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Broadening shared knowledge within the specialized community in the 17th century

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ABSTRACT

The aim of this paper is to illustrate the different methods that the specialized discourse community of the 17th century used to spread the news about the many activities then taking place and the discoveries being made by its members. It will be shown that the communicative role of early scientists was not limited to the fulfilment of goals linked to socialization and solidarity, but also included the reform of existing means of discourse and the development of new ones. Indeed, the propagation of discourse conveying new information about specialized facts or events to a social group sharing intellectual and professional interests implied the adoption of various textual forms, each with its own specific pragmatic aim so as to carry out different communicative functions and meet the expectations of a large number of non-homogenous addressees.

Keywords: specialized discourse, discourse community, 17th Century, scientific discourse, communal correspondence, Royal Society, early scientific publications, The Philosophical Transactions of the Royal Society of London.

1. Introduction

The developments of specialized discourse in the Early Modern English period were consequential to the great epistemological and methodological innovations which took place in 17th and 18th century England (Vickers, 1987; Hunter, 1989; Jardine, 1999; Shapiro, 2000). These innovations determined the need for corresponding changes both as regards the methods of communicating information about new scientific discoveries and as regards the most suitable means of expression chosen to describe and discuss the new phenomena then being observed and analysed. Indeed, British scientists made great efforts not only to increase the number and quality of specialized terms but also to create novel expository genres able to guarantee the prompt and widespread diffusion of information relating to the new developments in the various specialized fields (cf. Gotti, 2008, pp. 153-188). Moreover, there was a need to socialize the discoveries made and the new ideas developed, also thanks to the collaborative spirit that inspired 17th and 18th century scientists, in contrast to the individualism that characterized philosophers in the Renaissance period. The development of the sciences was now seen as a result of public discussion and knowledge sharing, in the conviction that "In Assemblies, the Wits of most men are sharper, their apprehensions readier, their thoughts fuller, than in their closets" (Sprat, 1667, p. 98).

The aim of this paper is to illustrate the different methods that the specialized discourse community of the time used to spread the news about the many activities then taking place and the discoveries being made by its members. It

will be shown that the communicative role of early scientists was not limited to the fulfilment of goals linked to socialization and solidarity, but also included the reform of existing means of discourse and the development of new ones. Indeed, the propagation of discourse conveying new information about specialized facts or events to a social group sharing intellectual and professional interests implied the adoption of various textual forms, each with its own specific pragmatic aim so as to carry out different communicative functions and meet the expectations of a large number of non-homogenous addressees.

2. Means to broaden knowledge

2.1. Communal correspondence

A relevant role in the performance of this important function was played by communal correspondence (cf. Gotti, 2006a). Indeed, in this period the exchange of letters was not always intended for merely personal purposes, but often had a wider scope and a more official function, offering recipients greater opportunities of keeping abreast of the times. With this exchange of letters, scholars could find out about work in progress, new publications and how controversially they were received. Letters often conveyed information about the research work carried out not only by individuals but also by groups, and were frequently addressed not merely to single experimenters but also to teams of researchers working elsewhere. Correspondence was often distributed through clearing houses for scientific correspondence, such as the salon of Father Marin Mersenne in Paris or the office of Henry Oldenburg in London. Here, letters were copied and sent to several new recipients, who usually read them aloud at their local meetings with colleagues and friends, thus helping the formation of 'hidden' or 'invisible' colleges (Manten, 1980).

In the 17th century communication by letter became a truly public event.[1] For example, in France and England scientists published announcements of

[1] Ultee (1987, p. 100) estimates that in 1690 there were at least 1,200 active corresponding members of the Republic of Letters in northern Europe.

discoveries, reported on experiments or expressed their views on some subject of controversy in the form of a letter to a friend. These letters were reproduced and distributed to several readers. While circulating among various correspondents, letters accumulated information and comments. As they often described equipment or reported experiments, these letters were usually quite long, and formed the basis of the later experimental essay (Gotti, 2010). The development of communal correspondence –favoured by the introduction of postal services, which, particularly in the seventeenth century, became quite regular and reliable– greatly stimulated the growth of a real community of adepts, as it provided an excellent means for the exchange of views, the conducting of controversies and the corroboration of individual observations. The vastness of Oldenburg's exchange of letters is confirmed by his contemporaries. According to the biologist Martin Lister,

