

“... but be fure you let it fettle”:¹ Late Modern Authors’ Presence in English Scientific Texts

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The use of pronouns shows the author’s intention to address the reading public or the presence of the target readership in texts. This paper focuses on second-person pronouns, which are especially revealing of the author’s desire to engage the reader by endowing on them an active role in the negotiation and construction of knowledge. For the same reason, we will also analyse the use of the word *reader*. Science writing is thus understood as a dialogue between the two groups of participants involved in knowledge creation. Two usages of *you* have been detected in previous works using the *Coruña Corpus of English Scientific Writing* (CC): general and dialogic. The former might be interpreted as a generic “one,” “everybody;” the latter, considered as an in-group strategy that embraces both the writer and the reader. The detailed analysis of the pragmatics of the second-person pronouns and *reader* in *Corpus of English Chemistry Texts* (CEChET) and *Late Modern English Medical Texts* (LMEMT) will hopefully shed some light on the object-centred nature of scientific writing.

Keywords: Late Modern English; scientific discourse; readership; personal pronouns; corpus linguistics

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“... but be fure you let it fettle”: la presencia autorial en los textos científicos del periodo moderno tardío en inglés

El uso de pronombres por parte de un autor o autora muestra su intención de dirigirse a su público lector o la propia presencia de ese público destinatario en los textos. Este trabajo

¹ Baker (1753, 93), author whose text has been compiled in the *Corpus of English Chemistry Texts* (CEChET).

se centra en los pronombres de segunda persona que revelan de forma especial el deseo de los/las autores/as de implicar a la audiencia al otorgarles un papel activo en la negociación y la construcción del conocimiento. Por la misma razón, analizaremos también el uso de la palabra *reader* (lector). La escritura científica se entiende, por tanto, como un diálogo entre dos grupos de participantes en la creación del conocimiento. En trabajos previos usando el *Coruña Corpus of English Scientific Writing* (CC) se detectaron dos posibles usos de *you*: general y dialógico. El primero puede interpretarse como un “one,” “everybody” genérico; el segundo puede considerarse una estrategia de pertenencia a un grupo que se refiere tanto a las escritoras y escritores como al público lector. El análisis detallado de los aspectos pragmáticos de estos pronombres y de la forma *reader* en el *Corpus of English Chemistry Text* (CEChET) y en *Late Modern English Medical Texts* (LME MT) quizás arroje luz sobre la naturaleza objetiva de la escritura científica.

Palabras clave: Inglés Moderno Tardío; discurso científico; público lector; pronombres personales; lingüística de corpus

This Procefs is only to give the Reader a Knowledge of Litharge which arifes
therein, becaufe that is used much in external Remedies.
(Quincy 1722, 262)

1. INTRODUCTION

The claims by Robert Boyle (1661) and other members of the Royal Society of London that scientific knowledge should be conveyed in a clear way soon led to the slow but unstoppable disappearance of the personal characteristics of style (variations in use, Yule 1996) in science writing. In recent decades, after many years of the supposed objectivity of science writing, interest has arisen in the degree of authors' conscious presence in their written work. Various linguistic features have been explored as a means of revealing this presence, which lies behind an apparently cold, distant and detached discourse and seems to be produced without conscious effort on the part of writers. One of the many linguistic features through which authorial presence is assumed to be detected (Biber 1988; Hyland 1996; Atkinson 1999; Mazzon 2010; Pahta and Taavitsainen 2010) is that of the use of pronouns. This is the case even in apparently objective communicative intercourse, such as that typical of the dissemination of scientific knowledge. Our intention in this article is to discuss authorial presence in medical and chemistry texts not by analysing self-mentions but by studying the use of explicit reader engagement mechanisms such as the different terms of address used to refer to the readership. In other words, we will be using an indirect way of measuring the presence of scientific writers in their works. To this end, section 1 will discuss the presence and use of personal pronouns in eighteenth-century scientific English, namely

those referring to the reader and second-person pronouns, as well as the noun *reader/s*. Section 2 will describe the material used for the present study, which is drawn from the *Coruña Corpus of English Scientific Writing (CC)* and the *Late Modern English Medical Texts (LME MT)*. Because scientific English has been seen to evolve from person-centred in the past to object-centred discourse in the present (Atkinson 1999), we would expect our material to contain very few pronouns, that is, few manifestations of authorial presence. In section 3 we will see to what extent this is indeed the case, and we will also compare the results from the analysis of texts from different scientific disciplines in an attempt to stimulate discussion on the different functions that such linguistic items perform. Since our intention is to show that the presence of authors can be detected through the ways they address the reader, we believe our study will contribute to demonstrating that scientific English is not as objective as was generally considered in the twentieth century. As such, some concluding remarks will be offered in the final section to reinforce this initial hypothesis.

