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Evidentiality in Early Modern English Medical Treatises (1500–1700)

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Abstract: This study investigates diachronic trends in the use of evidential markers in Early Modern English medical treatises (1500–1700), with data drawn from the *Corpus of Early Modern English Medical Texts*. The state of medical thought and practice in Early Modern England is discussed, with particular focus on the changing role that Scholasticism played during this period. The nature of evidentiality and types of scholastic vs. non-scholastic evidence are given attention, and quantitative results are outlined. It is shown that as scholastic models of medicine gave way to more empirically-driven approaches, the use of evidential markers indicating direct perceptual and inferential evidence increased drastically, while the use of markers signaling reported information – particularly information mediated by classical authorities – decreased significantly. The results are finally discussed in light of discursive and typological considerations relating to contextual changes accompanying the reference to classical authors as sources of evidence, as well as the notion of "marked" and "unmarked" evidence types.

Keywords: evidentiality, Early Modern medicine, scholasticism, *Corpus of Early Modern English Medical Texts*

1 Introduction

This paper presents a corpus-based study of the linguistic realization of evidentiality – how speakers and writers encode their evidence (or source of knowledge) for asserted propositions – in Early Modern English medical writing from 1500 to 1700. Consider the following:

(1) The receptacles of bloud, be the vaynes, and pulses, but the bloud, that is contayned in the pulses, (**as Gallen sayeth** in his first boke, and first chapter of affected places) differeth from the blowde of the vaynes, in that,

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> that the blowde of the pulses is both hotter, thynnar, and yelower (Christopher Langton, *A uery brefe treatise, ordrely declaring the principal partes of phisick*, 1547: f.c6v).[1]

In this medical treatise, Langton attempts to lay out the principles of medicine and humoral theory to a general audience, and with the phrase *as Gallen sayeth*, he points to the ancient Greek physician Galen of Pergamum (ca. 130 – ca. 210) as the source of his claims about the nature of blood. The Early Modern period witnessed the replacement of scholastic medical thought, which had been the dominant paradigm of medicine throughout Europe during the Middle Ages, in favor of more empirical models of medicine. The key difference between scholastic medicine and later empirical models was one of priorities relating to sources of knowledge. Whereas medical Scholasticism held that classical authorities such as Hippocrates, Aristotle, and Galen were virtually unfailing in their understanding of nature, the human constitution, as well as the preservation and maintenance of health (and thus should inform one's understanding of these domains, as seen in [1]), later empirical models of thought – ranging from Paracelsianism to Baconian philosophy – were in broad agreement that direct observation of physical phenomena and subsequent induction served as a preferable basis of knowledge acquisition (for a good overview of scientific developments during the Early Modern period, see Shapin 1996 or papers in Park and Daston 2006). So in (2), for example, Packe justifies his claim on the virtues of salt not by appealing to some classical authority, but rather through recourse to his own senses and what he has seen for himself:

(2) Now although this Salt be of great use and service in very many diseases, yet I have by long Experience **observed**, that in some it is specifically potent; as in the Scurvy, Jaundies, Dropsie, Hysterical Suffocations, Melancholy Vapours, Green-sickness, stoppage of the Menses, Piles, Ghonnorrhæa, Collick, Diarrhæa, Bloody Flux, Griping of the Guts, Worms of all sorts, old Head-achs, Inflammations and Rhumes of the Eyes, Itch, and Cholerick Eruptions of the Skin, stoppage and heat of Urine (Christopher Packe, *Mineralogia: OR, An Account of the Preparation, manifold Vertues and Uses of a Mineral Salt, both in Physick and Chyrurgery*: p. 9).

1 All examples are taken from the *Corpus of Early Modern English Medical Texts* (EMEMT), see Taavitsainen and Pahta (2010).

In this treatise, Packe – a chemical physician – attempts to persuade his readers to purchase medical salts that he himself was selling, and through the use of the verb *observe*, he backs up his claim that he has indeed witnessed the efficacy of these salts on a number of occasions. That language should reflect such a massive philosophical shift as the transition from Scholasticism to Empiricism is to be expected (Taavitsainen 2001a, 2002; cf. Bates 1995), especially in the domain of evidentiality, which is directly concerned with how language users mark sources of information and knowledge (Aikhenvald 2004). The nature of these changes in medical writing will be examined from both qualitative and quantitative angles, using data from the *Corpus of Early Modern English Medical Texts* (EMEMT), which contains a representative sample of sixteenth- and seventeenth-century medical writing in English from a number of genres (Taavitsainen and Pahta 2010). This study complements extant diachronic studies on English medical writing that focus on various aspects of stance or expressions of knowledge (Gray et al. 2011; Hiltunen and Tyrkkö 2009, 2011; Moessner 2008, 2009a, 2009b; Taavitsainen 2001a, 2002, 2009) by providing both a qualitative and quantitative study of evidentiality, a category yet to receive exclusive attention in the broader focus on the linguistic realisation of medical epistemologies.

The paper is structured as follows – in Section 2, I provide an overview of the state of medicine in England (and Europe in general) during the sixteenth and seventeenth centuries, noting especially the major upsets to Scholasticism that occurred during the later part of the seventeenth century. I then introduce the linguistic category of evidentiality in Section 3, and in Section 4, the data and methodology used in this investigation are discussed. An overview of the quantitative results follows in Section 5. Finally in Section 6, I contextualize these results within the sociohistorical context of Early Modern medical thought and practice, as well as language typology. A few concluding remarks are made in Section 7.

2 Medicine and medical theory in Early Modern times

The Early Modern period in England, generally held to begin around 1500, saw the continuation of a long-standing tradition in European philosophical thought: Scholasticism. This medieval tradition held that the thoughts and beliefs of ancient writers such as Plato and Aristotle were highly authoritative

and reliable, and that true knowledge could best be arrived at by a careful analysis and understanding of the words of these authorities (Wear 1995: 250–264; Lindemann 2010: 84–120). Regarding medicine, this entailed that understanding of the workings of the human body and the upkeep of its health was best serviced by what classical medical authorities like Hippocrates (ca. 460–370 BC) and Galen, as well as later Arabic physicians such as Avicenna (ca. 980–1037) or Averroës (1126–1198) (through whom much classical medical writing and information was mediated), wrote on the matter (Temkin 1973; Park 1992). This certainly did not mean that one's own observations of nature or the human body were irrelevant; however, under Scholasticism, all such personal observations would subsequently be contextualized and interpreted within the frameworks laid out by the *auctores* (Siraisi 1990: 170–176).

