

LINKING IDEAS IN WOMEN'S WRITING: EVIDENCE FROM THE CORUÑA CORPUS¹

Isabel Moskowich

Leida María Monaco

Universidade da Coruña

Abstract: *This paper provides an overview of some rhetorical devices found in scientific works by late Modern English women. We will focus on apparently marginal linguistic elements as devices fundamental for the expression of logical reasoning in different disciplines. We have based our study on four subcorpora in the Coruña Corpus of English Scientific Writing, so that the behaviour and distribution of rhetorical devices will be studied at a microscopic level and attending not only to how they appear in each discipline, but also taking into consideration elements such as time and genre. Our conclusions are limited but we observe the effort women made at a moment when their role in society was not related to knowledge. In general there is an overall increase in the frequency of features typical of an abstract style as well as an increase of conjuncts and adverbial subordinators as linking devices.*

Keywords: *Coruña Corpus, abstraction, logical reasoning, female writing, scientific English, late Modern English.*

1. INTRODUCTION

The present paper aims to provide an overview of some of the rhetorical devices used by women during the eighteenth and nineteenth centuries in writing science. It complements a previous study (Moskowich and Monaco, 2014) and offers a microscopic analysis of women's use of certain conjuncts and adverbial subordinators as a means of linking ideas in various disciplines when addressing topics of differing technical complexity. Following a brief section dealing with some general tenets, section 3 provides a thorough description of the corpus material used. Section 4 then presents the findings on those elements which seem to be useful in characterising female writing style (if such a thing in fact exists); of the two subsections here, one considers conjuncts and the other adverbial subordinators, both as they appear in our material and also analysed according to the variables of time, genre and discipline. Finally, in section 5 some concluding remarks will be given.

2. RHETORICAL DEVICES IN WOMEN'S SCIENTIFIC WRITING IN LATE MODERN ENGLISH

Any language, and thus any of its registers, will necessarily contain features with a high content load, such as nouns and verbs. However, other items exist which deserve our attention precisely because of the apparently unimportant role they play in communication. Such marginal elements are relatively dispensable, and it is precisely this which makes their use so interesting in a text. Indeed, the subtle role that categories such as conjuncts and adverbial subordinators play is of importance because of what they reveal about a writer's intentions and the fabric of discourse.

¹ The research reported here has been funded by the Spanish Ministerio de Economía y Competitividad (MINECO), grant number FFI2013-42215-P. This grant is hereby gratefully acknowledged.

Conjuncts and adverbial subordinators are among the features studied by Biber (1988, 1995) and Conrad and Biber (2001) in the application of his multi-dimensional (MD) analysis. It has been found that they tend to co-occur in the expression of abstraction (as well as some other linguistic features typical of what he calls dimension 5). In that such forms have often been associated with subjectivity and feeling rather than with objectivity and thought, the present study will look at the way they were used by women when dealing with scientific topics. It might be added that women have historically been associated not with scientific knowledge (objective and universal), but rather with popular knowledge (subjective and of a practical, immediate nature), and this forms the basis of our interest here.

Prelli (1989) and Besnier (1994) have argued that objectivity may reflect certain ideological constructs which have evolved through the transmission of scientific information. From this, we arrive at the pervasive idea that authors detach themselves from their work when dealing with scientific topics, given that science demands objectivity, disinterestedness, organised scepticism, and universalism (Hyland, 1996). We could add perhaps that it also favours abstraction. This same objectivity, together with the content of science itself, demands that abstract concepts are explained in a succession of logical connections, both as manifestations of western cultural ideology and as analytical constructs in the description and interpretation of linguistic behaviour (Besnier, 1994:284).

Lakoff (1990:50) claims that there are users of “high-involvement styles” and users of “considerate styles”. As argued elsewhere (Moskowich, 2013), and in terms of power relations, the former are considered to be domineering whereas the latter are said to be dominated in discourse interaction. This could perhaps be also applied not only to the degree of involvement but also to the ability to use and express abstract thought. We know that such an asymmetry in power relations is often reflected in male and female discourse strategies (Lakoff, 1990).

Abstraction can certainly be detected in the use of specific terms, but since we are dealing with an asymmetrical power relation, it may be argued that female writers would perhaps resort to more subtle (even unconscious) ways of expressing abstract thought. For this reason, less obvious linguistic devices, such as conjuncts and adverbial subordinators, are ideal indicators of women's ability to express abstraction, although it may still be the case that, given the social contexts that promoted the kind of asymmetry just mentioned, women may still have had to seek to conceal or disguise their abstract thoughts. Given the socially-motivated nature of the expression of abstraction here, it may be interesting to assess the extent to which the social evolution of women from the eighteenth to the nineteenth century was reflected in their writing strategies, looking particularly at devices to link ideas and build discourse. Moskowich and Monaco (2014) explored the evolution of the linguistic features typical of Biber's dimension 5 (abstract vs. non-abstract style) in women and found a general increase in frequency over time. Such an increase, then, might also be observed in the use of linking devices such as conjuncts and adverbial subordinators.

Not all conjuncts proposed by Biber (1988) have been found in our material. However, those which do occur include:

altogether, consequently, else, hence, however, instead, likewise, nevertheless, notwithstanding, otherwise, rather, therefore, thus, in comparison, in particular, in consequence, in sum, in other words, for example, for instance, on the contrary, on the other hand

Similarly, the adverbials with a presence in our corpus are:

although, as soon as, because, since, so that, such that, though, whereas, whereby, while, whilst, whereupon, inasmuch as, forasmuch as, insofar as, insomuch as, as long as

Of course, the elements in both groups are not devoid of semantic content, and thus their function is not limited to that of grammatical connectors.

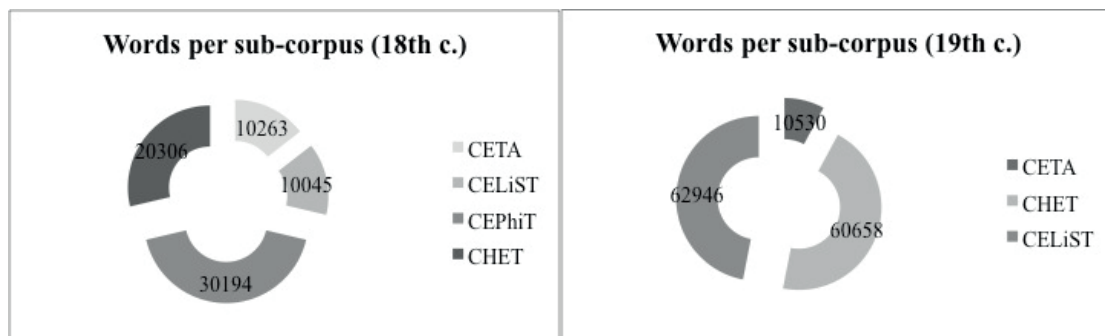
3. CORPUS MATERIAL AND METHODOLOGY

Our analysis is based on the *Coruña Corpus of English Scientific Writing (CC)*, which currently consists of four subcorpora representing the scientific disciplines shown in Table 1 and containing 811,150 words in total (Moskowich, 2012). The main aim of the CC is to provide material for the study of change and variation within scientific writing in late Modern English (1700-1900). The factors determining the chronological period covered by the corpus are of a socio-external nature (Moskowich and Crespo, 2007; Parapar and Moskowich, 2010).

Table 1. Subcorpora contained in the CC.

