

# MULTIDIMENSIONAL ANALYSIS: A LOOK AT INVOLVEMENT IN MALE AND FEMALE 19TH-CENTURY HISTORY AND LIFE SCIENCES TEXTS IN THE CORUÑA CORPUS\*

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## ABSTRACT

Female discourse has often been described as more personal, tentative, and narrative than male discourse, a view that has supported broader generalisations about women's tendency to privilege cooperation and community through language. At the same time, research on scientific writing complicates this picture: studies of Late Modern women scientists show a markedly detached register and a preference for objectivity and impersonality, setting them apart from non-scientific female writers. Against this backdrop, the present study investigates variation in Late Modern English scientific discourse authored by men and women using Biber's Multidimensional Analysis. Focusing on nineteenth-century history and life sciences texts from the Coruña Corpus of English Scientific Writing, the analysis examines involvement as captured by Dimension 1 ("Involved/persuasive vs. informational style"), with particular attention to the role of author sex, discipline, and genre in shaping subregister differences.

**KEYWORDS:** Multidimensional Analysis, Register Variation, Women's Scientific Discourse, Late Modern English, Coruña Corpus.

ANÁLISIS MULTIDIMENSIONAL: UN ESTUDIO DEL INVOLUCRAMIENTO EN TEXTOS DE CIENCIAS DE LA VIDA DEL *CORUÑA CORPUS* ESCRITOS POR HOMBRES Y MUJERES EN EL SIGLO XIX

## RESUMEN

El discurso femenino se ha caracterizado tradicionalmente como más personal, tentativo y narrativo que el masculino, asociado a valores de cooperación y comunidad. Sin embargo, estudios sobre escritura científica muestran que las mujeres científicas del período moderno tardío adoptaron registros más objetivos e impersonales. Este trabajo analiza la variación en el discurso científico inglés de hombres y mujeres mediante el análisis multidimensional de Biber, centrándose en el *involvement* en textos del *Coruña Corpus of English Scientific Writing*. El estudio examina textos decimonónicos de historia y ciencias de la vida para identificar diferencias de subregistro relacionadas con el sexo del autor, la disciplina y el género textual, utilizando como referencia la Dimensión 1 ("involved/persuasive vs. informational style") del modelo de Monaco (2017).

**PALABRAS CLAVE:** Análisis multidimensional, variación de registro, discurso de mujeres científicas, inglés moderno tardío, Coruña Corpus.

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## 1. INTRODUCTION

The differences, or lack thereof, between male and female language have been a widely discussed subject in sociolinguistics for –at least– the past fifty years. Lakoff's (1973) pioneering paper entitled “Language and women's place” offers a vision of language as a historical tool of oppression (Eckert & McConnell-Ginet 2003: 38) that has contributed to shaping women's subjugated status in a patriarchal society. Based more on intuition and social norms than on real linguistic data, Lakoff's work opened the gate towards a stream of comparative sociolinguistic studies of male and female speech (Dubois & Crouch 1975; Tannen 1990; Mills 1992; Gordon 1997, and many more). Romaine (1996:117) cites a number of generalisations drawn from research in this area, such as the fact that women use language to prioritise cooperation and community relationships, whereas men use it to assert dominance and control. On the other hand, it has also been suggested that the language use by women appears to be less detached and more personal, tentative and narrative than that used by men, while men tend to be more informational and use more persuasive strategies in their speech (Lakoff 1990; Biber & Burges 2000; Argamon et al. 2003).

Among diachronic studies, Geisler's (2003) multidimensional analysis of nineteenth-century epistolary language –based on Biber's (1988) pioneering work– confirmed that male and female letters present differences with respect to several dimensions of variation, the former showing more elaboration and abstractness, and the latter and involved and increasingly persuasive style. However, diachronic studies in English scientific discourse, such as Crespo and Moskowich (2015) and Crespo (2019), show a different picture. While the former talks of a detached discourse in female late Modern English scientific writing, the latter –a comparative microscopic analysis of scientific and non-scientific female nineteenth-century texts– demonstrates that women dedicated to science tended to write in a more objective and impersonal way than other women, thus reflecting the general trend of scientific writing in that period (Halliday 1988; Taavitsainen 1994; Atkinson 1999).

The aim of this study is to look at involvement in among male and female late Modern English scientific texts from the *Coruña Corpus of English Scientific Writing* (Moskowich & Crespo 2007; Crespo & Moskowich 2020) belonging to the scientific disciplines of history and life sciences (the latter including biology, zoology, geology and botany), in the hope of spotting differences related to subregister (i.e. sex of the author, scientific discipline and genre). The data for life sciences texts are extracted from a previous multidimensional analysis of register variation (Monaco 2017), with the addition of the sex-of-the-author variable. This study uses the methodology from Biber's (1988) Multidimensional Analysis, and the texts are analysed with regard to Monaco's (2017) Dimension 1 “Involved/persuasive vs. Informational style”.