Within scholastic medicine, the accepted medical model was that of Galenic humoral theory, which held that the human body was comprised of seven "naturals": the classical elements (earth, water, air, fire), the four humors (phlegm, blood, black bile, yellow bile), temperaments (an individual's constitutional blend of elemental hotness, coolness, wetness, and dryness), body parts and organs, an animating *spiritus*, virtues (activities of bodily systems), and operations (the functions of the organs). Good health depended on a positive interaction with the "non-naturals" (things separate from the constitution of the human body that nonetheless had clear effects upon it, i. e. air, food and drink, sleep and watch, moving and rest, emptiness and repletion, and affections (emotions) of the mind). Each individual's constitution was slightly different, depending on factors such as age and gender; sometimes seven astrological considerations such as time of birth and planetary alignments were held to affect the humoral balance. The "contra-naturals" were held to be states or forms of the naturals that could have a detrimental effect on human health. Hence sickness was viewed as an upset of one's humoral balance – which could be due to bad or putrid airs (miasmas), lack of sleep, emotional upsets, or even comets passing near the vicinity of earth – and there was generally not an understanding that an illness worked independent of a person's constitution. Medical treatment was thus highly individualized and sought to restore an individual's humoral balance, often through the forced release of excess humors built up in the body using methods such as bloodletting, vomiting, or evacuation (more comprehensive overviews of humoral theory are provided by Nutton 1995, Wear 2000: 156–209, and Lindemann 2010: 86–90).

This system of thought in medicine continued relatively unaltered into the seventeenth century, although the Reformation in the sixteenth century began to

sow the seeds of the decline of Scholasticism through questioning previously uncontested authority. The entire Latinate tradition found itself at risk through the increased vernacularization of texts; that is, writers began writing in their native languages (such as English, German, and French) rather than in Latin. Authority figures past and present – however influential or revered – began losing their status as great figures whose claims and advice could be trusted without question (French 1989; Nurmi 2012: 50). Indeed, the sixteenth-century German physician Paracelsus (or Philippus Aureolus Theophrastus Bombastus von Hohenheim, 1493–1541) was extremely critical of the Scholastic medical tradition and championed his own brand of iatromedicine (chemical medicine), which he wrote about in his native German rather than in Latin. His medical philosophy did contain astrological and other occultic elements (i. e. elements with no physically tangible existence) as well, so it was not completely divorced from earlier medical traditions. In addition, because much of Paracelsus' work was published posthumously, most of his influence on medical thought came after his death (Newman 2006). More detrimental to the long-standing scholastic tradition were the consequences of massive exploration undertaken during the Early Modern period, which resulted in the European population's exposure to a host of "new" diseases such as syphilis and smallpox – diseases unaccounted for in the medical writings of antiquity (Grafton et al. 1992: 161–193; Mikkeli and Marttila 2010: 17–20). Periodic outbreaks of the plague also brought the credibility of scholastic medicine into question, as entire communities were affected without apparent regard to individual humoral constitutions (French 2003: 127–132). During this period, a number of medical proposals and advancements were made that were in direct contradiction to Scholasticism and traditional humoral theory. Andreas Vesalius (1514–1564) made some anatomical observations, such as of the septum in the heart, that were contrary to Galen's writings (Cook 2006: 414–416). William Harvey (1578–1657) uncovered the exact nature of blood circulation through direct observation while conducting vivisections on animals (French 1989). Jan-Baptist van Helmont (1580–1644) promoted empirical methods in his version of iatrochemistry, or medicine based on the use of chemicals to treat illnesses and ailments (Wear 2000: 353–398). Thomas Syndenham (1624–1689) adopted empirical means of diagnosing diseases through repeated observations of a number of patients (Cunningham 1989). The Royal Society was formed in 1660 (chartered in 1662) in England to promote the exchange and dissemination of new medical observations and breakthroughs (Wear 2000: 358–359). Indeed, by the end of the seventeenth century, there was a "chaos of medical theories" (Wear 2000: 437) in England, although Scholasticism was not yet completely overthrown. Later developments during the "medical enlightenment" of the eighteenth century – the complete

rejection of revelation from authority in favor of reason and personal observation – as well as advances made in pathological anatomy and clinical medicine spelled the ultimate demise for scholastic models of medical thought (Lindemann 2010: 90; see also papers in Cunningham and French 1990).

A word must also be said about medical practice during the Early Modern period. Healthcare was a much less systematic, unified enterprise in the sixteenth and seventeenth centuries than it is in the West today. On the one hand, there were learned physicians who had studied at university, and they were the most overt promoters of scholastic medical thought, as the bulk of their education would have consisted of studying the writings of the likes of Galen and Hippocrates rather than practical, hands-on treatment of patients (Siraisi 1990). Indeed, scholastic *physic* was so concerned with medical theory that the treatment of patients was considered secondary to understanding the words of the *auctores* (Cook 2006: 408–416). When the treatment of patients did occur, it would have been a highly intellectual endeavor: factors such as age, gender, and time of birth would have been collated with environmental factors (sometimes including astrological phenomena) to arrive at an individualized diagnosis and treatment. A much more hands-on approach was taken by surgeons, barber-surgeons, and apothecaries, accorded less prestige because they had not studied at university but rather entered the profession through apprenticeship and guild membership (Lindemann 2010: 262–268). Surgeons and apothecaries were not beyond the influence of scholastic thought (Tyrkkö 2010: 121); but a sick person would more likely consult a surgeon or apothecary rather than a physician during Early Modern times, if for no other reasons than availability and cost (Wear 2000: 210–274; Lindemann 2010: 235–280). Finally, there were a variety of health care providers such as midwives, village healers, lay practitioners, bone-setters, and itinerants who operated outside the jurisdiction of any institutionally recognized order or guild (Lindemann 2010: 235–280). Those who were sick and had the means to do it generally consulted a number of healthcare providers, and medical encounters were patient-driven rather than provider-driven. This plethora of options available to the sick, in addition to healthcare providers' desire for patient revenue, have led some scholars to describe the Early Modern period as a "medical marketplace" (Cook 1989; Wear 1989, 2000; Jenner and Wallis 2007), one in which scholastic medicine was the dominant medical paradigm at the beginning of the sixteenth century, but by the end of the seventeenth century, it was losing its privileged position and was simply one of a number of approaches available. As Wear (1989, 2000) has argued, however, it is difficult to assess how much medical practice actually changed during this period, and patient expectations in the medical encounter most likely retarded short-term practical changes.