2. REFERENCES TO THE READERSHIP IN SCIENTIFIC ENGLISH

Generalisations on the form of scientific discourse tend to focus on its impersonal style (Ding 2002) and on the author's search for credibility, reliability, objectivity and authority (Marín-Arrese 2002a). However valid this may be, the manifestation of such universal authority also involves communication with and a consideration of the addressee. As the ultimate goal of scientific language is to inform and describe, that is, to communicate, the issue of how to refer to the target audience is as pressing a rhetorical necessity for contemporary science writers as it was during empiricist times. Also, scientism is not necessarily at odds with an author's intervention in their text or with references to the reader, which can act as signposts towards consolidating communication within the epistemic community. The idea that personal pronouns can help reveal how academic writers construct their relationships with readers and with their corresponding discourse community (Chamonikolasova 1991; Kuo 1999) is a fundamental tenet in our study.

Identity (Hyland 2015) and authorial presence (Vassileva 2000) can be perceived in the way that authors address their target readership. In scientific writing this address is realised in two ways: a) by using second-person pronouns (Hyland 2005; Taavitsainen 2006); or b) by resorting to specific direct terms such as the nouns *reader* and *readers*. The latter approach, however, has fallen almost entirely out of favour because of the increasing tendency towards detachment, although the former, as a proform which has long been used in scientific writing, can still be found in some instances.

Most present-day manuals on scientific and academic writing, as well as other recommendations for students, stress the need to avoid personalising these kinds of discourse. As such, it is a notion which we can see as intimately related to the ideas of detachment (Grabe and Kaplan 1997) and objectivity (Atkinson 1999) inherited from late seventeenth- and early eighteenth-century scholars. The stylistic patterns of

science writing were, though, turned upside down following the rise of Empiricism, which itself constituted a reaction against the scholastic and logo-centred approach (Taavitsainen and Pahta 1998, 167) to conducting and transmitting science of the medieval period (Puente-Castelo 2017). Empiricism employed what Atkinson (1996, 35) has called the “rhetoric of immediate experience,” which involved an extensive authorial presence in the text which would later evolve to an object-centred approach (Atkinson 1996, 341). This presence of the author diminished at the same time as the importance of rigorous methods and evidence increased. As a result, the scientific claim of objectivity gradually came to be expressed through detachment in language use, both aspects—objectivity and detachment—coming to be seen as essential characteristics of scientific and academic discourse for writers. This is confirmed by authors such as Gilbert and Mulkay (1984, 56), who claim that:

[e]mpiricist discourse is organized in a manner which denies its character as an interpretive product and which denies that its author’s actions are relevant to its content [...], it portrays scientists’ actions and beliefs as following unproblematically and inescapably from the empirical characteristics of an impersonal natural world.

The main tenets of the practice of science are, then, reflected in the way in which the endeavour is conveyed, that is, in the language of science. The characteristic features present in this language are “the use of passive structures, a general lack of personal pronouns, and an abundance of logical connectors and nominalisations, all of which create a rather impersonal, object-centred kind of discourse” (Monaco 2017, 3).

Authors may use such strategies to efface themselves in order to make their work look more objective but on occasions they need to be present in order to make clear their belonging to a particular community (Swales 1990; Hyland 1999) and/or to express authority. On other occasions, however, due to the writer’s awareness of the reader, an author may want to be a little more subtle so as to avoid confrontation and it is in these moments that they may resort to the use of the second person since, we believe, addressing the reader makes the existence of the author evident but not face-threatening.

Although there has been general consensus as to the predominance of these features, over the last three decades the overall picture on scientific discourse has become more refined, and one element that has provoked considerable discussion is that of the use of personal pronouns: some scholars defend the use of *I* for an overt manifestation of authorial presence, others favour an inclusive and more impersonal *we*, and a third group rejects the use of any pronominal forms at all (Joshi 2014). Something similar happens with the use of second-person pronouns, still a widely debated topic today. Internet sites frequently consulted by both students and academic writers² recommend avoiding direct

² Academia Stack Exchange is a question-and-answer site for academics and students in higher education (see <https://academia.stackexchange.com/>).

addresses to the reader and to instead use the inclusive *we* or *our*.³ However, despite the efforts of authors to hide themselves in academic and scientific writing, their presence in their works has been detected in several ways (Hyland 1998; Mischke 2005; Dontcheva-Navrátilová 2013). In the past, things were somewhat different; thus, as early as the seventeenth century, authors were advised to avoid flourishes (Boyle 1661; Sprat 1667) but nothing was said about the use of direct addresses to the audience, that is, to “the responsive, critical forum before whom the utterances are performed” (Bell 1984, 161). The recommendations by the abovementioned members of the Royal Society, then, were of a grammatical and stylistic, rather than a pragmatic, nature.

