

NOMINALIZATIONS AND FEMALE SCIENTIFIC WRITING IN THE LATE MODERN PERIOD

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ABSTRACT

The aim of this paper is to study the sex variable in the use of nominalizations, a well-known marker of scientific register, in scientific texts written in English in the eighteenth and nineteenth centuries, and to delve into whether we can identify differences in the use of nominalizations in the writings of female and male scientists of that time. The paper is structured in four parts. Section One provides an account of the situation of women scientists in the late modern period, encompassing and analysis of their situation in the academia and their consideration for intellectual activities. Section Two is concerned with scientific register, female writing styles and nominalizations. In Section Three the corpus and methodology used for this study are presented. This is followed in Section Four by an analysis of data. In the last section, conclusions and suggestion for further research are offered.

KEYWORDS: English scientific register, nominalizations, female writing, historical sociolinguistics, descriptive linguistics.

RESUMEN

El objetivo de este trabajo es el estudio de la variable sexo en el uso de nominalizaciones, un conocido marcador de registro científico, en textos científicos escritos en inglés en los siglos XVIII y XIX, y la profundización en las diferencias en el uso de nominalizaciones en los escritos de los científicos y científicas de la época. El artículo está estructurado en cuatro partes. La primera sección proporciona una descripción de la situación de las mujeres científicas en la época moderna tardía. La segunda sección se ocupa del registro científico, el estilo de escritura femenina y las nominalizaciones. En la tercera sección se presentan el corpus y la metodología utilizada para este estudio. A continuación, en la cuarta sección se presenta un análisis de los datos.

PALABRAS CLAVE: Registro científico en inglés, nominalizaciones, escritura de mujeres, sociolingüística histórica, lingüística descriptiva.



1. WOMEN SCIENTISTS IN THE LATE MODERN PERIOD

The situation for women scientists—or any woman interested in learned activities—was harsh until the twentieth century. According to Schiebinger, the notion that women did not take an active role in science until the twentieth century is a wrong idea that originated in the nineteenth century. In early modern and modern Europe, women had a more active role in science. Even if it is true that their presence in scientific circles was not as ubiquitous as that of men's, women of that time could resort to non-canonical ways to access knowledge and practice science. Scholars (Schiebinger, Burke) have emphasized the importance of prince courts in the Renaissance, together with salons in the seventeenth and eighteenth centuries as alternative places of knowledge with relatively easy access for women. The real implication of women in science, however, remains very difficult to demonstrate without reliable written materials to prove it.

During the Renaissance, authors like Bocaccio, Christine de Pizan and Henricus Agrippa wrote essays vindicating the intellectual aptness of women. In his understanding of a perfect courtier, Baldassare Catiglione proclaimed that men and women should portray different qualities. For him, a lady should be beautiful, cautious, dignified, modest and affable. However, concerning intellectual abilities he did not see differences between men and women and criticized those who asserted that women were imperfect beings.

In the seventeenth century we find women defenders like Margaret Cavendish and Mary Astell. Cavendish's main argument was that women's subordination to men in society was due to a lack of opportunity, which was the result of inappropriate education. At the end of the seventeenth century, Mary Astell, a middle class woman from a merchant family from Newcastle, revolutionized English society. In *A Serious Proposal to the Ladies* (1694) she called on women to widen their intellectual capacities and proposed the creation of a secular convent in which women could cultivate their minds. The idea of an academy for women caused a stir among her contemporaries and Astell received patronage from wealthy ladies—including Queen Anne—to help bring her idea to fruition.

French writers¹ were very prolific during the years of the Scientific Revolution in championing for the equality of women. The importance of these writers is considerable if we take into account that until the eighteenth century anatomists did not undertake a real revision of old traditional opinions about women's anatomy and ability to science. Men and women were thought to be different and theories

¹ A brief account of French works from the seventeenth century dealing with this topic may be: Marie le Jars de Gournay's *Egalité des hommes et des femmes* (1622), Samuel Chapuzneau's *L'Académie des femmes* (1661), Jean de la Forge's *Le cercle des femmes sçavantes* (1663), Louis de Leslache's *Les avantages que les femmes peuvent recevoir de la philosophie et principalement de la morale* (1667), François Poulain de la Barre's *De l'éducation des dames pour la conduite de l'esprit dans les sciences et dans les moeurs* (1674), Bernard Le Bovier de Fontenelle's *Entretiens sur la pluralité des mondes* (1686) and Gilles Ménage's *Historia mulierum philosopharum* (1690).



about humors had been replaced by theories claiming that women were imperfect, not-fully-developed men (Schiebinger).