> [Oldenburg] held Correspondence with seventy odd persons in all parts of the World, and those be sure with others; I ask'd him what Method he used to answer so great a variety of subjects, and such a quantity of Letters as he must receive weekly; for I know he never failed, because I had the honour of his Correspondence for Ten or Twelve Years. He told me he made one Letter answer another, and that to be always fresh, he never read a Letter before he had Pen, Ink and Paper ready to answer it forthwith; so that the multitude of his Letters cloy'd him not, or ever lay upon his hands. (Quoted in Oldenburg, 1965-77, p. I, pp. XVII-XVIII)

In 1662 the Royal Society was founded, after a period in which its members had met in an informal manner (Hartley, 1960). The efficacy of this corresponding activity was greatly enhanced by the Royal Charter which gave the Society "full power and authority, by letters or epistles [...] to enjoy mutual intelligence and knowledge with all and all manner of strangers and foreigners, whether private or collegiate, corporate or politic, without any molestation, interruption, or disturbance whatsoever" (quoted in Boas Hall, 1991, p. 55). This privilege to correspond freely with citizens of other countries was particularly helpful in a period of great domestic turbulence and international conflicts. Many letters were read aloud at meetings of the Royal Society, particularly before the *Philosophical Transactions* started publication (Johns, 2003). Indeed, this was

one of the functions of the Royal Society, as clearly set out in its statutes: "The business of the Society in their Ordinary Meetings shall be [...] to read, hear, and discourse upon letters, reports, and other papers concerning philosophical matters" (quoted in Boas Hall, 1991, p. 1). The use of correspondence offered several advantages to researchers, as is clearly pointed out by Rusnock (1999):

> Unlike weekly meetings of the Society, correspondence allowed geographically remote individuals to engage in, and with, the new sciences. While publication and distribution of the *Philosophical Transactions* certainly contributed to the diffusion of knowledge, it did not provide for the flexibility, openness, manoeuvrability and relative rapidity of interaction that correspondence did. In short, the Society's correspondence encouraged a more participatory science. (Rusnock, 1999, p. 156)

The Secretary of the Royal Society, Henry Oldenburg, played a fundamental role in coordinating this letter network, which acted as a very efficient clearing-house for scientific news. In the mid-seventeenth century it became customary for many scientists residing outside London to write letters to Henry Oldenburg sending news about their experimental activities and interests, not so much to inform him personally but because they "expected Oldenburg not only to read their letters but to digest them and in some cases transmit what they wrote to others. Thus much of Wallis's early communication to Hevelius passed in this way through Oldenburg's hands, as Newton's to Leibniz was later to do" (Boas Hall, 1965, p. 285). Oldenburg's role was not limited to providing foreign scientists with news, but also to act as intermediary between foreign scientists and English ones, informing them of one another's activities and opinions. Sometimes foreigners contacted Oldenburg directly to learn more about the current work of an English scientist, and would then receive some news from him. The reverse also occurred, with English fellows contacting Oldenburg with enquiries requiring him to write letters to experts abroad. The vastness of these intermediary activities are confirmed by Oldenburg himself in his account of 'The Business of the Secretary of y^{e} R. Soc.':

> He [...] writes all Letters abroad and answers the returns made to ym entertaining a corresp. wth at least 50. persons; employes a great deal of time, and takes much

> pains in inquiring after and satisfying forrain demands about philosophicall matters, disperseth farr and near store of directions and inquiries for the society's purpose, and sees them well recommended etc. (Quoted in Boas Hall, 1965, p. 290)

As Secretary of the Royal Society, Oldenburg often read the contents of his 'official' correspondence, particularly about new theories and experiments, at the Society's meetings. These were considered of great interest by the Fellows, who debated them by adding their own considerations and experimental accounts. Oldenburg's role as the centre of this correspondence network was not at all neutral. At times he either mediated between contrasting views or did the reverse, stimulating debate and even arousing conflict, as in the case of the prolonged controversy over comet observation and theory, involving exchanges between both Auzout and Hooke and Auzout and Hevelius (Boas Hall, 1991, p. 58). Moreover, his role in promoting a wide *commerce de lettres* brought him a certain status, as he was the kingpin in the correspondence network.

