1 Vernacularisation of scientific and medical writing in its sociohistorical context

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1.1 Science and medicine in the medieval period

In the history of the English language, the register of scientific writing is one that shows almost unbroken continuity from the earliest periods to the present. However, the conception of what counts as science and scientific writing has undergone fundamental changes in the course of time. Medieval classifications of knowledge include fields like music, physiognomy, and areas that border on the occult and magic.[1] Distinctions between various branches of science were not made in the present way, for example astronomy was a main scientific interest of the scholastic age with astrology as its application; it also formed an integral part of medical theory and practice (see e.g. French 1994). The influences of the macrocosm projected on the microcosm of man, the centre of the universe. The heavens influenced all worldly conditions and affairs from health to appropriate times for performing various actions (see Plate 1).

The earliest layer of scientific writing in English dates from the Anglo-Saxon period. A continuous line of development can be traced from the end of the fourteenth century up to the present in the field of medicine, which provides us with the perspective of register and genre conventions vacillating and developing over seven centuries. The fourteenth and fifteenth centuries, i.e. the time when scientific texts started to appear on a larger scale in English, fall within the prime of scholasticism in England. Thus the vernacular tradition emerges from the background of already established conventions of scientific writing in Latin. The Latin tradition and its conventions also provide a point of comparison for the assessments of early vernacular scientific writings in the present volume.

One of the most distinctive characteristics of scholasticism has been said to be its unfailing persistence in examining its own progress (Jacquart 1998: 197). This feature is attested in the layered nature of learned texts of the period. Western science was initiated by ancient Greek scientists in their search for principles of nature and, at the same time, for principles of argumentation for presenting their ideas (Crombie 1995: 225). New generations of scientists based their studies on texts written by their predecessors, quoted and elaborated them or explicated

their sayings. Accordingly, references to authorities are perhaps the most conspicuous feature of the logocentricity of medieval science (see Demaitre 1976, and Taavitsainen and Pahta 1997, 1998). Within this general frame there was, however, room for innovation and progress. The attitudes to the 'new' and the possibility of progress vary according to the epistemological levels and different genres, such as commentaries, compendia, and surgical or pharmacological writings (Crisciani 1990: 120, 126).

Theoretical foundations of medicine were likewise derived from antiquity. Learned Arab scholars emphasised and systematised the links between medicine and philosophy already extant in the basic core. The development of medicine towards its high peak of scholasticism took place in Italy from the twelfth century onwards (Siraisi 1990: 11–13, 48). Unlike for example philosophy, medicine was both a science and a craft, and combines both theory and practice (cf. Demaitre 1975; see also French 2001: 68–75). Moreover, the practical nature of medicine was undoubtedly a major incentive for the social diffusion of academic knowledge in the field, and through the process of vernacularisation, more people gained access to learning and useful knowledge. Practical considerations were probably not the only factors promoting vernacularisation. The process was also advanced by ideas about the vernacular language and was tied to issues of nationalism (cf. Evans *et al*. 1999; see also Taavitsainen 2001b).

1.2 The aim and approach of this volume

This volume describes the late medieval period of English scientific writing from the late fourteenth to the sixteenth century. It tackles three core issues in the vernacularisation of scientific and medical writing, illuminates them from various angles, and shows how this field of writing developed. The emergence of the scientific register in English is part of a larger pattern. Similar developments took place in other vernaculars in Europe at the same time, and new discourse communities were created alongside the pan-European discourse world in Latin. Writings in the new medium, the English language, altered the scene as access to knowledge became available for a wider readership. The new discourse world was not created in a vacuum: what we have as the basis of our assessment is texts, i.e. communicative exchanges, from the scientific discourse world of the late medieval period. Historical information about the social basis of discourse communities is scarce, but the sociohistorical context necessarily includes the people who produced the texts and those who consumed them. The chapters in the book take this into account and deal with linguistic processes without forgetting language-external factors – the people who wrote and read these texts, the conditions under which they worked, and the materials they had at hand. This is the first unifying theme.