Apart from all the pieces of work defending women, another indicative point providing a trustful piece of evidence for the active involvement of women in science is the big number of scientific works aimed at women. In England publications like *The Athenian Mercury* (1690-1697), *The Free-Thinker* (1718-1721), and *The Female Spectator* (1744-146) were successful. Perhaps one of the most important scientific journals aimed at women was *The Ladies' Diary*, which was regularly published from 1704 to 1841. It contained almanacs, enigmas, mathematical questions and answers, quests, chronologies and remarkable events of the year, birthdays of the members of the royal family and main kings in Europe.

In most cases, titles of scientific works already contained the specification that the work was directed at women². This interest in the female audience was common all over Europe³ and in some cases we find that those texts were even translated and commented by women. This is the case of Francesco Algarotti's successful book, *Il Newtonianismo per le dame*, which was translated by Elizabeth Carter two years after its publication in 1737. It is clear that in the eighteenth century there was an urge, professed by both men and women to channel women's interests into knowledge and science.

In the eighteenth and nineteenth centuries, the number of publications defending the intellectual ability of women multiplied, especially in France and Germany. The work of anatomists in the second half of the eighteenth century led to the conclusion that there was no intrinsic difference between the nature of men and women. Men and women were considered "perfect in their difference" (Schiebinger 191), each of them displaying their own characteristic features —physical and intellectual strength for the man and motherhood for the woman. This new configuration could perfectly fit into Darwin's evolutionary theory but it failed to secure equality for women, since women were thought to be perfect but hierarchically inferior to men.

² Examples of this may be John Harris' *Astronomical Dialogues Between a Gentleman and a Lady* (1719, contained in *CETA*), Jasper Charlton's *The Ladies Astronomy and Chronology in Four Parts* (1735, contained in *CETA*), James Ferguson's *Easy Introduction to Astronomy for Gentlemen and Ladies* (1768) and Denison Olmsted's *Letters on Astronomy, Addressed to a Lady in which the Elements of the Science are Familiarly Explained in Connexion with its Literary History* (1841, contained in *CETA*).

³ Other scientific books aimed at women in other languages are George Saville's *Avis d'un père à sa fille* (1756), Leonard Euler's *Lettres à une princesse d'Allemagne sur divers points de physique et de philosophie* (1768), Jakob Weber's *Fragmente von der Physik für Frauenzimmer un Kinder* (1779) or August Batsch's *Botanik für Frauenzimmer* (1795).



2. FEMALE WRITING, SCIENTIFIC REGISTER AND NOMINALIZATIONS

Differences in male and female writing styles have attracted the attention of scholars (Labov, Lakoff). According to Mulac, even if it is possible to identify linguistic features that are used differently by male and female authors, it is not possible to consider them markers, but rather tendencies. This has a direct effect on the way texts are perceived. Interestingly enough, Mulac (27) reported⁴ that texts written by women were judged as “[from a] higher social status and more literate” as well as “more pleasant and beautiful”, whereas texts written by men were perceived as more dynamic, “stronger and more aggressive”, which does not differ much from Francis Bacon’s description of female and male writing styles almost five hundred years ago. At this time, women were believed to be incapable of showing abstraction in their thought and, consequently, on their writing. Their writings were considered elegant but not very informative and their style, loose (Moskowich & Monaco).

Even if it is true that differences in formal written texts are more difficult to find, generally speaking it is believed that women tend to make a greater use of features displaying involvedness (Argamon *et al.*, Biber *et al.*, Palander-Colin). This implies an enhancement of the personal sphere and personal relationships. References to emotions are also common (Mulac *et al.*). It has also been shown that women are more attentive to conversation and include more question tags in their speech (Holmes), which could be aimed at controlling the conversation. In a similar light, female writers tend to use more persuasive strategies (predictive modals, conditional subordination, necessity modals and suasive verbs) in formal scientific writing (Crespo). On the other side male writing has been identified as more informational (Argamon *et al.*) and containing more judgements (Mulac *et al.*), which, in some way, could be related to Francis Bacon’s description of the virile style as dynamic and pragmatic.