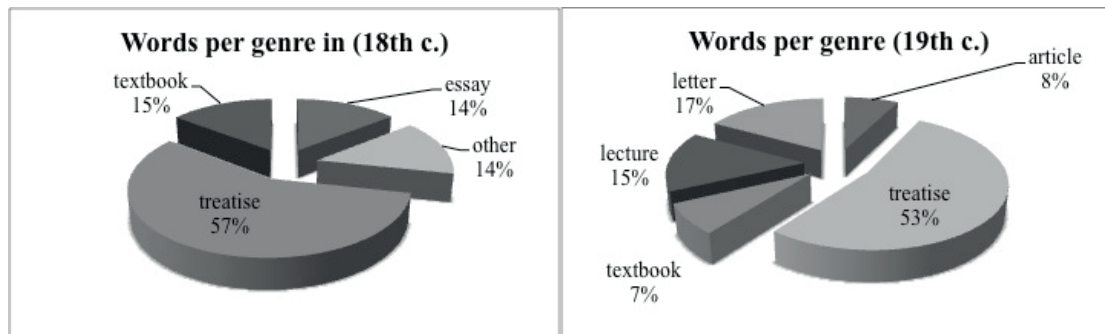
Discipline	Subcorpus
Philosophy	<i>Corpus of English Philosophy Texts (CEPhiT)</i>
Life Sciences ²	<i>Corpus of English Life Sciences Texts (CELiST)</i>
Astronomy	<i>Corpus of English Texts on Astronomy (CETA)</i>
History	<i>Corpus of History English Texts (CHET)</i>

All those texts by women in the CC have been included for this analysis. As a mere reflection of the society of the period, these texts together contain a total of 204,942 words, representing only 16.65% of the whole word-count in the four subcorpora here (8.73% in the eighteenth and 7.92% in the nineteenth century). Also, it is clear that our 20 women authors were not equally active in all disciplines, at least from an official point of view (Graphs 1a and 1b)³.



Graphs 1a and 1b. Distribution of female writing per subcorpus in the 18th and 19th centuries.

All sampled texts are listed in the appendix, sorted by subcorpus and arranged chronologically. If women seem to have had different preferred disciplines, it also appears that they aimed to provide instruction. This is the conclusion we can reach if we look at the six genres represented in Graphs 2a and 2b (textbook, treatise, travelogue, article, letter, and lecture):



Graphs 2a and 2b. Words per genre in 18th- and 19th-century women texts.

The graphs above show that Treatise is the genre preferred by women, although there seems to be a small decrease in its use from the eighteenth to the nineteenth century as Article gained ground (which, as Mössner (2006) has pointed out, is a general phenomenon). We might affirm that in overall terms the different picture we obtain for the two centuries here indicates a slow yet clear shift from the classic genres of instruction, such as Textbook (15% vs. 7% in the eighteenth and nineteenth centuries) to the new ways of conveying knowledge that the new century brought (as we see with Letter, Article and Lecture). Clearly, these new genres reflect a social change in the relation of women to science: whereas it would have been most unusual to find women giving lectures in the 1800s, it seems to have been somewhat more normal from the turn of the century.

² Life Sciences includes diverse disciplines such as Biology, Zoology, and Botany, nowadays considered independent fields.

³ Women often wrote works which they did not publish at all. They also wrote for male authors, either husbands or brothers, as was the case with Catherine Herschel whose brother, William, is included in the *Corpus of English Texts on Astronomy* (Moskowich et al., 2012).

An analysis of the data in relation to three variables (discipline, genre and time) will be presented in the following section.

4. OVERALL FINDINGS

As noted above, the use of conjuncts and adverbial subordinators as linguistic elements for the linking of ideas may reveal some of the rhetorical patterns preferred by women and their motivation for resorting to them. In what follows we will deal with each of them separately.

4.1. Change across disciplines

The abstraction features under survey here seem to be most abundant in the *Corpus of English Philosophy Texts (CEPhiT)* (7.0 nf) in the eighteenth century, followed by Astronomy (6.5 nf); History (5.3 nf) occupies the third position and in Life Sciences (0.8 nf) they are found with the least frequency. Hence, there does not seem to be a greater use of these devices as indicators of abstraction in the Natural Sciences than in the Humanities.

Table 2. Linguistic features by discipline across centuries (nf).

Discipline	18 th century		19 th century	
	Conjuncts	Adverbial sub.	Conjuncts	Adverbial sub.
Astronomy	3.9	2.6	7.7	3.1
History	2.6	2.7	2.8	2.5
Life Sciences	0.4	0.4	2.1	3.3
Philosophy	3.7	3.3	-	-

Findings for the eighteenth century in Table 2 show that Astronomy is the discipline where conjuncts are most often used (3.9 nf). However, adverbial subordinators are most abundant in Philosophy (3.3 nf). This may have to do with the very nature of the subject matter: Philosophy calls for logical thinking and, in that sense, adverbial subordinators play an essential role, whereas conjuncts are present in texts taken from *CETA* (Astronomy), where the observations described must be summarised in some way. Extracts (1) and (2) below illustrate these points:

(1) The Sun, although an immense body, yet being so far removed from our Earth, has but a small parallax with it; and *therefore* Astronomers have recourse to the parallaxes of the planets nearest to our Earth, Venus and Mars... (Bryan, 1797:112)

(2) A Woman cannot be too watchful, too apprehensive of her danger, nor keep at too great a distance from it, since Man whose Wisdom and Ingenuity is so much Superior to hers, condescends for his Interest sometimes, and sometimes by way of Diversion, to lay Snares for her. (Astell, 1700:65)

What is especially noteworthy is that, of the four disciplines, Life Sciences is the one where both resources are least frequent, with only 0.4 nf conjuncts and 0.4 nf adverbial subordinators. At the other end of the scale, in Philosophy, both features are used extensively. This could be explained by the argumentative nature of philosophical texts, requiring a greater use of adverbial subordinators. Thus it seems that subject matter does have an influence on discursive patterns.

History samples show a moderate use of both features. This could perhaps indicate that the discourse here exhibits a similar organisation to that in the Life Sciences: both disciplines are more descriptive than argumentative, and perhaps this is revealed in their linguistic strategies. Conjuncts are in fact less frequent in Life Sciences (only 0.4 nf) than in History (2.6 nf), perhaps because examples (introduced by *namely, that is, for example*) are not so often used. On the same lines, it would seem logical that adverbial subordinators are also less frequent in Life Sciences, where description predominates and there is little room for abstract reasoning.

In the nineteenth century data (Table 3), all frequencies increase, which indicates that both conjuncts and adverbial subordinators now have a greater overall presence in scientific writing. Of the three disciplines considered (there are no samples for Philosophy), Astronomy is the one with highest rates (7.7 nf) of conjuncts, followed by History (2.8 nf), then Life Sciences (2.1 nf). Curiously, there is a very notable increase in the use of adverbial subordinators in the Life Sciences during this century (from 0.4 in the eighteenth century they reach 3.3 nf in the nineteenth century). Perhaps the use of adverbial subordinators in the case of our samples from *CELisT* is, however, not dependent on discipline alone but also on genre, since the letters found in this century belong to this field. We will return to this in the following sections.

Conjuncts are distributed similarly and, according to our data, adverbial subordinators tend to abound where conjuncts are less frequent. This is the case with the Life Sciences texts, with 2.1 (nf) conjuncts. Both resources can be used as discourse organisers and they are to some extent interchangeable, but an abundance of both is not common (Clerke's extract being perhaps an exception to this pattern).