The second theme shifts the focus to the producers of texts and approaches vernacularisation specifically from the point of view of people involved in the processes of book and text production from the commentator, the compiler and the translator to the scribe. The introduction of a new field of writing in English

posed several challenges to those in the vanguard as the means of expressing scientific ideas in the vernacular had to be invented. Writers developed various strategies to overcome the difficulties. Decisions were made at several levels, as will be demonstrated in the following chapters. The language form adopted for texts in the new register may also have involved conscious choices to ensure communication and enhance the national language. Strategies for rendering scientific texts into the vernacular, whether on the level of discourse forms, phrasal units, lexis, or dialectal forms and spelling variants, are the second focus of this volume.

The third theme is perhaps more abstract and less obvious, but it is nevertheless an important underlying influence in scientific writing of the Middle English period. The scientific register was created and its writing conventions established at a time when no national standard in language use existed. Models were adopted from foreign sources, though it is also possible that some practices arose within vernacular discourse communities. The influence of Latin traditions is conspicuous at every level: in the macroforms of discourse, how they became modified in the vernacular; in lexical patterns, how the vocabulary was formulated to express new concepts; in code-switching, what was rendered in the vernacular, what retained in Latin and why; the creation of text-type conventions and even the 'house-styles' of scriptoria reflect the tendency towards some kind of focused use and 'incipient standards'. Standardisation and foreign models are the third unifying theme. The difficulty here is that Latin traditions are to a large extent uncharted, but much can be done on the basis of our limited knowledge at present, nevertheless.

The book approaches vernacularisation of medical and scientific writing from a sociolinguistic and sociopragmatic point of view, combining modern methods of linguistic analysis with contextual assessment on the levels of culture, societal developments and textual evolution. Both the broad and the narrow contexts have been taken into account. All levels of written language from spelling forms to discourse structures are discussed in this volume. On the macrolevel, textual patterns were transferred and disseminated through various layers, and intertextuality is an important feature in the dissemination of knowledge. On the microlevel, the cotext, i.e. the surrounding text, with its lexical and collocational patterns, needs to be taken into account. The chapters of this book approach their topics with different methodologies, but all the authors try to use the most modern tool-kit suitable for their research tasks. We have tried to reconstruct some of the scene and discuss the pertinent questions of what, how, and why. We hope to provide new insights into these issues through new approaches to new data, and in this way encourage new studies.

1.3 Earlier studies – editorial activities, early surveys, linguistic studies

Early scholarly activity on English scientific writing in the late nineteenth and much of the twentieth century was directed towards editing. Non-literary practical and scientific prose was not, however, a major focus; the choice of materials

for editing was biased towards religious treatises and literary works instead, in accordance with the value judgements of the times. In scientific writing, the earliest editions are from the nineteenth century, the first edition being *Reliquae antiquae* by T. Wright and J. O. Halliwell, in two volumes from 1841–43. It consists of eclectic passages of recipes and remedybook materials, selected for their curiosity. George Stephens published an edition of extracts from the materials of the Stockholm Royal Library in 1844 (see Taavitsainen 1994b). Similar texts are included in F. Heinrich's *Ein Mittelenglisches Medizinbuch*, published in 1896, and G. Henslow's collection of *Medical Works of the Fourteenth Century* from 1899. Some surgical treatises attracted early attention as well. R. von Fleischhacker's edition of Lanfranc's *Surgery* is from 1894, and D'Arcy Power's edition of John Arderne's *Fistula in Ano* from 1910. Early reviews of the field of scientific writing are found in manuscript catalogues, including Dorothea Waley Singer's 'Handlist of scientific manuscripts in the British Isles dating from before the sixteenth century' (1922), and in surveys by, for example, H. S. Bennett (1944) and R. H. Robbins (1970). Recent and on-going activities charting the underlying reality of extant manuscripts in various repositories have led to the discovery of abundant new materials. Some attempts have been made to balance the situation and make a wider and more systematic range of texts available to scholars. Editions of several vernacular versions of Chauliac's learned surgical writings by Björn Wallner from 1964 onwards and Margaret Ogden (1971) have broadened our views. Academic and technical scientific texts containing information on contemporary physiological theory and recommended practice in the vernacular have been edited more recently (Voigts and McVaugh 1984; Carrillo Linares 1993; Eldredge 1996; Pahta 1998; Tavormina forthcoming a; Voigts forthcoming). Astronomical and astrological materials have also received some attention (e.g. Mooney 1984; Taavitsainen 1987, 1988, 1994c). Alchemy is still a fairly unknown field of science, but work is being done in this area, too.[2] In general, only a fraction of the extant texts have been published in modern editions. This can be easily verified by comparing the number of editions with the most up-to-date information about texts extant in manuscripts: less than a hundred texts have been edited out of the approximately 10,000 extant items included in the recently published electronic catalogue of early English scientific and medical texts by Linda Voigts and Patricia Kurtz (see below).