Concerning scientific discourse the debate over old rationalist styles and new empirical methodologies permeated discourse and allegorical, poetic language was considered unsuited to new scientific methods (Schiebinger 151). Women’s style was thought to be gallant, polite, aristocratic and poetic, as opposed to Bacon’s virile and masculine style. For the promotor of The Royal Society calling something ‘masculine’ was an appraisal, whereas calling it ‘feminine’ or ‘effeminate’ was an insult. For empiricists, man and science were active, they did things and they required energy and power. This idea became imbued in scholarly circles and it definitely affected very negatively women’s involvement in science. As Eger pointed out, in the late seventeenth century this created a dichotomy between those who would accept a peacefully relation between men and women and those who would declare a war of sex.

⁴ For more recent research, see Mulac *et al.*, where their gender-linked language effect hypothesis is again confirmed by measuring empirically the differences according to the sex variable in oral production as reaction to visual stimuli (description of a photo).



The difficulty of the language of science is not only a matter of vocabulary. Writers and readers have to be trained to use a series of lexicogrammatical features, namely passives and nominalizations (Albentosa, Albentosa & Moya, Banks, Halliday, Halliday & Martin, Sušinskienė, Vázquez) that add complexity to the prose and delimit the discourse community. Nominalization is understood as a linguistic expression of a conceptual representation of a process or state of affairs in a nominal form. According to Downing (147) situations and processes can be expressed through nominalizations, as in (1)

(1) From whence it is gathered, that *the apparent progressive Motion of the Fixed Stars* hath gone forward one Degree towards the consequent Signs, in about Seventy Years fpace (Whiston, 14; emphasis added)

or through finite sentences, as in (2)

(2) Astronomers know that not only the 12 Constellations of the Zodiac, but also *all the fix'd Stars move from the West toward the East about 50" in a Year, or one Degree in 71 Years, in Circles parallel to the Ecliptick* (Watts, 34; emphasis added)

Obviously, although in general terms they convey the same meaning, each of these two linguistic encodings have a different structure and fulfill different functions in texts. In (2) *move* controls the syntax of the whole sentence through a system of obligatory valencies and optional adjuncts. Similarly, in (1) *motion* also exerts control over its phrase but it is inserted into a larger sentence. Structure is not so rigid in this case as, by definition, all elements in the Noun Phrase with exception of the head are optional, which allows a more complex arrangement. According to Downing (151), nominalizations tend to appear in written genres because they can establish abstractions, objectivize and stratify the processes they refer to. Their abundance in modern scientific register has thus been seen as a sign of the augmentation of abstraction in modern scientific (Halliday & Martin).

3. CORPUS AND METHODOLOGY

The material for this study was taken from the *Coruña Corpus*. This corpus, which is the product of an ongoing project, is made up of several subcorpora of different scientific disciplines. Each subdiscipline contains around forty texts with ca. 10,000 words each, which makes a total of approximately 800,000 analyzable words for this study.

TABLE 1. NUMBER OF WORDS			
	FEMALE WRITERS	MALE WRITERS	TOTAL
<i>CETA</i>	20,793	389,116	409,909
<i>CEPHiT</i>	30,194	370,935	401,129
TOTAL	50,987	760,051	811,038



The time span covers the eighteenth and nineteenth centuries. For the present work *CETA* (Moskowich *et al.* 2012), the astronomy subcorpus, and *CEPHiT* (Moskowich *et al.* 2016), the philosophy subcorpus have been chosen. These two disciplines had different writing conventions as a result of different evolutions which, at the end of the seventeenth century became especially interesting: Astronomy on the one hand was perhaps one of the most established scientific disciplines when the Scientific Revolution took place and experimented like no other the shift in focus that the revolution brought. Philosophy was as well a well-established discipline that opposed rational thought to religious beliefs but, like other Humanities disciplines, did not embrace the empiricist method and that, too, had an effect on language. *CETA* and *CEPHiT* contain only five texts written by women⁵ out of a total of eighty-two texts. This, however, rather than being a mistake in corpus compilation, reflects the lack of visibility and social acceptance of women scientists in the eighteenth and nineteenth centuries.