The use of second-person pronouns in scientific works may well be understood as revealing the author's invitation to the reader to be involved in this discourse. In such cases, *you* forms appeal directly to the reader as in a sort of virtual dialogue between the two ends of the communicative process: writer and reader. This can be seen clearly in formats such as lectures, which are spoken to be written and reflect this interaction. These cases represent what can be called ‘dialogic *you*’: the inclusive use of *you* indicating whoever *you* represents in the text by means of an exophoric reference (Hoey 1991). This intentional and personal address is in contrast to a more general reference to anybody, an indefinite and imprecise reference, the understanding of which is not limited to the context in which it occurs. The pragmatic effect deriving from what can be called ‘generic *you*’ is that of depersonalising the discourse, whereas ‘dialogic *you*’ conveys a sense of belonging to the group by reinforcing the other's involvement. Both functions of *you* complement the hidden *I* of the author. Biber (1988), in his explanation of multidimensional analysis, claims that the high frequency of co-occurring features in a text can reveal the dimension to which the text belongs. In the case of second-person pronouns, their frequent occurrence together with other features (for instance, first-person pronouns, private verbs, emphatics, hedges and amplifiers, among others) seems to indicate that a text is more involved than it is informational or detached. In a similar vein, Monaco (2017, 24) has claimed that “first and second person pronouns, present tense verbs, contractions and general emphatics tend to appear together, or co-occur, because they all contribute to an involved, interactive type of discourse.”

Similarly, the noun *reader* (or *readers*) constitutes the explicit manifestation of ‘dialogic *you*’, which once again promotes interaction between authors and their reading public. As Seoane (2016, 199) has noted: “these allusions to the reader make this text very interactive, with the style more typical of a dialogue than a written text for an unknown audience.” She also points out the linguistic function that this noun plays in the structure of the text, that of a vocative, and goes on to explain that “the author is trying to engage the reader and bring him (*sic*) closer to his (*sic*) own position, as if trying to gain the reader's trust, empathy and understanding, at times even asking

³ <https://academia.stackexchange.com/questions/29535/is-it-okay-to-directly-address-your-reader-when-writing-a-scientific-paper>

explicitly for his (*sic*) support” (Seoane 2016, 199). The noun *reader*, as a term of address, can perform an identifying function, but it also reveals an extraordinary illocutionary force coming from the writer (Davies 1986; Shiina 2007).

All these references to the readership seem to reveal the presence of the author and can be understood as a result of the period of production. In social terms, there was a high level of demand for the popular treatment of what we nowadays call scientific topics, not only among the cultivated elite but also among the increasing literate general population. The use of forms such as *you/reader* as a means of inviting the audience into a dialogue might have helped to facilitate the spread of knowledge by creating a sense of community. Berkeley’s words illustrate the social value of medical writing:

INQUIRIES,

or Introduction to the following piece I assure the reader, that no-thing could, in my present situation, have induced me to be at the pains of writing it, but a firm belief that it would prove a valuable present to the Public (Berkeley 1744, 33).

In what follows we will describe the data from the current study of addresses to the Reader in examples of eighteenth-century scientific discourse, along with its analysis.

3. CORPUS MATERIAL AND METHODOLOGY

As Wales (1996) affirms, there is general consensus nowadays that a binary distinction exists in present-day English pronouns between the subjective and objective cases. Such a distinction can be traced back to Late Modern English (Moskowich 2001). As for the genitive, Wales notes that Quirk et al. (1985) do not seem to hold a clear position, in that they talk about the ‘genitive case’ on some occasions (section 6.2) and about the ‘possessive pronoun’ on others (section 6.14). We do not, however, wish to enter here into the question of whether the original genitive case should be regarded as a different type of pronoun or not. Consequently, we have not considered forms such as *yours* and have limited our analysis to the form *you*—the reference of these pronouns, including the addressee(s), but excluding the speaker(s)/writer(s) (Quirk et al. 1985, 339)—irrespective of its syntactic function.

The data are drawn from the CC. The subcorpus of the CC used is the *Corpus of English Chemistry Texts* (CEChET). In addition, and by way of comparison, we used part of the *Late Modern English Medical Texts* corpus (LMEMT)⁴, compiled by the VARIENG group at Helsinki University (Taavitsainen et al. 2014; Taavitsainen and Hiltunen 2019). Both of these corpora are beta versions at the time of writing this paper.

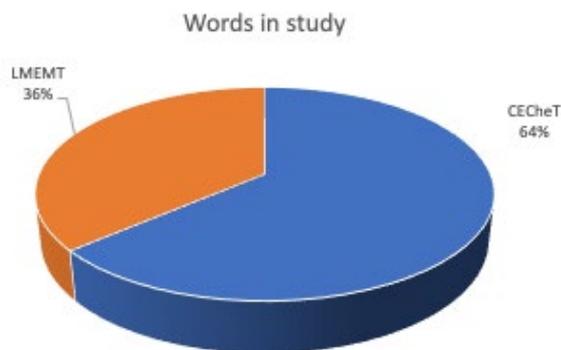
⁴ We are grateful to the compilers for granting us permission to use a selection of the pilot version of LMEMT as it came out in December 2019.

CEChET has been compiled following the same principles as other subcorpora in the CC in order to ensure representativeness and balance (Crespo and Moskowich 2010). For this study we have only used the eighteenth-century section of CEChET, which contains twenty-one samples⁵. Thus, the material on Chemistry amounts to 201,498 words. All these data correspond to text samples, that is, no prefatory material has been included here, in that the CC as a whole does not include material that is not part of the main body of a scientific text.