2.2. The minutes of the Royal Society

The minutes of the meetings of the Royal Society constituted another source of specialized news. They were based on the notes taken at the meetings themselves, reporting the experimental demonstrations carried out there or the accounts given during the meetings of experiments performed elsewhere. As it was perceived that the news about these experiences and accounts was highly interesting and valuable, it was decided that it should be preserved and transmitted by means of its recording in the Register Book of the Society (started in 1660). This recording could also serve the purpose of establishing priority, although at that time originality of discovery was deemed of less importance than it is today. Indeed, scientific activity in that period implied a less competitive attitude and greatly relied on a spirit of cooperation.[2] In the drafting

[2] In the following decades, however, this attitude changed, as can be seen as regards Robert Boyle, who in the 1670s and 1680s became increasingly concerned about the unauthorized use of his writings. (Hunter, 1999, p. 269)

of the minutes of the meetings, Henry Oldenburg also played a relevant role as this task was considered to be performed under the sole responsibility of the Secretary of the Society.

2.3. Early scientific publications

The scientific journal evolved from communal correspondence (cf Gotti, 2006b). The diffusion of early newspapers and other periodic publications (Boyce / Curran / Wingate, 1978) favoured the emergence of journals devoted to specialized matters and which were mainly addressed to those really interested in them. The first scientific periodical was the French *Le Journal des Sçavants*, which appeared on 5 January 1665 under the editorship of Denis de Sallo de la Coudraye. Two months later (on 6 March 1665) the first issue of *The Philosophical Transactions of the Royal Society of London* (henceforth *PT*) was published. These two journals were imitated in other countries, such as by the *Giornale de' Letterati* in Italy, by the *Acta Eruditorum* in Germany, and several others (Garrison, 1934; McKie, 1979). Journals were mainly subscribed to by individuals, as universities tended to acquire books, which were considered more useful for teaching purposes.

The *PT* were meant to serve as a newsletter, to favour the spread of news within the Royal Society and other learned circles. The aims of the *PT* were made clear by Oldenburg –the editor– in his introduction to the first issue of the journal; the new publication had not merely been designed as a channel of information for those working in this particular field, but also had a proselytizing function as it was meant to arouse the interest of new minds in specialized matters and promote their involvement in scientific research according to the criteria shared by the members of the Royal Society. Particularly in the first issues, most of the news items were reported by Oldenburg himself and frequently consisted of short extracts that he had drawn from the correspondence he had received and to which he sometimes added his own comments, as he himself admits in some of them. Little by little unsolicited articles for publication in the *PT* were sent to the editor, who was now seen as an intermediary, as the readers of the journal were actually perceived by the author to be his real addressees.

Although the original communal correspondence gradually evolved into the news item and experimental account text types, letters continued to thrive and be published in specialized journals. Indeed, many experimental reports often took the epistolary form, developing out of correspondence with the editor. This is the case of Newton's article titled "A New Theory of Light and Colours" (1672, *PT* VI, 80, pp. 3075-3087), which was the result of his correspondence with Oldenburg. The latter had originally requested additional information from him about his reflecting telescope, which had been demonstrated before the Royal Society by Barrow. The letter style of Newton's contribution is easily detectable in the initial formula of the article:

> Sir,
>
> To perform my late promise to you, I shall without further ceremony acquaint you, that in the beginning of the Year 1666 (at which time I applyed myself to the grinding of Optick glasses of other figures than Spherical,) I procured me a Triangular glass-Prisme, to try therewith the celebrated *Phænomena* of Colours. (Newton to Oldenburg 1672, *PT* VI, 80, p. 3075)[3]

Letters were easily distinguishable from news items and experimental accounts as they opened with a salutation, and were frequently followed by a polite reference to the editor or to the Royal Society. The main topics covered by the *PT* were medicine, science and technology; subjects such as archaeology and philology were also dealt with, but much less frequently. The early issues devoted considerable space to observations and reports of natural events, accounts of technological and medical advances, travelogues and news of a practical nature. Articles reporting information useful for the trades or artisans belong to the latter category. Directions for practical use were also given on more general issues such as producing cold, useful for chilling drinks.

