

THE MIGHT OF 'MIGHT': A MITIGATING STRATEGY IN EIGHTEENTH AND NINETEENTH CENTURY FEMALE SCIENTIFIC DISCOURSE*

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ABSTRACT

Apart from the practical function of efficiently exchanging knowledge, scientific writing is also used to convey persuasion by using a number of pragmatic strategies that help authors gain acceptance for their claims. Such strategies include the acknowledgment of other authors and their opinions, politeness directed towards the reader, and hedging, this is, the mitigation of certain claims that may otherwise sound too categorical by means of various linguistic devices, among them, modal verbs. This paper analyses the use of the modal verb 'might' as a mitigating device in eighteenth- and nineteenth-century English scientific writing. The text samples used for this study are taken from the *Coruña Corpus of English Scientific Writing*. Variables such as scientific discipline, genre, sex and origin of the author, as well as date of publication have been considered in the analysis.

KEYWORDS: Scientific writing, historical linguistics, corpus linguistics, pragmatics, mitigation, modality.

RESUMEN

Además de la función práctica de intercambiar conocimientos, el discurso científico tiene una función persuasiva que se refleja en ciertas estrategias pragmáticas que contribuyen a que un texto científico sea aceptado por los lectores. Estas incluyen el reconocimiento de otros autores y de sus opiniones, el uso de la cortesía dirigida hacia el lector, así como el *hedging*, o la mitigación de ciertas afirmaciones que, por sí solas, tienden a sonar de forma categórica. Esto se consigue mediante diversos elementos lingüísticos, entre ellos los verbos modales. Este artículo analiza el uso del verbo modal 'might' en su función mitigadora en el discurso científico inglés de los siglos XVIII y XIX. Las muestras de texto utilizadas en este estudio pertenecen al *Coruña Corpus of English Scientific Writing*. En el presente análisis se han considerado variables tales como disciplina científica, género, sexo y origen del autor, así como el año de publicación del texto.

PALABRAS CLAVE: discurso científico, lingüística histórica, lingüística de corpus, pragmática, mitigación, modalidad.



INTRODUCTION

The final demise of scholasticism during the seventeenth and eighteenth centuries introduced a new requisite for scientists beyond correctness and methodological soundness to ensure that their claims would be accepted by the scientific communities: peers must be actively persuaded to accept. Consequently, since then, scientists have had to adapt the way in which they presented their claims, developing a series of strategies, such as conveying humility and modesty, respecting and circulating conflicting opinions, or recognising previous contributions in the field, among others. This gave rise to the distinctive profile of a now conventionalised scientific register.

One of such strategies is mitigation. Mitigation is a phenomenon whereby claims are toned down so that they would not sound too categorical or as if they were being imposed on others as established knowledge. Mitigation is realised at the linguistic level by a series of different devices, including verbs of cognition ('believe', 'think'), adverbs ('roughly', 'probably'), conditional clauses, and, among many others, modal verbs.

Modal verbs are particularly useful for mitigating purposes in that they encode a large array of semantic nuances with a limited range of structures, not only introducing information about the probability of a statement, but also conveying uncertainty on the part of the speaker, as well as a series of rhetorical functions, such as politeness. The aim of this work is to analyse the uses of one such modal, 'might', in eighteenth and nineteenth century scientific writing, with special attention being paid to its use by women authors.

In order to do so, three of the subcorpora (*CETA*, *CEPbiT* and *CELiST*) of the *Coruña Corpus of Scientific Writing* will be searched for uses of 'might', which will then be analysed. The analysis will present two parts, one in which the distribution of the uses of 'might' will be examined according to a series of parameters (sex and origin of the author, discipline, genre and date of the text), and a second where the uses of 'might' by women authors will be looked at in more detail, paying attention to its context.

In what follows, Section 1 introduces the historical context of science and scientific discourse in the eighteenth and nineteenth centuries, with special attention being paid to women authors. In Section 2 the concept of mitigation in scientific discourse is presented and the adequacy of the term 'hedge' as referring to these mitigating devices is discussed. Section 3 reviews the relationship between modality and mitigation, with a particular interest in the uses of 'might' as defined in the literature. Section 4 describes the corpus and the methodology used in the study,

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while Section 5 presents the analysis of the results and, finally, Section 6 offers some provisional conclusions and suggestions for further research.

1. SCIENCE AND SCIENTIFIC DISCOURSE IN THE LATE MODERN PERIOD

Life in medieval Europe was dominated by the Church, and so was scientific knowledge. The paradigm of knowledge imposed by the Church during this period was known as scholasticism. It was developed by Saint Thomas Aquinas, and it was characterised by a dogmatic study of classical sources, always in a strict compliance with the Word of God – which was written and, consequently, discussed in Latin.

Scholastic knowledge lived in a perpetual circle of sterile controversies which, however, did not question the Canon. Change came by the late sixteenth and early seventeenth centuries, when two new streams of learning appeared: rationalism, which tried to explain a wide range of physical and metaphysical matters through logic; and empiricism, a new paradigm in which knowledge was to be acquired from real-world experience, rather than by reasoning. Although rationalism and empiricism coexisted for a period of time, it is the latter that would cause the ultimate shift in scientific thought through a number of “self-conscious and large-scale attempts to change belief, and ways of securing belief, about the natural world” (Shapin 5). This set of changes would later be referred to as ‘Scientific Revolution’.

The development of the Scientific Revolution was influenced by several other factors taking place from the sixteenth century. One of them was the growing interest in practical rather than theoretical and ineffective knowledge: artisans (builders, surgeons, painters), prompted by a desire to apply knowledge to the real world and improve the quality of life, started their self-education, becoming engineers or anatomists, and consequently contributing to the development of established science.¹ At the same time, the indisputable authority of the Church (and the Bible) over science started to be undermined. This was helped by the popularisation of practical knowledge and the spread of alternatives to clergy-controlled institutions of learning, although perhaps the most important factor was the development of the printing press. This caused an expansion of knowledge, first among the literate minorities and gradually among the popular masses, which also started receiving education thanks to the foundation of schools.

These parallel processes of change eventually led to the development of a desire to change the ways in which the natural world was studied. Thus, a number of natural philosophers tried to establish a new scientific program, based on experimentation and the challenge of a long-established trust in authorities, living

¹ In fact, this was advocated by both Erasmus and Leonardo Da Vinci, who defended the return to the classical ideas that encouraged the study of the different arts and crafts with the purpose of enlightening.



or dead. A key aspect of this was the creation of new places of learning which conformed to this new method. The Roman *Accademia dei Lincei* was one of the earliest, established in 1609, whereas the *Accademia Naturae Curiosorum* in Berlin and the *Académie des Sciences* in Paris would not open until the second half of the century. The *Royal Society* of London, founded in 1660, was one of these new places of learning. Its ranks were filled mostly by amateurs, who formed a scientific community and were encouraged to report their scientific discoveries and expose them to the criticism of their peers. This meant that the Royal Society not only promoted the study and practice of science, but also contributed to the emergence of English as its language, replacing Latin, until that moment the only legitimate instrument for the transmission of knowledge.