The data from LMEMT, in turn, includes prefaces or dedications whenever these occur, and samples vary in length. The eighteen texts from this corpus are found within the category called *Specific Treatises: Texts on Therapeutic Substances*, and also come from the eighteenth century, although their dates of publication are not distributed equally, which is the case with CEChET. For the sake of rigour, we have used XML Word-Counter (Camiña-Riobóo 2013), given that it was the software used for word-counts in CEChET, ensuring a more reliable comparison of the two sets of texts. Our LMEMT data totals 115,020 words, and thus the final number of words we will be working with is 316,518.

The texts dealing with Chemistry represent 64% of the total word-count, and those dealing with Medicine, 36%. Differences in number of words mean that figures should be normalised to 10,000 words in order to make comparisons feasible and reliable. The distribution of words in our material is shown in figure 1.

FIGURE 1. Distribution of Words in the Corpus



One of the differences between the two sets of texts used here relates to the authors of the texts themselves. Whereas LMEMT includes two anonymous samples (those from 1712 and 1719), all the samples in CEChET have been attributed to specific writers. Despite the presence of these two anonymous texts, we can infer that all the

⁵ CEChET contains two ca 10,000-word samples per decade except in the period 1740-1750, for which there are three.

authors in LMEMT are men, in that this was generally the case in the eighteenth century. The material from CEChET includes just one text written by a female author, Elizabeth Fullhame, from 1794. Given these circumstances, the sex of the author is not considered a useful variable in the analysis of the forms under investigation.

Tables 1 and 2 below set out the information relative to authors' names and dates of publication, plus the word-count for each individual sample in the two subcorpora.

TABLE 1. Details of the Samples in LMEMT

Year	Author	Words
1712	Anonymous	1,362
1719	Anonymous	2,011
1719	Colbatch	4,771
1738	Hartley	4,240
1743	Boerhaave	11,140
1744	Berkeley	10,377
1745	Heberden	4,236
1761	Turner	4,016
1762	Störck	7,042
1770	Arnaud	6,291
1780	Graham	9,735
1785	Withering	10,064
1790	Hamilton	6,068
1790	Johnstone	9,978
1791	Thompson	8,373
1792	Gowland	6,389
1794	Alderson	4,639
1797	Trinder	5,288

TABLE 2. Details of the Samples in CEChET

Year	Author	Words
1700	Wilson, George	10,200
1708	Packe, Christopher	10,256
1711	Allen, Benjamin	10,325
1719	Hauksbee, Francis	10,070

1722	Quincy, John	10,449
1730	Bradley, Richard	10,081
1734	Shaw, Peter	10,057
1739	Hales, Stephen	10,043
1744	Jackson, Humphrey	3,371
1746	Mortimer, Cromwell	6,107
1748	Brownrigg, William	10,264
1753	Baker, Henry	10,076
1759	Dossie, Robert	10,186
1763	Lucas, Charles	10,000
1767	Monro, Donald	9,677
1771	Pemberton, Henry	10,052
1772	Falconer, William	10,012
1781	Watson, Richard	10,079
1789	Keir, James	10,060
1794	Fulhame, Elizabeth	10,090
1797	Garnett, Thomas	10,043

Several other differences that have some methodological consequences are found among the texts. The first one to note is that, as already mentioned, none of the samples from CEChET include any prefatory material, the intention of the compilers being to collect instances of the scientific register only, avoiding any other register. However, seven of the samples from LMEMT do include a preface, these being the anonymous text from 1719, Colbatch (1719), Turner (1761), Störck (1762), Johnstone (1790), Thompson (1791) and Gowland (1792). In section 4 we will consider whether the inclusion of prefaces and dedications serves to increase the degree to which texts address their readership.

The forms under scrutiny (*you* and *reader/s*) were retrieved by means of two different applications. For the LMEMT texts, the online application Sketch Engine was used, whereas for CEChET we employed the 2019 version of the *Coruña Corpus Tool* (CCT), a desktop application. The resulting data will be presented and analysed in the following section.

4. DATA ANALYSIS

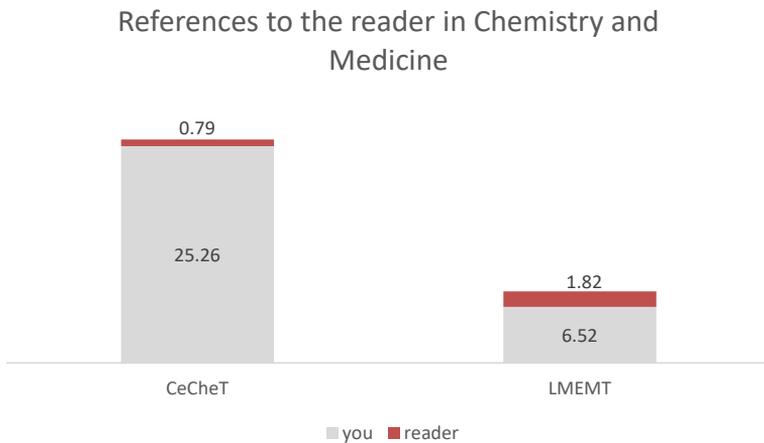
The texts under study represent different writing traditions (Taavitsainen 2004; Moskowich et al. 2016) and these differences are reflected in our findings. Nevertheless, a general overview will be provided first. Taking the data as a whole, of the 316,518 words in total, 616 words are references to the readership, representing 0.19% of all the