4.2. Change across genres

The other variable of interest to us is genre, in that we believe it may have some influence on the linguistic features authors resort to. Each genre has its own implicitly agreed restrictions as regards language, and this may be reflected in the overall picture in Table 3 below, in which the use of these features for both centuries is presented:

Table 3. Target features by genre and century (nf).

Genre	18 th century		19 th century	
	Conjuncts	Adv. Subordinators	Conjuncts	Adv. subordinators
Textbook	3.9	2.5	2.9	2.8
Treatise	3.0	2.8	3.1	2.7
Essay	3.4	2.4	-	-
Other	1.4	1.8	-	-
Article	-	-	4.6	2.5
Lecture	-	-	2.8	2.2
Letter	-	-	1.5	4.5

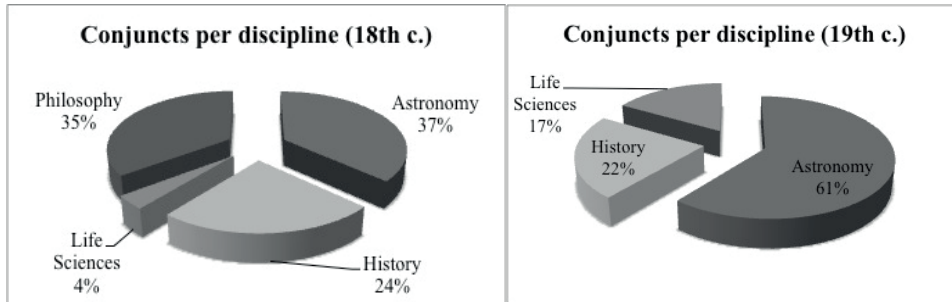
Table 3 shows the relative frequencies for the genres represented in each century. Overall, the data indicates that Article (7.1 nf for the nineteenth century) is the genre where both features are most abundant, followed by Textbook (6.4 nf in the eighteenth century); at the other end of the scale we find Other (3.2 nf in the eighteenth century) and Lecture (5 nf in the nineteenth century). The reason for this may lie in the relative proximity of genres to the oral register. Articles and textbooks were written to be read, and involve a high-brow, formal register, whereas our sample of Other is a travelogue, a genre which shares some characteristics with diaries, thus making use of a more intimate, oral-like language. Similarly, lectures were intended to be spoken (Gómez-Guinovart and Pérez-Guerra, 2000) and in this sense are also closer to orality. Letters deserve special attention since they make frequent use of the features under survey (6.0 nf) and because the presence of conjuncts and adverbial subordinators in them is somehow unbalanced (with the latter appearing three times more often than the former). This may be due to the fact that these are not private letters but rather letters intended to be published, yet which were written with the aim of conforming to the supposed style of the genre. This, for example, may account for the lack of “therefores” and the abundance of “because” in these letters.

5. MORE FINDINGS

5.1. An analysis of conjuncts

Biber (1988) lists a large number of conjuncts contributing to the abstract or impersonal style of texts. Not all these were found in our corpus. For instance, *altogether* is used only twice in our nineteenth century data. Other elements (*else, in comparison, instead, in sum*) are used as conjuncts only the 1700s. The most numerous forms across the corpus in both periods are *thus* and *therefore*, two resultive conjuncts (Quirk *et al.*, 1985:635) associated with logical reasoning.

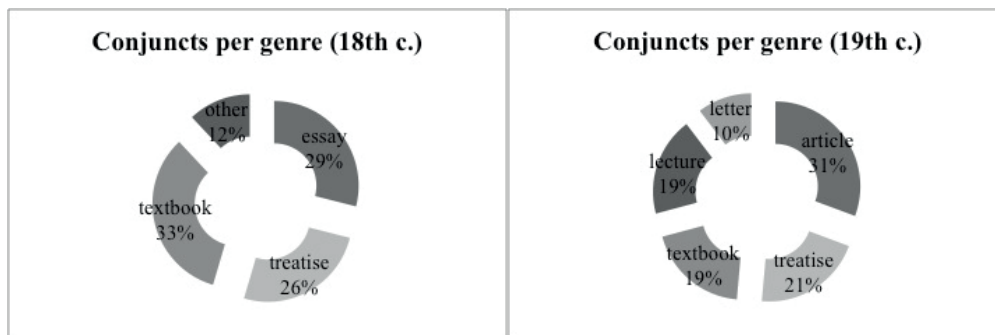
The presence of conjuncts is greatest in Astronomy (11.6 nf), followed by History (5.4 nf) and Philosophy (3.7) The very low figure for Life Sciences (2.5 nf) is perhaps due to the fact that the texts here are chiefly descriptive in nature, with little reasoning or argumentation. This suggests a division between the Humanities (Philosophy and History contain 59% of conjuncts) and the Sciences (Life Sciences and Astronomy have 41%) in the eighteenth century. Although Philosophy is not represented in the nineteenth-century section of our material, we still see that History contains 22% of all recorded conjuncts (see Graphs 3a and 3b):



Graphs 3a and 3b. Conjuncts per discipline in 18th- and 19th-century texts.

The distribution of conjuncts is also very irregular across genres. Textbook, which is represented in both centuries, contains the highest proportion (6.8 nf), followed by Treatise (6.1 nf). Elements such as *thus*, *therefore* and *in sum* abound as recapitulating devices. At the other end of the scale we find that genres such as Letter (1.5 nf) and Other (1.4 nf) do not make much use of these linguistic features, perhaps due to their particular nature and their proximity to orality.

As shown in Graph 4a, Textbooks heads the list (33%) for the eighteenth century, followed by Essay (29%). The three new genres favoured by women writers in the nineteenth century (Article, Lecture and Letter) show a very different distribution of conjuncts: articles contain the highest proportion of conjuncts (31%), whereas lectures and textbooks stand at 19% each; treatises have 21% and letters, a more informal and less complex genre, have 10%.



Graphs 4a and 4b. Conjuncts per genre in 18th and 19th century texts.

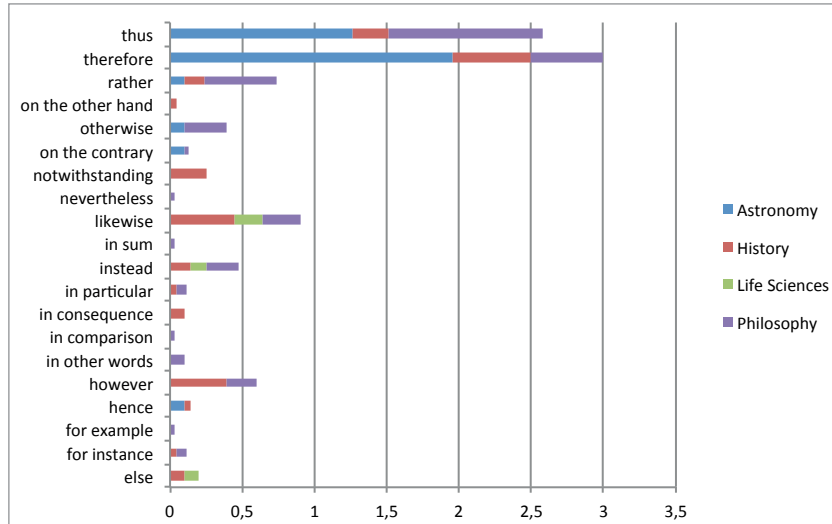
Our analysis of the different types of conjuncts reveals a similar distribution of these features in the two centuries, in the sense that in both cases there are two types which significantly outnumber the rest (see graph 5 below). As regards the eighteenth century, the most frequently used conjunct, *therefore*, is registered in *CETA*. This deserves some comment since we only have one sample for that period, the text by Margaret Bryan. Consequently, the high use of this form may be due to the author's preference rather than to the genre (Textbook), given that the other textbooks in our material do not exhibit such high frequencies. Notwithstanding, the second most used conjunct, *thus*, is also found in Astronomy. Both terms express the concatenation of logical thought in a very obvious way and are abundantly used by the author in her *Compendious System of Astronomy* (1797). But Bryan resorts to just six of the twenty different types recorded for this period, which again may be telling us something about her own style and thus cannot be used to draw any definite conclusions.