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Section 2 introduces the situation of women in the scientific communities during the late Modern period and the impact it had on their voice within nineteenth-century scientific discourse. The corpus and methodology used in this study are described in Section 3, and the results and their discussion are offered in Section 4, followed by some concluding remarks in Section 5.

## 2. WOMEN AND SCIENCE IN THE LATE MODERN PERIOD

If there was a general attitude towards women in the eighteenth and nineteenth century, it was one inherited from medioeval times –one that defended the superiority of men over women (Torrallbo 2010; Moskowich 2013), as well as a certain belief that women were somehow ‘designed’ to care for their families and children and, therefore, were mentally and physically incompatible with activities of an intellectual character, let alone taking up leading roles in the public life (Trouille 1997; Moskowich & Monaco 2014). Science, thus, was considered a male activity, and, despite having been only partially accessible to women through convents and guilds in the middle ages (Schiebinger 1987), its migration to the universities in the seventeenth and eighteenth centuries became an additional obstacle for those women who wanted to dedicate their lives to scientific research. In the 1700s, the few women that had had access to education and were brave enough to practise what was agreed to be way above the possibilities of their limited minds –for they were even considered incapable of abstract thought, as claimed by Rousseau (Trouille 1997)– did so by also claiming their rights as human beings and condemning their lack of recognition as individuals, equal to men, with Margaret Cavendish and Mary Wollstonecraft raising their voices in vindication (Barker-Benfield 1992; Moskowich 2013).

In the nineteenth century, the professionalisation of scientific practice further restricted the latter for women, whose presence was not conceived outside the domestic sphere, albeit including certain roles such as that of governess, dedicated to the instruction of children, particularly girls. This little area was an excuse for many educated women to do research, especially in the field of botany, which was regarded as a suitable entertainment for ladies (Shteir 1990) –unlike astronomy, which entailed engaging into activities considered of dubious morality in Victorian times, such as stargazing in the middle of the night (Herrero 2007), or philosophy, which consisted in reflecting on matters considered beyond their understanding. This may well be the reason why we can find many more women within the field of life sciences in the late Modern period (Mary Jacson, Almira Lincoln, Anne Pratt, Elizabeth Agassiz, Phebe Lankester), than in those of astronomy or philosophy, with Margaret Bryan, Mary Astell or Mary Wollstonecraft being three of a very few exceptions in these scientific disciplines.

In this study we look at history and life sciences texts written by men and women. As it has turned out to be, history is another scientific discipline where women are comparably less scarce, particularly in the nineteenth century. Our aim is to measure their degree of involvement, compared to that of their male colleagues,



and to consider variation with respect to scientific discipline and genre. The corpus and methodology are described in what follows.

### 3. CORPUS AND METHODOLOGY

The material used in this study corresponds to the nineteenth-century part of two subcorpora of the *Coruña Corpus of English Scientific Writing* (hereafter CC), namely: the *Corpus of History English Texts* (CHET; see Moskowich et al. 2019a, 2019b) and the *Corpus of English Life Sciences Texts* (CELiST; see Lareo et al. 2020, Moskowich et al. 2021). Each subcorpus contains 20 texts, which means that a total of 40 texts are included in the present study.

The CC has been conceived with the aim of providing material for the study of variation and change in late Modern English scientific register (1700-1900) (Moskowich & Crespo 2007; Crespo & Moskowich 2020). The chronological period covered by the CC was determined by factors of a socio-external nature (Moskowich & Crespo 2007; Parapar & Moskowich 2010). Each subcorpus in the CC corresponds to a particular scientific discipline and contains a series of samples of ca. 10,000 words in length, with two samples per decade, resulting in a total of 20,000 words per decade and, approximately, 200,000 words per century. The authors included in the CC were all native speakers of English that received their education in different English-speaking places (e.g. England, Scotland, Ireland, the USA). Finally, texts are also labelled according to their genres (i.e. treatise, essay, article, lecture, etc.), which are usually stated either in the title or in the preface to a work.

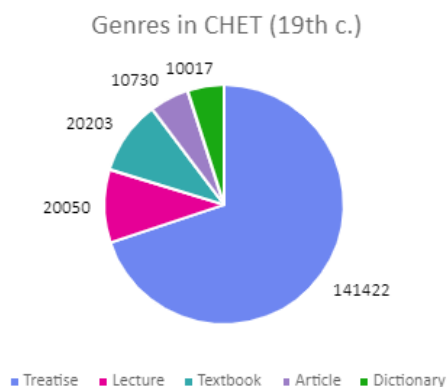
Table 1 shows the distribution of texts and number of words per sex of the author and per century in CHET and CELiST, while Graphs 1 and 2 illustrate the number of words for each of the genres present in 19<sup>th</sup>-century CHET and CELiST, respectively.