tokens. This low frequency is in line with the main tenets of scientific writing after the rise of Empiricism, which favoured an objective narration of facts. Splitting these data into the two categories analysed yields a far greater prevalence of *you*, with 579 cases, and only 37 hits for *reader*.

Looking at the distribution of the 579 instances of *you*, we see that most of them (509 tokens, 87.91%) are found in Chemistry texts and only 70 (12.09%) in Medicine. As for *reader*, which appears only in the singular form in these data, 21 hits (56.76%) were returned from LMEMT and 16 (43.24%) from CEChET.

Given the difference in word numbers in the two disciplines, we have normalised figures (nf) to 10,000 words. Figure 2 illustrates the distribution of each type in the two subcorpora.

FIGURE 2. References to the Reader in Chemistry and Medicine (nf/10,000 words)



Thus, we can see that CEChET contains nearly four times as many uses of *you* as LMEMT, whereas the medical corpus contains twice as many references to the *reader*. According to the CCT, the pronoun *you* represents 0.26% of all the tokens in the Chemistry subcorpus, whereas *reader* represents just 0.008% of this total. As regards the results for LMEMT, the second-person pronoun represents 0.06% and *reader* 0.02% of all the tokens in the texts pertaining to Medicine. That is, *you* is proportionally far more abundant in Chemistry than in Medicine texts, and the vocative *reader* is more often used by medical authors. This leads us to conclude that the inclusion of prefatory material in LMEMT does not play a significant role in making reference to the reader, although the analysis of the pronominal functions below might reveal something a little different. As for the classification of samples into different genres, all the texts in LMEMT, except one, are labelled as *Book on a Specific Topic* and are often manuals or practical guides for practitioners, or even letters

(Hiltunen and Taavitsainen 2019). In the case of Chemistry texts, the genres to which the different samples belong include treatises (7), articles (2), textbook (1), letter (1), dictionary (1), as well as essays (5) and lectures (4). This variety of formats, some of which are more reader-oriented than others (namely, letters and lectures), could help to explain the predominance of *you* forms in this subcorpus.

Despite this generally low frequency of occurrence, it is worth describing these findings in some detail. Curiously, only five of the twenty-one authors in CEChET use the term *reader* and the person using it most often is Watson (1781), whose extract contains some nine tokens of this type. Although his text is an essay, a genre that is not particularly interactive—unlike lectures or dialogues, which evidently are—there is an external motivation on the author's part which clearly underlies the prominent use of the form. In his dedication to the Duke of Rutland—not included in the corpus—Watson seeks to convince his patron of the benefits of Chemistry:

My Lord Duke,

Your grace, whilst I had the honour of being intrusted with your Education in this place, shewed a disposition to the Study of Chemistry: I wish that any thing contains (*sic*) in the following Essays may tend to revive it.

Chemistry is cultivated abroad by persons of the first Ranks, Fortune, and Ability; they find in it a never failing source of honourable amusement for their private hours; and as public men, they consider its cultivation as one of the most certain means of bringing to their utmost perfection the manufactures of their country (Watson 1781, i-ii).

However, it is in the preface to his work (also not included in the corpus) that he reveals the nature of his writing:

The subjects of the following Essays have been chosen, not so much with a view of giving a System of Chemistry to the world, as with the humbler design of conveying, in a popular way, a general kind of knowledge, to person (*sic*) not much versed in chemical inquiries (Watson 1781, preface).

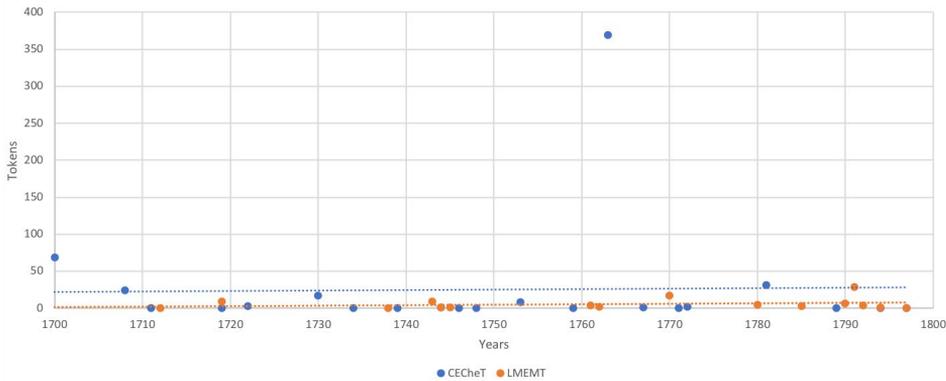
Watson's dedication is a product of the social circumstances of the period. Authors in the eighteenth century made extraordinary efforts to popularise science, that is, to help people come to terms with contemporary scientific topics, and thus to disseminate knowledge to the general population. Some scholars have dated the creation of 'the genre of popular science' to this very period, as the thirst for such knowledge grew greatly in society at the time:

Accumulating knowledge about the natural sciences also gave one a certain cachet [...] knowing what was happening in the world of science was thought to make a person more cultured and capable of rational decision-making (Boissoneault 2019).

