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Your very first ESP text (wherein Chaucer explaineth the astrolabe)

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Your very first ESP text (wherein Chaucer explaineth the astrolabe)

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Introduction

- 1 Chaucer is primarily thought of as a literary author. Indeed, probably few realize that he ever produced anything that might be conceived of as a scientific text. Nevertheless, in 1391, Chaucer wrote *A Treatise on the Astrolabe*. Even those who refer to “scientific” aspects of his writing (Curry 1960, Savory 1953), usually only mention allusions to astrology or alchemy in his literary work. To the best of my knowledge Turner (1972) was the first to mention the *Treatise* as a scientific text. And the first to discuss it at any length was Halliday (1988, 1994 ; Halliday & Martin 1993), who described it as “a kind of technical, perhaps proto-scientific discourse” (1988 : 165). He contrasts Chaucer with Newton whom he sees as the originator of modern scientific style, particularly in his development of grammatical metaphor as a stylistic device, notably in the form of nominalization of processes.
- 2 In this paper I hope to show that the comparison with Newton is not wholly valid, due to the nature of the texts concerned. I shall discuss the features of grammatical metaphor, the passive voice, and personal pronouns in Chaucer’s text and in an equivalent modern text. And I shall consider instructions for use as they appear in the *Treatise* and as they are written today.

The Nature of the *Treatise*

- 3 The first thing to be said about Chaucer’s *Treatise on the Astrolabe* is that it is not a research paper, indeed it does not deal with experimental science in any way. Thus it cannot be directly compared to a modern journal article, nor to the writing of Newton, whose difficulty was precisely to find new stylistic strategies to account for the new experimental nature of the science he was proposing.

Chaucer's text is ostensibly addressed to his son. The opening words are :

Lyte Lewys my sone, I aperceyve wel by certeyne evydences thyn abilitie to lerne sciences touching nombres and proporciouns, and as wel considre I thy besy praier in special to lerne the tretys of the Astrolabie.

- 4 Some specialists claim that Chaucer had no natural son of his own, but even if this were to be the case, it is evident from the above that the text is written for a young person (Banks 1997). A little later he gives the age of the person he is addressing as ten years, and justifies his use of English, on the grounds that this young person's command of Latin would be insufficient to read a work of this type in that language :

[...] and somme of hem ben to harde to thy tendir age of ten yeer to conceyve. This tretis, divided in 5 parties, wol I shewe the under full light reules and naked wordes in Englissh, for Latyn ne canst thou yit but small, my litel sone.

- 5 One is also struck by Chaucer's pedagogical awareness. He is conscious of the fact that he is writing for a young person and deliberately writes with this in mind, apologising to more sophisticated readers for his pedagogical approach :

Now wol I preie mekely every discret persone that redith or herith this litel tretys to have my rude endityng for excusid, and my superfluite of wordes, for two causes, the first cause is for that curious endityng and hard sentence is ful hevy at onys for such a child to lerne. And the secunde cause is this, that sothly me semith better to writen unto a child twyes a god sentence, than he forgete it onys.

- 6 The idea that it is better to write something twice for a child, than that the child should forget it once, is particularly charming.
- 7 Chaucer originally intended writing five parts, but in the event only the first two were completed, so the text we have today consists of a Prologue, Part 1, which is a description of the instrument, and Part 2 which are instructions for its use. The sort of modern text to which this most closely corresponds would seem to be the "how it works" type of book written mainly for teenagers. I shall therefore use such a book, *Machines and How They Work* (Burnie 1990), for comparative purposes. In this book, although there are some machines that children use themselves, like bicycles, the majority are not, for example, hovercraft or mechanical diggers. They are therefore mainly descriptive and the following sections will compare this book with the Prologue and Part 1 of Chaucer's *Treatise*. I shall nevertheless say something about instructions for use in a later section.

Grammatical Metaphor

- 8 The notion of grammatical metaphor, as developed by Halliday (1987, 1988, 1994a, 1994b ; Halliday & Martin 1993) and his collaborators (Downing & Locke 1992 ; Eggins 1994 ; Bloor & Bloor 1995 ; Lock 1996 ; Thompson 1996) within the framework of systemic functional linguistics, is a metaphor that operates by means of a change in grammatical function, rather than a change in semantic function. Thus if instead of "they separated" we say "their separation", we have produced a grammatical metaphor ; in this case, a process, normally encoded as a verb, has been encoded as a noun. Nominalisation of processes is perhaps the most obvious case of grammatical metaphor, and the one that is most interesting for the study of scientific text. This permits modification of the new nominal form, e.g., "their lengthy separation". It is difficult to add this extra information if we retain the verbal form : "they separated for a long time". As a nominalised form it can

fulfil any nominal role, such as subject or object of a clause : “Their lengthy separation has been beneficial”.