Even less lexical variety is shown by Elizabeth Blackwell, the only woman writing about Life Sciences in the eighteenth-century part of our corpus. She employs only to three of all the conjuncts under survey, and even these are used just once (*else*, *instead*) or twice (*likewise*). Contrary to the example of Bryan in Astronomy, these forms convey a shade of contraposition rather than that of logical consequence in the way in which different ideas are linked. The herbal from which we have obtained our sample is a catalogue describing plants and their applications and benefits, and in it there is little scope for speculative reasoning. Example 3 below illustrates this:

(3) Marum is accounted a good cephalic and nervine Plant, and is much ufed in cephalic Snuff; but is of little fervice elfe in Phyfick. (Blackwell, 1737:12)

Texts dealing with History exhibit a total of 13 different types. This, we can perhaps say, is a high tally compared to the samples from the natural observational sciences. Besides, our analysis of History seems to reveal that all these conjuncts are more or less equally distributed, and there is no specific preference for any one form on the

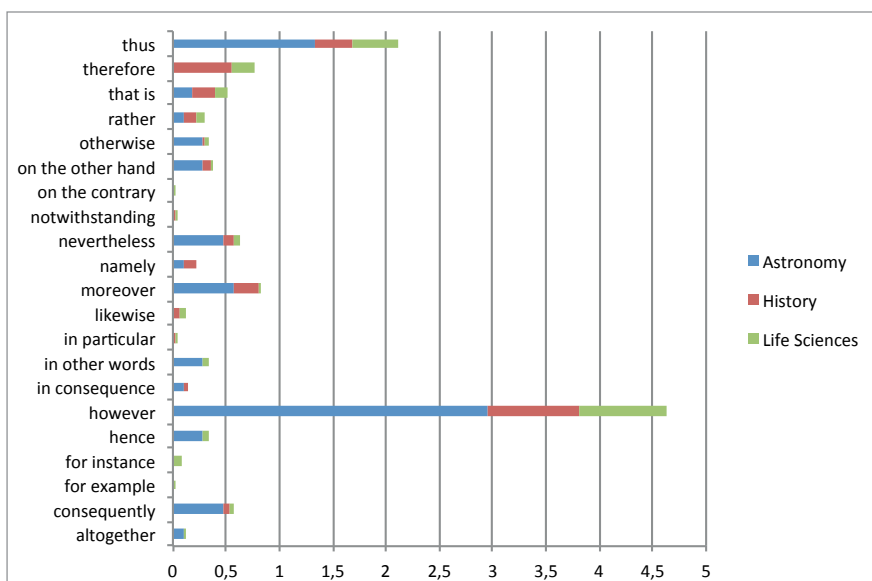
part of the two authors here (Elizabeth Justice and Sarah Scott). As for Philosophy texts, these head the ranking in that their authors use a wider variety of conjuncts (15 out of the 20 we have encountered for this particular century), although these are not evenly distributed. Here, certain aspects of the discourse of these authors is clearly conditioned by their socio-historical context, in that it is evident that they are at pains to prove they can reason as well as men as a means of vindicating their rights.



Graph 5. Distribution of conjuncts across disciplines in the 18th century.

Our picture for the nineteenth century and the 21 conjunct types recorded in it is represented in Graph 6 below. No data is offered for Philosophy since *CEPhiT* contains no samples by women for this period.

As already mentioned, Astronomy is the discipline where the most often used conjunct, *however*, is found. As in the previous century, our sample again corresponds to a single author, Agnes Mary Clerke, and thus personal writing style may have an influence on findings here. It is also in this discipline that we find *thus*, the second most frequent type. In this sense the discipline behaves the same across the two centuries, although Clerke uses three times as many conjuncts as her predecessor in the eighteenth century. The other two disciplines offer a very similar picture except for the fact that whereas we find 19 different types in Life Sciences samples and only 15 in History, both disciplines are represented by the same number of authors and samples. Again, both History and Life Sciences seem to prefer *however*. Even so, we can affirm that all these texts resort to a wider range of conjuncts than texts in the preceding century and are, in that sense, lexically richer.

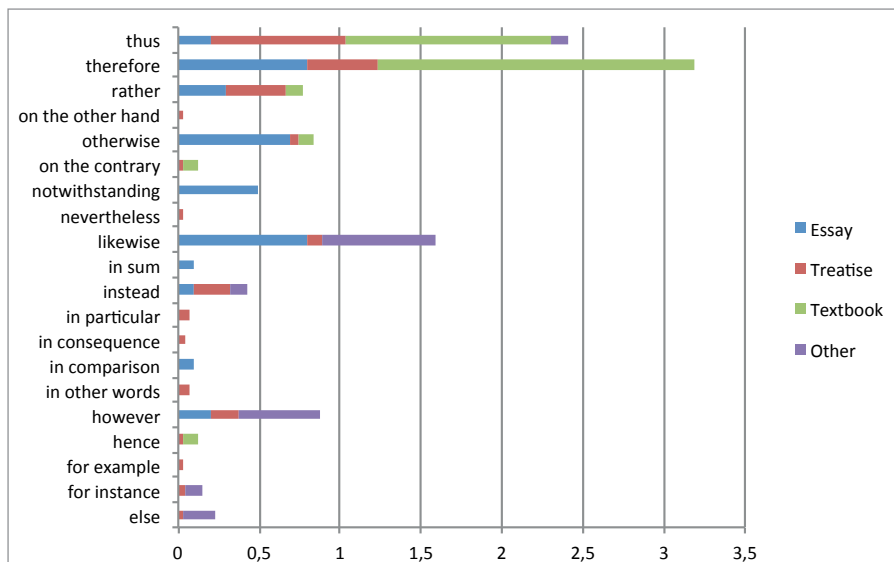


Graph 6. Different types of conjuncts per discipline (19th century).

If we now turn to the analysis of how conjuncts are distributed in the different genres represented in our material we can see some slight differences over the centuries. In fact, we do not find the same genres throughout the whole period under survey, since discursive patterns, stylistic standpoints and genre preferences change.

Graph 7 below sets out the data for the eighteenth century. In it we can see that four of the eight genres included in the CC are represented here (Essay, Treatise, Textbook and Other). The graph shows how *therefore*, *thus*, *likewise* and *however* are the preferred conjuncts, all of them used to make the discourse fluid either along the same argumentative lines (the first three types) or through the contraposition of ideas (*however*). Both *therefore* and *thus* have an important presence in Textbook, and this is not surprising if we take into account that they are resultive conjuncts and thus they “tend to be a conclusion in more ways than one: a mere termination, a reinforcement, a summary, a result, and a basis for further inference” (Quirk *et al.*, 1985:638). On the other hand, neither *likewise* nor *however* have been recorded in Textbook at all. Again, this may be conditioned by the nature of the genre, which seems to avoid equative (*likewise*) and concessive (*however*) conjuncts for the construction of didactic discourse.