Boissoneault thus sets out the reason behind the need to write interactive and dialogic texts as a means of disseminating the kind of scientific topics demanded by the reading public, especially if these topics led to practical applications for ‘the manufactures of their country’ (Watson 1781, i-ii).

As regards the evolution of the use of direct addresses (both *you* and *reader*) to the readership of the time and in accordance with the background we have described in the previous sections, one would probably think that as the century advanced fewer and fewer such addresses might be detected. In other words, as authors recommended that scientific writing should be objective, mention of the readership would fall. However, we have not been able to find any such clear pattern in CEChET. Figure 3 shows a couple of stand-out outliers for 1700 and 1763. Notwithstanding, the tendency shown in figure 3 below indicates a slightly clearer decrease in writings about medical topics in the last decade of the eighteenth century, excluding Thompson (1791). All these outliers will be explored later in this section.

FIGURE 3. Distribution of Addresses to the Readership over Time



This evolution in medical texts might be related to the specialisation of science, something that occurred earlier in Medicine than in other more recently developed areas of science, such as Chemistry. Moving towards the nineteenth century implies addressing an epistemic community in a broader objective, impersonal and detached way.

In relation to the linguistic forms under analysis here, another point of interest is the pragmatic function they perform in these eighteenth-century scientific samples.

The use of *reader* as a vocative and a term of proximity endows the text with a sense of involvement on the part of the author. Examples (1) to (3) below illustrate this idea:

- (1) From the analysis of decomposition of sulphur effected by burning, we have concluded, that the constituent parts of sulphur are two, – an acid which may be collected, and an

inflammable principle which is disperfed; if the **reader**⁶ has yet acquired any real tafte for chemical truths, he will wifh to fee this analyfis confirmed by fynthefis (Watson 1781, 173-74).

(2) The **reader** may probably recolleçt, that fulphur is compofed of two things, – of an acid, and of phlogifton. – Iron alfo is compofed of two things, – of an earth and of phlogifton (Watson 1781, 208-209).

(3) This experiment renders it neceffary to explain to the **reader** two terms, frequently met with in chemical books – affinity and precipitation (Watson 1781, 228-29).

Most of the authors (eleven out of eighteen) whose works are compiled in LMEMT use *reader*. In fact, there seems to be a firm commitment on the part of these authors to incorporate addressees into their work by frequently attracting their attention. The extract below (example 4) from Arnaud's work is a good demonstration of how such medical authors make use of the vocative among their stylistic resource options:

(4) Many examples might be brought to refute what perfons, otherwife refpectable, have thought proper to advance to the Prejudice of this remedy; but I will refer the **reader**, to many obfervations given by the **author** in his treatife, and to take into confideration here the firft paragraph of the third Formula on the inefficacy of the poultices generally prefcribed (Arnaud 1770, 9).

Example 4 confirms that the use of *you* is a counterpoint to the author's presence. That is, the fact that there exists a *you* implies that there exists an *I* (the author). In this case, the author indeed mentions himself (here, in bold) explicitly.

The reason why more authors writing about Medicine than those dealing with Chemistry resort to the vocative may be related to the tradition of the discipline itself. From the traditions of medical writing in the Middle Ages, addressing the readership was paramount to the process of the vernacularisation of science (Pahta and Taavitsainen 2004a). Despite all the changes in the medical world after the medieval period, what we find in these eighteenth-century samples might simply be reminiscent of earlier attempts to target a potential discourse community composed of various audience types—from more to less literate—and comprising specialised practitioners as well as lay people. Thus, the noun *reader* would serve to encompass all of these.

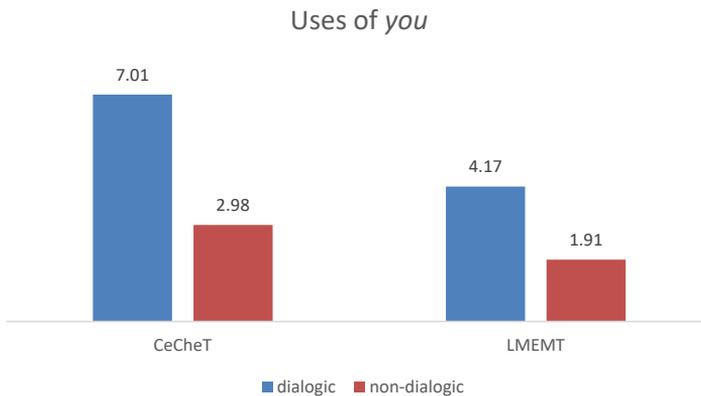
As for the second-person pronoun, it is not used by many writers in CEChET; only eight of the twenty-one authors in the Chemistry section of the CC use *you* to address their readers. To illustrate the very different behaviour of authors in the two disciplines considered in this work, it is interesting to consider that Charles Lucas (1763) employs