Soon after its creation, the desire to standardize the scientific reports presented before the Society appeared. Sir Francis Bacon proposed a model for them, based on observation and experiment, and Robert Boyle defended a new scientific genre, the experimental essay, ruled by five basic characteristics: brevity, lack of assertiveness, perspicuity, simplicity of form, and objectivity (Gotti 2001). Although most natural philosophers at that time, including Boyle himself, digressed from this established model in a number of occasions, these five rules may be regarded as a goal that scientific writing would be gradually achieving along the two centuries that followed, until a standard scientific discourse was established in the early twentieth century.

However, those who presented their work in institutions such as the *Royal Society* would not only have to present scientific evidence to back their reports, but they would also have to persuade their peers to accept it. Persuasion would, then, gradually become an indispensable part of scientific discourse (Bazerman; Allen, Qin, and Lancaster; Moessner), adopting different forms and changing slowly as the scientific community gained professional scientists: during the late seventeenth and most of the eighteenth centuries, and despite the fact that the Royal Society was conceived for anyone who would call himself a natural philosopher, independently from his socio-cultural background (Sprat 427), the Royal Society was still a genteel society, composed of gentlemen whose word alone was, in principle, a guarantee of truthfulness. However, from the late eighteenth century onwards the growing importance of the scientific method and the professionalisation of science reduced the power of that gentleman's word considerably, to the point that *who* carried out the experiment was nowhere near as important as the experiment itself. This was reflected in the emergence of a series of persuasive strategies in scientific discourse, including the mitigation of categorical statements (Hyland 1996), the inclusion of the scientific community in the report ('we' replacing 'I'), or the shift from an author-centered to an object-centered kind of discourse (passive voice replacing 'I'; Atkinson 1996).

The institutionalisation and professionalisation of science along the nineteenth century was followed by another massive opening of schools, libraries and new universities, as well as special institutions where certain less privileged groups of society (such as children from poor families, working classes, or women) could also access education and specialisation. Female education, all in all, was still deficient



in many ways and this constituted a particular difficulty for women who wanted to pursue a scientific career. The next section will be devoted to the role of women in the recent history of western science.

1.1. THE CASE OF WOMEN SCIENTISTS

In the seventeenth and eighteenth century, science was indeed a gentlemanly activity in all senses – including that of ‘gentlemanly’ as restricted to men only. Even if during the Renaissance women did have some access to learning, either in guilds or in convents (Schiebinger 1987), their scientific practice would usually be restricted to medicine and to obstetrics in particular. Bearing in mind the religious prejudice against knowledgeable women in the Middle Ages —when a genuine interest in astronomy could serve to accuse a woman of witchcraft—, it is not surprising that female scientists would be granted due recognition at a very slow pace.

During this period, the role of women was confined to the household where they would be daughters, sisters, wives, or mothers. Their interest in learning was looked at with some suspicion and often discouraged and, even though privileged girls who were raised in cultured families could in some cases receive private tuition at home, universities were restricted to the male public.² In the nineteenth century, the Victorian morals contributed even further to the reinforcement of patriarchal ideals that banned women from leading an active social and cultural life (Abir-Am and Outram) and it was uncommon, if not impossible, for a woman to have a profession.

Some women, however, would undertake a teaching position in female schools or in private homes. This was often the case of young girls who failed to “marry well” and could no longer be supported by their families, although there were also a few learned women who were truly concerned with female education and dedicated their efforts to instructing children and less privileged women. One such woman was Margaret Bryan, an English astronomer who, albeit married and a mother, devoted her life to learning and instruction and published her works in the eighteenth century. Male scientists also sometimes had their wives, sisters, or daughters trained as their research assistants, although their contributions were not publicized and their names were not published (Schiebinger 1989; 2003).

Despite all this, there were a number of ladies who, even at that early period, studied the laws of nature in solitude and left the world an invaluable legacy in the fields of philosophy (such as Margaret Cavendish, Mary Wollstonecraft), life sciences and, particularly, botany (such as Elizabeth Blackwell, Elizabeth Agassiz), or mathematics (such as Ada Byron) (Slack; Shteir 1987; 2008; Barker-Benfield; Richards). However, it would not be until the late nineteenth century that female

² An exception occurred in Italy, where two outstanding scientists, Elena CornaroPiscopia and Laura Bassi, obtained a university degree and a professorship, respectively.



scientists would be able to openly dedicate their lives to research and occupy a teaching position in an institution of higher education.

The few works signed by female scientists would often undergo an initial stage of distrust, and it was not uncommon for the authors of those works to apologise in the prologue for “daring” to undertake such an enterprise and to recognise the help of a male relative, as if their condition of women implied that they were less capable to conduct scientific research and had little right to publish their writings. These open politeness strategies would be often further strengthened by a more covert persuasive tone across the text, often through hedging conveyed by consensus-seeking devices such as modal verbs or conditional structures (Crespo). This does not seem surprising, considering that even male scientists made use of persuasion in their writings in order to help them gain acceptance in the scientific community.

As already explained, in this paper we are going to look at the modal verb ‘might’ as used in eighteenth- and nineteenth-century male and female scientific texts, focusing on its mitigating power in the latter, which shall be analysed in detail, considering several factors. The theoretical framework for this study is described in the following section.

2. MITIGATION IN SCIENTIFIC WRITING

Scientific writing is characterized by a permanent tension between two needs felt by scientists: that of presenting their research as a unique contribution to a field and promote its particularities and simultaneously, needing to move their peers towards accepting their contributions as valid. This means that scientific writing can be conceived as a negotiation between readers and writer, in which writers have to assert and mitigate their claims at the same time in order to maximise the possibility of reaching an agreement. This aim of moving one’s readers towards consensus is achieved by means of a series of strategies, such as emphasizing the writers’ belonging to a community, recognising shared knowledge and others’ works, assuming the existence of more than one point of view (Crompton; Hyland 1998), avoiding categorical claims, using a non-confrontational tone, or conveying respect, modesty and politeness (Hyland 1998; 2000).

These different strategies materialise in a series of linguistic devices which are characteristic of scientific writing, such as modal verbs, verbs of saying, passive sentences, nominalisations, mental state predicates, and epistemic adverbs and adjectives. Warchal (141-142) groups these devices in five sets of rhetorical or pragmatic strategies which play a role in the tension between individualism and consensus: inclusive-‘we’ constructions, common knowledge markers, attitude markers, certainty markers (also called emphatics), and hedges.

Inclusive-‘we’ constructions and common knowledge markers are used to emphasize the existence of a shared set of knowledge and values. The function of the former is helping authors to position themselves and their readers as members of “the same group of experts” (Warchal 142), whilst the latter (which include evaluative adjectives and expressions of attribution including textual references) are used



to refer to knowledge which the readership is assumed to share (Koutsantoni) and to promote the claims by indicating that they are “based on knowledge shared by other members of the academic discourse community working in the same field” (Warchal 142).