As can be seen on Table 1, the number of female historians and life scientists included in the CC is particularly scarce in the eighteenth century, which makes it difficult to draw any conclusions from a comparative analysis of their texts and those of their male colleagues, thus justifying our decision to exclude the eighteenth-century

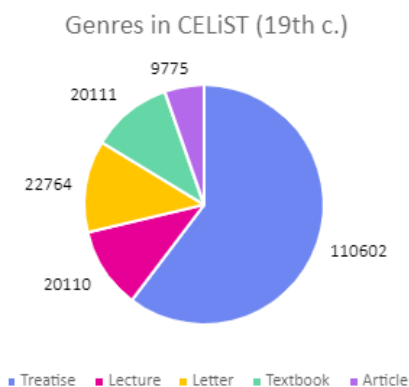
TABLE 1. DISTRIBUTION OF TEXTS AND NUMBER OF WORDS PER SEX OF THE AUTHOR AND PER CENTURY IN CHET AND CELiST (total N texts per subcorpus: 40; total N texts per century: 20)

SUBCORPUS	18th-CENTURY		19th-CENTURY	
	MALE AUTHORS	FEMALE AUTHORS	MALE AUTHORS	FEMALE AUTHORS
CHET	N= 18 (181,770 words)	N= 2 (20,119 words)	N= 14 (141,034 words)	N= 6 (61,388 words)
CELiST	N= 19 (190,604 words)	N= 1 (10,045 words)	N= 4 (139,441 words)	N= 6 (62,713 words)





Graph 1. Number of words per genre in 19<sup>th</sup>-century CHET



Graph 2. Number of words per genre in 19<sup>th</sup>-century CELiST

part of CHET and CELiST from this study. In what respects the distribution of genres in the nineteenth-century parts of each subcorpus, we can see that treatises abound both in CHET and CELiST, accounting to around two thirds of the former and to more than half of the latter, while the rest of the genres are more evenly distributed among the rest of the texts in each subcorpus, the article seemingly being the least preferred genre in both scientific disciplines, along with the dictionary in CHET.

The methodology used in this study is Biber's (1988) Multidimensional Analysis, a technique that was first use in an attempt to explain the fundamental differences between English speech and writing by analysing a large number of spoken and written corpora, and which has ended up being replicated once and again through a wide range of studies in the past thirty-seven years. The method consists in using factor analysis, a multivariate statistical technique that transforms a large number of variables into a much smaller one. In studies following Biber's (1988) method, factor analysis groups several lexical and grammatical features into factors, each factor resulting from the frequent co-occurrence of some of those features in the different texts of the corpus analysed due to their sharing an underlying communicative function. On the other hand, each of the factors will normally yield two complementary sets of features, called "positive" and "negative" (in that they present positive and negative loadings on the factor), due to their opposed communicative functions (e.g. involved vs informational; narrative vs non-narrative; elaborate vs spontaneous, etc.). Thus, each factor is considered a 'dimension' of variation, labelled according to the communicative function conveyed by its features, and each text, in turn, has a position on the factor, or factor score, reflecting its unique co-occurrence patterns, so that this text can be labelled as more (or less) informational, elaborate, narrative, and so on. As texts belong to different registers and subregisters, the latter can also be characterised with regard to each factor, or dimension of variation.



Biber's (1988) pioneering work offered five dimensions of variation – (1) informational vs involved production; (2) narrative vs non-narrative concerns; (3) explicit vs situation-dependent reference; (4) overt expression of persuasion, and (5) abstract vs non-abstract style – which have served as a reference for many studies that have replicated this five-dimensional model on different, specialised corpora (e.g. Atkinson 1999; Biber & Finegan 2001), and as an inspiration to other multidimensional analyses that yielded dimensions of variation of their own (e.g. Lee 1999; Conrad 2001; Gray 2011; Grieve 2016, among others). While, in the case of the latter, it is not unusual for each register to present specific variation patterns, many such studies have revealed that some dimensions keep emerging “repeatedly across MD studies: a basic oral/literate parameter of variation, and a narrative/non-narrative dimension” (Biber 2016: 16), which points towards the existence of certain functions of language that might be considered universal. These two parameters also emerged in Monaco's (2017) Multidimensional Analysis of three subcorpora of the CC: CETA (the Corpus of English Texts on Astronomy; see Moskowich & Crespo 2012), CEPHiT (the Corpus of English Philosophy Texts; see Moskowich et al. 2016), and CELiST (see above), which yielded four dimensions of variation in this subset of late Modern scientific English: (1) involved/persuasive vs impersonal style; (2) argumentative vs descriptive focus; (3) elaborate vs non-elaborate discourse, and (4) narrative vs non-narrative discourse, with dimensions 1 and 4 confirming the pervasiveness of the aforementioned oral/literate and narrative/non-narrative continua.