⁶ Bold added.

the pronoun *you* 368 times in the text while using *reader* only once. This text, which contains more than half the occurrences in CEChET, is a letter written against a certain Mr Rutty M.D. Once again, this seems to highlight the fact that the appearance of numerous tokens of the type *you* must be a result of the interactive nature of the text itself, *you* being perhaps more direct than *reader*, although the extralinguistic referent is the same in both cases.

We have not considered any functions performed by *reader* other than that of the vocative. However, in previous studies (Moskowich and Crespo 2019; Crespo forthcoming) we have identified two possible functions for the second-person pronoun: one that serves to convey interaction between reader and writer (which we termed *dialogic*), and one that conveys other impersonal references in a more general way. The distribution of these two functions of *you* with respect to our dataset is set out in figure 4 below. Since the two corpora analysed contain different word-counts and also a different number of occurrences of *you*, frequencies have again been normalised to 10,000.

FIGURE 4. Dialogic and Non-Dialogic Uses of *you* (nf/10,000 words)



We can see that the frequency of occurrence of each function is certainly different in the texts dealing with Chemistry and those dealing with Medicine. In fact, and although both groups of texts were written during the same time period, the functions of *you* observed in them do not share the same distribution. Specifically, the dialogic function of the pronoun is more abundant in Chemistry (7.01 nf) than in Medicine (4.17 nf). A notable finding here is that the texts in LMEMT only seldom contain *you* to make reference to a general situation (1.91 nf), yet this function is found far more often in CEChET (2.98 nf). Since the period under study is the same for all samples, and all pertain to what Hyland (2004) calls the Hard Sciences, we can only explain this fact, once again, as a result of differences in the evolution of the two disciplines

themselves, each with its own tradition but also each with its own purpose: while Chemistry authors may have sought to interact with other members of their epistemic community for the sake of the advancement of knowledge at a moment when the field was still not well developed,⁷ it is probable that authors of Medicine texts were more interested in the real and general application of their proposals in a more direct and practical way. This might be one of the reasons why we find cases of *you* in the form of instructions in medical texts (“*you* add one of the Aether ...”, “*you* must procure ...”) whereas the sort of verbs accompanying the pronoun in Chemistry samples are related more to emotions: verbs of thinking, feeling (“as *you* please to carry off”, “when *you* perceive it”, “as *you* judge to be caft up”, “*you* understand”, “*you* contend”).

It is also worth noting that even the inclusion of prefaces or dedications in eight of the texts in LMEMT has no significant consequences in terms of the presence of direct addresses to the audience, especially if we consider the very slight difference in frequency of the dialogic function in the two corpora.

When looking at the raw numbers, we see that of the 509 tokens of *you* in CEChET, some 357 are performing a dialogic function. By way of illustration, in his work from 1763, Lucas devotes several pages to asking direct questions of his readers where *you* has a clear dialogic function. The extract below (example 5) illustrates this use:

(5) Do you not, agreeable to your principles, in your preface, lay it down, that the quantity of terreftrial matter in a water is determined, by the quantity of fediment fubfiding, upon the infilling the folutions of filver, lead, alum and lime-water? And are you not now convinced of your error, and by whom, and that falts, as well as earths, in waters caufe the precipitations with thefe folutions, and that the precipitates are from the folutions, not from the waters? See Analyfis, [p]. 13, 22, 23. Do you ftill obtinately perfift in thefe glaring errors?

Do you not confine the curdling of milk to your nitre, or as you fometimes call it, calcarious nitre, or Epfomfalt? And are you not now convinced, and by whom, that the union of the Vitriolic or Muriatic acid, to moft abforbent earths and Alcaline falts, in certain quantities, produce the fame effect? (Lucas 1763, 10).

The presence of *you* is combined with another rhetorical mechanism of audience inclusion, that of questions, perhaps inherited from the Question-Answer formula and the animal debate poems of the Middle Ages (Garbaty 1984). The author's presence is highlighted in that questions are “explicitly persuasive and are employed to manoeuvre readers into accepting the writer's viewpoint or follow a particular line of argument” (Hyland 2005, 368).

⁷ We recall that Berzelius proposed his notation system for chemical molecules as late as 1813, a period also characterised by many disputes on nomenclature.

The remaining 152 tokens are non-dialogic in that they are used to refer to people in general, with an impersonal shade of meaning. Example (6) below from Watson (1781) represents one such non-dialogic use:

(6) **You** do not furely expect that chemiftry fhould be able to preſent you with a handful of phlogifton, ſeparated from an inflammable body; **you** may juſt as reaſonably demand a handful of magnetiſm, gravity, or electricity to be extracted from a magnetic, weighty, or electric body. (Watson 1781, 167).

