

*LOP-WEBBE AND HENNE CRESSE: MORPHOLOGICAL ASPECTS OF
THE SCIENTIFIC REGISTER IN LATE MIDDLE ENGLISH*

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ABSTRACT

The aim of the present paper is to present an approach to the vernacularisation of English scientific texts with special attention to lexicon. Word-formation is a better indicator than other linguistic levels of the extent to which the scientific register is adapted to the vernacular because such vernacularisation can be seen clearly when scientific items reproduce the patterns of the general lexicon. To this end, we will attempt to measure the degree of development of the vernacular scientific register by analysing word-formation processes. It is also our intention to ascertain whether there is a predominance of one particular linguistic stratum in texts of that kind from the late Middle Ages, unveiling the etymological origin of some lexical items of diverse provenance. The paper is therefore divided into four sections. In section 1 the socio-historical context of the scientific register is described briefly. Section 2 covers the processes of lexical enrichment in Middle English due to word-formation. The presentation of the corpus material and the analysis of data is dealt with in the third section. Finally, section 4 contains the conclusions reached in the light of previous research.

1. Socio-historical context

Medieval scholars studied, praised, rejected and criticised the theses of classical authors. In the 12th century medieval scholasticism conceived of science as deduction from assumed principles. A century later, still influenced by the earlier intellectual current, some scholars began to devote themselves to establishing the tenets of natural science: induction, experimentation and mathematics. For a time, the coexistence of both stances induced a kind of chaos. The Late Middle Ages was witness to a transitional intellectual climate, pervaded by theological digressions, matters of faith, and a general interest in achieving an accurate understanding of nature.

Some socio-historical factors, such as growing national consciousness, con-

tributed to the emergence of a vernacular scientific register and the consequent incorporation of English into prestigious fields of knowledge. The development of this specialised variety of English was facilitated by the Lancastrian language policy which attempted to strengthen the position of the vernacular against French (Taavitsainen 2000a, 2000b). However, vernacularisation was an arduous process that lasted around four centuries. The general use of English in the written record of scientific matters was adopted later than other new methodological proposals.

Studies of early scientific writings (Irma Taavitsainen, Päivi Pahta) reveal that the classical format of scholastic thought was still employed before the adoption of empiricism. There are two main external causes: the retention of the classical format was merely a linguistic necessity to cover the vacuum in English technical terminology; and socio-political interests were served in endowing the vernacular with prestige by incorporating Latin linguistic structures and lexical items.

2. Word-formation processes in Middle English

Halliday (1978: 87) has observed that in the field of scientific terminology there are seven strategies for lexico-semantic innovation, namely, reinterpretation of existing words, creation of new words from native resources, creation of new words from foreign resources, borrowing, calquing, creation of locutions and, finally, inventing new words. Of these seven strategies, only three were commonly used at this time: the reinterpretation of existing words to endow them with a specialised meaning, the creation of new words from a native word stock and borrowing, especially from classical languages. We will specifically concentrate on creation in our analysis.

Foreign words were adopted with their own structure, including affixes. Initially, these terms were considered foreign by speakers but as they spread among the speech/discourse community they became familiar terms and so did their affixes (Burnley 1992: 445-446; Runblad 1998; Castairs 2002: 103). Hence, the combination of foreign affixes with native roots or vice versa (*unknowable, colourless*). In the scientific register loanwords were frequently taken from other languages but they were seen as particularly foreign because this was a new register which was transmitted through the written medium. In addition, most of these texts were not addressed to the general public but to a scholarly elite. However, when the topic of the text concerned non-academic people more directly, the degree of vernacularisation of the text was higher.

According to the literature about historical derivational morphology (Marchand 1969; Burnley 1992; Kastovsky 1992), compounds and derivatives were the two most frequent word-formation processes in the early stages of the Eng-

lish language. In fact, compound nouns are the commonest type of compound in English (Castairs 2002: 60) particularly in scientific texts because “cultural and technical change produces more novel artefacts than novel activities or novel properties” (Castairs 2002: 62).