3 Evidentiality and the marking of information source

Given that the priority of scholastic medicine was to understand the writings of classical authorities, whereas later empirical approaches placed greater value on direct observation and subsequent inference, it is to be expected that medical writing changed in how sources of information were treated and referred to. This directly concerns the domain of evidentiality, the linguistic marking of a speaker's or writer's source of knowledge (Aikhenvald 2004). As a field of study in linguistics, evidentiality has received systematic attention only in the last three decades, beginning with papers in Chafe and Nichols (1986). Anderson (1986) and Willett (1988) are early attempts to delineate the category typologically. Palmer (2001: 35–52), Aikhenvald (2004), and Boye (2012) are more recent contributions to the field of typology. All are in broad agreement that evidentiality concerns the marking of information source, but the consensus ends there. Aikhenvald (2004), for example, argues that evidentiality is exclusively a grammatical category, realized in inflectional verb morphology; more lexicalized markers that appear to indicate information source – as is the case with the evidential uses of English *say* and *observe* in (1) and (2) – are secondary uses of the marker in question and constitute "evidential strategies" (Aikhenvald 2004: 105–152). Boye (2012: 183–275) disagrees, arguing that an item's ability to scope over a proposition – regardless of whether it is considered lexical or grammatical – is the key to determining its status as an evidential marker. Earlier treatments of evidentials (Anderson 1986; Willett 1988) were not very concerned with strictly distinguishing evidentiality from the related category of epistemic modality, which concerns the speaker's assessment of the likelihood of a proposition being true or not (as in *Jane must have missed the train*, where the speaker considers it highly likely that the proposition *Jane missed the train* is true). Palmer (2001) groups both evidentiality and epistemic modality under "propositional modality," whereas Aikhenvald (2004) and Boye (2012) argue for clear notional separations between the two categories (although Boye [2012] subsumes both under the broader category of "epistemic meaning").

Work on evidentiality in English, whether from a synchronic or diachronic angle, does not concern itself too much with Aikhenvald's (2004) belief that evidentiality should be considered solely a matter of verb inflection, as English clearly does not mark information source in this way. Some have nonetheless examined how certain evidential uses in English are the result of grammaticalization (Traugott 1997; Brinton 1996, Brinton 2008; Whitt 2015) or (re)lexicalization

(Timofeeva 2013). The bulk of studies dealing with evidentiality in English (Chafe 1986; Brinton 1996, 2008; Traugott 1997; Fox 2001; Taavitsainen 2001b; Bednarek 2006; Aijmer 2009; Whitt 2010, 2015; Grund 2012, 2013; Timofeeva 2013) are broadly content with the notion of evidential markers scoping over propositional content (as is ultimately expounded in Boye [2010, 2012]).[2] While early studies on evidentiality in English (Chafe 1986; Taavitsainen 2001b) conflate the category with epistemic modality, more recent studies (Whitt 2010; Grund 2012, 2013) make this distinction clear. These categories are also kept distinct in the current study; that is, the focus here will be exclusively on the marking of information source in Early Modern English medical treatises, rather than on authors' assigning a degree of likelihood to the truth of a given proposition.

Some diachronic work related to the linguistic realization of knowledge in English medical writing has already been done. Hiltunen and Tyrkkö (2009, 2011) have examined changing uses of verbs of knowledge (such as *to know*) in Early Modern medical writing and beyond, noting how changing thought styles in science and medicine gave rise to increased self-assertion and less reliance on authority figures. Their studies, however, focus on expressions of knowledge rather than on *sources* of knowledge, which is of concern here. Evidentiality is treated indirectly in Gray et al.'s comprehensive 2011 study of stance markers used in the early writings of the Royal Society (the *Philosophical Transactions*), but they tend to subsume evidential markers into broader categories, so that the precise behavior of markers of information source is difficult to gauge. Finally, Taavitsainen (2001b) explicitly deals with evidential markers in late middle and Early Modern English medical writing. However, she conflates the notion of evidentiality with epistemic modality, and her focus is primarily on modal verbs. In addition, her study occurred before the EMEMT corpus was completed, so far more data has now become

2 The notion of the proposition is ubiquitous is discussions of evidentiality, but it is rarely defined. Boye (2010: 293; 2012: 185–199) attempts to remedy this by providing a theoretically-informed and precise definition: the proposition should be thought of as a representation of acquired "pieces of knowledge" that contain a truth value, i. e. that can be true or false. A proposition can be thought of as a "fact" that codes the intention to refer to extra-linguistic referents. So in example (1), for example, the claim being made (the proposition) concerns the differentiation of blood types: *The receptacles of bloud, be the vaynes, and pulses, but the bloud, that is contayned in the pulses, [...] differeth from the blowde of the vaynes, in that, that the blowde of the pulses is both hotter, thynnar, & yelower*. This is a claim about the world that is subject to falsifiability, and the evidential phrase *as Gallen sayeth* scopes over this proposition to indicate this "fact" or "piece of knowledge" has been acquired through information mediated by a classical authority, Galen.

available. Hence the current study seeks to complement these previous studies by focusing exclusively on markers of information source, rather than on markers of knowledge itself or epistemic modality.

Distinguishing between different sources of information, especially as it pertains to Early Modern medical writing, is crucial to determining if, when, and how the use of evidential markers changed during the period under investigation. However, the framework presented by typologists is not consistent (although sometimes this is simply a matter of terminology). Anderson (1986: 274) distinguishes between direct evidence and observation, direct evidence and subsequent inference, inference (with the evidence driving the inference left unspecified), and logical expectation. In addition, hearsay is implicitly included as a type of evidence in Anderson's study. Willett (1988), Palmer (2001), Aikhenvald (2004), and Boye (2012) make a distinction between direct (Willett 1988; Boye 2012) / sensory (Palmer 2001) / firsthand (Aikhenvald 2004) evidence on the one hand, and indirect (Willett 1988; Boye 2012) / reported (Palmer 2001) / and non-firsthand (Aikhenvald 2004) evidence on the other hand. Direct evidence is held to be evidence acquired through one's firsthand perceptions (regardless of sensory modality, although oftentimes the distinction between visual and non-visual perception is also made, e. g. Aikhenvald 2004: 63), while indirect evidence is taken to include both information mediated through others (with further distinctions being made between 2nd- and 3rd-hand reports, hearsay, and folklore, see Willett 1988: 57; or between hearsay and quotatives, see Aikhenvald 2004: 64), as well as conclusions arrived at through logical processes (with further distinctions made between inference resulting from perceived results or from mere reasoning processes, see Willett 1988: 57; or between inference [based on evidence] and assumptions resulting from logic or common knowledge, see Aikhenvald 2004: 63).