The main contributor and addressee of the early issues of the *PT* was the 'virtuoso' (Hunter, 1981), mainly interested in curious facts and in the unsystematic

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3 All quotations from the *Philosophical Transactions* are taken from an original copy in the British Library in London.

collection of specimens of various kinds. Besides this category, there was another including those scientists involved in the systematic observation and description of natural phenomena, and in active participation in experimental activity. The composite nature of this early scientific community reflects that of the membership of the Royal Society, as is well described by Valle (1999):

> It consisted of an inner 'esoteric' core of committed Baconian experimental philosophers, above all Boyle, Hooke and Desaguliers, whose aim was the creation of new knowledge. [...] This community, however, was defined not in terms of object of study, but according to epistemological and rhetorical norms and practices: how they went about constructing scientific facts. Around this inner circle was a larger concentric zone of the exoteric community, the bulk of the Society: men who were capable of taking an informed interest in what was happening, and of contributing to it on a more minor level. Surrounding this again was a sizeable penumbra of the genteel London public, who went to the weekly meetings of the Society for entertainment, and because it was the fashion, but who had no clear understanding of what they were hearing or witnessing; men, in fact, very like Pepys. (Valle, 1999, p. 111)

However, the readers of the *PT* did not totally coincide with the members of the Royal Society. Indeed, in the first years of its existence the publication was not considered a structured activity of the Society but a sort of private enterprise run by its Secretary, Henry Oldenburg. The people who subscribed to the journal were mainly representatives of the groups mentioned above, plus other interested readers who did not belong to the Royal Society, both from England and from foreign countries. These various readers, however, shared feelings of cooperation and understanding, as is shown by the mild and sympathetic way in which criticism was expressed by the more specialized readers towards the accounts given by the less specialized ones:

> And probably you will be invited to look on this account, though not as compleat, yet as very sincere, and on that score Credible, if you consider, that this was not written by a Philosopher to broach a Paradox, or serve an Hypothesis, but by a Merchant or Factor for his Superiors, to give them an account of a matter of fact. (Boyle, 1673, *PT* VIII, 97, p. 6113)

In the first issues only a minority of the papers were devoted to experimental activities. Only after the 80th issue did the percentage reach about 40 per cent. Bazerman's (1988) analysis of the first 90 volumes of the *PT* has shown that in the first period (1665-1700) articles consisted of mere reports of events, and only later did they tend to argue over results and offer claims and experimental proof. The brevity of many of the contributions to the *PT* confirms that they had been mainly conceived as news items or informative reports. For example, the report of "the Ingenious Ms Hook [on] a small Spot in the biggest of the 3 obscurer Belts of Jupiter" (Oldenburg, 1665, *PT* I, 1, p. 3) is only eight lines long. Particularly in the first volume, articles tended to be short (one or two pages long) and focused on one single experiment.

Experimental accounts usually started from the observation of natural phenomena, which had aroused the curiosity and intervention of the researcher. It is interesting to note that the introductory sections usually contain passive verbs, a form which correlates well with the researcher's rather passive attitude in this phase, and whose role is limited to the observation of facts taking place without his direct intervention:

> [...] fresh Mackrels were boyl'd in Water, with salt and sweet herbs; [...] the Mackrels were left in the Water for pickle. [...] more fresh Mackrels were boyl'd in like Water. (Beale, 1666, *PT* I, 13, p. 226)

When the experimental part is reported instead, verbs are usually in the active form with the frequent use of *I / we* subjects:

> [...] we repeated the same Trial, and found the same effects. [...] I took a piece that shin'd most, and fitted it as well as I could devise in the night, both to my great Microscope, and afterwards to my little one; but I could discern no light by any of these Glasses; [...] I examin'd, in my great Microscope. [...] We numbred them, and agreed in the number, order and place. (Beale, 1666, *PT* I, 13, p. 227)