3. Our data

Our selection of material comprises texts of two types. On the one hand, medical texts, represented by an edition of MS H Glasgow, University Library MS Hunter 185, described in Young – Aitken (1908: 131-132), under the heading *Flora medica, Latine et Anglice*, etc.¹ On the other, astronomy texts are represented by Chaucer’s *A treatise on the Astrolabe*, edited by the *EETS*, and an extract from *The equatorie of planetis*, taken from the *Helsinki corpus of English texts (HC)*.

Both samples belong to the late 14th/early 15th century, the moment when scientific texts of different kinds were beginning to be written in English. Vernacularisation was not complete, however, as attested by the fact that our medical extract was copied around 1400 and contains items in English, Latin, and French, the same as does Chaucer’s. The gradual disappearance of multilingualism from scientific texts is symptomatic of an increasing degree of vernacularisation (Pähta – Taavitsainen 2004: 11). Moreover, and considering the tripartite hierarchical classification of medieval discourse forms, from most to least learned (commentaries, compilations and question-answer formulae (Taavitsainen 2004: 38)), and considering the intended audience/readership, our samples would seem to correspond to the lowest of these discourse forms: only the bare concepts/ideas are presented, with no exegesis or interpretations of contents. In the case of Chaucer, the text² is presented as an answer to a question by a child, whereas the compiler of the medical text intended to bring independent material together in one book probably because he wanted it to be used by practitioners. In both cases, the conscious use of English, as explicitly mentioned by Chaucer, seems to simplify the subject matter.

Our three samples contain 42,332 words. We have 20,788 words belonging to the medical recipes sample and 21,544 in the astronomy texts so both disciplines are more or less equally represented.

For the purpose of our study, those word classes which could be subject to different native morphological processes seem to be especially significant. In

¹ We are indebted to Dr Alonso Almeida who kindly allowed us to use the typescript of his edition.

² Astrological texts followed the question-answer pattern but this interactive form of transmitting scientific content did not necessarily require the explicit formulation of the first element, the question (Taavitsainen 2004: 63). We believe this is the case with Chaucer’s *Astrolabe*.

Millward's (1996) terms, English words can be inflected or uninflected (invariable). We have elected to examine inflected word classes or lexical categories to observe how they combine with native affixes or other lexical stems and see how the creation of new words can contribute to the vernacularisation of English.

In all those lexical categories, only nouns have been taken into consideration because, as Sager – Dungworth – MacDonald (1986) claim, nouns are typically found in those pieces of discourse in which not actions, but the transmission of ideas is intended (as is the case with the scientific register).

We have applied some other criteria to our selection of nouns prior to the scrutiny of data. We have excluded placenames, proper nouns (except when they appear as part of a compound: *herbe Robert*), *-ing* nominalised forms (*arising*, *akyng*), though we are aware this may be a risky decision, and adjectival nominalisations (*the same*). Cardinal points, nouns denoting seasons, days of the week, months of the year, constellations and zodiac signs have also been disregarded.

One of the most important decisions we had to make was whether a particular noun was standing on its own, followed or preceded by a modifier, or really part of a larger unit, a compound noun. As Kastovsky (1992) has already explained, sometimes it is difficult to distinguish between compounds and syntactic groups (in our case, noun phrases). However, since word-formations are lexical syntagmas based on a determinant (modifier)/determinatum (head) relationship (Marchand 1969: 3), some of the examples we have selected may be safely considered as compounds rather than as NPs.

3.1. Procedure

Once extracted from our samples, nouns were placed on a database containing the following fields: "Form", "Text", "Discipline", "Process", "Etymological origin", "Place in the text" and "Meaning".

The field FORM contains the form as it appears in the text, that is to say, with the different spelling alternatives. This means that all tokens have been considered. Here, we have only intervened in cases where there was no blank space between the determiner and the noun, as in the following example:

Zef þou may haue no lesard, tak spereston or asnyk... (*OMed*: 30-31)

The field TEXT contains the information about where the form belongs: "Med" is *Old medycynes*, "Astr" is Chaucer's *Astrolabe* and "Equa" stands for *The equatorie of the planetis*.

Since one of our aims is to study the behaviour of nouns in different scien-

tific disciplines, the field DISCIPLINE divides our nouns in “Med” or “Astr” respectively.