Besides various surveys and editions of texts, towards the end of the twentieth century philological scholarship produced analyses that are relevant for our understanding of the language of medieval science and medicine. Analyses of translation techniques or lexical strategies in individual Middle English learned and technical translations are a case in point (e.g. Voigts and McVaugh 1984; Minnis 1987; Wallner 1987; P. M. Jones 1989; Pahta 1998). Some studies have applied theories and methods of modern linguistics to the analysis of medieval medical and scientific language, but these are still rare. The pioneering linguistic studies in the field are M. A. K. Halliday's diachronic study of the language of physical science (1988), using Chaucer's *Treatise on the Astrolabe* as evidence of

medieval scientific writing; Juhani Norri's analysis of the lexical field of names of sicknesses in 1400–1550 (1992); Irma Taavitsainen's study of involvement features in different types of late Middle and Early Modern English scientific texts (1994a); and Linda Voigts's discussion of multilingualism in medieval scientific and medical writings (1996). These innovative studies are linked with recent developments in research tools that have made new approaches possible (see also section 1.6).

1.4 New reference tools and electronic databases

A new phase was reached in the last few decades of the twentieth century, with a number of important surveys outlining the field of scientific and utilitarian writing in more detail. Recent scholarly work in these areas has focused on improving bibliographical tools. Extensive research projects have been launched to chart extant manuscripts, and new electronic research tools have been created. The first landmark was the volume *Middle English Prose* (ed. Edwards) from 1984. It brings together articles that focus on various genres and registers of prose. The book provides an overview of the extent of knowledge and scholarship up to the early 1980s, including chapters on medical prose by Linda Voigts and on scientific and utilitarian prose by Laurel Braswell. Another useful work, *The Index of Printed Middle English Prose*, came out a year later in 1985, a survey of all editions up to that time. A comprehensive and up-to-date review of scientific writing in English is available in a recent volume by George Keiser in *A Manual of Writings in Middle English* (1998). It gives bibliographical details of both editions and background literature. The major international project of *The Index of Middle English Prose* (*IMEP*) was launched at the beginning of the 1980s. Its aim is to chart all extant Middle English prose in manuscript repositories all over the world; some thirty scholars are working on this project. *Handlists I–XVII* have now come out (by spring 2003). The volumes for the Ashmolean Collections (Eldredge 1992), Trinity College, Cambridge (Mooney 1995), and Gonville and Caius College, Cambridge (Rand Schmidt 2001) are of special importance to our knowledge of the nature and extent of scientific writing in this period. Other repositories contain scientific materials as well, for example the Royal Library of Copenhagen has a large number of alchemical texts (Taavitsainen 1994b). Revisions of *The Index of Middle English Verse* are in progress by A. S. G. Edwards, Julia Boffey, and Linne Mooney. This work is also relevant for our knowledge of the field, as medical texts were transmitted in verse form as well.

An indispensable research tool is provided by the recently published electronic catalogue of *Scientific and Medical Writings in Old and Middle English Writings: An Electronic Reference* compiled by Linda Voigts and Patricia Kurtz (2000; henceforth *eVK*). It gives us knowledge of the underlying manuscript reality and makes it possible to chart the extent of survival of vernacular texts in manuscripts in an easy and reliable way. The related field of medical texts in Anglo-Norman French has been most comprehensively studied by Tony Hunt (1990, 2000; Hunt and

Benskin 2001). A revised and supplemented edition of the bibliographical index of Latin scientific writings by Thorndike and Kibre (1963; *TK*) is under way, in electronic form, directed by Linda Voigts (*eTK*). Another valuable contribution to our knowledge of extant sources and their interrelations is provided by Monica Green's detailed charting of gynaecological and obstetrical writings in Latin, English and other vernacular languages (Green 1992, 1996, 1997, 2001). Scientific and medical illustration has been studied by John Murdoch (1984) and Peter Murray Jones (1984, 1998a).