- 9 Halliday maintains that use of grammatical metaphor constitutes the major difference between Newton and Chaucer. This, he claims, was the great stylistic advance made by Newton. We would therefore not expect to find a great deal of grammatical metaphor in Chaucer’s text. This turns out to be basically true. In the Prologue and Part 1 there are 33 examples of nominalized processes. The nouns in question, with the number of occurrences of each, are shown in Table 1.

Table 1

cause	7
conclusion	16
declinacioun	3
descripcioun	1
divisioun	2
governaunce	1
mediacioun	1
praier	2

- 10 It will be noted that “conclusion” accounts for almost half of the examples. Moreover this is the word that Chaucer uses for each of his sections in Part 2.
- 11 Perhaps more interesting as a first step towards grammatical metaphor is Chaucer’s use of the -ing form as a verbal noun. Joseph Banks, the botanist who sailed with Cook to Australia almost a century after Newton’s time, did not use nominalisation to any extent, but he did use -ing forms extensively (Banks 1996). It is probably not insignificant that at that time botany was still a descriptive, and not an experimental science. In the Prologue and Part 1 of Chaucer’s text there are 14 examples of -ing verbal nouns (see Table 2).

Table 2

arisyng	2
endityng	2
knowing	1
moevyng	8
worchynge	1

- 12 The verbal noun “moevyng” accounts for more than half of the examples and in one case we see Chaucer using both the finite and non-finite forms in the same sentence :

And all that moeveth withinne the hevedes of thes Aries and Libra, his moeving is clepid northward : and all that moeveth without these hevedes, his moevyng is clepid southward.

- 13 Turning to our modern children’s text, nominalisation seems no more common than it does in Chaucer. In 8 pages selected at random, I found only 12 examples (see Table 3).

Table 3

design	1
movement	6
pollution	1
position	2
rock-falls	1
work	1

- 14 Hence, although I suspect Halliday is basically right in citing Newton as an innovator in terms of scientific style, it is not valid to use Chaucer as a comparison. He was writing a different type of text, a different sub-genre. Comparison with a modern text much closer to the type of text Chaucer was writing, displays no more nominalisation than Chaucer’s text does.

Passive Voice

- 15 Use of the passive is probably the most frequently cited linguistic feature of scientific text (Banks 1994). It would therefore be interesting to see whether it plays any significant part in Chaucer’s text. According to some specialists (Mossé 1959 ; Crépin 1972) Middle English had no passive voice. They go on to say, however, that this notion is expressed with the periphrastic form of *be* + past participle. I consider that the definition of the passive is a structural one ; that is, it is a label for a form, and that that form is precisely *be* + past participle (Banks 1987, 1994). Some (e.g., Halliday 1994a) adopt a purely semantic definition of the passive, involving role reversal of the grammatical functions. This leads him to say that *The leader is John* is the passive of *John is the leader*. This, it seems to me is merely confusing the issue. I will therefore consider that the term “passive” is a label for a form, that in English that form is realized by *be* + past participle, and I will treat such forms in Chaucer as passives.
- 16 In the Prologue there are 7 passives of which 6 are mental process and 1 verbal process. It might also be noted that in earlier versions of systemic theory, verbal process was conflated with mental process, being considered a choice within it. In Berry 1975, for example, what is now usually called verbal process, was classed as externalized mental process. In Part 1, there are 67 passives, of which 10 (15 %) are mental process, 36 (54 %)

verbal process, and 21 (31 %) material process. The most commonly used verb is *clepe*, which occurs 33 times in Part 1 and accounts for 49 % of the passives in the section. The verb *calle*, which has given the contemporary English verb, is used only once as a passive in this section. It is true that as it is used, *clepe* constitutes a verbal process which is in fact fairly close to relational process, but it still maintains sufficient of its verbal nature to be classified as verbal. The following is a typical example :

Of this forseide skale fro the cross lyne unto the verrey angle is clepid Umbra Versa,
and the nethir partie is clepid Umbra recta ...