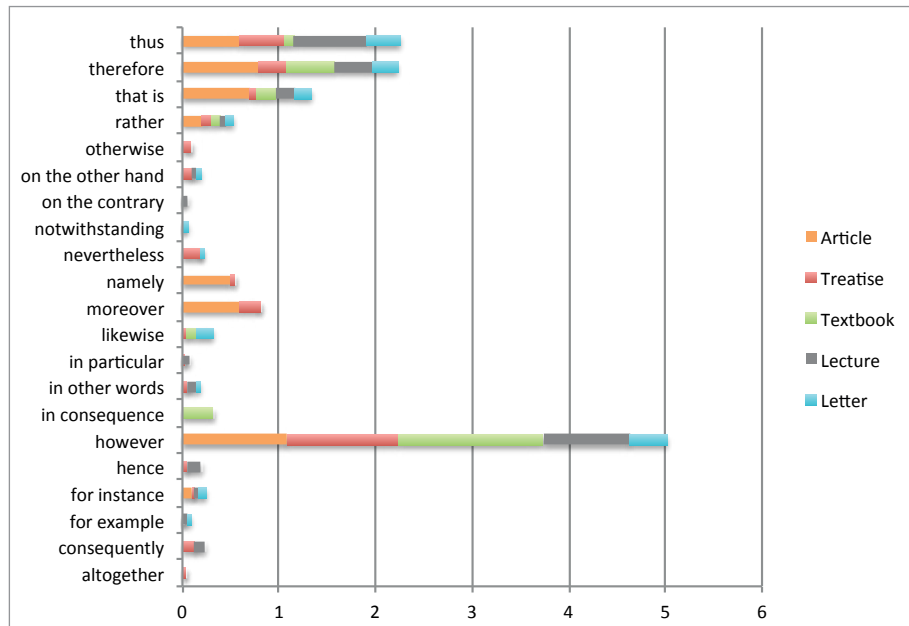
In this same vein, it is worth mentioning that conjuncts such as *for example* and *for instance* are only very poorly represented in Textbook, whereas they are very often used in present-day instances of the genre. Likewise, concessive conjuncts are only seldom found in Textbook and Treatise (*on the other hand*) or only in Treatise (*nevertheless*).



Graph 7. Distribution of conjuncts by genre in the 18th century.

The nineteenth century part of our data, shown in Graph 8 below, corresponds to extracts belonging to five genres (Article, Textbook, Letter, Lecture and Treatise). We can see that the number of genres represented has increased slightly, and they have also varied. We now find some instances of Article, Letter and Lecture and no examples belonging to Other. No doubt this may have some impact on the distribution of the conjunct types found. Once more, *thus*, *therefore* and *however* are at the top of the frequency list, although we also see that *likewise* has virtually disappeared from our samples. Notwithstanding, it is *however* and not *therefore* that occupies the first position. Indeed, *however* is now used in all five genres, and appears with particular frequency in Textbook.

It is worth mentioning that appositive conjuncts such as *that is* and *namely* emerge in the nineteenth century section of our material as new types and, in fact, the former is recorded in all the genres here, whereas the latter seems to be largely restricted to more formal discourse patterns (Article and Treatise). In general, we observe a replacement of types in the transition from one century to the other with some disappearing and some others blossoming.



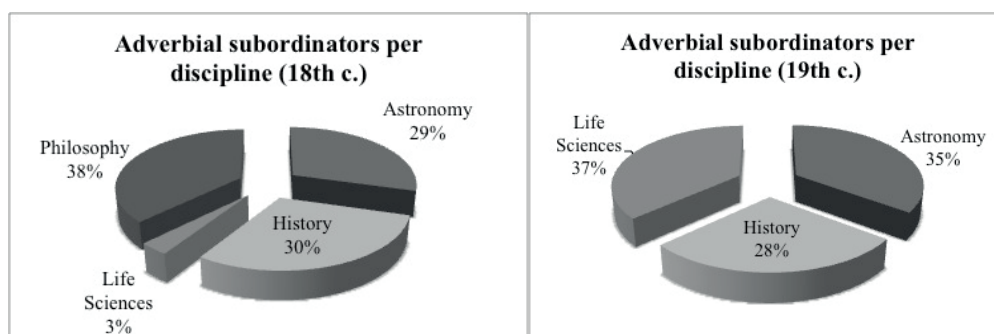
Graph 8. Distribution of conjuncts by genre in the 19th century

5.2. An analysis of adverbial subordinators

Adverbial subordinators may convey different meanings, those in our material being concessive and adversative. Among them, the one form that stands out is *(al)though*. Forms such as *whereupon*, *inasmuch as*, *forasmuch as*, *insofar as*, *insomuch as* and *as long as* have not been recorded in our material, although they were indeed used by male writers at the time, as example (4) from *CEPhiT* illustrates:

(4) And forasmuch as the Reason or Motive, in this Cafe, is external; and directly concerns only the Senfible part of his Nature; therefore I term this kind of Obligation external, or Senfible. (Balguy, 1733:6).

On analysing the distribution of adverbial subordinators per discipline, we find that Astronomy still takes the lead with 5.7 nf. Curiously, History again occupies the second position (5.2 nf), followed by Life Sciences (3.7 nf) and Philosophy with 3.3 nf. The two last disciplines here seem to exhibit a reverse order in their use of adverbial subordinators compared to the use of conjuncts by female writers. However, it is still the fact that Astronomy and History are the two disciplines where they seem to have resorted to these features most frequently. On closer inspection, we observe that the two Humanities subjects are the ones containing the highest proportions of adverbial subordinators in the eighteenth century (see graph 9a below). The picture changes dramatically for the following period, where we perceive a very important increase in the number of adverbial subordinators used in Life Sciences (Graph 9b).



Graphs 9a and 9b. Adverbial subordinators per discipline.

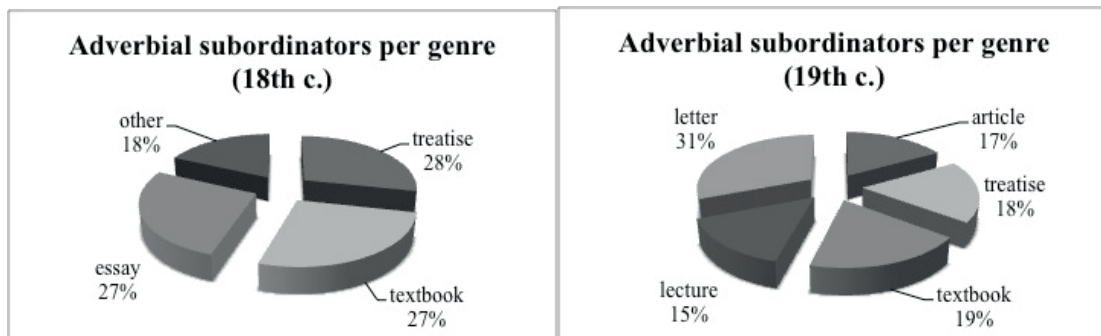
This dramatic rise may be accounted for in terms of the women writing on Natural Sciences needing to show (and express) a logical turn of mind. The processes they were describing were all associated with cause-effect relations, reflecting new tendencies in the discipline. However, the fact that this is not found so abundantly for the material in the eighteenth century does not necessarily imply that such a tendency had not in fact begun earlier. We have just one sample from that period, a botanical catalogue which is descriptive rather than explanatory in

character. Thus, its subject-matter may serve to determine its style to a large extent. The contrast can be seen in examples (5) and (6) below:

(5) This Plant grows to be two Foot high; its Leaves are greener and broader than the Garden Sage; the Flowers are yellow, with purple Stamina. (...) It grows in Hedges and bulfhy Places, and flowers in July and August. (Blackwell, 1737:3).