The present study, partially based on Monaco (2017), focuses on Dimension 1: involved/persuasive vs. impersonal style (hereafter D1). This dimension has two subsets of features in binary opposition. The so called ‘positive’ features (because they had positive loadings on the factor that originated this dimension) are: first person pronouns, second person pronouns, pro-verb do, split auxiliaries, analytic negation, synthetic negation, perfect aspect, conditional subordination, possibility and necessity modals, indefinite pronouns, pronoun it, to-infinitives, adverbs, public and private verbs, suasive verbs, existential there, questions, WH pronouns in subject/object position, WH relativiser in object position, demonstratives, demonstrative pronouns, that-clauses as verb and object complements. All these linguistic features tend to co-occur in different texts of the corpus and contribute to conveying a more involved and persuasive discourse. Conversely, ‘negative’ features (which had negative loadings on that factor), such as nouns and diverse passive structures (such as agentless and by-passives, as well as past participle and present participle clauses), tend to appear together in other texts from the corpus and create a densely informational discourse.

Since CELiST, including its nineteenth-century part, already had its factor scores calculated in the reference study (Monaco 2017), positive and negative D1 features were searched for separately in CHET<sup>1</sup> with the help of the Coruña Corpus

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<sup>1</sup> CHET was analysed in its totality, both its eighteenth- and nineteenth-century parts, although only the latter was taken into consideration when applying the sex of the author and genre variables in the analysis.



Tool (hereafter CCT; see Parapar & Moskowich 2007) and CQPWeb (Hardie 2012, 2016), after which their frequencies were normalised per 1,000 words and standardised to a mean score of 0.0 and a standard deviation of 1.0 in order to obtain standard scores, or z-scores, by using the following formula:

$$z = (x - \mu) / \sigma^2$$

Standard scores of positive and negative features were added up for each text to obtain dimension scores whereby a text can be characterised with regard to a particular dimension, in this case D1, as more, or less, involved or informational. Texts with positive dimension scores present a stronger co-occurrence of positive features and are therefore more involved or persuasive, whereas texts with negative dimension scores have a dense concentration of negative features, which contribute towards their more informational style. Finally, dimension scores were also calculated for different subsets of texts, by applying the different variables used in this study: scientific discipline, sex of the author and genre, so that each subregister could be characterised with respect to D1 along the involved-informational continuum. Results are discussed in the following section.

## 4. RESULTS AND DISCUSSION

### 4.1. BY SCIENTIFIC DISCIPLINE

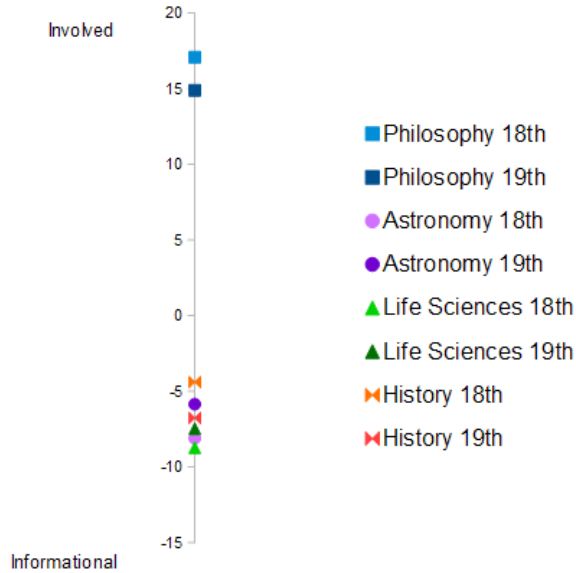
Graph 3 plots D1 scores for three scientific disciplines analysed in Monaco (2017) –philosophy (CEPhiT), astronomy (CETA), and life Sciences (CELiST)– and history (CHET), differentiating between eighteenth- and nineteenth-century scores. The first major difference that can be observed is the one between philosophy, with very high –that is, involved and persuasive– dimension scores, and the other three scientific disciplines, concentrated on the other end of the scale with sub-zero –i.e. informational, non-involved– dimension scores. This separation of philosophy from astronomy and life sciences was justified earlier (Monaco 2017, 178) by its being a discipline based on the development of thoughts and/or controversial ideas, with a reflective and often persuasive discourse, while the latter are disciplines based on observation and/or experiment, rather than reasoning, and present a much more impersonal, analytic language. What is remarkable, however, is that the newly added discipline, history, which, just like philosophy, is today classified as belonging to the humanities (as opposed to astronomy and life sciences, which belong to the so-called natural sciences; see UNESCO 1978), also presents comparatively low scores for D1, and appears to join the ‘informational’ group, thus seemingly portraying itself

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<sup>2</sup> Normalised frequency value minus mean value in the reference corpus, divided between the standard deviation.