Attitude markers are used to express the author’s affective values in relation with the content, contributing to guide the interpretation of the reader (Hyland, *Hedging in scientific research articles*) by establishing a background of assumed attitudes in relation to which the claims have to be considered. They include evaluative adjectives and adverbs, modals expressing obligation and negative evaluations of previous research (Koutsantoni). Certainty markers, on the other hand, are used to express the confidence of the author towards their findings, and thus avoiding a possible disagreement by predisposing readers to accept the claims presented (Hoey 33). They are realised by expressions of probability, modals and verbs of cognition in the first person.

Finally, hedges are defined as “expressions that tone down the force of a statement by limiting the commitment of the author to the expressed proposition” (Warchal 142). Hedges are used to distinguish claims from established knowledge (which does not need hedges as it is undisputed) as well as to leave open the possibility of differing points of view. However, Warchal’s classification overlooks the problems inherent to the concept of ‘hedge’. These problems are that, despite the important body of literature on the subject (Lakoff; Fraser; Brown & Levinson 1978; Myers; Hyland 1994; Salager-Meyer 1994; 1998; Crompton; Lewin; Alonso Almeida), scholars have not been able to reach any kind of consensus about either its definition or the set of structures considered as its members. These two aspects are analysed in what follows.

2.1. THE PROBLEMATIC CONCEPT OF ‘HEDGE’

Hedges have been characterised as “a concept that evades definition” (Lewin 165). The attempts to define the concept in the literature have produced often contradictory results, and the borders with related phenomena reflecting involvement of the writer have not been well defined. Moreover, there is no consensus on the members of the category, and even the criteria to identify linguistic elements as hedges are considered as arguable.

The term ‘hedge’ was coined by Lakoff to refer to linguistic structures, such as ‘sort of’, ‘quite’... “whose job is to make things fuzzy or less fuzzy” (194), although six years earlier Weinreich (163) had already identified “metalinguistic operators” such as ‘true’, ‘real’, ‘so-called’, ‘strictly speaking’, or ‘like’, which correspond with a similar idea. From the 1980s (Fraser, Myers, Salager-Meyer 1994), hedges were defined as an expression of the author’s desire to present themselves as diplomatic or modest, echoing Brown and Levinson’s (“Universals in language usage: Politeness phenomena”, *Politeness: Some Universals in Language Usage*) politeness model and presenting hedges as a strategy to avoid face-threat, in this case the one the author would suffer if they were to be seen as imposing a particular interpretation of the facts



on the reader. Brown and Levinson themselves define 'hedge' as "a particle, word, or phrase that modifies the degree of membership of a predicate or noun phrase in a set; it says of that membership that it is partial, or true only in certain respects, or that it is more true and complete than perhaps might be expected" (*Politeness: Some Universals in Language Usage* 145).

However, from the 1990s onwards hedging has most commonly referred to a conventional phenomenon of academic style by means of which authors tone down the strength of a claim to avoid disagreement (Taavitsainen "Genre conventions: personal affect in fiction and non-fiction in early Modern English"), as part of a set of fixed strategies such as the ones included in Warchal's model above. Other authors, such as Crompton, dissent from the view that hedges express the attitude of the speaker towards a proposition, considering instead that they are used by a speaker "to explicitly qualify his/her lack of commitment to the truth of a proposition he/she utters" (281). Thus, Crompton would only consider terms such as 'possibly' or 'probably' as hedges, leaving out terms such as 'fortunately'. Hyland (1998) joins both points of view, considering that hedges are "any linguistic means used to indicate either (a) a lack of complete commitment to the truth value of an accompanying proposition, or (b) a desire not to express the commitment categorically" (1998, 1).

A further problem is that hedging has been frequently confounded with other phenomena, such as 'stance', 'evidentiality', and 'metadiscourse', which are also related in one way or another with authors' involvement. These concepts, moreover, have received several definitions, some of them contradictory, and some overlapping with each other, and their limits are, again, fuzzy. Thus, 'hedge' appears as a concept which cannot be defined easily. However, it is evident that, despite this difficulty, it has been used profusely as a label with which different phenomena have been named. In Alonso's words, "the notion of hedging has been used as a stock category, often used to account for unclear strategies in discourse showing some degree of epistemic modality" (199).

In fact, hedges can be realised by several structures at the linguistic level. For instance, for Brown and Levinson (1978, 146-166) hedging "can be achieved in an indefinite number of surface forms", including adverbs ('roughly', 'probably'...), adverbial clauses ('that's how it is', 'in fact'), verbs of cognition ('I believe'), conditionals, or even prosody or gestures. Similarly, Hyland distinguishes between lexical hedging (expressed by means of lexical devices, such as epistemic lexical verbs, modal auxiliaries, adjectives, adverbs, and nouns) and strategic hedging, or "hedging strategies", expressed by means of "questions, conditional clauses, and contrast markers, as well as a limited range of formulaic phrases" (1998, 103).

However, there is no consensual approach about how to identify members of the category beyond the different classifications of hedges. A possible solution was proposed by Crompton, who created an operational definition of 'hedge'. According to him, hedges are expressions whose change would render the truth-value of the proposition unchanged, whilst, at the same time, increasing the commitment of the writer. Although this definition would lead to an unequivocal identification of the members of the category, it would also narrow the category too much, as criticized by Salager-Meyer (1998, 228), who defended the fuzziness of the concept and that



the identification of hedges was to be based on contextual analysis. Alonso (204) shares this position, defending that “[t]he analysis of context is not only necessary, but unavoidable if one really wants to highlight the cases of hedging with any degree of confidence.”

It seems therefore that the term ‘hedge’ can be considered problematic in that several of its definitions are too fuzzy, and others, such as the one by Crompton, seem too narrow. Consequently, in order to avoid falling in either definition gap, this study will analyse modal uses in relation to the pragmatic effect they produce, this is, the mitigation of the force of the claim, avoiding the use of the label ‘hedge’, although the pragmatic effects of these linguistic devices as defined in the literature will, of course, be taken into consideration.

3. MITIGATION AND MODAL VERBS

The mitigating power of modal verbs³ is considered a particular resource in academic discourse (Gotti & Dossena), which takes advantage of modalisation to introduce information about the probability of a statement, to convey uncertainty, to express the range of probabilistic outcomes in conditional settings, or to distance the author from the propositional content by means of expressing the claim in a less categorical way (Ferguson), among others. Modal verb forms, such as ‘may’, ‘might’, ‘can’, ‘should’, ‘must’... usually convey meanings related to notions such as ability, permission, necessity, or obligation (Biber *et al.* 73, 483-497). Regretfully, though, there is no biunivocal relation between modal forms and modal meanings. On the contrary, each modal verb form can express several modal meanings at once, and each modal meaning can be conveyed by several modal forms. This has led to an important number of different classifications in the literature.