(6) They look very pretty when dried in that way, because, though they have lost all their spines and suckers, the spots where these appendages were attached form a sort of pattern in regular rows or zones over the surface of the animal. (Agassiz, 1859:8)

As regards the use of adverbial subordinators across genres, it appears to be very similar to that found in earlier studies (Moskowich 2013; Moskowich and Monaco 2014), and is unequally represented across the seven genres for which we have samples. Adverbial subordinators abound in Treatise (5.5 nf) and Textbook (5.3 nf). Such a distribution, which is to be expected overall, is in fact very much unexpected in the genre Letter (4.5 nf), since authors of this type of writing would not, *a priori*, resort to a style where complex ideas need to be expressed. Let us bear in mind, however, that the genre is here represented by fake letters in the sense that they appear to be addressed to a friend or relative, and thus to be informal, yet are in fact very formal and highly technical in nature. It is the use of this rhetorical device that favours the whole discursive pattern to be found later in the text, where logical thinking is reflected in the abundant use of adverbial subordinators as the description and explanation proceeds. Adverbial subordinators are only half as frequent in the four remaining genres, which, surprisingly, include Article and Essay, whose nature would seem to demand a greater use of such devices.



Graphs 10a and 10b. Adverbial subordinators per genre (18th and 19th century).

Graphs 10a and 10b above show how the different genres are represented in the two centuries plus the different use they make of adverbial subordinators. The distribution observed for the eighteenth century is quite logical in that it is more or less uniform (27-28%) except for Other (18%). This can be accounted for by the fact that our sample in Other is taken from a travelogue by Justice (1739) and is therefore a more narrative piece of writing, as opposed to the highly informational character of the other three texts. The percentages of adverbial subordinators found in our nineteenth-century material, as we can see, confirm what we have already noted about the high frequency of these in Letter (31%) as compared with other apparently more expository types of text: Treatises (19%) and Textbook (18%), followed by Article (17%) and Lecture (15%).

On closer inspection, we can see that adverbial subordinators behave differently in the two periods under study. In the eighteenth century, the most frequent types are *though* and *although*⁴ (see Graph 11) and they also seem to have a distribution reflecting certain patterns: *though* abounds in Philosophy and *although* does so in Astronomy. Such preferences may be part of the writing habits of authors, acquired after reading other works in the field, and perhaps thus typical of a specific discipline. *Since* and *because* follow, with exactly the same frequency (1.02 nf). Although both subordinators are causative, Biber uses them to characterise two different dimensions: *since* is used as one of the features typical of dimension 5 (abstraction) whereas *because* is placed within dimension 1 (involvement). This may be due to the fact that the former expresses detachment whereas the latter is certainly closer to the reader. See examples (7) and (8), respectively:

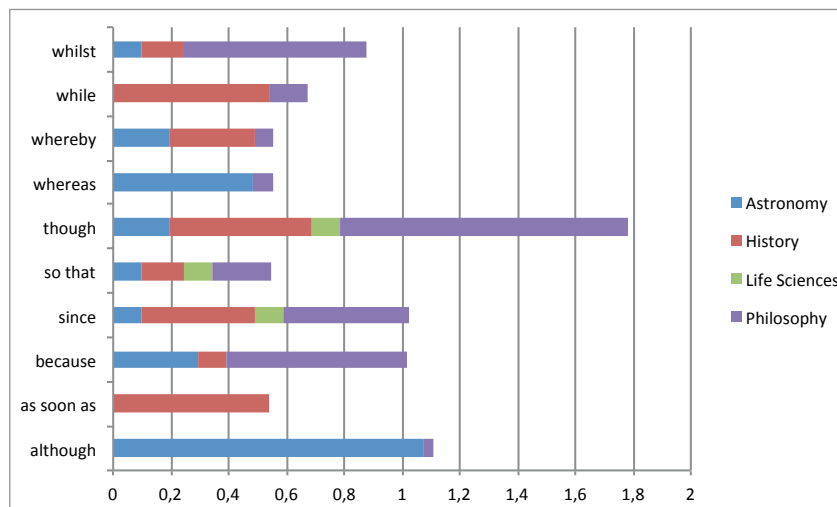
(7) When the sunbeam becomes a tangent to the atmosphere, as at R, then twilight ends, because the light does not fall upon our atmosphere. (Bryan, 1797:107)

⁴ The OED mentions 1905 as the date for the first colloquial use of *though*

(8) It was benevolent of God to give lenitive existence on any terms, because lenitive existence, in the simple sense of the word, is a blessing, which indeed may be diminished, by its being accompanied with suffering; but which no supportable sufferings can destroy, and when sufferings are insupportable, they necessarily put an end to existence. (Macaulay, 1783:34)

The fact that *because* appears in the text by Bryan (Astronomy) as well as in those by Astell, Macaulay and Wollstonecraft (Philosophy), may be accounted for on similar grounds. Bryan is writing a textbook and therefore she needs to be very clear and also close to her readership. In a similar vein, the authors writing on Philosophy are producing very vindicative texts in which they want to involve their readers in their claims. In both cases the use of *because* makes any explanations proposed seem more down to earth.

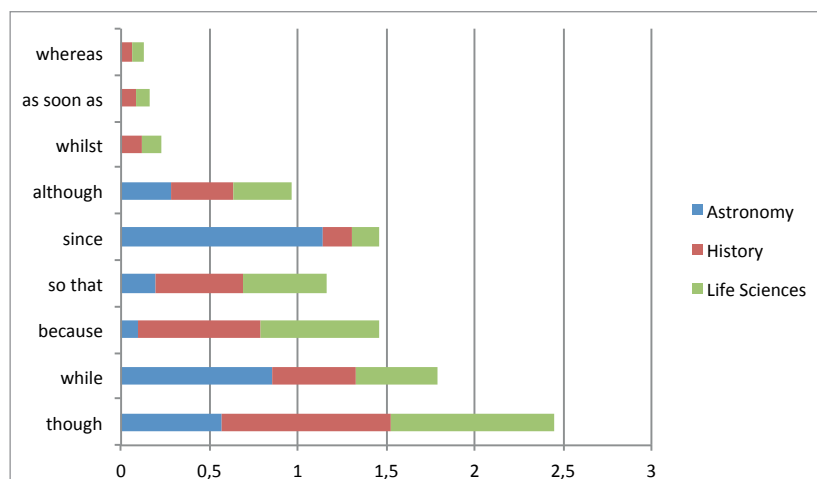
At the other end of the scale we find *as soon as*. In addition to not being very frequent, we should also point out that it was recorded in only one of the four disciplines under study, History, again perhaps due to the tendencies to be found in the field.



Graph 11. Different types of adverbial subordinators per discipline (18th c.).

The picture for the nineteenth century in Graph 12 regarding the use of the different adverbial subordinators changes only slightly. First of note is that nineteenth-century authors resort to fewer types, in that *whereby* is not found in our nineteenth-century material. *Though* is still the type used most frequently, despite a decrease in the use of *although*. However, it is more evenly distributed (found in both Life Sciences and History samples).