One key distinction that needs to be made in the current study is between information mediated through classical authorities versus information received from a source contemporary to the author:

(3) **Hippocrates saith**, that there be some liuing and some dead Moles. The dead are like to the false burthens, so called, because women carry them not long, as being but lightly tyed and fastned to the sides of the Matrice. Sometime they are deuided into diuers seuerall pieces, so that **Nicholas Nicolus saith**, he saw a woman which cast forth nine of them in one day, the least whereof waighed foure pound. The quicke and liuing Moles are they which wholly cleaue to the wombe, and continue with the woman euen to her death (Jacques Guillemeau, *THE NVRSING OF CHILDREN* [trans. unknown], 1612: 14).

There are two evidential uses of *say* in (3), but of interest here is the source of information. In the first instance, Hippocrates is referred to as the source of information, whereas a contemporary of the author is the source of information in the second instance. Hearsay is another form of mediated information:

(4) And whereas **some report** that Queene Anne of blessed memory, being in our Kings Bath, there arose a flame of fire like a candle from the bottome of the Bath to the top neare vnto her, they must giue mee leaue not to beleeue it, but rather to thinke they were mistaken: for, I am not bound to beleeue any thing against reason, which God hath giuen mee to bee my guide (Edward Jorden, *DISCOVRSE OF NATVRALL BATHES, AND MINERALL WATERS*, 1631: 25).

The supposed happenings of Queen Anne's visit to a bath are described in (4), but the author is clear to point out that this information comes from a source other than himself (and it remains vague through the use of *some*); he even expresses his doubts as to the validity of this report later on. Given that the current study is concerned with the linguistic changes associated with the decline of medical Scholasticism, a distinction will only be made between information mediated from a classical authority and information received from a contemporary of the author, whether this be through a specified individual or through hearsay, i. e. evidence from a non-scholastic source.

As one of the chief concerns with Empiricism was the reliance on one's own observations and assessments, rather than dependency on the received wisdom passed down by classical writers, markers signalling direct perception and inference are crucial to the current study:

(5) For there is a Seminarie Tincture full of a venemous quality, that being very thin and spirituous mixeth it selfe with the Aire, and piercing the pores of the Body, entreth with the same Aire, and mixeth it selfe with the Humors and spirits of the same Body also. For proofe of this, **we see** by daily experience, that Garments, Coffers, nay walls of Chambers will a long time retaine any strong sent, wherwith they have beene fumed (Stephen Bradwell, *PHYSICK FOR THE SICKNESSE, Commonly called the PLAGVE*, 1636: 7).

(6) First of all in Fishes having but one ventricle of the heart (as having no lungs) the thing is clear enough. For **it is certain**, that it may be confirmd before our eys, that the bladder of blood, which they have at the bottom of the heart, answerable to the ear of the heart, sends the blood into the

> heart, and that the heart does afterward, through a pipe or arterie, or something answering to an artery, openly transfuse it, both by our own view, and also by cutting the arterie, the blood leaping out upon every pulsation of the heart (William Harvey, *THE ANATOMICAL Exercises of Dr. WILLIAM HARVEY Professor of Physick, AND Physician to the Kings Majesty, Concerning the motion of the Heart and Blood*, 1653: 27).

In (5), a plague treatise, Bradwell points to direct perception – using the perception verb *see*, although a more general sense of observation than mere visual perception is indicated here – as evidence for the potency and resonance of a specific tincture. In (6), on the other hand, William Harvey's inference concerning the nature of blood circulation is indicated by *it is certain*, and the discourse context makes clear that direct observation is driving this inference.[3] There are some instances where the indication of direct observation and a subsequent inference appear to be indicated by one and the same marker:

(7) You must likewise note, that every sharpe disease hath an hot and burning Fever joyned with it, and that the Urine (for the most part) in a burning Fever, is of an intense high red colour; and this colour, amongst all the other uncertaine signes of Urine (which **seeme** to shew a disease, to put a difference betweene sharpe and Chronicall diseases and to discover a Fever only) is the most certaine of all other, and yet uncertaine in it selfe (Thomas Brian, *THE PISSE-PROPHET OR CERTAINE PISSEPOT LECTURES*, 1637: 3–4).

Here the visual appearance of urine is taken as a sign for the (possible) presence of disease; however, the disease itself can only be inferred from the color of the urine and not perceived directly. The verb *seem* thus simultaneously refers to the perceivable evidence and the subsequent inference drawn from the observable facts.

3 One of the anonymous reviewers correctly pointed out that markers of inference such as *certain(ly)* and *doubtless* (see example 13) contain a strong epistemic commitment to the proposition in addition to their marking of inference as evidence. I agree, and it is such cases that illustrate the boundary between evidentiality and epistemic modality – at least in languages such as English that don't have pure grammatical evidentiality – is fuzzy rather than clear cut. Although I do keep these two categories separate in the current study insofar as I am not concerned with markers that indicate the writer's assessment of the likelihood of a proposition being true or not (e. g. *may, might, must, possibly, probably*), I have admitted markers where the inference appears to indicate absolute certainty on the part of speaker/writer to the domain of evidentiality.

For purposes of the current study, it is sufficient to draw the three-fold distinction discussed above:

1. MS: markers of information mediated by learned authorities in the tradition of Scholasticism (example 3);
2. M: markers of mediated information with the source contemporary to the author (examples 3 and 4); and
3. DI: markers of direct observation and inference (examples 5–7).[4]

Given that the sixteenth and seventeenth centuries witnessed the erosion of scholastic medical thought in favor of more empirically-based medical theories, it was predicted that a gradual decline in markers of mediated scholastic information (as with *Hippocrates saith* in [3]) would be complemented by a significant increase in the use of markers of direct observation and inference (as in [5] through [7]) and of markers relating to information mediated by non-scholastic authorities (as in *Nicolus saith* in [3], as well as via hearsay in [4]).