## 18th- and 19th-century CEPHiT, CETA, CELiST and CHET



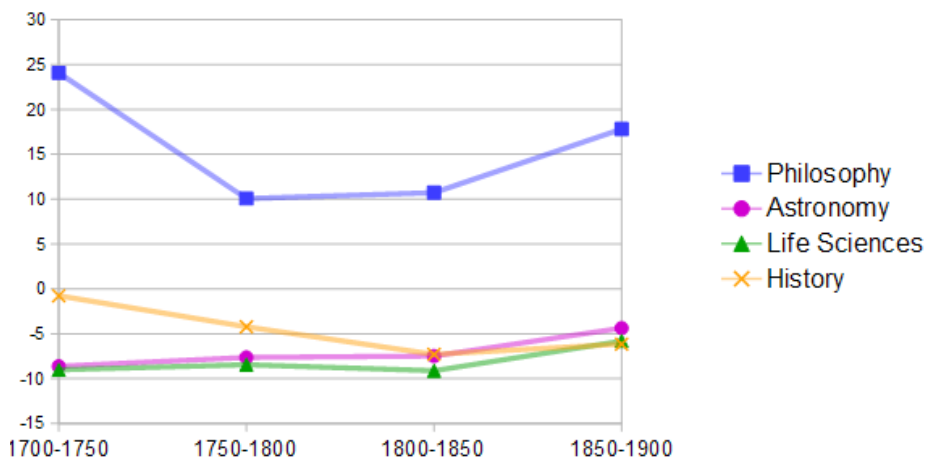
Graph 3. Mean scores for four scientific disciplines (philosophy, astronomy, life sciences and history) as represented by four subcorpora from the CC, across the 18<sup>th</sup> and 19<sup>th</sup> century, along Dimension 1 “Involved/persuasive vs informational style

as a discipline characterised by an objective discourse with little persuasion or involvement (next page).

Example (1) illustrates the remarkably persuasive style of philosopher David Hume (1748), with a high content of personal pronouns, private verbs, rhetorical questions and speculation, while Example (2), belonging to a treatise on the pancreas by Alexander Macalister (1876), appears to be clearly informative, with a high density of nouns:

By bringing Ideas into so clear a Light, we may reasonably hope to remove all Dispute, that may arise, concerning their Nature and Reality. It is probable, that no more was meant by those, who denied innate Ideas, than that all our Ideas were Copies of our Impressions; though it must be confessed, that the Terms they employed were not chosen with such Caution, nor so exactly defined as to prevent all Mistakes about their Doctrine. // For what is meant by innate? If innate be equivalent to natural... (CEPhiT, 1748 Hume).

- (1) The pancreas secretes a fluid containing water, phymatin, salts of soda, &c., tyrosin, leucin, guanin in traces. It emulsifies fats, setting the acids free, and permits their absorption, dissolves albuminoids, saccharizes starch, even in arid solutions. (CELiST, 1876 Macalister)



Graph 4. Mean scores for four scientific disciplines (philosophy, astronomy, life sciences and history) as represented by four subcorpora from the CC, across the 18<sup>th</sup> and 19<sup>th</sup> century with 50-year intervals, along Dimension 1 “Involved/persuasive vs informational style

Example (3), in turn, belongs to a nineteenth-century text on history, with a noticeable presence of passive structures:

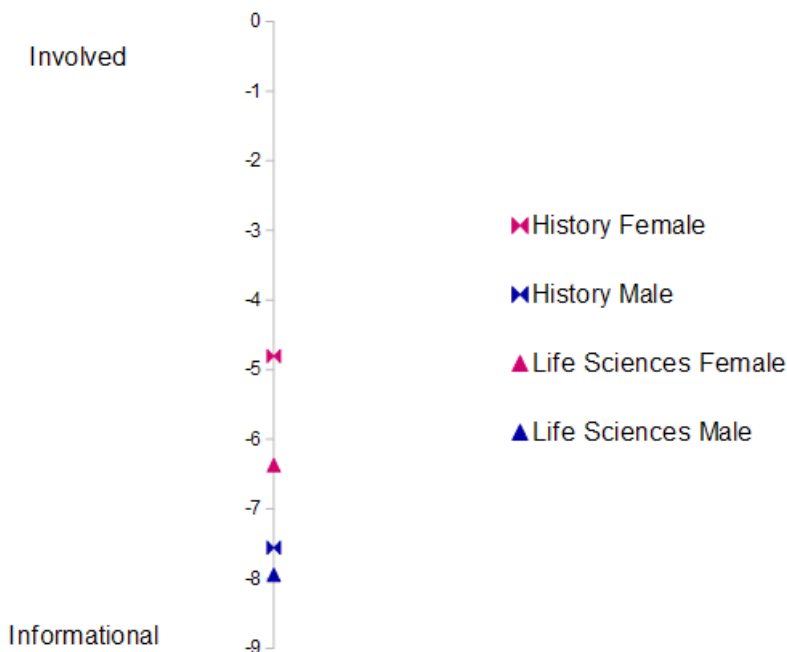
- (2) For the purposes of administration, the kingdom was divided into counties, each governed by an officer appointed by the king; the king had the right of declaring war or concluding peace; but the laws and general business of the kingdom were decided in assemblies consisting of the royal officers, the great Hungarian chiefs, and representatives of the clergy and the free Magyars (CHET, 1855 Mason)