In PROCESS, different kinds of information have been included:

“No” indicates that the form undergoes no derivation or compounding process. This has, however, been applied very rigidly because it has been applied also to compound and derivative nouns that were already so in the source languages. Consequently, cases such as *aloes epatik*, *archangel*, *brymston* or *chikemete* (a phrase in OE *cicena mete*) have not been considered to have undergone any morphological process during the ME period itself,³ but adopted already as existing compounds or derivatives from the source language (either foreign or OE). In this respect, we are conscious of not being in line with the works of authors such as Dalton-Puffer (1996) but we believe that doing otherwise, considering inherited forms as well, would not reveal which processes were actually taking place in Middle English. Similarly, even though phrasal words are terms that have the internal structure of phrases but function syntactically as words (Castairs 2002: 59), we consider them to have undergone no morphological process.

“Der” is the label given to those forms undergoing some derivational process in ME. To this end, we have checked the dates provided by the *Middle English dictionary* (*MED*, henceforth) for the first occurrences of such forms in the quotations it includes. If a particular item is not quoted before 1300, we consider it to have been coined during the ME period. This decision has forced us to exclude many more examples, such as *seknese* or *handful*.

In the same vein, the label “Comp” was applied, using the same criteria, to those nouns that seem to have been formed after 1300, again according to the *MED*.

The field ETYMOLOGICAL ORIGIN contains the information provided by the *MED*. On occasions we have found that such information collided with our own knowledge of particular forms but consistency demanded that we followed it all the time. Consequently, though we would have liked to classify *myrre* or *mygran* as having a French or Latin origin, we entered OE for this field.

Two other related fields were useful in distinguishing etymological origins: PLACE IN THE TEXT and MEANING. The PLACE IN THE TEXT helped us decide on the MEANING of those items such as *ache* that could mean ‘pain’ and have an OE origin or mean ‘celery’ and have a French origin.

³ Other studies (Crespo 2004) reveal that OE is the prevailing origin in compounding. In fact, there are two clear tendencies: that of nouns of Germanic origin (OE, ON, etc.) and nouns of Italic origin (OF, L and similar). Among those belonging to the first group, few different processes have been observed, suffixation and compounding being the most relevant ones. Those words etymologically ascribed to the Romance languages are, from a formal stance, much more complex. Affixation is quite common in this group. Nevertheless, these lexical items seem to have been adopted from the corresponding donor languages as originally derivative nouns.

3.2. Analysis

Table 1 below shows that of the more than 42,000 words, 9,245, that is to say 21.83%, are nouns and they are distributed on a more or less equal basis between medical and astronomy texts.

Table 1. Nouns in our corpus

Sample	N° of words		N° of nouns		%	
<i>Old medycynes</i>	20,788		4,538		21.8	
<i>Astrolabe</i>	14,908	21,544	3,413	4703	22.85	21.82%
<i>Equatorie</i>	6,636		1,290		19.43	
Total	42,332		9,245		21.83%	

3.2.1. Word-formation

However, the word-formation processes are not the same, as can be seen in Table 2 below:

Table 2. Word-formation processes in our corpus

Discipline	Total nouns	Compounding	Derivation	Hybrids	None
Astr.	4,703	95	3	—	4,605
Med.	4,538	175	34	2	4,327
Total	9,241	270	37	2	8,932

Most nouns show no word-formation process whatsoever during the ME period. As mentioned before, this includes those processes already taking place either in the original language (so that the form was imported after the process was completed) or in OE, which may coincide with Castairs–Mccarthy’s (2002: 21) statement for PE that “the English language has a natural preference for free roots”.

Apart from that, Table 2 shows that our corpus contains more tokens in the compounds group than in the derivative one and that they appear more often in the medical recipes. This may be due to the fact that this text was addressed to practitioners so the language really had to adapt to practical needs whereas the other samples (on astronomy), though supposedly directed to a child, have a more theoretical nature. The influence of the type of text and the intended readership on the choice of vocabulary is obvious: more theoretical texts borrow Latin words more readily than those intended for practical purposes even though both are specific.

In this sense, we could affirm that though we can find the seeds of ESP in both disciplines, the selection of vocabulary is not only a question of specificity

but also of the level of the discourse form mentioned earlier (we should bear in mind that the texts are addressed to a non-learned readership, Taavitsainen – Pahta 2004).