4 Data and methodology

Data for the study are drawn from parts of the *Corpus of Early Modern English Medical Texts*, which contains a representative sample of English medical writing from a number of genres between 1500 and 1700: general treatises and textbooks, treatises on specific topics, recipe collections and *materia medica*, regimens and health guides, surgical and anatomical treatises, and *Philosophical Transactions* of the Royal Society (from 1665) (Taavitsainen and Pahta 2010).The focus here will be exclusively on the language of medical treatises. Regimens, health guides, and recipe collections – where there is a highly regimented, formulaic textual structure and attention is paid mainly to *materia medica* and practical actions with little or no explicit mention of sources of knowledge (Marttila 2010; Suhr 2010) – are excluded from the current study. The *Philosophical Transactions*, which came into existence only in 1665 (Wear 2000: 358), are also excluded, as this is not a genre

4 In early stages of the study, markers of direct perception (perceptual uses of *see*, *observe*, etc.) were treated as distinct from markers of inference (*certainly, doubtless*, etc.). This distinction ultimately proved problematic, as there are a number of markers where observation and inference can be expressed simultaneously (*seem*, some cases of *see*, etc.). As the focus here is the erosion of scholastic influence and the emergence of empirical trends in medicine, these categories were ultimately conflated into one.

represented throughout the entire period under investigation (although see Moessner 2008, 2009a and 2009b for discussions of the language and influence of the *Philosophical Transactions* on medical writing). This leaves three relevant sub-corpora: (1) The section on general treatises and textbooks contains 20 texts on the general field of medicine addressed to both learned readers and lay audiences with a total of 178,416 words (Taavitsainen and Tyrkkö 2010); (2) Treatises on specific topics geared towards a range of audiences and includes 71 texts and a total of 609,961 words. Topics covered here include specific diseases (16 texts, 153,944 words), methods of diagnosis and treatment (21 texts, 168,098 words), specific therapeutic substances (15 texts, 121,535 words), midwifery and children's diseases (10 texts, 102,923 words), and plague treatises (9 texts, 63,461 words) (Pahta and Ratia 2010); and (3) the section on surgical and anatomical treatises contains 30 texts and 301,701 words. Texts here are almost exclusively geared towards surgeons (Tyrkkö 2010). The total word count for these three sections is 1,090,078.[5] Not all subsections of the corpus contain sample texts from each of the 50-year periods, so there is a lacuna in some of the corpus' coverage. The sub-corpus of treatises on specific therapeutic substances, for example, contains no texts from the first period of 1500–1549, while the sub-corpus of midwifery texts does not contain any texts published between 1550 and 1599.

In all categories, extracts are roughly 10,000 words in length, although shorter works are presented in their entirety. For purposes of the current study, texts have been divided into four 50-year categories (based on publication date) to examine diachronic trends: 1500–1549, 1550–1599, 1600–1649, and 1650–1700. Because the samples differ in both word count and number of available texts, frequencies have been normalized to a rate per 10,000 words. An analysis of variance (ANOVA) test was used to determine statistically significant differences in frequency among the periods (where $p < .05$) (Johnson 2008: 104–143).Where the assumption of homogeneity (equal distribution of samples) was not met by post-hoc tests (Levene's test of homogeneity of variance, Kruskal-Wallis one-way analysis of variance, and the Shapiro-Wilk test of normality), the Mann-Whitney *U*-test was used instead (Zimmerman and Zumbo 1990; cf. Boggel 2008: 112–113).[6]

5 The word count of individual text files is available in each text's respective information file in EMEMT (Taavitsainen and Pahta 2010).

6 The EMEMT is admittedly an unbalanced corpus, especially given the noticeably fewer number of texts available for the early sixteenth century (1500–1549). The small sample sizes in each of the sub-corpora for this period made statistical testing unfeasible, so only results for the entire corpus are presented.

In order to identify evidential markers in the EMEMT corpus, a combination of "top-down" and "bottom-up" analyses were employed (Pahta and Taavitsainen 2010: 563). A "top-down" analysis allows us to search for items that have already been identified in previous work, such as the verb *seem* (Aijmer 2009; Whitt 2015) or perception verbs such as *see* and *hear* (Whitt 2010). However, recent "bottom-up" analyses of evidentiality in English (Bednarek 2006; Grund 2012, 2013) have shown the value of examining data without preconceptions of what items are or are not used evidentially. In this approach, a close reading of a portion of the corpus is used to identify relevant items to be searched for. This was done here through a close reading of a 2,000 word extract from each of the seven subsections of treatises in EMEMT (1 extract from the sub-corpus on general treatises and textbooks, 1 extract from the surgical treatises, and 5 extracts from the subcorpora of specific topics [1 text from each topic] = 14,000 words). These extracts were taken from all of the four sub-periods (1 from 1500–1549, 2 from each of the other periods).[7] Not only did this reveal commonly used verbs such as *say*, *seem*, and *see*, but it also uncovered frequently occurring constructions such as complementizer constructions involving *that* (as seen in [2], for example) and *as X says* constructions (as seen in [1]), cf. Gray et al. (2011). Hence words such as *that* and *as* were searched for as well, and although this yielded a high number of hits, it was relatively easy (though time-consuming) to filter the searches to find relevant examples. In addition, morphologically related variants of identified items were searched for: all tense forms of *see*, for example; or in addition to adjectives such as *evident* (*it is evident that* …), the related adverb *evidently* was also considered (cf. *sure ~ surely* etc.). All searches were done using the WordSmith 6 concordancer package (Scott 2012). The current study is focused exclusively on the three-fold distinction of evidential markers discussed above, and of these categories' behavior across the two centuries under investigation; the syntactic and diachronic behavior of individual items falls beyond the scope of the current study. Finally, in addition to the original text, a version of each text with normalized modern spelling is provided in the EMEMT. This facilitates ease of searchability and eliminates the possibility of certain spelling variants being overlooked (Lehto et al. 2010). Examples, however, are given in the original spelling here.

Most, if not all, items analyzed evince both evidential and non-evidential uses. The speech-act verb *say*, for example, is often used evidentially, as in (1) and (3), but it can also be used in non-evidential contexts, as we see in (7):

7 Extracts from the sub-corpora of recipe collections and *materia medica*, as well as regimens and health guides, were also consulted at this stage. The dearth of evidential markers found in these subcorpora is what led to the decision to exclude them from further study.

(7) **I say** of the Mother or wombe because although the wombe many times in this disease doe suffer but secondarily, yet the other parts are not affected in this disease but from the Mother ... (Edward Jorden, *A BRIEFE DISCOVRSE OF A DISEASE CALLED THE Suffocation of the Mother*, 1603: 29).

Contrary to the earlier examples, *say* here does not refer to some other author as a source of information, but rather is used by the author to assert his own claim. This use is a mere speech-act use without any evidential component. Such uses (tokens) are excluded from the figures and analysis discussed in Section 5 below.

5 Results

There were a total of 3,138 evidential expressions found in the corpus, and the distribution across the two centuries is indicated in Table 1.

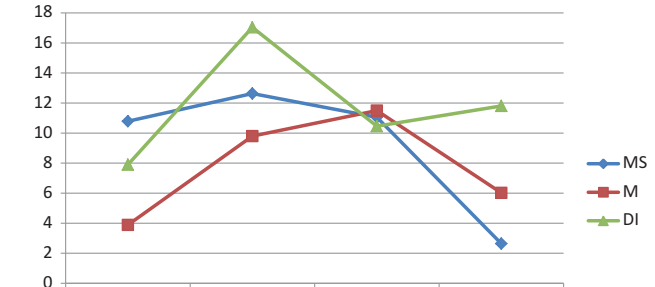
Table 1: Distribution of evidential expressions in EMEMT medical treatises.