If we go back to Graph 3, we can also observe that astronomy and life sciences show a very moderate movement in the involved direction in the 1800s, while history and philosophy do it the other way round, both moving a few scores down the scale. For a more accurate picture of change across the eighteenth and nineteenth century, Graph 4 plots the D1 scores for the four scientific disciplines with intervals of fifty years:

Graph 4 shows a very slow but, apparently, joint movement of the two natural sciences, astronomy and life sciences, towards a less densely informational style, although their dimension scores stay below the corpus mean by the end of the nineteenth century. Conversely, history, which was almost at a neutral point at the beginning of the 1700s, appears to gradually become more informational with time, with a very moderate movement upwards to reunite with astronomy and life sciences by the late 1800s, suggesting a general tendency towards a standard scientific discourse



## 19th-century CHET and CELiST



Graph 5. Mean scores for texts written by male and female authors in two scientific disciplines in the 19<sup>th</sup> century along Dimension 1 “Involved/persuasive vs informational style

that was consolidating at that moment. Philosophy, in turn, shows a dramatic drop during the second half of the eighteenth century from its highly involved initial position, staying moderately involved –though still well above the corpus mean– between 1750 and 1850, and going up again by the end of the nineteenth century and accentuating once more its separation from the three other scientific disciplines.

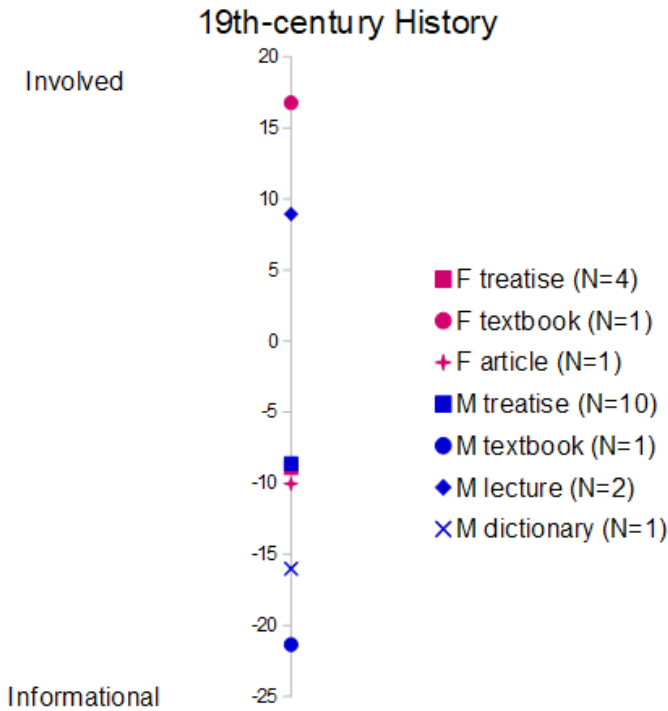
We have seen, thus, the evolution of four scientific disciplines across time with respect to D1. The following subsection focuses on comparing nineteenth-century history (CHET) and life sciences (CELiST) by applying the sex of the author variable.

### 4.2. BY SCIENTIFIC DISCIPLINE AND SEX OF THE AUTHOR

Graph 5 plots mean D1 scores for history and life sciences texts written by male and female authors in the nineteenth century.

If it appeared earlier that both disciplines were almost concentrated at the informational end of D1, Graph 5 shows a clear separation by sexes, with the texts written by female authors appearing as less informational (though remaining below the reference corpus mean) in both scientific disciplines, and with a wider gap between





Graph 6. Mean scores for 19<sup>th</sup>-century history texts (CHET), written by male and female authors, and belonging to 5 genres, along Dimension 1 “Involved/persuasive vs informational style”

the two sexes in the case of history. On the other hand, texts written by male authors present very similar scores in the two disciplines, at the lower end of the scale. These results, at a first view, appear to confirm earlier findings on the differences between male and female language, drawn from synchronic and diachronic studies (Lakoff 1990; Biber & Burges 2000; Geisler 2001; Argamon et al. 2003), whereby the latter has been characterised as more involved and with a lesser tendency towards abstraction than the former. However, we might want to take these data with caution, since, when comparing texts written by male and female authors in the CC, we are simultaneously comparing different genres without taking them into account.

In the next and last subsection, the genre category is dealt with as another variable, used along with the sex of the author variable.

#### 4.3. BY SCIENTIFIC DISCIPLINE, SEX OF THE AUTHOR AND GENRE

Graphs 6 and 7 plot individual D1 scores for each genre, distinguishing between those written by male or female authors, in nineteenth-century history and life sciences subcorpora of the CC, respectively. Each subcorpus contains five genres,



but not all of the latter are represented equally, nor does each of them contain texts written by both sexes.