- 17 The other verbs which are used a significant number of times are the material process verb *divide*, which occurs on 9 occasions, and the mental process verb *ymagyne*, which occurs 5 times :

And understond wel that degres of this bordure ben aunswering and consentrike to the degrees of the equinoxiall, that is dividid in the same nombre as every othir cercle is in the highe hevene.

Thys forseide grete pyn in manere of an extre is ymagyned to be the Pool Artik in thyn Astralabie.

In our text there are 13 other verbs with between 1 and 3 occurrences each.

- 18 In the sample from *Machines and How They Work* there are 45 examples of passive voice. This, in terms of raw numbers, seems to be of the same order as Chaucer's text. However, in the modern text, the passive voice occurs almost exclusively (that is, 44 of the 45 examples) with material process :

[...] the sewing speed and the shape of the stitches can be controlled very precisely.
Four-wheel drive cars, which are designed to travel over rough ground, are driven by all their wheels.

When the first railway and road tunnels were built during the last century, many of the men who dug them were killed through rock-falls.

- 19 The single exception is of mental process, and this has strong interpersonal content as it occurs as an interpolated speaker comment :

The first "horseless carriages", as they were known, were slow, uncomfortable and difficult to control.

- 20 Consequently, although it is true to say that Chaucer uses passive forms, his use seems to differ from that of a modern author writing a comparable type of text.

Personal Pronouns

- 21 The comparative absence of personal pronouns is also considered to be a feature of scientific text, so this would also seem to be a suitable area of investigation. Chaucer uses the first person singular pronoun, *I*, on 14 occasions in the Prologue, and 13 of these are in the first 64 lines which constitute a general introduction. On the other hand, only 8 examples occur in Part 1, which is about three times as long as the Prologue. Of those that occur in the Prologue, 11 occur with mental process verbs :

... I aperceyve wel by certeyne evydences thyn abilitie to lerne sciences ...

... in any tretis of the Astrelabie that I have seyn, there be somme conclusions that wol not in alle thinges parformen her bihestes ...

The other three examples occur with verbal, material and relational process :

... yf God wol vouche saaf and his Moder the Maide, moo then I behete.

... therefore have I yeven the a suffisant Astrelabie ...

I n'am but a lewd compiler of the labour of olde astrologiens ...

- 22 The eight examples in Part 1 are however exclusively verbal :
- ... for from henes forthward I wol clepen the heichte of any thing that is taken by the rewle “the altitude”, without moo wordes.
Now have I told the twys.
- 23 In the modern text, first person pronouns are extremely rare. Where they do occur, they are plural, not singular, and have a general or inclusive sense :
- We know exactly who invented modern machines such as the car, the vacuum cleaner and the hovercraft.
Although we cannot feel it, the atmosphere above us is very heavy.
- 24 When we turn to second person pronouns, we find that Chaucer has 12 in subject position. Of these 7 occur with a modal verb, which is a finite verb in Chaucer’s English. If however we consider the following infinitive in these cases to constitute the process type, then 6 of them occur with mental process verbs, 4 with relational and 2 with material :
- ... in which thou maist lerne a gret part of the generall rewles of theorik in astrologie.
... which thou maist turnen up and down as thiself liketh ...
- 25 There are also 4 occurrences in non-subject positions, and 32 possessive forms, of which the type *thyn/thin Astrolabie* accounts for 11 tokens :
- “Thy zodiak of thin Astrolabie is shapen as a compas which that contenith a large brede as after the quantite of thyn Astrolabie ...”
- 26 Moreover Chaucer had available a singular/plural choice, which was not simply a question of grammatical number, but involved an interpersonal component, the singular being the intimate choice, similar to the *tu/vous* distinction in modern French. Chaucer systematically uses the singular/intimate form.
- 27 In the modern text, second person pronouns are very rare. Of the 26 chapters in the book only 9 make any use of the second person pronoun at all. When it does occur, it tends to do so in the introductory paragraph. It tends to be associated with *if* or *when* clauses. It usually occurs with material, occasionally with mental, process, and modality is rare. The few possessives that occur are usually with parts of the body :
- If you have ever tried sewing, you will know that it is a slow job.
When you suck through a straw, the pressure in your mouth becomes less than that of the air outside.
- 28 On the basis of this evidence, it would seem to be the case that although personal pronouns are used in both texts, they are rather more frequent in Chaucer, and they are used in different ways.