This study deals with deverbal nominalizations formed by suffixation. The first stage in the study was the search of the nominalizations, which was carried out with the help of the *Coruña Corpus Tool*, (*CCT*), a search engine that has been designed for a joint use with the *CC*. As the *CCT* does not recognize suffixes but strings of words, the concordances generated included also gerunds and other words ending with these letters, which made a disambiguation process necessary. The first disambiguation was based on word class criteria and eliminated those words that were not nouns. Context reading and semantic disambiguation were carried out at the second stage to sort out the final number of nominalizations considered for study: 18,069.

Nominalizations are abstraction boosters that allow the presentation of abstract ideas and the expression of reason and causality (Downing, Eggins). Their use is usually linked to an increase in ambiguity due to detransitivization processes (Givón) that condenses information by reducing verbal valencies and increasing the level of implicit communication (Mackenzie). Hence, after data analysis it can be concluded that the consideration of female scientists' style was based on social prejudices rather than linguistic evidence.

The key to understand sex-related choices may be to consider how men and women used nominalizations. Argamon *et al.* (321) studied sex-related linguistic choices in formal written texts in English and concluded that "female writing exhibits greater usage of features identified by previous researchers as "involved" while male writing exhibits greater usage of features which have been identified as "informational"." In their study, they considered the use of personal pronouns and

⁵ Sample texts of Margaret Bryan's *A Compendious System of Astronomy in a Course of Familiar Lectures* (1797) and Agnes Clerke's *A Popular History of Astronomy during the Nineteenth Century* (1893) are included in *CETA*. *CEPHiT* includes three samples written by women: Mary Astell's *Reflections upon Marriage: Occasion'd by the Duke and the Dutchess of Mazarine's Case* (1700), Catharine Macaulay's *Treatise on the Immutability of Moral Truth* (1783) and Mary Wollstonecraft's *Vindication of the Rights of Woman* (1792).

of-phrase postmodifiers to reveal traces of women’s involvedness and men’s specificity, respectively. Taking into consideration the results achieved by Argamon *et al.* I adapted the study variables to nominalizations and therefore studied those nominalizations premodified by possessive determiners as well as those with a postmodifying *of*-phrase. A description of the results will now be presented.

4. ANALYSIS OF DATA

Beginning with a general analysis, 18,069 tokens of nominalizations⁶ were found in both subcorpora together.

TABLE 2. NUMBER OF NOMINALIZATIONS						
	FEMALE WRITERS		MALE WRITERS		TOTAL	
	<i>Raw frequency</i>	NF (10,000)	<i>Raw frequency</i>	NF (10,000)	<i>Raw frequency</i>	NF (10,000)
<i>CETA</i>	581	279	7865	202	8,446	206
<i>CEPHiT</i>	628	207	8,995	242	9,623	240
TOTAL	1,209	237	16,860	222	18,069	222

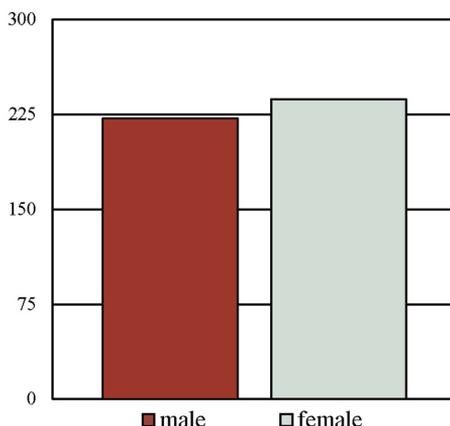


Table 3. Frequency of use of nominalizations according to the sex of author (NF 10,000).

The distribution of nominalizations in normalized frequencies depicts a completely different situation. Data show that there is a slight tendency to find a higher frequency of nominalizations in texts written by women (237 nominalizations

⁶ Types will not be considered in this study because one of its goals is to study differences in frequency of use of nominalizations according to the variable of sex of the author. Hence, unless stated, data refer to number of tokens.



per 10,000 words, compared to 222 in male-authored texts, $t = 0,66$). Subcorpus breakdown shows variation: 58% of the nominalizations in *CETA* appear in texts signed by women whereas in *CEPHiT* the frequency of use is higher (54%) in texts written by men. It seems also untenable to claim that in spite of the unequal social consideration of male and female scientists at the time, the assimilation of markers of scientific discourse affected writers in a different way depending on their sex, at least, as far as nominalizations are concerned.