In the history subcorpus, represented on Graph 6, only treatises (among which 10 are written by male, and 4 by female authors) and textbooks (one for each category) are directly comparable, the rest of the genres being represented either by men (lecture, dictionary) or women (article) only. With respect to D1, all five genres, along with their variations by sex of the author, are distributed all along the scale, with different degrees of involvement, or lack thereof. The most involved genre, with the remarkably high score of 17.0, is female textbook, whereas the most informational one, with a negative score of -21.5, is its male equivalent. Considering the fact that each category is represented by only one sample, it might seem sensible to take this result with caution and avoid making any affirmations based on either of the variables included in this particular equation. While the CC is meant to be representative of the linguistic reality shown through its samples, one or a very small number of samples may not correspond to any existing trend as such, and could show a distorted picture of the reality we are trying to describe, due to specific idiosyncrasies related with the author of the text. The same may be said about the male dictionary and of the female article, although it does seem to be the case that they follow the general trend of the subcorpus, staying below the overall corpus mean.

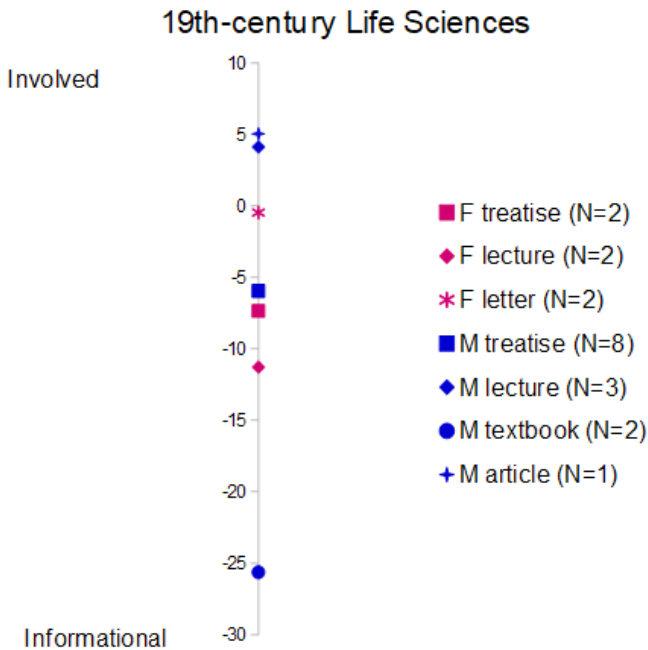
The two lectures, both written by men, present in turn rather high scores (8.9), reflecting an involved and/or persuasive style, perhaps because lectures were intended to be delivered in front of an audience and needed to appeal directly to the listeners, as can be seen in Example (4), where we find an abundance of rhetorical questions and the presence of first and second person pronouns *we* and *you*:

- (3) But here we ought certainly to ask, how, after all, was the Prince of Orange to attempt any regular enterprise against the crown of England? Observe his difficulties, and you will then understand his merit. He was only at the head of a small republic; that republic had been reduced, but a few years before, to the very last extremities, by the arms of Louis. How was William to prepare an expedition, and not be observed by the French and English monarchs; how to prosecute it, and not be destroyed by their power? If he attacked England with a small force, how was he to resist James? (CHET, 1840 Smyth)

What can also be noticed on Graph 6, however, is that treatises, male and female, appear to have very similar mean D1 scores (-8.6 and -8.9, respectively). This appears to suggest that, unlike lectures, late Modern English treatises on history in the 1800s tend to be quite informational and uninvolved, and, more remarkably, that male and female discourse in this genre does not seem to present any differences with respect to D1, as can be seen through examples (5) and (6), belonging to treatises written by historians John D'Alton and Martha Walker Freer, respectively:

- (4) There are no passage boats on either of these water lines. It may be here mentioned that the amount of inland traffic with Drogheda by these canals and by the





Graph 7. Mean scores for 19<sup>th</sup>-century life sciences texts (CELiST), written by male and female authors, and belonging to 5 genres, along Dimension 1 “Involved/persuasive vs informational style”

roads was, on the latest Parliamentary inquiry, estimated as 67,000 tons to the town, and 39,000 from it, annually. This river, discharging itself into the Irish sea about five miles below the bridge, affords equal facilities for foreign commerce, while the grand northern trunk railway makes its first important rest on its southern bank, at Pitcherhill, in the parish of St. Mary. (CHET; 1844 D’Alton)

- (5) The birth of a second illegitimate son at the château de Carlat in 1589, the fruit of a scandalous intrigue with one Aubiach, who held a menial position in the queen’s household, had again covered her name with infamy. After the arrest of Marguerite at Ivoi, a country house appertaining to queen Catherine, by order of her brother Henry III., her captor, the marquis de Canillac, succumbing under the power of her charms, caused Aubiach to be hanged from the ramparts of Usson, whither, by royal command, he had conveyed his prisoner. (CHET; 1860 Freer)

Graph 7, on the other hand, shows the case with nineteenth-century life sciences, where the directly comparable genres are treatise –this time, with two samples belonging to female, and ten to male authors– and lecture, of which three are written by men and two by women. Among the other genres, one –the



epistolary genre— is represented by women only, and two —textbook and article— by men. In terms of D1 scores, genres represented by men are separated very widely along the axis, ranging from -25.6 in the case of the textbook, to 4.1 in the case of the lecture (which, once more, and now also in the case of life sciences, appears on the ‘involved’ end of the dimension). Letters, written by female botanists, appear to be only slightly below the reference corpus mean (-0.4), with a more balanced distribution of involvement features and informational density, while both lectures and treatises written by women can be characterised as more or less informational, rather than involved, with respect to D1, with scores of -11.2 and -7.4, respectively.