Early classifications were characterised by their exhaustiveness. Jespersen, for instance, distinguished among eighteen⁴ different moods. However, most classifications in the literature (Lyons; Palmer 1990) distinguish between ‘epistemic’ and ‘deontic’ modality. Epistemic modality is used to express the speaker’s knowledge, belief, commitment or opinion towards the truth of the statement and is related to meanings of certainty, possibility, or certainty of falsehood. Deontic modality is related to the authorised, obligatory, or necessary possibility or impossibility of actions performed by morally responsible agents (Lyons 823), and is thus related to

³ Although modality is actualised in language mainly through the use of modal verbs, this notion, defined as “the grammaticalization of speakers’ (subjective) attitudes and opinions” (Palmer *Mood and Modality*16) or “the degree of possibility (or permissibility) attached to a statement” (Vihla 17) is not exclusive to modal verbs, being also conveyed by adjectives “it is possible that...”, adverbs “Probably...” or nouns “there is the chance that...”

⁴ Jussive, Compulsive, Obligative, Advisory, Precative, Hortative, Promissive, Permissive, Optative, Desiderative, Intentional, Apodictive, Necessitative, Presumptive, Dubitative, Conditional, Hypothetical, and Potential (Jespersen 320-321).



meanings of obligation, permission, and prohibition. Sometimes a third type related to the notions of real world ability or intention of action, ‘dynamic’ modality (Palmer 1990; Papafragou), is added.

There are also some models that offer a different classification. Von Wright distinguishes between two other types of modals apart from deontic and epistemic ones: ‘alethic’ and ‘existential’. Existential modals express an existing or potential property of a subject (or lack thereof), and are thus similar to some of the uses of dynamic modals. Alethic modals, widely discussed in Papafragou, are similar to epistemic modals, but they are used to express objective (rather than subjective) certainty, possibility or falsehood, and would then only be used to refer to established scientific laws, general truths, and logical inferences. Table 1 below shows the types and degrees of modality distinguished in von Wright, following Vihla (25).

TABLE 1. TYPES AND DEGREES OF MODALITY IN VON WRIGHT			
ALETHIC	EPISTEMIC	DEONTIC	EXISTENTIAL
necessary	verified	obligatory	universal
possible	not falsified	permitted	existing
contingent	undecided	indifferent	(particular)*
impossible	falsified	forbidden	empty

* ‘Particular’ was added to the degrees of existential modality by Vihla herself.

Another classification is that by Coates, who distinguishes between epistemic and ‘root’ modalities. The latter type groups together dynamic and deontic modals in a single group. According to Coates (55), epistemic modals are those “concerned with the speaker’s assumptions or assessment of possibilities, and in most cases it indicates the speaker’s confidence or lack of confidence in the truth of the proposition expressed.” Root modals, in turn, are those conveying “meanings such as permission and obligation, and also possibility and necessity” (Coates 55).

3.1. USES OF ‘MIGHT’

As explained above, the different types of modality are not expressed by exclusive markers, but, on the contrary, a single modal verb may express more than one meaning and a given meaning may be expressed by more than one form. This is the case with ‘might’. It can express two different meanings, as shown in examples (1-2) below:

- (1) Might I ask whether you intend to stay?
- (2) This might hurt a little, but just for a second.

These two examples represent a deontic and an epistemic use, respectively. The deontic use (1) is looking for (rhetorical) authorisation, this is, it is asking for permission to perform an action, in this case to ask the addressee whether they intend to stay. The epistemic example (2) expresses the speaker’s belief about a statement, this is, their judgment about the possibility of the event, hurting a little, to happen.



Some authors would also distinguish a third meaning, shown in (3) below, in which 'might' would be a dynamic modal:

(3) This species might be found in the North of England only.

This example would be expressing the real world status of the entity being judged, in this case, informing about a characteristic (that it might be found in the North of England) of the subject, the species.

In scientific writing, however, most uses of 'might' are epistemic, while deontic uses appear only in discourse management contexts. This is the case of example (4) below, in which the author is guiding their audience towards a particular part of the discourse. This is of course, particularly productive in face-to-face interaction, such as that in lessons, discourses and conference presentations.

(4) If you might take a look at the median palliative index.

The frequent use of 'might' as an epistemic modal, is, however, hardly surprising, as the relation between mitigation (or hedging) and epistemic modality has long been identified in the literature. According to Taavitsainen ("Evidentiality and scientific thought-styles: English medical writing in Late Middle English and Early Modern English"), early experimental essays were already characterized by their non-assertiveness, containing features which conveyed a non-prescriptive point of view, among which the key one was the use of epistemic modality. Hyland (1994, 240) defends that hedges chiefly express epistemic modality (a notion primarily developed in Lyons), and that they are related to the speaker's "unwillingness to make an explicit and complete commitment to the truth of propositions" (Hyland 1998, 3). Thus, by using the different epistemic modals, the author is able to encode different degrees of probability, but also indeterminacy, thus avoiding the imposition of a particular interpretation on the reader. It must be remembered, however, that this expression of mitigation by means of epistemic modality is not restricted to modal verbs, being also frequently encoded by epistemic lexical verbs such as 'suggest', 'indicate' or 'predict', which are considered to be "the most transparent means of coding the subjectivity of the epistemic source" (Hyland 1998, 119), as well as by epistemic adjectives ('possible', 'unlikely'...) and adverbs ('generally', 'presumably', 'probably', 'evidently').

Dynamic uses are more difficult to distinguish in that there is an inherent ambiguity between epistemic and dynamic uses in scientific modals, as shown in example (5) below, taken from Hyland (1998, 111):

(5) This could be sufficient for hemoglobin to function in the facilitation of diffusion of O₂... (D1: 638)

= a) I believe it is possible that this causes the effect (epistemic) OR

b) In some circumstances it is possible for the effect to occur (dynamic)

These instances show that the distinction between dynamic and epistemic modality is rather weak in written formal discourse. According to Hyland, this sort



of ambiguity in scientific writing might be strategic: whether the actual meaning is epistemic or not, the authors are distancing themselves from the proposition, this is, they are mitigating it.

As already explained, some authors in the literature, such as Coates, distinguished between epistemic and root modalities, the latter comprising both dynamic and deontic modals. However, in this case, this classification seems unhelpful. If only, dynamic 'might' seems more similar to epistemic than to deontic modals, and subsuming deontic and dynamic modals in a single type would hinder the very characteristic deontic uses of 'might'. Consequently, the study will use a two-type classification such as those by Lyons or Palmer (1990) and only two functions of 'might' will be distinguished, the deontic and the epistemic one. Both functions have mitigating readings, but they are different, with the use of deontic 'might' expressing a higher level of politeness in a requirement, whilst epistemic 'might' has more to do with either lack of confidence over the certainty of the event or with an attempt to tone claims down.

