked back to Greek and Latin, some of them may have come into Danish via a nonclassical language, e.g. English, French, or German. This is a factor that may also have influenced the way in which we spell or combine the different word elements: maybe the missing *o* in *psykanalyse* is a result of the term having simply been adopted directly from French?

#### 4. Conclusion

There seem to be some discrepancies as regards the definition of affixes versus combining forms. A more thorough morphological study needs to be carried out before it will be possible to distinguish affixes from combining forms and to define possible linking elements. Once this has been done, it will be possible for the future Medical Language Advisory Board on the one hand, to draw up a list of medical prefixes and medical suffixes, respectively, and on the other hand to make a set of simple spelling rules for the combining forms, the Danish “kryptorødder”. Such tools would be a great help for all producers of medical texts in Danish.

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