Experimental accounts were characterized by the temporal structure typical of a narrative text, often marked by a series of dates. Here is an example:

> *An Experiment To examine, what Figure, and Celerity of Motion begetteth, or encreaseth Light and Flame.*

> This was communicated by Dr Beale, as follows: May 5. 1665. [...] May 6 [...] But on the next Munday (May 8). evening [...] On Tuesday night (May 9) [...] And May 10. [...] (Beale, 1666, *PT* I, 13, pp. 226-227)

Similarly, results were reported as the product of an observation process:

> On Tuesday night (May 9) we repeated the same Trial, and found the same effects. The water, till it was stirr'd, gave no light, but was thick and dark, as we saw by day-light, and by candle-light. As soon as the Cooks hand was thrust into the water, it began to have a glimmering; but being gently stirr'd by the hand moving round (as the Dairy-maids do to gather the Curds for Cheese) it did so shine, that they, who look'd on it at some distance, from the further end of another room, thought verily, it was the shining of the Moon through a Window upon a Vessel of Milk; and by brisker Circulation it seem'd to flame. (Beale, 1666, *PT* I, 13, p. 227)

The researcher usually described the object of his observation with great care and caution as he had perceived it, reporting events faithfully and sincerely, and expressing his opinions and conclusions with the degree of positiveness corresponding to the certainty of the facts described, availing himself of the various modal expressions that the English language offered in order to suit the different degrees of certainty of the facts reported. Here is an example of this attitude:

> Yet of these sparkles we are certain; we numbred them, and agreed in the number, order and place. Of the steam I am not confident, but do suspect our Eyes in the bright Sun, or that it might be some dust in the Aire. (Beale, 1666, *PT* I, 13, pp. 227-228)

The writer was often aware that the approach adopted in his account was not always appropriate, and apologized for not adopting a strictly 'scientific' approach:

> And since that time, I have my self very frequently observed (both at London and elsewhere, as I have had occasion) that in those months of February and November, (especially November) the Tides have run much higher, than at other times: Though I confess, I have not been so diligent to set down those Observations, as I should have done. (Wallis, 1666, *PT* I, 16, pp. 275-276)

At the end of his account too, the author also sometimes admitted the possibility of error or omission and therefore expressed his willingness to add clarifications or integrations:

> This, I conceive, is enough for an introduction to experiments of this kind; which if any of the Royal Society shall be curious as to prosecute, I should be very glad to be informed with what success: That, if anything seem to be defective, or to thwart this relation, I may have an opportunity of giving further direction about it, or of acknowledging my errors, if I have made any. (Newton, 1672, *PT* VI, 80, p. 3087)

3. Ways of developing a specialized community

3.1. Sharing knowledge

The main function of communal correspondence and scientific publications was informative. Letters and news items were principally used to circulate information about research being carried out not only in Britain but also in other parts of the world. Whole fragments of letters received from various authors were copied and exchanged between correspondents, as can be seen in the following extract of a letter which Oldenburg sent to Boyle:

> Casati, having been written unto by one of my Parisian Correspondents, about ye odd phenomenon of ye liquor of Bismutum sealed up hermetically, answers thus in his own language: [... *long extract in Italian*]. This account maketh us not wiser, yn we were before; but as good as I had it, I would not omit to send it, remembring yr concern in having it inquired after.
>
> I had lately a letter out of New England from Mr Winthrop, but almost 11. months old, wch I much wondered at. It refers to another letter, wch I never receaved, and mentions only 2. or 3. not very considerable particulars; whereof one is about a minerall, [...] (Oldenburg to Boyle 29 September 1664; in Oldenburg, 1965-77, II, pp. 240-1)

News from other correspondents was eagerly looked forward to by members of the scientific community and, when received, it was greatly appreciated:

> Sir,
>
> I am very much obliged unto you for yours of Dec. 26, containing so great a variety of mathematical news, and giving us hopes of shortly seeing so many admirable things. I hope it will not be long before we receive Dr. Pell's book, now in press, but more particularly [we] long to see Kinchhuysen's Introduction to Algebra, with those wonderful additions of Mr. Newton. [...] I hope Mr Oldenburg will give us a fuller description of Mr. Newton's new perspective, and inform us what kind of glass that is you look through. (Towneley to Collins 4 January 1671; in Rigaud, 1965, I, pp. 184-5)

Letters were also used as a means for gathering facts and observations on a systematic basis from correspondents based in various parts of the world. For this function, Oldenburg –acting on behalf of the Royal Society– played an important role. Here are two extracts from the letters he sent to Richard Norwood in the Bermudas and to John Winthrop in Connecticut to stimulate their contributions regarding some specific astronomical observations:

> The R. Society, persuaded, Sir, of yr ability and willingness to make such Observations, not doubting you to be furnisht wth instruments necessary for it, have commanded me to desire you, to observe wth all, possible exactness ye mentioned Conjunction, and to acquaint ym with yr performances therein. If yr generousness invite you to adde hereunto, what in and about yr iland occurs considerable for ye inriching of ye History of Nature (whose composure is one of ye maine things, they have in their Eye) it will be a very good service to ye Commonwealth of Learning, and a thing most acceptable to ye R. Society, and particularly obliging to
>
> Sir
> yr very humble and affect. servt
> *H. Old.*
>
> (Oldenburg to Norwood 6 March 1664; Oldenburg, 1965-77, II, p. 146)

> The sd Society being persuaded both of yr ability and willingness to make such Observations, and not doubting, you to be furnisht wth instruments necessary for

> it, have commanded me to desire you, to observe wth all possible exactnesse ye mention'd Conjunction, and to acquaint ym with yr performances therein. (Oldenburg to Winthrop 26 March 1664; Oldenburg, 1965-77, II, p. 149)

In this way, the huge potential of letters to link people from very distant parts of the world was fully exploited. The advantages of the use of correspondence as a scientific method soon became evident and constituted the basis for the creation of several international projects, mainly in the field of meteorological observation (Frisinger, 1977; Rusnock, 1999).

A further reason that justified recourse to communal correspondence and scientific publications was the writer's need to acquire official recognition of his results. Indeed, the detailed and accurate description of his personal scientific experience was considered one of the requisites for transforming a personal account into an official protocol to be submitted to the broad community of men of science. The careful and objective narration of experiments was meant to provide the basis for proper scrutiny and reliable judgement, and thus permit the transformation of personal results into facts widely accepted by the scientific world. Having obtained in this way the consensus of a wider public, experimental data could become 'matters of fact' and part of scientists' shared culture. Many of Oldenburg's friends and correspondents made use of his extensive network as they considered it an excellent system for making an official claim to experimental precedent (cf. Boas Hall, 2002, pp. 143-4). Oldenburg was fully aware of the importance of establishing priority in discoveries, and this is confirmed by the following extract from a letter to Robert Boyle in which he offered his willingness to carry out this registering function:

> I acknowledge, yt yt yealousy, about the first Authors of Experiments, wch you speak off, is not groundlesse: And therefore offer myselfe, to register all those, you or any person shall please to communicate, as new, wth yt fidelity, wch both of ye honor of my relation to the R. Society (wch is highly concerned in such Experiments) and my owne inclination doe strongly oblige me to. (Oldenburg to Boyle 29 August 1665, 1965-77, II, p. 486)

3.2. Attracting new practitioners

Communal correspondence and scientific publications also had a socializing function. Letters and news items were written not only to exchange information, but also to promote new professional relationships and to strengthen existing links, thus favouring the formation of a new scientific community. Specialized matters were attracting wider interest, especially among aristocratic and cultured people, and this select group of people, who found their proper identification in the newly-founded Royal Society, were gradually separating themselves from the less learned group of non-scientific practitioners. The members of this select group often took advantage of the writing activity to inform others of the new principles they shared and to gain their consensus. Indeed, many of Oldenburg's letters were written to people active in research and experimentation in order to present the purposes of the Royal Society and stimulate their contribution and feedback. Here is the beginning of a letter to Richard Norwood:

> Sir,
>
> I am apt to believe, you may have heard, yt his Majty hath not long since founded a Corporation of a number of Ingenious and knowing persons, by ye Name of ye *Royall Society of London for improving Naturall knowledge*, whose dessein it is, by Observations and Experiments to advance ye Contemplations of Nature to Use and Practise, and to render ym more serviceable for ye necessities and accommodations of ye Life of Man.
>
> Such a Foundation being laid, ye persons thus incorporated Judge it very conducive to their purpose, to bespeake and engage all sorts of intelligent and publick-spirited men, to contribute, what they can, to so Noble and Usefull a Work. (Oldenburg to Norwood 6 March 1664; in Oldenburg, 1965-77, II, p. 146)

An important aspect of this proselytizing activity concerned the methodology to be adopted in research and experimentation, which emphasised direct experience and personal observation. News items and communal correspondence were often meant to encourage the readers to perform the experiments themselves. Apart from this emphasis on experimental activity, another important aspect of the new scientific approach consisted in the need for both the procedures and the results of these experiments to be made known

to the entire learned world. The publicity given to the work of the members of the Royal Society would further distinguish them from the group of alchemists, who considered secrecy one of the main characteristics of their research method. This explains the wish often expressed very strongly that researchers should publish the results of their enquiries:

> We therefore suggest that we have often heard that the worthy and learned Mr. Barrow hath divers treatises in a good forwardness for the press, and some of us have lately seen his Treatise of Optics, which he prepared to deliver in to the former Vice-Chancellor, as his anniversary lectures, according to the laudable constitution or injunction laid upon your mathematic professor; but we fear the author's modesty is such that he will not promote the publication thereof, unless excited thereunto. [...] We are induced to believe that length of time, and the persuasion of friends, may hereafter prevail with the said Mr. Barrow to publish some other good books by him intended, as his Comment on Archimedes, on the Spherics, his own Perspective, Projections, Elements of Plane Geometry; (To Mr. Baldroe; in Rigaud, 1965, I, pp. 137-8)

The sense of belonging to this community often stimulated the writer not only to comment on the methodology and instruments employed by others, but also to describe his own so as to suggest practical and concrete ways in which the experiments commented on could be improved:

> And in particular I have wished that those sextants, at least, he makes use of for measuring the distances of stars, were furnished with telescopical sights, which is no small advantage for regulating and assisting the sights, which if he desires it, I shall be most ready to gratify him with any information, that the small experience I have in those things will furnish me with. The largest glass I have several times made use of, is a spherical lens, convex on both sides, of a sphere whose radius is 60 feet, and the focus or length of the glass is near about the same length; [...] The tube I make use of is about 66 or 68 feet in length, and consists [...]. I have inquired the lowest rate any such object-glass will be sold for, and find it will not be afforded for less than twenty-five pounds sterling, and the eyeglasses will cost forty or fifty shillings more. If Mr. Hevelius desire any, upon his signifying his mind to me, I shall endeavour to get him the best that can be made here, and at the lowest rate. (Hooke to Hevelius no date; in Rigaud, 1965, I, pp. 180-2)

The same cooperative principle also encouraged writers to report experiments which had proved to be unsuccessful, as the analysis of these experiences was thought to help the reader not to make the same mistakes as those reported or to enable him to draw interesting conclusions. Indeed, these experimental accounts could provide the identification of useful superstructures on which other scientists might be able to build appropriate theories. In promoting the reporting of even unsuccessful experiments 17th century scientists were following Bacon's teachings:

> No one should be disheartened or confounded if the experiments which he tries do not answer his expectation. For although a successful experiment be more agreeable, yet an unsuccessful one is oftentimes more instructive. (Quoted in Hacking, 1983, p. 247)