4. CORPUS USED IN THE STUDY

This study uses the *Coruña Corpus of English Scientific Writing* (henceforth *Coruña Corpus* or *CC*). The *Coruña Corpus* is a "purpose-built electronic corpus conceived of as a resource for the study of scientific writing in English" (Moskowich 35), consisting of several twin subcorpora, one for each discipline, sharing the same design and principles of compilation. It covers the period between 1700 and 1900 at a rate of two c.10,000-word samples per decade and discipline, totalling c.400,000 words per subcorpus.

The corpora used in this study are the *Corpus of English Texts on Astronomy* (*CETA*), the *Corpus of English Philosophy Texts* (*CEPhiT*) and the *Corpus of English Life Sciences Texts* (*CELiST*). These three corpora contain 122⁵ samples of texts in total, adding up to 1,215,003 words. These three disciplines have been selected because they provide a representative picture of the uses of scientific register as a whole when considered in common, but, at the same time, they are also sufficiently different from one another so as to provide the opportunity to compare different styles in each of them: astronomy used to be an observational science, characterised by the presence of careful descriptions of observations and mathematical analyses. Life sciences, whilst not disregarding observation, focused on experimentation and classification, creating taxonomies by means of analysing similitudes and differences

⁵ There are two more texts that would be expected. This is because *CETA* contains four shorter texts, which do not reach the 10,000-word threshold by themselves, but which are included so that the word count in that given decade is maintained. These four short pieces (such as Wilson's 1774 article "Observations on the solar spots" published in the *Philosophical Transactions*) are included *in toto* in order to introduce other types of works which are also representative of the production of the discipline at the time.



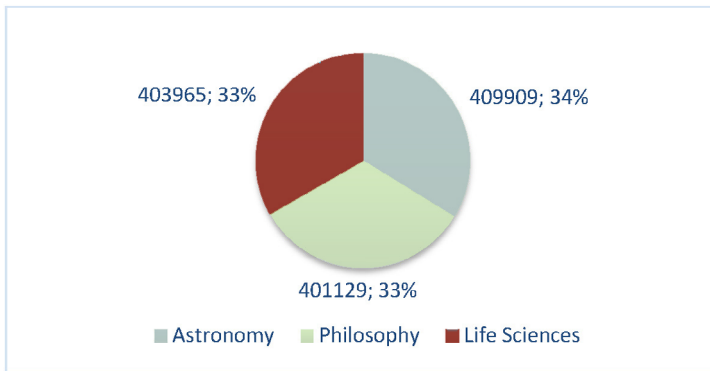


Figure 1. Words per discipline in the corpus.

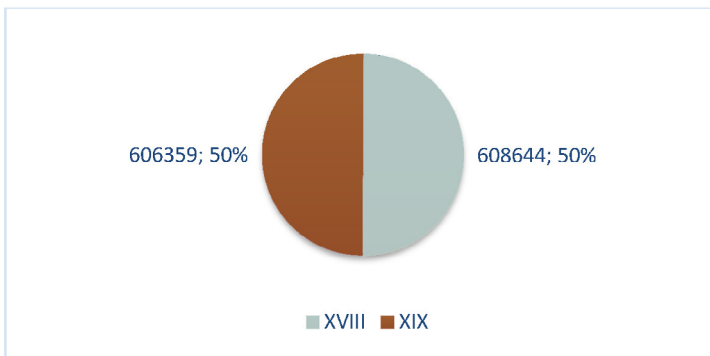


Figure 2. Distribution of words in the corpus per century.

between classes. Finally, philosophy was more of a speculative science, relying on the elaboration of arguments by means of the logical development of discourse from given premises.

As can be seen in Figure 1 below, *CETA* comprises forty-two samples and 409,909 words, *CEPhiT* presents forty samples and 401,129 words, and *CELiST* contains 403,965⁶ words and other forty texts.

This analysis comprises both the eighteenth and nineteenth centuries in their entirety. There are the same number of samples (sixty-one) from each century, and, as shown in Figure 2 below, samples from both centuries contain a similar number of

⁶ The different number of words in each discipline is the result of the fact that the samples contain *approximately* and not *exactly* 10,000 words, thus allowing for slight differences. These differences will also be present in all the other parameters presented below, thus explaining the lack of round numbers.



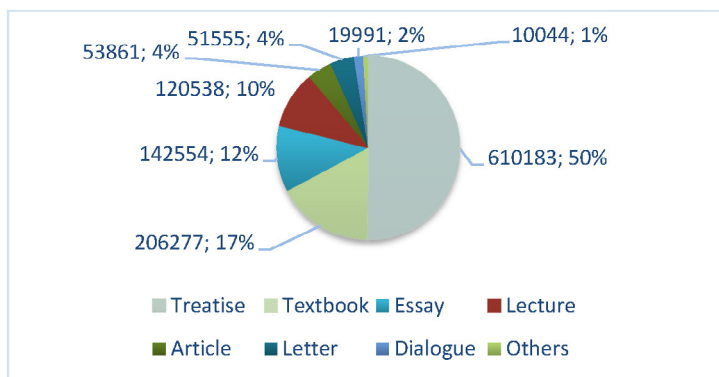


Figure 3. Distribution of samples and words per genre.

words: samples from the period between 1700 and 1800 add up to 608,644 words, and samples from the nineteenth century total 606,359 words.

The genres of the samples have also been taken into account. As shown in Figure 3, there are sixty-one treatises, adding up to 610,183 words; twenty textbooks (206,277 words), fourteen essays (142,554 words), twelve lectures (120,538 words), seven articles (53,861 words), five letters (51,555 words), two dialogues (19,991 words) and one sample from a dictionary, which appears under the label “others” and contains 10,044 words. This distribution tries to provide a representative picture of the genres used in scientific writing at the time, reflecting the dominance of treatises, the importance of textbooks in the drive for popularising scientific knowledge, as well as the evolution in the genres used for communicating science, with the gradual disappearance of genres such as letters and dialogues which were more characteristic of the previous scholastic paradigm, and the first uses and gradual popularisation of articles, which would later dominate scientific writing.

The samples selected represent the entirety of native English-speaking areas at the period, comprising (as shown in Figure 4 below) fifty-six samples from works written by English authors (556,885 words), twenty-eight samples from Scottish authors (276,331 words), sixteen samples from North American authors (158,170 words) and ten samples from Irish authors (101,723 words). A further twelve samples (121,894 words) are labelled as “others.” This label includes two different groups of authors, those who have been educated in several countries, being influenced by more than one diatopic variety, and those about whom there is no definite information.

Finally, the last parameter and perhaps the most relevant is that of sex. As shown below in Figure 5, there is a clear majority of samples written by men, 110 out of 122, adding up to 1,091,025 words. This is in keeping with the reality of the time, in which female science writers were still very much on the minority. There are twelve samples by female authors in the corpus, adding up to 123,978 words.