Women writers seem to have opted for nominalizations just as much as their male counterparts did. This contradicts the perception of the way in which women wrote science at the time. In the late Modern period, women were believed to be incapable of showing abstraction on their thoughts and, consequently, on their writing (Moskowich & Monaco) and female writing was usually associated with a flourished style, more apt for literature.

4.1. INVOLVEDNESS IN NOMINALIZATIONS AND POSSESSIVES

After the definite article *the*, possessives are the most frequent type of determiner in nominalization noun phrases in the corpus. The reason for this success lies in the fact that the pairing possessive plus nominalization usually mirrors the same semantic relationship existing between a verb and its subject, where the possessive indicates the agent of the process encoded in the nominalization (Bello). The English SVO sentence pattern is also reflected in those nominalizations with a possessive determiner (3).

(3) The path described by a planet in *its motion round the sun* is called its orbit (Adams, 4; emphasis added).

Other combinations of postmodifying possessive structures and nominalizations as in (4)

(4) [...] and that there is nothing else wanting to the establishing that Motion, and unto the thorough *Conviction of the mostobstinate Adversaries*, but that a Parallax of these Stars might be perceiv'd according to the diversePosition of the Earth in its Annual Orbit: [...] (Whiston 29; emphasis added).

lack this echoing of verbal structures, which in the case of scientific register, has been considered crucial for their higher frequency. Prototypically the information contained in sentences is packed into a nominalization noun phrase which is placed as theme and subject of the following sentence (Ventola 183). The methodic backgrounding of information through nominalized processes allows some degree of systematicity in the balance of backgrounded and foregrounded information and ultimately favors the assimilation of new information (Banks, Downing, Halliday, Ventola) and, as Halliday (1985) noted, this fostered the adoption of nominalizations as markers of scientific discourse.



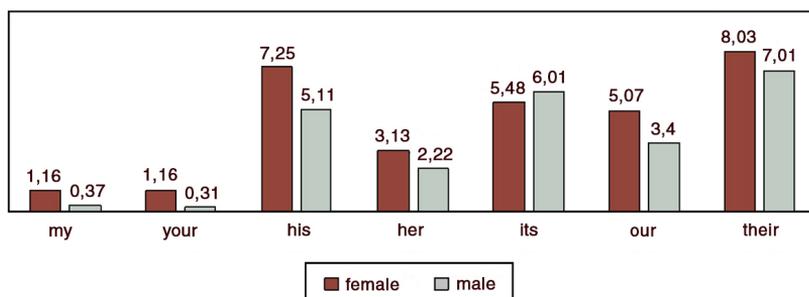


Table 4. Frequency of use of nominalizations and possessive determiners according to the sex of author (NF 10,000).

According to the results and conclusions presented by Argamon *et al.*, formal texts produced by women tend to contain a higher frequency of possessive structures that reinforce personalization and involvedness in their speech. After data analysis there seems to be indeed a preference for women to include more possessive determiners premodifying nominalization, as female texts contain a normalized frequency of 31.32 nominalizations paired with possessives per 10,000 words, whereas in texts written by men the normalized frequency is 24.47 ($t = 0,5$). This trend affects all determiners except the neuter third-person singular *its*, which is more frequent in male-authored texts (5.48 nominalizations per 10,000 words, 52%) than in texts written by women (6.01 nominalizations per 10,000 words, 52%).