If the difference between male and female lectures in nineteenth-century life sciences is remarkable (with respective scores of 4.1 and -11.2), pointing, perhaps, towards a conscious effort to avoid involvement on the part of female authors with the attempt of conveying a more rigorous and academical type of discourse, the gap between male and female treatises is, on the contrary, very small (-5.9 vs -7.4, respectively), confirming the informational character of this genre and the apparent lack of differences it presents when applying the sex of the author variable, as can be observed in Examples (7) and (8), both excerpts from treatises, written by a male zoologist and a female botanist, respectively:

- (6) The scapulæ, placed at the posterior and lateral aspects of the trunks, are kept wide apart by the clavicles: a line falling perpendicularly from the shoulder, in the erect attitude of the body, would pass far behind the hip: thus the upper limbs are thrown outwards and backwards, and have a free range in their principal motions, which are in the anterior direction. (CELiST; 1819 Lawrence)
- (7) The prickle may be stripped off with the bark, as in the rose and bramble, but the thorn, proceeding from the wood, cannot be torn off in this way.

The pink-blossoming hawthorn (*Crataégus rósea*) is merely a variety of the common hawthorn. Another variety—the yellow-berried hawthorn (*Crataégus aurea*)—which is often planted in shrubberies, is still more beautiful. (CELiST; 1840; Pratt)

It seems, thus, that the genre variable plays a crucial role when comparing male and female scientific texts in nineteenth-century CHET and CELiST with respect to D1, in that sex of the author alone shows only part of the picture. While both history and life sciences texts written by women present, overall, higher D1 scores than those written by men (as was shown in Graph 5, Section 4.2), those mean dimension scores appear to mask a very rich internal variation that emerges when we add the genre variable to the equation. The latter, in turns, has revealed a number of genre-related tendencies, such as that of a larger presence of involvement features in lectures (particularly male, since we have no samples of female lectures in CHET, while female lectures in CELiST do not show such tendency), or, conversely, the tendency towards informational density in treatises, regardless of the sex of their authors. It seems, thus, that the characterisation of women’s discourse as more involved and less abstract than male (Lakoff 1990; Biber & Burges 2000; Geisler



2001; Argamon et al. 2003) is only true for specific subregisters, but does not seem to apply to all women's writing—at least not to late Modern English scientific writing.

## 5. CONCLUDING REMARKS

In this study we have looked at a total of forty nineteenth-century history and life sciences texts from two subcorpora of the Coruña Corpus, CHET and CELiST, through the lens of Biber's (1988) Multidimensional Analysis as applied in Monaco (2017), focusing on Dimension 1 "Involved/persuasive vs informational style". A first part of the analysis has situated CHET and CELiST on the dimension scale along with two other subcorpora of the CC that had been used in the original analysis—CETA (astronomy) and CEPHiT (philosophy)—grouping history, astronomy and life sciences as informational disciplines, as opposed to philosophy, an involved and/or persuasive discipline. A diachronic glance shows that history and philosophy become slightly less involved with time, while life sciences and astronomy slightly moderate their informational character along the 1800s.

A second part of the study consisted in comparing nineteenth-century history and life sciences texts, using the sex of the author variable. The analysis has revealed that, within their relatively informational range, both history and life sciences texts written by women have higher mean D1 scores than those written by men, apparently confirming a recent generalisation in linguistics, according to which male language is more abstract and less involved than female (Lakoff 1990; Biber & Burges 2000; Geisler 2001; Argamon et al. 2003) —and suggesting that Rousseau's prejudice against women as rational creatures (Trouille 1997) may have had a justification in the way they used to write.

Despite these preliminary findings, a third part of the analysis, which included the genre variable, has shed some light on the incognita behind the aforementioned overall male and female dimension scores, unveiling sex-of-the-author variation among genres, some of which appears to respond to certain trends, namely: that in the two scientific disciplines analysed, a) lectures written by men are relatively more involved than almost all other genres, and b) treatises tend to be characterised by a high informational density and a strongly passivised discourse, whether they were written by male nineteenth-century scientists or by their female colleagues. While these results should be taken with caution, given the size and scope limitations of the present study, the latter finding appears to disprove Rousseau's aforementioned affirmations (Trouille 1997), demonstrating that women in the late Modern period were certainly capable of abstract reasoning. Further studies are needed to explore genre and sex of the author variation in other scientific disciplines along the eighteenth and nineteenth centuries, a crucial time when each discipline was developing its own particular (sub)register.

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