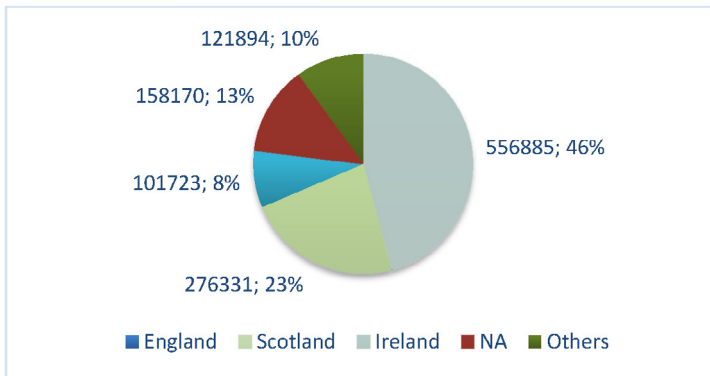


Figure 4. Distribution of words per provenance of the author.

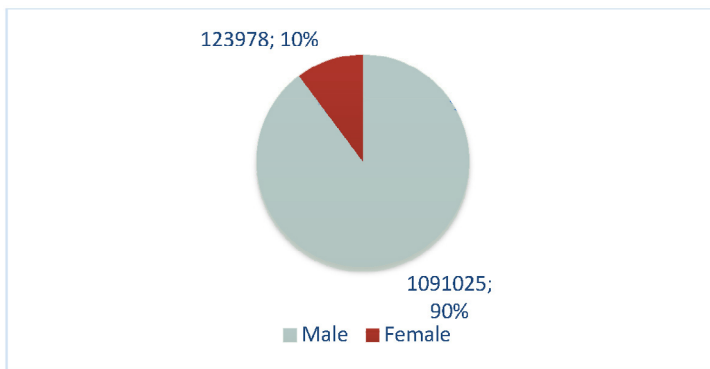


Figure 5. Distribution of words per sex of the author.

4.1. METHODOLOGY

In order to obtain the data to analyse, searches for ‘might’ were conducted with the help of the *Coruña Corpus Tool* (henceforth, *CCT*), a corpus management tool specifically designed for its use with the texts of the *CC* “to help linguists to extract and condense valuable information for their research” (Parapar & Moskowich 290). The searches have been conducted in two stages.

First, the uses of ‘might’ in all texts were counted. Since the *Coruña Corpus* was not tagged for parts of speech when this research was carried out, it was impossible to refine the results of the searches *a priori*, and it was necessary to manually disambiguate the list of occurrences obtained with the *CCT* in order to eliminate possible uses of the searches which did not correspond with the desired set of data.



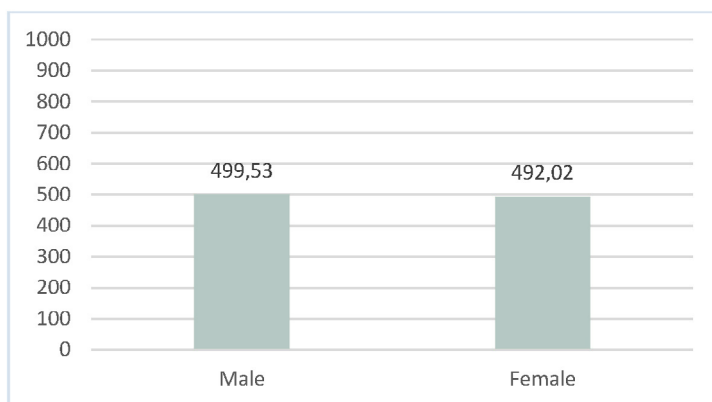


Figure 6. Uses of 'might' per sex of the authors. Normalised figures (N=1,000,000).

In this case, occurrences were examined to exclude potential appearances of 'might' as a noun, but no cases were found. After the disambiguation process ended, the total number of cases was 606.

Second, a new query was conducted using the function of the *CCT* which allows to search by metadata, in order to obtain the cases of 'might' used by female authors, which were then extracted with sufficient context so that it would be possible to analyse them in detail. The number of cases obtained were 61.

5. ANALYSIS OF THE RESULTS

The analysis of the results will be divided in two parts. First, the results for the uses of 'might' in the whole corpus will be classified on account of six parameters: sex of the authors, diachronic evolution, discipline of the text, discipline of the text and century of the sample, genre of the text, and origin of the author. Second, the 61 uses of 'might' in female-authored texts will be analysed in detail, taking into account whether they are examples of epistemic or deontic modality and examining their context meticulously in order to find characteristic usages.

5.1. GENERAL ANALYSIS

Since the uses of 'might' in female-authored text are going to be the object of the second part of the analysis, it seems adequate to start by comparing the uses of male and female authors. As can be seen in Figure 6 below, both sexes show a strikingly similar proportion of use: men scientists use 'might' 499.53 times per million words, whilst women use it just a little less frequently, 492.02 times per million.



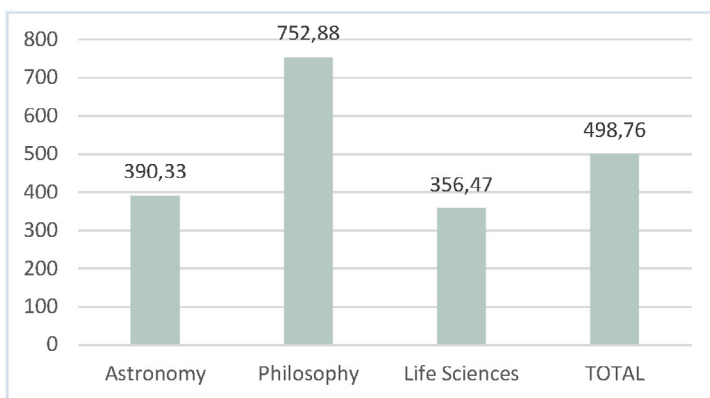


Figure 7. Uses of 'might' per discipline. Normalised figures (N=1,000,000).

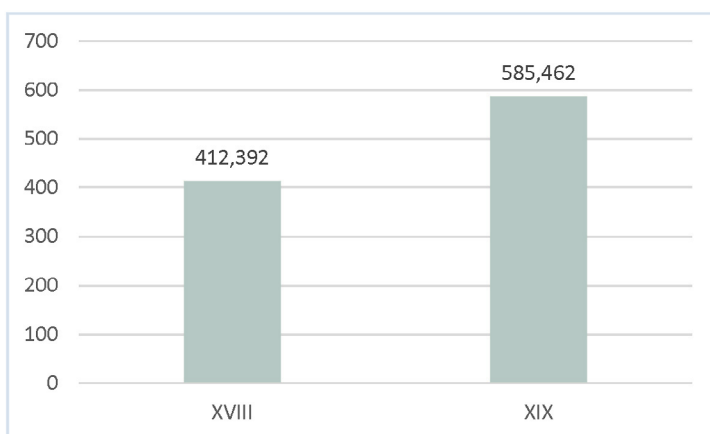


Figure 8. Uses of 'might' per century. Normalised figures (N=1,000,000).

'Might' is then used in a similar proportion by both men and women, although this does not preclude differences in their particular uses.