Period	Count	Normalized (per 10,000 words)	Sample Size (number of words)
1500–1549	203	22.59	89,869
1550–1599	1,091	39.47	276,417
1600–1649	953	33.01	288,691
1650–1700	891	20.48	435,101

A total of 108 individual lexemes comprise this count, although many of these appeared only a handful of times, and some were used only once. On the other hand, the verb *say* was the most frequently found verb with evidential uses, accounting for one-third of all cases (1,093 total evidential uses, both as a marker of mediated scholastic information and mediated non-scholastic information).[8]

Figure 1 provides the normalized aggregate frequencies in all treatises of the corpus.

8 That is, a single item (such as *say*) could be classified as having different evidential functions within the corpus (see example 3). This was done on a case-by-case basis, and the following counts are concerned chiefly with categorial behavior and not with the behavior of individual evidential markers (cf. Whitt's 2010 discussion of polysemy and the range of evidential uses attested by perception verbs).



	1500-1549	1550-1599	1600-1649	1650-1700
MS	10.79	12.63	11.05	2.64
M	3.89	9.8	11.5	6.02
DI	7.9	17.04	10.46	11.81

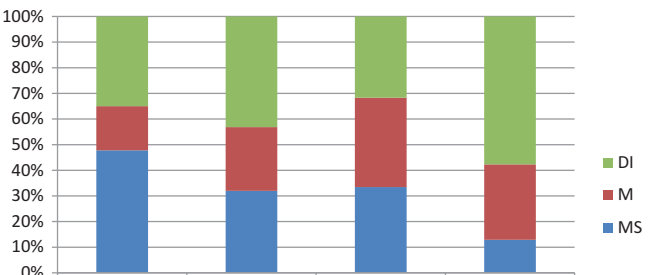
Figure 1: Normalized frequencies (per 10,000 words) of evidential markers in all treatises of EMEMT.
Source: MS: mediated scholastic information; M: mediated non-scholastic information; DI: direct observation and inference.

Aside from the apparent decline of mediated scholastic evidence between 1600 and 1700, and especially after 1650, these figures in Figure 1 do not paint a homogenous picture of the behavior of evidentiality in Early Modern medical writing. The decline in the use of markers of medicated scholastic information from 1600–1649 to 1650–1700 was found to be highly significant[9]; in addition, the frequency of markers of mediated scholastic information at the end of the seventeenth century (1650–1700) was found to be significantly different from that at the beginning of the sixteenth century (1500–1549).[10] Regarding mediated non-scholastic information, a significant increase of usage was found to occur in the sixteenth century (i. e. from 1500–1549 to 1550–1599).[11] However, there is then a significant decline in usage in the seventeenth century (i. e. from 1600–1649 to 1650–1700).[12] That being said, there is no significant difference in the usage of markers of mediated non-scholastic information in the beginning of the sixteenth century and the end of the seventeenth century.[13] On the other hand, no statistically significant changes in the sixteenth and seventeenth centuries

9 Mann-Whitney: $U = 314.5$; $n = 29$ (1600–1649), 50 (1650–1700); $p < 0.001$.
10 Mann-Whitney: $U = 123$; $n = 10$ (1500–1549), 50 (1650–1700); $p = 0.010$.
11 Mann-Whitney: $U = 78$; $n = 10$ (1500–1549), 28 (1550–1599); $p = 0.040$.
12 Mann-Whitney: $U = 446$; $n = 29$ (1600–1649), 50 (1650–1700); $p = 0.005$.
13 Mann-Whitney: $U = 228.5$; $n = 10$ (1500–1549), 50 (1650–1700); $p = 0.670$.

were observed in markers of direct observation or inference. This partly confirms the earlier stated hypothesis, insofar as it attests a significant decline in the reliance on scholastic authorities in the period under investigation, most noticeably witnessed in the latter half of the seventeenth century. And even though there is no significant change in the use of markers of direct observation and inference, they are the most frequently used type of evidential marker at the end of the seventeenth century, whereas markers referring to learned authorities dominated at the beginning of the sixteenth century.[14]

Another interesting way to look at the distribution of evidential markers in the treatises is to see what proportion of overall use each evidential category enjoys in each of the four periods. Figure 2 displays the aggregate proportions for all the treatises.



	1500-1549	1550-1599	1600-1649	1650-1700
DI	34.98	43.17	31.69	57.69
M	17.24	24.84	34.84	29.41
MS	47.78	31.99	33.47	12.91

Figure 2: Proportional use of evidential markers in all treatises of EMEMT.
Source: MS: mediated scholastic information; M: mediated non-scholastic information; D: direct observation; DI: direction observation + subsequent inference; I: inference.

As with the frequencies discussed above, there is a general decrease in the proportion of evidential markers of scholastic information used in the EMEMT corpus. This is quite clear here, and it also appears in several of the subgenres: general treatises and textbooks, treatises on specific diseases, treatises

14 As stated earlier, the small number of texts in each of the sub-corpora – especially texts representing the early sixteenth century – made statistical testing of individual sub-corpora unfeasible.

on specific methods of diagnosis or treatment, treatises on specific therapeutic substances, plague treatises, and in surgical and anatomical treatises. Markers of non-scholastic mediated information paint a very unclear picture, often fluctuating in different sub-genres and showing no clear diachronic trend. Markers of direct observation and inference, on the other hand, generally show a proportional increase in usage that accompanies the decrease in usage of markers of scholastic information. This is the case with the aggregate counts, as well as with almost all of the sub-genres, except for treatises on midwifery and children's diseases, in which the proportion of mediated scholastic evidence appears relatively constant throughout the entire period (accounting for between 30 % and 40 % of evidential markers), and there is only a noticeable decline in the use of non-scholastic mediated evidence.

6 Discussion of results

The quantitative figures and subsequent statistical tests revealed two findings, one which supports the earlier stated hypothesis and the other which only partly supports it. For one, a statistically significant decline in the use of mediated scholastic information was attested for the seventeenth century, and the use of markers of mediated scholastic information was found to be significantly less at the end of the seventeenth century than at the beginning of the sixteenth century. An accompanying rise in the frequency of markers of direct observation and inference was only attested in the proportion of types of evidential markers used, whereas any changes in raw figures were not statistically significant. At the same time, the raw figures show a higher number of markers of direct observation and inference being used at the end of the seventeenth century, whereas markers of mediated scholastic information dominated nearly two centuries earlier.