Each type of possessive has different pragmatic and textual functions that dictate their frequency of use. First person possessive determiners are usually used to enhance rhetorics. Pragmatically, first person singular *my* highlights the individuality of the author, as in (5)

(5) In like manner, the utmost pleasure of which the imagination is susceptible by a poetical narrative or exhibition, is a thing, in *my judgment*, not inconceivable. (Campbell, 10; emphasis added).

whereas the plural *our*, as in (6)

(6) [...] as in revolving in very long ellipses, they are sometimes too remote for *our inspection*, their greatest distance from the Sun being far beyond the orbit of the Georgium Sidus, as these bodies are not much larger than our Moon (Bryan, 94; emphasis added).

can be read as a guild codification where writers can place themselves as members of the scientific community⁷. Data show that female writers clearly favor the use

⁷ The plural *our* can also be a rhetorical device to refer to the author himself and the community to which the determiner refers may be society or the population rather than only the scientific community.



of this type of nominalization premodifier. In both cases, women tend to favor involvement with both their readers and the community. However, the singular *my* is clearly more frequently found in female writers' texts with a proportion of 3:1 (1.17 per 10,000 words, 75% in texts written by women and 0.38, 25% in texts written by men, $t = 0,07$) whereas the frequency of *our* in texts produced by women (5.07 per 10,000 words, 60%) and men (3.4, 40%) seems more homogeneous ($t = 0,8$). Here we can find two antagonistic tendencies: on one side female writers encourage involvement in their writings through the use of *my* but, on the other side, the sense of belonging expressed in *our* may be a more delicate feeling to convey given the strong social refusal against women scientists at the time.

The use of second person possessives is dictated by register and text-type. In some way, the use of *your* is also a stylistic choice but it is only found in learner's texts, namely dialogues, textbooks and lectures, usually emulating direct speech as in (7)

(7) *YOUR Objection* is juft, laid I, Madam if you confider the thing after the Sun was actually Rifen and juft before his Setting (Harris, 28; emphasis added).

Second person possessives make relationships explicit and show greater involvement of the author towards the reader. There is indeed a higher frequency of this type of possessive paired with nominalizations in female-authored texts (1.17 per 10,000 words, 79%) than in texts written by men (0.32, 21%) ($t = 0,2$).

Third-person possessive determiners clearly outnumber the rest of possessives but the difference in frequency of use is not sex-related. Indeed, the fact that the referent of the determiner can be found in the text makes these nominal groups useful lexical cohesion devices. The combination of third-person singular possessive and nominalization usually mirrors a preceding sentence where the possessive was a nominal group functioning as subject and the process is expressed in the form of a verb, as in (8)

(8) Though *Copernicus* thus simplified so greatly the Ptolemaic theory, *he* yet found that the idea of circular orbits for the planets would not explain all the phenomena; *he* therefore still retained the "cycles and epicycles" that Alfonso had so heartily condemned. For forty years *this illustrious astronomer* carried on *his observations* in the upper part of a humble, dilapidated farm-house, through the roof of which *he* had an unobstructed view of the sky (Steele, 24; emphasis added).

The differences in frequency of all third-person possessive determiners are determined by the gender of their referent. Data show that masculine *his* (12.36 per 10,000 words) and neuter *its* (11.51) are more frequent than feminine *her* (5.35). This should be also understood as a consequence of the exclusion of women from science although it does not reveal misogynist attitudes in writers. The distinction between animate and inanimate referents is crucial because whereas there seems to be no difference in the use of inanimate referents, the predominance of male scientists at the time explains the higher frequency of *his* in texts. Its frequency in texts written by women (7.25, per 10,000 words, 59%) and men (5.11, 41%) is rather balanced and it is possible to find similar references to famous astronomers such as



Ptolemy, Copernicus, Brahe, Galileo, Kepler, Newton and Halley or philosophers in all texts, as in (8).

Similarly, women (3.13 per 10,000 words, 59%) and men (2.22, 41%) seemed to use the feminine *her* in a similar way ($t = 0.7$). In this case, the lack of women scientists at the time restricts the frequency of the determiner. However, it is still possible to find animate referents in the generic lady or woman—the generic *man* applied to the human species and *God* are also found as referents of *his*— or personifications such as *Nature* or *Athens*. In astronomy texts, names of celestial objects are considered feminine or masculine and therefore it is common to find feminine possessives in phrases referring to Venus and the Moon and masculine *his* alluding to the Sun or Mars.