Also, the use of *since* and *because* as complementary linguistic features seems to be evident in this period. The increase of *since* is accompanied by a corresponding decrease of *because* in the text by Clerke (Astronomy), perhaps due to genre restrictions, given that treatises typically resort to a more formal register.

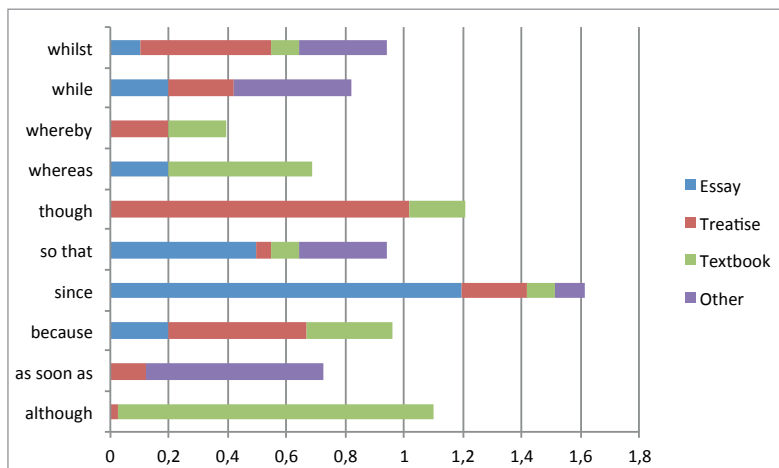


Graph 12. Types of adverbial subordinators per discipline (19th c.).

Some differences can be also observed in how certain types seem to be preferred in some genres. Treatises and essays are in principle aimed at a more educated readership, familiar with more elaborate schemes of thought, reflected in more complex syntax and a high degree of subordination. This same reason may explain the use of adverbials in textbooks. Although textbooks may be thought to belong to a lower academic and technical level, we must also bear in mind their specific discipline. In this case, the Astronomy sample demands a considerable degree of proficiency on the reader's part. Finally, the sample by Justice, representing travelogue (History), contains only 1.7 nf, probably due to its narrative rather than argumentative nature.

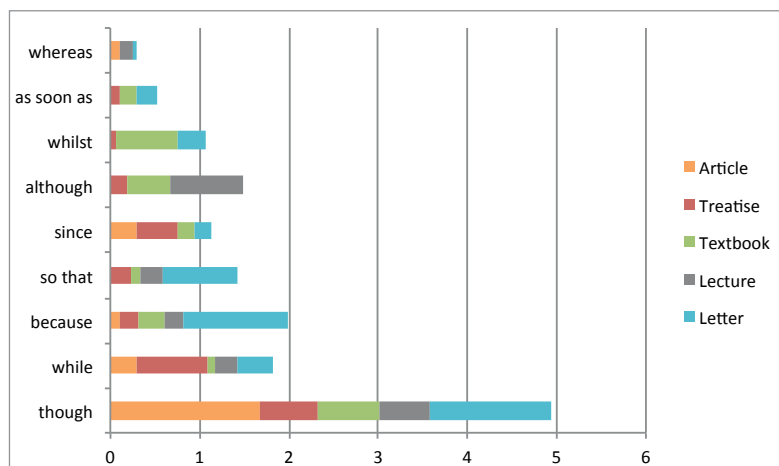
Our findings on the use of adverbial subordinators per genre are related to those for discipline in the eighteenth century (see Graph 13). Thus we see that *although* is very abundant in Textbook (our only sample being the text on Astronomy by Bryan). There is a slight change in the proportion in the case of *though*, where there is no one-to-one equivalence between genre and discipline, if we consider that Treatise includes works on Life Sciences, History and Philosophy.

The picture acquires more detail when we look at the distribution of *since* and *because*. According to our analysis by discipline, women writing on Philosophy seem to prefer *because* as a way to involve their readers. However, when analysing the use of these subordinators by genre we see that this is not always the case. The author writing in the genre of Essay (Astell) prefers *since*, whereas *because* is more often found in Treatise (Macaulay and Wollstonecraft). The nature of genres themselves can explain this phenomenon, the level of technicality of each of them playing a determining role.



Graph 13. Types of adverbial subordinators per genre (18th c.).

Only three of the nine types, namely *though*, *while* and *because*, were found in all the genres in the nineteenth-century corpus. As mentioned above, the main difference with the previous period is that although there are fewer disciplines (no Philosophy texts by women were included in the CC for this century) there is one more genre. Graph 14 below shows the overall distribution of types per genre:



Graph 14. Types of adverbial subordinators per genre (19th c.).

Despite this absence of a one-to-one correspondence, it is worth mentioning that our samples of Lecture and Letter belong to the same discipline (Life Sciences). In the case of Lecture (Jacson and Lincoln), which is more closely related to orality, we have seen that the genre tends to avoid *as soon as*, *whilst* and *since* and favours a high proportion of *although* (but at this stage not the formal variant of *though*). Authors of Letter (Wakefield and Agassiz) do prefer *though*, and they also seem to use *because* rather than *since* to involve their readers more personally than they might with other kinds of (supposed) addressees. As for other features, they use *so that* as a final subordinator but avoid more formal ones such as *whilst* (and they clearly prefer the more colloquial form *while*), *as soon as* and *whereas*.

Our material reveals that Article again illustrates the complementary distribution of features such as *though* (of which we have 1.7 nf) and *although* (with no occurrences at all). The more formal *since* (0.3 nf) is preferred to *because* (0.1 nf). See, for example, (9) and (10) below, both by Alice Cooke (CHET):

(9) The latter do not appear in statute form until after Stephen's resignation, though it is probable that they were collected and defined somewhat earlier. (Cooke, 1893:627)

(10) And since neither in the rule nor in the life of [St]. Benedict did they read that the latter had possessed (...) the Cistercians proceeded to reduce to a practical reality their ideal of poverty — to be cum paupere Christo pauperes— by renouncing all these things, the ordinary sources of monastic income. (Cooke, 1893:628)

Curiously, *while* is in evidence (0.3 nf) whereas no instances of *whilst* are recorded.

The genre of Treatise seems to show a more regular distribution of most of the forms under survey here, except for its low use of *as soon as* and *whilst*, and an absence of *whereas*. As for Textbook, there is a preference for *though*, *although* and *whilst*. Perhaps the fact that our sample deals with History can account for the use of *whilst* in its temporal sense here.

6. CONCLUDING REMARKS

The low number of occurrences of conjuncts and adverbial subordinators in our material makes it difficult to draw any definite conclusions. However, the findings presented above seem to show that the behaviour of linguistic features used to link ideas in a logical succession depends on a number of variables. Although no firm conclusions can be drawn from a microscopic analysis of the sort described here, we can begin to build up a picture of women's discursive strategies when writing seriously about science at a time when their role in society was not associated with the realm of knowledge and its dissemination.

The general increase in the frequency of features typical of Biber's dimension 5 (abstract vs. non-abstract style) in women's writing noted in Moskowich and Monaco (2014) seems to be accompanied by an increase of conjuncts and adverbial subordinators as linking devices. However, this depends on discipline, time and genre, and behaviour is not always identical. In fact, our analysis based on the disciplines in which texts were written has shown that Astronomy shows the greatest frequency in the use of all these devices, and Life Sciences the least. One could be tempted to explain this difference by the fact that Astronomy deals with remote objects and phenomena that require a careful explanation in terms of cause-effect, whereas Life Sciences, whose topics tend to be more down to earth, demand less explanation and more description. Although the two features under study, conjuncts and adverbial subordinators, are both found in abundance in Astronomy, their distribution is not equal: the former are found the least in Life Sciences and the latter the least in Philosophy, a very surprising finding in that the subject-matter typical of Philosophy would seem to call for expressions such as *whereas*, *since*, *because* and *so that* among others.