The decline in the reliance on scholastic methods during the two centuries covered by EMEMT may be even starker than the quantitative data reveal. Consider the following:

(8) So it remayneth fyrme that **Galen writeth**, as obserued in his time, that Theriacle is in deede better then Mithridatium in bytinge of vypers and like beastes, and that Mithridatium exceadeth th' other in remedying all other poisons taken into the body and inward diseases (Walter Bailey, *A DISCOVRSE OF THE medicine called Mithridatium*, 1585: f.A7v).

(9) **Galen**, speaking of the dressing Ulcers, **saith**, he dressed them but every third day, though the Matter flowed very much; and but every fourth day in Winter. Indeed the too frequent dressing is hurtful: yet there may be occasion of opening them sooner than by him proposed, for the strengthening of Bandage, or for the preserving of the Stitches by putting on dry Stitches. Also the retention of Matter causeth the Suture to relax, and the Lips of the Wound to open again: therefore that ought to be left to the discretion of the Chirurgeon (Richard Wiseman, *A TREATISE OF WOUNDS*, 1676: 349–350).

In (8), from a 1585 treatise on mithridatium (a semi-mythical antidote), the author makes recourse to Galen in claiming when mithridatium is to be used, or when other substances may be preferable. Galen's words are final, and the value of his observations is authoritative here. In (9) from 1676, on the other hand, Galen's advice on the dressing of ulcers is acknowledged as at least partly valid, but the author notes with equal authority that other courses may be preferable to Galen's suggestions, and that the surgeon is ultimately the best judge on what course of action to take in any given circumstance. So here, Galen is still acknowledged as a valid authority on the subject; however, his comments are not uncritically accepted and it is freely admitted that he may not be correct in all circumstances, or at least that other conclusions are plausible. The treatise on mithridatium was published in 1585, nearly a century before this surgical treatise on the treatment of wounds, so it could well be that by the end of the seventeenth century, classical authorities had not completely lost their credibility, but their views were no longer prioritized over present-day medical authorities and the power of their own observations and decision making capabilities. Hence the presence of a statistically significant decrease in the evidential use of scholastic authorities during the period covered by EMEMT is accompanied by a changing discursive use of mediated scholastic information as well. That is, the influence of Scholasticism on medical thought is still present (there are still a number of attestations of mediated scholastic information in late seventeenth century texts), but rather than being the dominant influence, it is now simply one viewpoint among a range of possible approaches to medical diagnosis and treatment (see Wear 2000: 434–473). This is perhaps best illustrated by another late seventeenth-century surgical treatise:

(10) To the outward senses is refer'd sleeping and waking; sleep is caused of a benign vapor, obstructing part of the spirit's course; not all for they breathe, and sometime walk; 'tis caused also by retraction of the spirits

> toward the heart, by the senses organs; whence singing, music, labor, talk, earnest reading, cause sleep; narcotics, by staying the spirits, pain, labor, waking, by absuming them, circular motions distract, coctions, frictions, lotiones pedum revoke, binders, obstructers, darkness, night, silence, bring a numness upon them. The loco-motive faculty is in the muscles, influenc'd from this spirit: of dreams, &c. in Philosophy. And this is the œconomy of our Body, **according to** the doctrine of the Ancients, I know the Moderns, as Rolfinccius Cartesius, Regius, Silvius, and others **decree** otherwise, as to the doctrine of chilification, sanguification, nutrition, generation, motion, respiration, sensation, &c. but whether either be receiv'd, yet the old method of healing is not chang'd by the mortification of plethora, cacochymia, or any cause; but the same curatory, preservatory and vital indications remain still, as Rolfinccius hath strongly **insinuated**; and his defender the most excellent Moebius, elegantly prosecutes, and largely: Therefore, **says** the Learned Jo. Daniel Horstius, we owe God thanks, that the method of curing grows famous daily, and is still the same, notwithstanding the disagreeing of so many new physical and anatomical Opinions (Ellis Prat, *VADE MECUM: OR, A COMPANION FOR A CHIRURGION*, 1689: f.A10r-f.A10v).

Similar to (9), the views of both ancient and contemporary medical authorities are taken into consideration, and both are acknowledged as making valid contributions (disagreements are also expounded). Yet the ancient authorities are not given any more credence than the sources contemporary to Prat. Such a discussion that intermingles both scholastic and non-scholastic authorities could not be found in any of the earlier, sixteenth-century surgical treatises. Both Taavitsainen (2009) and Hiltunen and Tyrkkö (2009) have pointed to an overall decline in the frequency with which scholastic authorities were referred to by name in medical writing during the Early Modern period, so there is some linguistic evidence that accompanies the waning of Scholasticism during this period, although admittedly, neither of these investigations subjected their findings to statistical testing. A more detailed investigation of the discursive contexts in which mediated scholastic information is presented in EMEMT would be beyond the scope of the current study, but examples (8) through (10) at least point to the possibility of definitive changes in the discursive use of markers of scholastic evidence in EMEMT (and the period in general), in addition to any quantitative changes that occur.

Regarding the lack of statistically significant change in and erratic behavior of markers of direct observation and inference (increasing in frequency and proportion in the second-half of the sixteenth century, then decreasing, then

increasing again at the end of the seventeenth century), Aikhenvald (2004: 70–80) points to a general typological discrepancy between the marking of different types of evidence in the languages of the world. That is, evidence based on direct perception or observation is less likely to be marked overtly than other types of information sources (such as reported information or inference). Boye (2012: 172–181) arrived at a similar conclusion in his cross-linguistic study of epistemic meaning. Granted, both Aikhenvald and Boye (especially Aikhenvald) are concerned with morphological (inflectional) markers, but their findings reinforce the primacy of perception – especially vision – in the acquisition of knowledge over more indirect sources of information (Sweetser 1990: 23–48; Palmer 2001: 35–52; cf. Viberg 1983). So we are faced here with a tendency for more primary, direct sources of information (i. e. direct perception) to be "unmarked" and more indirect means of knowledge acquisition to be "marked." In English this could mean that unless stated otherwise, direct observation as evidence is taken as a given and not as likely to be marked overtly than mediated information. There is some evidence that this may well be the case in Early Modern medical writing. Consider, for example, William Clowes' introductory comments to his surgical treatise of 1596:

(11) I thought it best friendly Reader, in a word or two to make cleere and plaine vnto you since the publishing of this my booke of obseruations, and also the other of Lues Venerea, vpon some speciall occasions, I haue againe examined and diligently perused them ... I haue therfore in some sort altered and corrected these two books, and so haue ioyned them both togither in one, and many things I haue left out as needlesse againe to be spoken of, also I haue enlarged these two bookes with new obseruations and approoued remedies ... (William Clowes, *A PROFITABLE AND NECESSARIE Booke of Obseruations, for all those that are burned with the flame of Gun powder, &c.*, 1596: 1).