Male and female writers seem to use feminine and masculine possessives as nominalization premodifiers in a similar way. No trace of a possible misogynist attitude in texts written by males was detected, as both *his* and *her* have the same percentage distribution: *his* has a frequency of use of 7.25 (59%) per 10,000 words in texts written by women and 5.11 (59%) in texts written by men whereas the normalized frequency of *her* is 3.13 (41%) in female-authored texts and 2.22 (41%) in male-authored texts. Similarly no bias to favor references to other women have been found in texts written by women, which may be explained by the lack of conscience about women scientists as a group in this period. Women tend to favor the use of possessives even if in this case the cohesive function of possessives minimizes the difference. However, the situation is reversed in the case of the neuter *its* as this is the only possessive that is more frequently used by men (6.02 per 10,000 words, 52%) than by women (5.49, 48%)

Predominance of *its* in male writing (frequency of 5.49 per 10,000 words, 52% in male writers) may indicate the preference of male writers to objectivity as opposed to the preference of female writers to highlight human or human-like connections in their texts. The results are consistent with the hypothesis confirmed by Argamon *et al.* that male authors are more likely to indicate or specify.

Concerning subcorpus variation, several trends can be described. On the one hand similar results have been found in the distribution of the normalized frequencies of *my*, *your*, *his* and *their* according to the sex variable. Both *CETA* and *CEPHiT* show similar distribution for first person singular *my*: in both cases women favor the inclusion of the possessive, whose normalized frequencies oscillate between 79% (0.96 per 10,000 words in *CETA*) and 72% (1.32 per 10,000 words in *CEPHiT*). Similarly, the second person *your* is also favored by women in both subcorpora. In this case a higher frequency of *your* can be reported in female astronomers (85%, mean frequency of 0.66 per 10,000 words), whereas the percentage of use of female philosophers is lower (69%). In the case of *his*, both *CETA* and *CEPHiT* show the same percentage (59%), which again confirms the tendency of women to use more possessives. The frequencies of use of *their* by women in *CETA* (50%) and *CEPHiT* (57%) are also close.



TABLE 5. FREQUENCY OF USE OF NOMINALIZATIONS AND POSSESSIVE DETERMINERS IN BOTH SUBCORPORA ACCORDING TO THE SEX OF AUTHOR (NF 10,000)

	CETA		CEPHiT	
	FEMALE AUTHORS	MALE AUTHORS	FEMALE AUTHORS	MALE AUTHORS
<i>my</i>	0.96	0.25	1.32	0.51
<i>your</i>	1.92	0.35	0.66	0.29
<i>his</i>	6.73	4.78	7.61	5.47
<i>her</i>	1.92	4.13	3.97	0.21
<i>its</i>	10.58	8.06	1.98	3.88
<i>our</i>	5.77	1.28	2.31	5.63
<i>their</i>	7.28	7.34	0.33	6.68

On the other hand, in the case of the third person *its* distribution results in both corpora give apparently different results: whereas in *CETA* there is a higher frequency in texts written by women (10.58 per 10,000 words, 57%), *CEPHiT* shows a higher frequency in male-authored texts (3.88, 66%). The use of third person determiners is normally determined by textual concerns and, in the case of *its*, the lack of a gendered referent makes it possible to exclude direct sociolinguistic explanations for its use in texts. The possessive *its* usually serves to specify the properties of the thing or process it refers to. These results then confirm the hypothesis that male authors tend to exhibit more specification features (Argammon *et al.*).

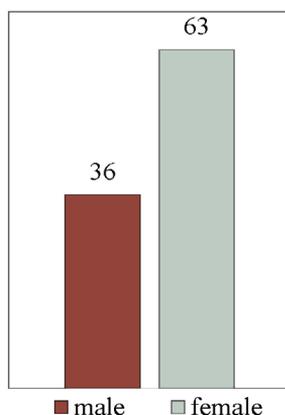


Table 6. Frequency of use of nominalizations postmodified by an *of*-phrase according to the sex of author (NF 10,000).

Finally, *her* and *our* show disparity of results in both subcorpora. In the case of *her*, male astronomers included a higher frequency of the possessive than women (mean frequency of 4.13 per 10,000 words in texts written by males and 1.92 in those written by females), whereas in the philosophy subcorpus, 95% of occurrences of the possessive premodifying a nominalization (3.97 per 10,000 words in texts written by women, 0.21, 5% in male-authored texts) were found in texts written

by women. The reason for this difference may be related to the topic of the texts, as some celestial objects (Venus, The Moon) require a feminine possessive and hence their high frequency is not dictated by sociolinguistic concerns. In the case of *our*, women in *CETA* tend to use the possessive more frequently (mean frequency of 5.77 per 10,000 words, 82%), whereas in *CEPHiT* almost three quarters (5.63 per 10,000 words, 71%) of *our* paired with a nominalization are found in male texts.