Other new sources and research tools have become available. These include the four-volume *Linguistic Atlas of Late Mediaeval English* (*LALME*), which contains localisations of a large number of manuscripts and provides a basis for mapping further texts through regional patterns of linguistic features. The basis of the *LALME* method is the insight that the patterns of co-occurring language features at any one place are different from those which occur in other areas, so that it is possible to localise the dialect of a text with greater precision than before. The method has brought new accuracy to Middle English linguistic studies on regional variation, and it is possible to locate most texts written before the rise of the national standard fairly precisely with this method. Scribal language with its spelling variants and diverse morphological forms gives us valuable information about the patterns of the period covered by *LALME*; for the south of England the date 1430 is usually given as the deadline after which it is difficult to localise texts with accuracy. In addition to providing information about regional characteristics of language use, the method can be applied to a multitude of other subjects: to gain knowledge about scribes and scriptoria, multiple copies and textual histories, the circulation of texts, the dissemination of ideas, and the geography of writing.[3]

The new electronic dictionaries serve as reference tools for a broad range of studies. As a result, lexical developments can be accessed through them with new efficiency, precision, and coverage. Besides their traditional uses, they can be adopted for a number of other study purposes. The *Oxford English Dictionary* (*OED*) has been released on CD-ROM and as an Internet version, allowing complicated searches with the query language. The *Middle English Dictionary* (*MED*) is accessible on-line as part of the *Middle English Compendium*. The *Dictionary of Old English* is also available on-line. *A Historical Thesaurus of English* is being prepared at the University of Glasgow.

Other large-scale ongoing philological and linguistic research that in the near future will provide invaluable information on the language, texts, and discourse communities of the period is being carried out in the Linguistic Atlas of Early Middle English project in the Institute for Historical Dialectology at the University of Edinburgh, in the Middle English Grammar Project at the University of Glasgow, and in the Urban Manuscripts Database Project at the University of York. Our knowledge about book production and trade before the age of printing has also substantially increased through recent work by several scholars, notably C. Paul Christianson (1987, 1989a and b), and Linne Mooney's ongoing work on professional scribes' hands in multiple manuscripts will undoubtedly provide a fuller picture (see e.g. Mooney 2000).

The advent of electronic text collections has made the retrieval of data for linguistic studies on texts speedy and effective. With text corpora, the whole research paradigm in linguistics is changing: the focus of linguistic analysis has shifted to actual language in use instead of individual examples of structures that in reality may be rare. The more comprehensive databases yield new accuracy to linguistic studies and it is possible to find answers to new research questions. The pioneer in the field of historical corpora is the *Helsinki Corpus of English Texts*, a multipurpose, multigenre corpus, compiled in the 1980s by a research team at the University of Helsinki (see Rissanen *et al*. 1993). Over the past ten years it has become a standard tool in historical linguistics and proved useful in indicating new lines of research. However, its text selection and sample size have proved too limited for some more specific research questions raised by pilot studies (e.g. Taavitsainen 1994a). This in turn has sparked off a new trend in historical corpus compilation that aims towards larger databases of one register or one genre. This volume has benefited from modern techniques and medical text corpora. Jones's chapter on medical discourse communities draws on results of recent manuscript surveys, Norri's study of medical terms is based on his private electronic database (see below), and the studies by Mäkinen, Pahta and Taavitsainen rely on the corpus compiled for the purposes of the research project on 'Scientific thought-styles' (see section 1.6 below).