Other parameters do, however, show more notorious differences. This is the case of the discipline to which the sample belongs: philosophy samples use 'might' almost twice as frequently (752.88 uses per million) as astronomy (390.33) and life sciences (356.47), as can be seen in Figure 7 below. A possible explanation for this is the more argumentative nature of philosophical discourse, which would then require a higher level of mitigation than those of astronomy and life sciences, which, in turn, are more descriptive.

The most notorious differences are found in the analysis of the parameter of diachronic evolution. As can be seen in Figure 8 below, there is an important



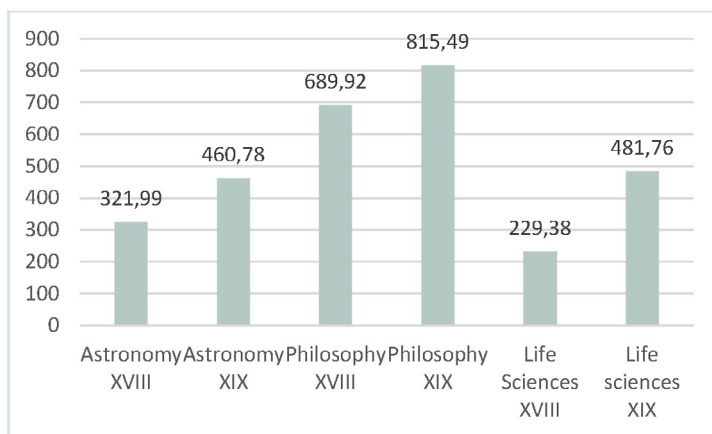


Figure 9. Uses of 'might' per discipline and century. Normalised figures (N=1,000,000).

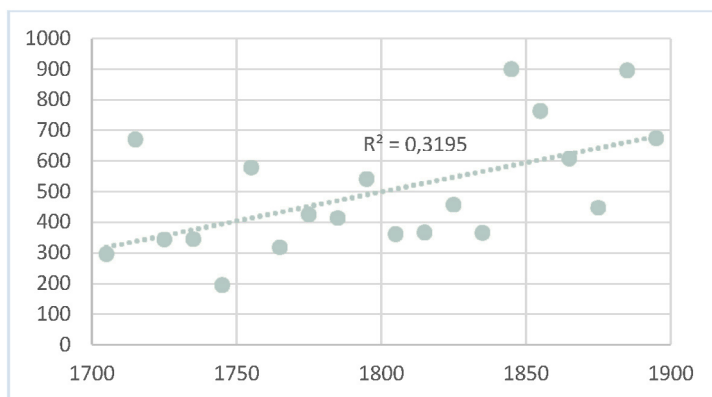


Figure 10. Diachronic evolution in the use of 'might' per decade. Normalised figures (N=1,000,000).

increase in the proportion of use of 'might' over time, from 412.39 uses per million in the eighteenth century to 585.46 in the nineteenth.

Moreover, as shown in Figure 9 below, this increase appears in all three disciplines, being most notorious in life sciences (from 229.38 uses of 'might' per million in the eighteenth century to 481.76 in the nineteenth), although it is also important in astronomy (321.99 in the eighteenth century and 460.78 in the nineteenth) and philosophy (689.92 and 815.49).

If the use of 'might' is analysed by decades instead of centuries, the picture gets even clearer, as there is an evident increase in the proportion of use over time, as can be seen in Figure 10. In fact, if the results are tested in order to examine



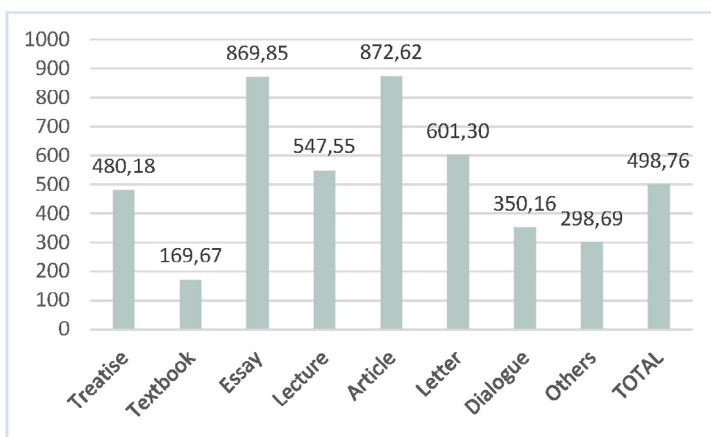


Figure 11. Uses of 'might' per genre. Normalised figures (N=1,000,000)

whether the diachronic evolution is a statistically significant factor explaining the variation in the use of 'might', the results of the statistical test applied to the data (linear correlation) indicate that the diachronic evolution explains 31.95% of the variation in the use of 'might' between the different decades, and that this variation is statistically significant ($R^2=0.3195$, $p<0.05$). Thus, diachronic variation may be shown as a statistically significant factor to explain the use of 'might' in the corpus.

On the other hand, as shown in Figure 11, the results reveal important differences between the genres: articles (872.62 uses per million) and essays (869.85) present a substantially more frequent use of 'might' compared to the average, whilst textbooks (169.97) show a remarkably smaller presence. Letters (601.30), lectures (547.55), treatises (480.18) and dialogues (350.16) show a proportion of use more in line with the average in the corpus.

The higher proportion of 'might' in articles is coherent with its increasing use over time, as articles become more and more common as the period progresses. On the other hand, textbooks usually transmit knowledge as if it were unquestionable, and thus it does not seem surprising that 'might' should not appear as frequently there.

Finally, in what has to do with the origin of the author (Figure 12), the results show that texts belonging to Irish and North American authors contain a smaller proportion of 'might' than the average (334.24 and 341.40 uses per million, respectively), whilst English and Scottish authors appear to use 'might' only slightly more frequently (511.78 and 559.87, respectively). In any case, these differences are not as notorious as in the case of genre.



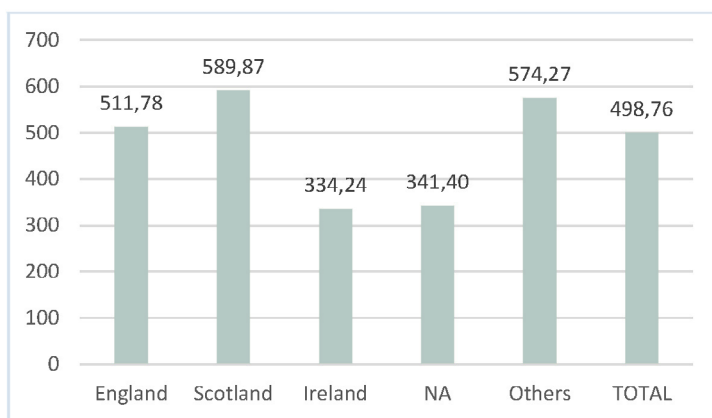


Figure 12. Uses of 'might' per geographical origin of the authors. Normalised figures (N=1,000,000).