The data for our survey reveal derivation as a minor process. It is more abundant in the medical text than in the astronomy ones though the whole 34 tokens correspond to just five types (*sponeful*, *saucerful*, *costifnes schelleful* and *sewet*). This means that derivation is almost non-existent and we are conscious that this is partly due to the criteria we chose for selection purposes. Within derivation all forms found had been added suffixes. No instances with prefixes have been traced

3.2.2. Etymological origin

The scrutiny of non-complex nouns in the remedy book reveals that OE (61.13%) is considerably more numerous than other origins. OF comes second with 12.43% of all instances. In the astronomy samples the predominant origin is OF with 41.3%, closely followed by OE with 36.13%.

Surprisingly enough, though Latin occupies the third position in both text-types, it provides the etymological origin for 19.56% of non-complex nouns in astronomy samples but only 5.73% in the remedy book.

Table 3. Etymological origins of non-complex nouns

Medical text		Astronomy texts	
Origin	%	Origin	%
OE	61.13	OF	41.3
OF	12.43	OE	36.13
L	5.73	L	19.56
OE&OF	4.6	AF	2.52
ON	3.82	ON	8.43
AF	3.65	OE&OF	0.08
Unk	0.3	Unk	0.02
Mdu & MLG	0.21	Mdu & MLG	0

As can be seen in Table 3 above, several Germanic languages are present in the medical text. This is not so for both astronomy samples where Romance language sources stand out.

We have also analysed the etymological origin of the elements involved in the processes of compounding and derivation when they take place in ME. Tables 4 and 5 display for each discipline and process in descending order the

etymological structure of forms according to the information provided by the *MED*:

Table 4. Complex nouns in astronomy texts: Etymological origins

Process	Origin	Tokens	Example
Der	OF & L + OE	2	<i>Philosopre, Kalkuler</i>
	AF + OE	1	<i>Streitnes</i>
Comp	OE & L & OF + OF & L	31	<i>Line meridional</i>
	OF & L + OE & L & OF	16	<i>Meridional line</i>
	OE + OE	11	<i>Lop-webbe</i>
	L + OE & L & OF	10	<i>Ecliptic line</i>
	OE & L & OF + ML	8	<i>Line alhuda</i>
	L + OF & L	3	<i>Altitude meridian</i>
	OE & ON + OE & OF & L	3	<i>Cros-lyne</i>
	OE + L	3	<i>Sterre fix</i>
	OF + OE	3	<i>Mene while</i>
	OF + OE & L & OF	3	<i>Equinoxial line</i>
	OF + OF & L	3	<i>Equinoxial cercle</i>
	OE & OF & L + OF & L	2	<i>Line occidentale, line orientale</i>
	OF & L + OF	2	<i>Cercle equinoxial</i>
	OF & L + OF & ML	1	<i>Plom rewle</i>
	OE & OF & L + OF & L & ML	1	<i>Line orisonte</i>
	L & OF + OF & L	1	<i>Latitude meridional</i>
	L + OE	1	<i>Expanse yeres</i>
	OE & OF & L + OF	1	<i>Line equinoxial</i>
	OE & ON + OE	1	<i>Karte whel</i>
OE + OF	1	<i>Body celestial</i>	

In the derivative processes of astronomy texts, there are just three instances in which a French or Latin base combines with an OE suffix (*kalkuler, philosophre*), though the *-er* suffix they exhibit may well have already been present in the original form.

As for compounding, most instances belong to the combination of OE & L & OF, the OE base having been incorporated into the language previously from Latin through OF, and an OF from Latin base (*line meridional*). The inconsistency of ME word order may be detected in the variable position of the elements forming the compound noun: N + A (*line meridional*) or A + N (*meridional line*) (Moskowich 2002). The second compound in number of occurrences corresponds to the combination of OE + OE as illustrated in *lop-webbe*. Combi-

nations of bases from Latin and French origin come next: *ecliptic line* or *altitude meridian* are some examples of this. Likewise, it is worth noting, as cases of etymological hybridisation, the combination of OE + L in *sterre fix*, OE + OF in *body celestial* and even L + OE in *expanse yeres*.