1.5 The *Corpus of Middle English Medical Texts*

The electronic *Corpus of Middle English Medical Texts* (*MEMT*, forthcoming 2004), used as material in some of the studies in this volume, consists of medical treatises from *c*. 1375 to *c*. 1500. The corpus contains more than half a million words of running text and comprises edited medical texts and early printed books from different traditions of writing. The range is from theoretical treatises transmitting specialised top-level knowledge through learned surgical and anatomical texts to simple recipes for practical use and miscellaneous collections bordering on household literature. When released for wider scholarly distribution on a CD-ROM, equipped with suitable Windows-compatible software developed specially in co-operation with Raymond Hickey (Essen University), the database will serve the needs of linguists as well as historians of science, philologists, and manuscript scholars. It will complement *eVK* by giving direct access to editions of texts listed in it. The two databases can be used simultaneously on a personal computer to create a new kind of interface. A flexible and readily available personal tool like this is valuable especially for researchers studying original manuscripts in library archives.[4]

1.6 Applications of corpus-based methodology

Larger electronic databases make empirical studies on the characteristics of early scientific writing possible. Our research project 'Scientific thought-styles: The evolution of early English medical writing' (University of Helsinki) approaches

scientific writing from a new angle by examining in detail a large amount of data in this register in electronic format. We aim at describing linguistic changes in medical English in relation to the generic and sociolinguistic context in which texts were produced, including the changing scientific thought-styles, i.e. the underlying scientific concepts, objects of enquiry, methods, evaluations, and intellectual commitments, which are mediated to us through language. Different periods are traditionally connected with different styles of thinking and making decisions. Variability in language use is a key concept in our approach: changes in the underlying scientific ideology as well as the discourse community can be verified both on the microlevel of individual linguistic features and on the macrolevel of argumentative structures and textual organisation. Evidentiality and modality in language have proved important in our studies. Linguistic features reflecting the mode of knowing are crucial for analysing thought-styles as they change in the course of time (Taavitsainen 2001a). References to authors and prescriptive phrases are prominent in scholastic writing. Both the frequency and the specificity vary according to the tradition and genre of writing (Taavitsainen and Pahta 1998). So far our focus has been on writings of the scholastic period and on three aspects of the history of science: the underlying scientific paradigms, the transmission of scientific knowledge, and the dissemination of scientific knowledge across society (for an overview, see Taavitsainen *et al*. 2002). Some pilot studies have covered a longer time span in order to provide an idea of how changes in thought-styles proceed, and how these changes can be detected on the level of linguistic and textual structure. Pilot studies are helpful: the more we know about the texts, the easier it is to detect features for future studies, and lines of development gradually begin to emerge.

Several studies in this volume apply corpus-linguistic methods to new research questions and use *MEMT* as the database. Computer-searches of lexical items or longer strings have been used to point out relevant materials and to locate the relevant passages. For example, treatises with a logocentric focus can be located by retrieval of speech-act verbs of reporting in quotative passages (Taavitsainen 2002), mixed-language texts and functions of code-switching can be detected by searching for Latin lexical items, and recipes that deal with certain ingredients can also be collected on lexical grounds. In addition, the corpus helped us to relate our findings and conclusions to the larger context of different traditions and genres of scientific writing (see the individual chapters for details; for the list of texts included in *MEMT* see the Bibliography).

1.7 Latin and vernacular

In most of medieval Europe, Latin had a primary position as a written language. It was the institutionalised *lingua franca* of the church, government, and learning; in classical literature it was the standard of literary excellence. Despite the advantage that Latin held as the primary vehicle of knowledge during the first millennium, in the blooming culture of Anglo-Saxon England scientific texts were already

being written in the vernacular. All in all, 300 Old English items in manuscripts from the ninth to the twelfth centuries are listed in *eVK*; the majority of texts date from the eleventh century. This substantial body of writings, consisting of astrological and computational treatises of the calculation of time, herbals, and medical texts in the remedybook tradition, forms the earliest collection of vernacular medical literature in medieval Europe (Rubin 1974; see also Carroll, p. 175 below). By comparison, the first extant vernacular medical text composed in France dates from the thirteenth century (P. M. Jones 1990: 7, 10). Although the repertoire of Old English medical writings does not contain learned or theoretical medical texts, the influence of classical learning is conspicuous in extant writings. For example, the *Laeceboc* contains passages derived from several Latin works (Cameron 1983a: 153) and consists of fairly close translations of Latin originals (Kitson 1989: 57). The Old English version of *Herbarium Apulei* is also translated from Latin (Voigts 1979; see also Mäkinen, pp. 171–2 below).