5.2. USES OF 'MIGHT' IN TEXTS BY FEMALE AUTHORS

There are 61 uses of 'might' in the twelve samples written by women authors. Out of these 61 cases, there is no single use of 'might' as a deontic modal, and, consequently, all instances are considered epistemic. There are, however, some uses in which 'might' could be deemed a dynamic modal, such as 20 (3883)⁷ below, although these readings are far from clear:

20 (3883) That of Mercury at the time of his inferior conjunction might also be observed, as at that time he appears like a dark spot on the Sun's disk.

All in all, as already explained, the frequent ambiguity found in scientific writing between epistemic and dynamic readings of modal verbs may be considered a strategy by means of which authors distance themselves from their claims, either because they want to encode the probabilistic nature of the claims or because they want to tone them down. Thus, it is clear that all uses of 'might' in texts by female authors are mitigating. However, there are differences in the immediate grammatical contexts in which these uses appear, and an examination is required in order to find whether there are particularly common environments of use. In order to do so, three parameters have been analysed: the nature of the structure in which 'might' is used (main or subordinate clause, with their different types), the nature of the reference

⁷ The identification number of the examples is provided by the CCT. The first number identifies the sample in the list of samples in the *Coruña Corpus*, and the number between brackets identifies the position of the searched word (in this case, 'might') in the sample.

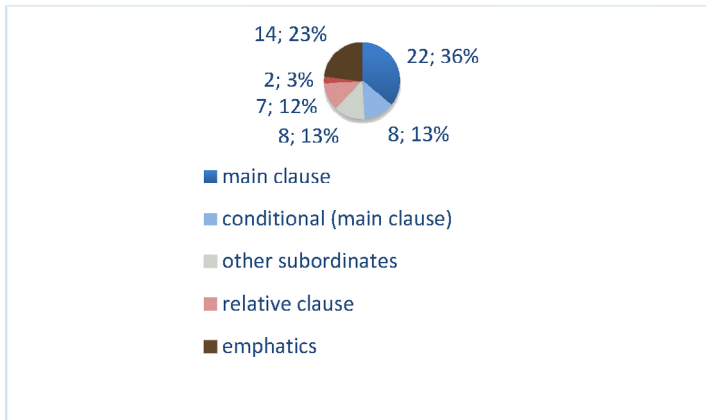


Figure 13. Types of structures in which 'might' is used in the female samples of the corpus.

of the subject (personal or referring to an object), and the grammatical form of the verb introduced by the modal (infinitive, perfect infinitive or passive infinitive).

Regarding the nature of the structure, there is an almost split distribution: there are 30 uses of 'might' in main clauses, and 31 in subordinate ones. Out of the 30 uses in main clauses, perhaps the most interesting trend is that there are eight instances of 'might' in conditional constructions, all of them in the apodosis. Out of the 31 uses in subordinate clauses, most (14) are examples in which 'might' is used in the complement clause of a mind-process verb or construction ('suppose', 'estimate', 'cherish', but also constructions such as 'hence arose the idea that'), a further seven uses appear in relative clauses, and two as complements of constructions playing the role of emphatics ('be granted', 'it is certain'). The detailed results are shown in Figure 13 below.

In what has to do with the reference of the subject, most 'might' uses (37) present a non-personal subject, normally referring to the object of the research. A further nineteen uses present a personal subject. These nineteen cases are very different, as shown in Figure 14 below. Five uses refer to a third person, about whom something is said. There are three uses of 'I', in which the author speaks in the first person, and a further two of 'we', in which the author rhetorically includes the audience. Both 'I' and 'we' uses function as reports of experiences and beliefs of the author. Finally, there are nine uses which seem to encode general or impersonal subjects. Three of them use 'one', and six use other references, such as 'a poet', 'the Lady', 'a man', or 'he'. There are, as well, four further cases which are categorised as others. These include cases whose subject is syntactically impersonal, such as 'there', as well as a case of a subject which is a relative pronoun which has the whole previous clause as its referent.

Finally, in what concerns the grammatical form of the verb introduced by 'might', there are 26 cases of regular infinitives, 25 cases of passive infinitives and



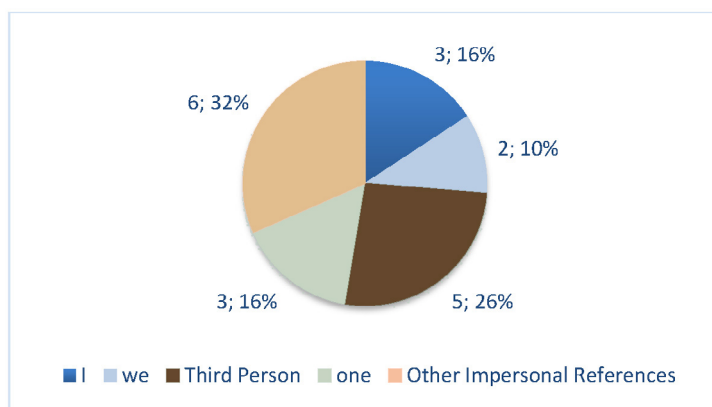


Figure 14. Types of personal subjects of 'might' in the female samples of the corpus.

10 cases of perfect infinitives. The number of passive infinitives is remarkable, as the results show a much more common use than in the language as a whole (see Pullum 71-72).

6. PROVISIONAL CONCLUSIONS AND FURTHER RESEARCH

The results obtained in the present study show that the distribution of 'might' does not vary according to the parameter of sex, but, on the contrary, is more influenced by the parameters of genre, discipline, and, particularly, diachrony. The results concerning this latter parameter have been demonstrated as statistically significant, indicating a tendency towards an increase in the use of 'might' as time passes.

Regarding the particular uses of 'might' in texts by female authors, it was shown that this modal verb appears frequently in certain environments, such as conditional clauses or complement clauses of a mind-process verb, and that it is also frequently used with passive infinitives and impersonal or object-referring subjects. Apart from that, during the examination of the cases, and even though it was not included in the parameters being analysed, it was found that there was a high percentage of mental process verbs among the different infinitives introduced with 'might'.

A common feature of all these uses is that they have all been characterised as linguistic devices with mitigating effects, as explained above. Thus, it may be considered that mitigation, in Hyland's words (*Hedging in scientific research articles* 157) "require[s] a 'more or less' rather than an 'all or nothing' account"⁸. This is,

⁸ Hyland used this quote to refer to the particular attribution of mitigating properties to single linguistic devices, a context which is different, but perfectly compatible, with the one used in here.

mitigation, rather than an isolated feature encoded by single devices, is an accumulative one, in which different devices work together to express a common drive, that of mitigating the force of a claim, and thus, together with other linguistic devices encoding the other pragmatic strategies used in scientific writing, achieve the best reception possible for a scientist's research.

All in all, these results only show part of the picture, in that a comparison with the instances of 'might' by male authors is needed to assess whether this mitigating device is used differently in men's and women's scientific writing. This will be the object of further research, in which the co-occurrence of the modal verb 'might' with other mitigating devices, such as probability adverbs, among others, will also be examined.

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