Clowes makes clear that much of what he reports and recommends is based on his own personal "obseruations," and revisions made to his earlier writings are enhanced by more recent observations. When Clowes discusses particular cases of injury he witnessed and treated, there are no overt evidential markers because the discourse context makes clear that this information has been arrived at through first-hand experience rather than through reports or reasoning processes:

(12) The cure of one Henry Rodes, one of the waiters at the Custome house, he being vpon the riuer of Thames a skirmishing with his peece, and by reason the peece had certaine flawes in it, did breake into many peeces,

> and made a great wound vpon his chin, and carried away a good part of the Manduble and the teeth withall: moreouer, it did rend his hand greatly: all which I cured without maine or deformitie. After I had searched the wound of his hand and face, then I preserued those wounds with oile of Hypericon warmed, and vpon the same to restraine the bleeding I applied this restrictiue … (William Clowes, *A PROFITABLE AND NECESSARIE Booke of Obseruations, for all those that are burned with the flame of Gun powder, &c.,* 1596: 20).

Presumably Clowes was not present as Henry Rodes injured himself, but his immediacy to the subsequent events (assessment and treatment of Rodes' injuries) is clear from the established context and needs no overt mention of information source. Should the author be more removed from any direct experience of what is being described, overt evidential markers are employed, as is often seen in William Drage's 1665 treatise on afflictions caused by bewitchment:

(13) The carrying of Mr. Silk from his Companion, Mr. Marshall, in the Fens, on his Horse back in the Air diverse miles, till he lighted into Sr. Oliver Cromwels Yard, leaping over one wall, and then another, leaving here a Glove, and there another, and elsewhere his Hat, could be no Delusion. **I had it from a sober Gentleman**, who took it from their mouths. **Doubtless** some Witch did it (William Drage, *DAIMONOMAGEIA A Small TREATISE OF Sicknesses and Diseases FROM Witchcraft, AND Supernatural Causes,* 1665: 9).

This fantastical possession of Mr. Silk was not witnessed by Drage directly, who instead had come across this information "from a sober Gentleman," who in turn came into this knowledge through the reports of others. That is, we are dealing with third-hand information here, from which Drage infers (expressed by *doubtless*) that "some Witch" is responsible. The EMEMT extract of Drage's treatise (10,808 words) abounds with similar evidential constructions (48 overt references to mediated information in total), in contrast to only 6 markers of direct observation and inference found in the 10,632 word EMEMT extract of Clowes' surgical treatise. This could help explain the unexpected irregular behavior of markers of direct observation and inference in the corpus. Even if there were a gradual erosion of scholastic influence over these two centuries and an increasing empirical reliance on direct observation and inference, this might not always be linguistically realized if direct observation is an "unmarked" category and left unexpressed in discourse contexts where it is clear such observation provides the source of knowledge.

7 Conclusion

The Early Modern period witnessed the waning of scholastic influence in medical thought and practice, but as the current study has shown, it was still influential to some degree even at the end of the seventeenth century. Our prediction that evidential markers pointing to scholastic authorities declined significantly in usage during the two-hundred year period under investigation was borne out by the data. Additional qualitative evidence suggests that, although still mentioned by medical authors throughout the seventeenth century, the writings of these individuals came under increasing scrutiny, and their views were simply one among a variety of choices in the medical marketplace, if not contradicted outright. This matter warrants further investigation, especially in longitudinal studies of evidential markers in medical writing beyond the seventeenth century into the eighteenth century. Data from the upcoming *Corpus of Late Modern English Medical Texts 1700–1800* will be of great value here (Taavitsainen et al. 2014). Also in need of further investigation is the discursive use in medical writing of markers of direct observation and inference. Their irregular frequency in EMEMT might well be due to broader typological considerations affecting the use of evidential markers, but a closer investigation of a larger number of texts is also in order. In addition, the current study has focused exclusively on broad categories of evidence type; the specific syntactic and diachronic behavior of particular lexical and grammatical items in medical writing is also worthy of further investigation (see Gray et al. 2011 and Hiltunen and Tyrkkö 2011 for some work in this area). A finer-grained analysis of the use of evidential markers taking the writer-audience relationship into account would also be worthwhile. Several texts in EMEMT are intended as practical advice for a general audience, while others are intended for a more learned or specialized readership. It is possible that scholastic evidence lingered longer in texts geared towards a general audience, who expected familiarity in their medical encounters and might have been resistant to obvious and drastic change (Wear 1989). It would also be worth seeing how the use of evidential markers in the empirically-oriented *Philosophical Transactions* of the Royal Society is similar to or different from the medical treatises discussed here (cf. Moessner 2008, 2009a and 2009b). Finally, as a number of the texts in EMEMT are translations into English rather than original English compositions, it would be worth noting whether the use of evidential markers differs between translated and original texts, and to what degree the use of evidentiality in other languages might have affected the use of evidential markers in translated English medical writing (see, for example, Aijmer's 2009 study on translating the English evidential *seem*). The current

study has provided mostly quantitative findings, but it has also shown how both "top-down" and "bottom-up" methods are necessary for understanding the role of evidentiality in the history of medical writing, let alone the general role evidentiality plays in all domains of language usage.

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Appendix

Below is a list of the 108 lexemes that were used in evidential constructions in EMEMT (individual frequencies are not included).

according	declare	opinion
account	decree	perceive
acknowledge	demonstrate	phrase
add	demonstration	plain
admonish	describe	prove
advise	divide	read
affirm	do	reason
agree	dream	receive
allege	evident	recite
answer	evidently	record
apparent	experience	relate
apparently	expound	remark
appear	express	report
appoint	find	say
as	follow	see
assert	gather	seem
assertion	give	show
assure	have	sign
avouch	hear	signification
avow	hearsay	signify
be	hold	speak
betoken	imply	suppose
bid	infer	sure
by	inform	surely
certain	insinuate	suspect

(*continued*)

(*continued*)

certainly	interpret	take
clear	inveigh	teach
command	judge	tell
conceive	learn	testify
conclude	maintain	think
confess	make	token
confirm	manifest	understand
conjecture	mean	verify
consider	mention	will
convince	note	witness
counsel	observe	write