Who is *you* in example (6)? Is the author referring to the readership, or is he simply generalising? *You* here could in fact be anyone.

Of the 70 tokens of *you* found in the medical texts, 48 can be considered as dialogic forms and only 22 are attributable to non-dialogic or generic references. Whereas most authors use them very rarely, there is a peak in the case of two authors: Thompson employs the device 26 times and Arnaud 14 times. Example (7) below illustrates pronominal use by the former:

(7) I SHOULD think myſelf loſt to all ſenſe of gratitude if I did not acknowledge that, under God, **you** have been the ſaver of my life by the uſe of your Baume d'Arquebufade (Thompson 1791, 34).

The texts by Graham and Johnstone also contain instances of dialogic *you*:

(8) The fire I ſay which I employ in the cure of diſeaſes, and for the preparation of theſe great medicines, is the univerſal living fire which connects and moves the whole ſolar ſyſtem – which animates all nature, and which you, my courteous reader – this book, the chair you fit in, the charming object by your ſide, and in a word, everything in the univerſe is full of... (Graham 1780, 19-20).

(9) From **you**, my humble but zealous endeavours to excite the attention of the younger and liberal Gentlemen of the profeſſion, to improved methods of curing diſeaſes, are ſure of a candid reception (Johnstone 1790, 49).

The predominance of dialogic *you* in this extract by Johnstone may be explained in terms of the text's communicative format: a letter, a genre which is in itself closer to the reader (Earle 1999). The identifying function of the second-person pronoun is thus well-rooted in the following example (10), and indeed, the letter format of the text is explicitly mentioned by the author:

(10) of theſe principles by caſes, but this **letter** being already too long, I now commit it to your conſideration. To **you!** who joining reading to experience and talents, make the healing art your ſtudy and delight (Johnstone 1790, 49).

One of the senses of *letter* recorded in the *Oxford English Dictionary* includes the role of the author: “a written communication addressed to a person, organisation, or other body, esp. one sent by post or messenger;” from which it can be concluded that the use of the second-person pronoun is required by the format itself.

As Crespo and Moskowich (2016, 232) have noted,

Personal letters lie at the basis of learned letters by means of which various phenomena of nature were reported. Following letter-writing conventions which include a direct address to a particular reader may be interpreted as a sign of intimacy and an attempt to establish rapport with the addressee.

Non-dialogic uses are illustrated in Arnaud’s work, where they predominate over dialogic ones. Example (11) contains a use of the pronoun that we could interpret as non-dialogic since it is a generic *you*, thus addresses anyone buying the remedy (his own) that the author is referring to:

(11) By inclining the bottle down-wards and putting the end of the fore-finger upon the aperture of the tube *you* may let the drops fall at pleasure, one after the other (Arnaud 1770, 21).

Although no differences have been found in individual authors, both the general findings and the detailed analyses of second-person pronoun references seem to indicate that language once again reflects the social reality lying behind science writing in the eighteenth century: external circumstances favour the predominance of dialogic *you* in both Chemistry and Medicine samples. The results seem to point to a pattern of use within the community of practice that confers importance on the presence of addressor and addressee in the communication of science. The author, then, manifests himself through *you*.⁸

5. CONCLUSIONS

This study has sought to show how, after the rise of Empiricism, scientific texts are not as impersonal as might be expected. In fact, we have tried to demonstrate that although the authors of these texts made no explicit self-mentions—that is, they may have not used the first-person pronoun *I*—, they were still present in the texts as interlocutors with their readership. From the very moment they write *reader* or *you*, they are acknowledging their own identity in opposition to that of the second person.

⁸ “Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavor” (Wenger-Trayner and Wenger-Trayner 2015, 1).

We have seen that the use of *you* is generally preferred to that of the vocative *reader* and that this seems to depend on the discipline. Similarly, the two functions identified for *you*—the dialogic, or interactive, and the non-dialogic—seem to be linked to the different writing traditions in each discipline, on the one hand, but also to their applicability. Thus, texts on Chemistry may be more theoretical than Medicine. We should bear in mind that the former field is still being redefined in the eighteenth century, with Berzelius' proposal for formulae to denote molecular compositions not appearing until 1813, whereas Medicine as a discipline, with its far longer tradition, has already resolved many of these basic issues, and is searching for practical applications of knowledge to improve general living conditions. In other words, negotiations and dialogue are taking place within the realm of Chemistry, but far less so within Medicine. Such a need for dialogue in the epistemological community of Chemistry can be seen in the fact that although the texts in CEChET do not contain any fragments of dedications or prefaces, where direct addresses to the readership are typically found, their use of *you* is much higher than in the case of the texts in LMEMT. As such, then, this comparison seems to support the notion, once more, that scientific writing is not monolithic, but rather is determined by subject matter and, ultimately, by the authors and their social environments.

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