Looking at genre, our analysis is perhaps less surprising. We saw that Textbook is the genre containing the highest number of both features, which is logical since such works were intended for teaching (often for self-education) and thus for the spread of knowledge, demanding both clarity of exposition and well-reasoned arguments. This may be the reason why Treatise comes second here. A more detailed analysis shows conjuncts are preferred by textbook writers (perhaps more useful in explanations, with elements such as *for example*) than those writing treatises, who may have been addressing a more learned readership, and who preferred adverbial subordinators. On the contrary, the genre that seems to use fewest linking elements in general is Other, in our study a Travelogue whose more narrative nature may have meant that it was unnecessary to resort to such linguistic resources.

Turning finally to the analysis of how conjuncts and adverbial subordinators behave over time, our initial hypothesis that they should increase has been confirmed, although less so than expected. It is true that both features are more often used by female writers in the nineteenth than the eighteenth century, but the increase is

not very significant (from 5.6 to 5.8 nf). Besides, within this general rise, there is a slight decrease in the use of conjuncts (from 3.0 to 2.9) which could be explained by the fact that the nineteenth century sees the arrival of women in the sphere of article writing and that articles tend to require less exemplification (conjuncts) and more justification (adverbial subordinators).

Finally, we have seen that none of the three variables can be contemplated in isolation, since time determines the coming and going of genres in the same way as discipline often determines genre-selection and, hence, the choice of particular discursive strategies. Women, then, come of age as writers of science over the course of the two centuries examined here, and it is through a comparison with their male counterparts in the CC that such a process can be perceived.

APPENDIX

<i>Author</i>	<i>Title</i>	<i>Subcorpus</i>	<i>Genre</i>	<i>Date</i>	<i>No. of words</i>
Mary Astell	<i>Some reflections upon marriage</i>	CEPhiT	Essay	1700	10077
Katharine Macaulay	<i>Treatise of the immutability of moral truth</i>	CEPhiT	Treatise	1783	10059
Mary Wollstonecraft	<i>Vindication of the Rights of Woman</i>	CEPhiT	Treatise	1792	10058
Elizabeth Blackwell	<i>A Curious Herbal...</i>	CELisT	Treatise	1737	10045
Maria Elizabeth Jacson	<i>Botanical lectures. By a Lady</i>	CELisT	Lecture	1804	10051
Priscilla Wakefield	<i>An introduction to the natural history and classification of insects, in a series of familiar letters</i>	CELisT	Letter	1816	9805
Almira Hart Phelps Lincoln	<i>Familiar lectures on botany, including practical and elementary botany</i>	CELisT	Lecture	1832	10028
Anne Pratt	<i>Flowers and their associations</i>	CELisT	Treatise	1840	10023
Elizabeth Agassiz	<i>A First Lesson in Natural History</i>	CELisT	Letter	1859	12959
Phebe Lankester	<i>Wild flowers worth notice... for their beauty uses and associations</i>	CELisT	Treatise	1879	10080
Margaret Bryan	<i>A compendious system of astronomy</i>	CETA	Textbook	1797	10263
Agnes Mary Clerke	<i>A popular history of astronomy during the nineteenth century</i>	CETA	Treatise	1893	10530
Elizabeth Justice	<i>Voyage to Russia: describing the Laws, Manners, and Customs, of that great Empire...</i>	CHET	Other (travelogue)	1739	10005
Sarah Scott	<i>The History of Mecklenburgh, ...</i>	CHET	Treatise	1762	10301
Mercy Otis Warren	<i>History of the rise, progress and termination of the American revolution...</i>	CHET	Treatise	1805	10032
Maria Callcott	<i>A Short history of Spain. Vol. II</i>	CHET	Treatise	1828	10333
Lucy Aikin	<i>Memoirs of the Court of King Charles the First. Vol. I</i>	CHET	Treatise	1833	10022
Elizabeth Missing Sewell	<i>A first history of Greece</i>	CHET	Textbook	1857	10057
Martha Walker Freer	<i>History of the reign of Henry IV...</i>	CHET	Treatise	1860	10102
Alice M. Cooke	<i>The Settlement of the Cistercians in England...</i>	CHET	Article	1893	10112
<i>Total</i>					204942

REFERENCES

- Besnier, N. (1994). Involvement in linguistic practice: An Ethnographic Appraisal. *Journal of Pragmatics*, 22, 279-299.
- Biber, D. (1988). *Variation across speech and writing*. Cambridge: Cambridge UP.
- Biber, D. (1995). *Dimensions of register variation: A cross-linguistic comparison*. Cambridge: Cambridge UP.
- Conrad, S. and Biber, D., ed. (2001). *Variation in English: Multi-Dimensional Studies*. Essex: Pearson Edu.
- Gómez-Guinovart, J. and Pérez-Guerra, J. (2000). A Multidimensional corpus-based analysis of English spoken and written-to-be-spoken discourse. *Cuadernos de Filología Inglesa*, 9(1): 39-70.
- Hyland, K. (1996). Writing without conviction? Hedging in science research articles. *Applied Linguistics*, 17(4): 433-453.
- Lakoff, R. T. (1990). *Talking power: The politics of language in our lives*. New York: Basic Books.
- Moessner, L. (2006). The Birth of the Experimental Essay, In *Explorations in Specialized Genres*, edited by Vijay K. Bhatia and Maurizio Gotti, 59-77. Bern/Berlin: Peter Lang.
- Moskowich, I. (2012). CETA as a Tool for the Study of Modern Astronomy in English. In *Astronomy 'Playne and Simple'. The Writing of Science Between 1700 and 1900*, ed. by Isabel Moskowich and Begoña Crespo, 35-56. Amsterdam: John Benjamins.
- Moskowich, I. (2013). Eighteenth-century Female Authors: Women and Science in the *Coruña Corpus of English Scientific Texts*. *Australian Journal of Linguistics*, 33(4): 467-487.
- Moskowich, I. and Crespo, B. (2007). Presenting the *Coruña Corpus*: A Collection of Samples for the Historical Study of English Scientific Writing. In *'Of Varying Language and Opposing Creed': New Insights into Late Modern English*, ed. By Javier Pérez Guerra et al., 341-357. Bern: Peter Lang.
- Moskowich, I. and Monaco, L. M. (2014). Abstraction as a Means of Expressing Reality: Women Writing Science in Late Modern English. In *Corpus Analysis for Descriptive and Pedagogical Purposes*, ed. By Maurizio Gotti and Davide Giannoni, 203-224. Bern: Peter Lang.
- Moskowich, I., Lareo, I. Camiña, G. and Crespo, B. (2012). *Corpus of English Texts on Astronomy*. Amsterdam/Philadelphia: John Benjamins.
- Oxford English Dictionary*. (1989). 2nd ed. online version October 2012. <http://www.oed.com> (Accessed 17 April 2014).
- Parapar, J. and Moskowich, I. (2010). CETA in the Context of the *Coruña Corpus*. *Literary and Linguistic Computing* 25(2): 153-164.
- Prelli, L. J. (1989). *A rhetoric of science: inventing scientific discourse*. Columbia, SC: U of South Carolina P.
- Quirk, R, Greenbaum, S. Leech, G. and Svartvik, J. (1985). *A comprehensive grammar of the English language*. London: Longman.