Materials from the intervening period between Old and Middle English are scarce: only three items from the thirteenth century are listed in *eVK*. This hiatus was partly due to the Norman Conquest in 1066 with its well-known radical consequences on the linguistic situation in England. The complex multilingual situation in the centuries following the Conquest can be described in sociolinguistic terms as polyglossia, where several languages coexisted with different, though partly overlapping social functions (see e.g. Clanchy 1993, Chapter 6; Blake 1996: 107–15, 132–8; or Machan 2003). The three main languages in descending order of prestige were Latin, French, and English, but there were also other minority languages, including Celtic languages spoken in some western and northern areas. Latin retained its position as the prestigious variety employed in public domains, including religion, government, law, education, scholarship, and literature. French had a mixed functional range: it was used in public domains, for example administration, law, commerce, education, and literature, but also for ordinary interaction in the French-speaking social strata. In the period after the Conquest until the mid-thirteenth century, English in general remained peripheral to written culture and was mainly used for interaction in more domestic and casual domains (for English writings from this period, see Laing 1993). The patterns of use changed over time, with English gradually gaining ground from the other languages. The written materials of the period in several registers reflect the dynamic state of societal multilingualism and are characterised to a varying degree by a mixture of languages (see Pahta, pp. 74–5 below).

1.8 Pan-European diffusion of learned medicine

Vernacularisation of science and medicine took place elsewhere in late medieval Europe as well. Advances in science continued to be discussed in Latin in the universities and university curricula provided for the transmission of authoritative medical texts, concepts, and techniques that formed the basis of medical knowledge and practice in society at large. Universities were responsible for the

training of a small medical élite, but medical practitioners were a much larger and heterogeneous group (see section 1.13 below). By the fourteenth century, diffusion of knowledge from the university world had begun in several fields of scholasticism, including theology and natural philosophy. Several of the important thirteenth-century scientific encyclopaedias were translated into various European vernacular languages in the course of the fourteenth century. Among these were works by scholastic scientists like Albertus Magnus, Vincent of Beauvais, Thomas Cantimprensis, and Bartholomaeus Anglicus (García-Ballester 1994: 4–5; Crossgrove 1998: 82). By the fifteenth century, texts on scientific and technological subjects in vernacular languages were becoming increasingly common all over Europe. Medical texts originating in learned contexts found their way into several vernaculars and gradually spread through society as they demonstrated their usefulness to all. Two examples may suffice here to illustrate the scope and nature of the diffusion. The *Lilium medicinae*, a Latin medical compendium completed in 1305 by Bernard of Gordon, a Montpellier professor of medicine, is known in medieval translations into English, French, Castilian, German, Gaelic, and Hebrew (see Demaitre 1980). In a recent study of a fourteenth-century Middle High German version of the *Lilium*, Luke Demaitre (1998) places this vernacular translation in its social *locus*. He shows that the text stands in both form and content in the intermediate setting between *ars* and *vulgus*, between the scholastic learning of formalised Latin textbooks and the popular, colloquial medical lore of vernacular recipe collections. The translator aimed at making the learned text more accessible to vernacular readers, for example by simplifying theories, and replacing Latin terms with native variants or explaining them in more familiar words. Demaitre's conclusion is that this text, like much of vernacular medieval medicine, was written and read on a level below the classroom but above the street. The second example is provided by the set of three gynaecological and cosmetic treatises written in twelfth-century Salerno and attributed to a woman author named Trota, or Trotula. These texts were widely disseminated in Latin throughout Europe and are known in 23 different vernacular versions in eight languages: one Catalan translation, three Dutch, five English, seven French, three German, one Hebrew, one Irish, and two Italian (Green 1996, 1997). The vernacular versions of the Trotula texts vary in the treatment of the source material. Some versions are literal translations rendering the Latin source text faithfully into the vernacular. Others are free adaptations, sometimes heavily abridged, sometimes fused with material from other sources.

1.9 The widening use of English across registers and genres of writing

The use of English in professional writing can be traced back to the late fourteenth century, when it gradually appeared as the language of legal proceedings, guild records, religious controversy, and instruction. The spread of the vernacular gathered momentum in the fifteenth century with the nationalistic strivings of the Lancastrian monarchs.[5] The broadening range of genres in English is