Instructions for Use

- 29 Part 2 of *A Treatise on the Astrolabe* consists of instructions for its use. There are 40 of these instructions in separate sections. A further 6 sections are of doubtful authenticity. What is immediately striking about these instruction is that, of the 40 sections, 29 have basically the same syntactic structure: this is an infinitive clause followed by an imperative clause :
- To knowe justly the 4 quarters of the world, as Est, West, North and South.
Tak the altitude of thy sonne whan the list, and note wel the quarter of the world in which the sonne is for the tyme by the azymutz.
- 30 To knowe in which partie of the firmament is the conjuncceyoun.

Considere the tyme of the conjuncyoun by the kalender as thus : - Loke hou many houres thilke conjunccioun is fro the midday of the day precedent, as shewith by the canon of thy kalender.

To fynde the lyne meridional to dwelle fix in eny certeyne place.

Tak a round plate of metal ; for werpyng the brodder the better ; and there upon a just compas a lite within the bordure.

- 31 The modernity of the structure is, I think, immediately evident. Here are just a few modern examples, selected at random :

To open the door turn the handle anticlockwise. (hand-written note pinned to church door, Edlingham, Northumberland)

To enter the next Prize draw complete and return this questionnaire in the next 10 days. (BT promotional competition)

To prime, push bladder with a paper clip until ink fully coats silver plate. (instructions, Hewlett Packard print cartridge)

- 32 This structure is so ubiquitous in instructions for use that one only has to look at a few examples of the genre to find numerous instances. At first sight, it seems quite astonishing that a structure has maintained its function virtually unchanged over a period of six centuries. The question then is, of course, whether it has changed to any extent, or has it remained identical. One factor that is noticeable is that Chaucer's examples occur exclusively with mental process verbs. Indeed, 25 of the 29 examples occur with the same verb, *knowe* ; the verb *fynde* occurs twice, and the verbs *prove* and *turn* (which here means to make a mathematical conversion) once each. Modern examples, on the other hand, tend to occur mainly with material process verbs.

Conclusion

- 33 Chaucer's *Treatise on the Astrolabe* is then an interesting historical starting point for the development of ESP, as it probably constitutes the first ESP text in the English language. However, we must be clear about the nature of the text, about what particular kind of text it is, and therefore what sub-genre it belongs to. It comprises a technical description, and a set of instructions for use, but these are addressed to, and written for, a young person. It serves no useful purpose to compare it with sub-genres which are comparatively far from it, without recognizing those differences in genre.
- 34 In this paper I have looked at Chaucer's use of grammatical metaphor, passive forms, and personal pronouns, in the Prologue and Part 1, and compared these with a modern text of the same type. I have also considered the instructions for use found in Part 2.
- 35 There is comparatively little grammatical metaphor in Chaucer's text, but there is little in a comparative modern text too.
- 36 Passive forms are used both by Chaucer and in the modern text. However, whereas 36 % of Chaucer's passives occur with verbal process, and 21 % with material process, the modern examples are almost all with material process.
- 37 First and second person pronouns are used in both texts, though not extensively, but they are used in different ways in the two texts.
- 38 Chaucer makes extensive use of an infinitive + imperative syntactic structure in his instructions for use. This bears remarkable resemblance to the structure used in many modern instructions for use. However, whereas Chaucer's examples are exclusively of mental process, modern examples tend to be mainly of material process.

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RÉSUMÉS

Treatise on the Astrolabe de Chaucer est un texte scientifique, mais il s'adresse à un enfant et doit être comparé uniquement à des textes similaires. Il comprend une description de l'astrolabe et son mode d'emploi. Chaucer utilise peu la métaphore grammaticale, mais un texte moderne comparable n'en utilise pas davantage. Il emploie quelques formes passives, mais avec des procédés différents de ceux d'un texte moderne. Il utilise des pronoms personnels mais pas de la même façon que le ferait un texte moderne. Son mode d'emploi a une forme syntaxique apparemment moderne, mais les procédés sont différents par rapport à un équivalent actuel.

Chaucer's *Treatise on the Astrolabe* is a scientific text but one addressed to a child, and should be compared only with similar texts. It consists of a description of the astrolabe and its instructions for use. Chaucer uses little grammatical metaphor but neither does a comparable modern text. He uses some passive forms but with processes different from those in a modern text. He uses some personal pronouns but not in the same way that a modern text does. His instructions for use have an apparently modern syntactic form but with different processes from the modern equivalent.

INDEX

Keywords : Chaucer, grammatical metaphor, instructions for use, passive voice, personal pronoun, scientific text

Mots-clés : Chaucer, métaphore grammaticale, mode d'emploi, pronom personnel, texte scientifique, voix passive

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