Few differences were found in the medicine text as Table 5 below shows:

Table 5. Complex nouns in the medical text: Etymological origins

Process	Origin	Tokens	Example
Der	OE + OE	23	<i>sponeful</i>
	OF & L + OE	4	<i>saucerful</i>
	OF + OE	3	<i>costifnes</i>
	ON + OE	2	<i>schelleful</i>
	OE + OF	1	<i>Sewet</i>
Hybrids ⁴	L + OE + OE	2	<i>Spanyssch code</i>
Comp	OE + OE	131	<i>penywit*</i> , <i>cheken wede</i>
	OE + OF	18	<i>Henne cresse</i>
	? + OE	4	<i>charcol</i>
	L + OE	3	<i>lorelecre</i>
	CF + AF & ML	2	<i>Oyle roset</i>
	OF + AF + OE	2	<i>Weperes grece talwe*</i>
	OE + ON	2	<i>Lyle rote</i>
	OF + OE	2	<i>gingebred</i>
	OF + OF	2	<i>Nigre piper</i>
	AF + OE	1	<i>chirystones</i>
	AF + OE + OE	1	<i>Chiristones Kernelles*</i>
	CF + OF	1	<i>Oyle laue</i>
	L & OF + ML	1	<i>Sal armoniak</i>
	ML + ON	1	<i>bosschel</i>
	OE & L + L & OF	1	<i>Radich sexfragie</i>
OE + ML	1	<i>erdoresses</i>	
OF + L	1	<i>Turbyt albi</i>	
OI + OE	1	<i>cordogge</i>	

There is a clear preference for the etymological coincidence of both base and suffix in the derivative processes of the medical text (*sponeful*). However, the same suffix also combines with bases of OF & L (*saucerful*) and, even, ON origin (*schelleful*).

The opposite process, OE base plus OF suffix, is also, though minimally, present: *sewet*. A morphological hybrid is also found in *Spanyssch code* as it involves suffixation (*span-yssch*) and compounding.

Compounding is the prevailing word-formation process in this text as well

and the most conspicuous type is the combination of two OE bases, as in *penywizt* or *cheken wede*. However, the number of occurrences of this etymological structure is followed by the pattern OE + OF (*henne cresse*). OE mixes with forms of unknown origin as in *charkol* and with Latin (*lorelcre*); and also, with ON, OI and OF or AF, as in *lyle rote*, *cordogge*, *gingebred* and *chirstones*, respectively.

Combinations taken from French were also found: *nigre piper* (OF + OE), *oyle laue* (CF + OF); and even French with Latin, as in *sal armoniak* (L & OF + ML).

4. Conclusions

We have seen that few nouns in the incipient scientific works of the fifteenth century have undergone a word-formation process in ME.

Basically, the predominant linguistic strata of both disciplines differ. Broadly speaking, though all the samples under survey belong to the lowest rank of the tri-partite classification of medieval discourse forms, the predominance of Germanic origins in the medical text and that of Romance languages in astronomy texts may be due to the different intended readership. The remedy book was conceived of as a practical guide whereas the more theoretical nature of astronomy samples encouraged the use of a less common lexical inventory.

Latin and Old French represent the etymological source of most complex nouns in astronomy texts. Old English is the most frequent origin in the suffixes and bases of the medical text, evidence, once again, of a clear process of vernacularisation in this discourse form. Our results seem to confirm that native Germanic affixes attach to free bases (Germanic, usually) while affixes that attach to bound bases tend generally to be borrowed (Castairs 2002: 106). If it is true that a language “comes of age” when it can express any extra-linguistic reality by resorting to its own mechanisms, then, as far as the lexical category of nouns is concerned, fifteenth-century English appears to be an adult.

Vernacular production targeted a particular type of audience, a prosperous middle class with a growing demand for books they understood and from which they could learn. The parallel growth of prosperity and literacy in this period is clear (Taavitsainen 2002) and is probably accompanied by a growth of special Englishes since registers can be defined as the linguistic manifestation of specific activities of a speech community. A register acts as a response to a particular demand in society which requires the verbal description of a conceptual area of reality.

Nonetheless, we should underline that this study on the morphological behaviour of scientific English will not be complete until verbs and the other lexical categories/inflected word classes are analysed.

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