4.2. SPECIFICATION AND NOMINALIZATIONS

According to Argamon *et al.*, post-head noun modification with an *of*-phrase is an indicator of male writing, as part of the tendency of male authors to provide specification in their texts (also confirmed by Mulac and Lundall and Biber). Their corpus consisted of 604 documents from the *British National Corpus* (BNC) that included both fiction and non-fiction texts. Data analysis has shown that this hypothesis cannot be applied to nominalizations in our corpus, as represented in Table 6.

In total, there are 5,081 nominalizations postmodified by an *of*-phrase, which represents the 28% of all nominalizations. 64% of occurrences were found in female-authored texts. Similar results are found after subcorpora breakdown: 70% of occurrences in *CETA* and 53% of those in *CEPHiT* were found in texts written by women.

The reason why *of*-phrase postmodifying nominalizations cannot be used as reliable specification features of male style is connected with the verbal features encoded in nominalizations. As nouns, nominalizations do not show signs of voice and tense as part of the decategorization process (Hopper & Thompson 1980) they undergo. However, information about the process in the form of former verbal valencies is in many cases still retained. In previous studies (Bello) it has been shown that agents are the most frequently retained group and can appear as promodifying possessives, as in (9)

(9) The direction of the meridian may be secured at every instant by observations, and although local difficulties may oblige us to deviate in *our measurement* from this exact direction, [...] (Bradford, 90; emphasis added).

or postmodifying prepositional phrases, as in (10)

(10) The fixed stars are distinguished from the planets by being more bright and luminous, and by continually exhibiting that appearance which we call the scintillation, or *twinkling of the stars* (Bonnycastle, 44; emphasis added).

The role of postmodifying *of*-phrases then is not only that of providing specification of their heads but also including information about the process. Hence there are instances of objects (11)

(11) [...] 59 Seconds, will be the mean Motion for two Days, which stands against the 2d of January, and thus by the continual *Addition of 4 Minutes, 59 Seconds, 18*



Thirde, the mean Motion of the preceding Day, you will have the mean Motion of the succeeding Day [...] (Hodgson, 88; emphasis added).

Information about circumstances, which are traditionally encoded as adjuncts in verbal realizations is also very frequently found in postmodifying prepositional phrases although these are not introduced by *of* but rather other temporal and spatial prepositions, as in (12)

(12) Near this Confellation there are severall unformed Stars, which in the year 1679. Mr. Edmund Hally, in memory of Charles II. King of Great Britain, &c. who was preferred by his *Hiding in an Oak*, reduced them into a Confellation, and called it Robur Carolinum (Morden, 36; emphasis added).

The complexity and multiplicity of functions of postmodifying *of*-phrases in phrases headed by nominalizations might have excluded their use as providers of specification and indicators of male writing.

5. CONCLUDING REMARKS

After data analysis it is possible to conclude that there is a slight tendency to find a higher frequency of nominalizations in texts written by women. However, statistical significance tests show that there is no evidence of differences in the frequency of use of nominalizations according to the sex of the author. Women in the corpus used this marker of scientific discourse as much as men did. Taking into account that nominalizations have been defined as abstraction boosters, the claim that women used a loose style in writing and were incapable of abstract thought cannot be therefore sustained according to data.

There are however differences in the way women and men used nominalizations in the corpus. Women's tendency to show involvedness in writing has been confirmed in the higher frequency in the use of first and second person possessives. Men's tendency to indicate specificity could not be seen in a higher frequency of use of post-head nominalization specification with an *of*-phrase, probably because nominalizations are a special type of words and the information included in their modifiers relates to the description of a process and is required by the context where the nominalization appears. The use of third person possessives paired with nominalizations showed some light evidence for specification, especially in the neuter *its*.

After these revealing results further research could be expanded to cover a higher number of texts and other features of scientific register, as well as other features that could confirm or refute the hypothesis that women make a greater use of features displaying involvedness and emotions whereas men tend to be more judgmental and informational (Mulac). The description of the language used by late Modern English female and male scientists is still an open question.

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