3.3. Establishing stylistic criteria

Apart from outlining clear principles of an epistemological nature, communal correspondence and specialized publications also had another purpose, linked to stylistic issues. Indeed early scientists clearly perceived that the differentiation of their group from that of practitioners was to be not only methodological and conceptual, but also linguistic and stylistic. According to this new stylistic approach, a gentleman was expected to structure his discourse in an appropriate manner, not only to guarantee a more successful perlocutionary result for his own argumentative text, but also because in that way he could facilitate his interlocutors' interpretative task. As successful argumentative activity implied the need for people to judge the validity of the various issues, it was very important that the language used in discussions should be clear and readily comprehensible. This is the reason why the use of ambiguous terminology was considered unacceptable, as it was perceived as a serious obstacle to correct argumentation which could render communication among scientists impossible. This terminological issue was deemed central to scientific procedures, as the obscure use of language on the writers' part would not only prevent them from being understood, but also from being fully accepted into the scientific community. Indeed, one accusation frequently made

against scientists by non-specialists was the obscurity of the terms used, many of them being either new or adapted from foreign languages (cf. Gotti, 2011).

One of the writers most commonly praised for his style was Boyle, who was often presented as a true gentleman, showing equilibrium and modesty not only when he made his own personal suggestions, but also when he took various opinions into consideration. The appreciation of Boyle's style, however, did not prevent his colleagues from expressing their criticism, albeit in a civil way and in a modest manner. Indeed, in the expression of criticism the tone was usually humble and polite, in line with the features of a 'civil' style (Gotti forth.). The adoption of this style was facilitated by the fact that the members of this community knew each other either directly or indirectly, which favoured the strengthening of communal links based on politeness values (Klein, 1994). This higher degree of cooperation and esteem was reflected in the frequent use of positive adjectives referring to personal qualities such as *celebrated, expert, great, industrious, ingenious, learned, worthy*. In the case of controversy too, although letters to be published in the *PT* were addressed to a specific addressee, the author also bore the other readers of the journal in mind, and this clearly influenced the style and tone of the letter, as has been aptly remarked by Bazerman:

> Letters in the *Philosophical Transactions* increasingly oriented towards the readership of the journal as its primary audience, rather than the nominal recipients of the letters. In this process of reorientation, a tension developed between the assertiveness, didactiveness, and disputatiousness of public argument and the gentility, politeness, and good-will of personal correspondence among gentlemen. (Bazerman, 2000, p. 24)

The rules of politeness, however, did not prevent people from expressing themselves freely. Indeed, errors or omissions were pointed out clearly, and motivations and explanations for challenged views were requested from the other party. However, even in the most polemic controversies, the tone remained 'civil' and criticism was expressed in an objective way, avoiding a direct attack on the opponent, but rather acknowledging his efforts to demonstrate his point of view:

> I have seen, how Mr Newton endeavours to maintain his new Theory concerning Colours. Me thinks, that the most important Objection, which is made against

> him by way of Quaere, is that, Whether there be more than two sorts of Colours. (Huygens, 1673, *PT* VIII, 96, p. 6086)

To soften the tone of the divergence of opinions, the writer frequently made use of hedging expressions:

> When Mr. Line has tryed this, I could wish, he would proceed a little further to try that which I call'd the *Experimentum Crucis*, seeing (if I mis-remember not) he denies that as well as the other. For when he has tryed them (which by his denying them, I know he has not done yet as they should be tryed) I presume he will rest satisfied. (Newton, 1676, *PT* X, 121, p. 502)

The 'challenged' author also showed a cooperative attitude. He commonly responded to the objections by trying to make his points clearer:

> However, since there seems to have happened some misunderstanding between us, I shall endeavor to explain myself a little further in these things according to the following method. (Newton, 1673, *PT* VIII, 96, p. 6089)

Indeed, in the course of the discussion the contestants kept repeating that the purpose of their objections was to clarify their own positions and not simply to quarrel. Their tone was commonly very polite, as can be seen in the use of the stance marker *I pray* in the following quotation:

> Touching the Solutions given by Mr Newton to the scruples by me propos'd about his Theory of Colors, there were matter to answer them, and to form new difficulties; but seeing that he maintains his opinion with so much concern, I list not to dispute. But what means it, I pray, that he saith; Though I should shew him, that the White could be produced if only two Un-compounded colors, yet I could conclude nothing from that. (Huygens, 1673, *PT* VIII, 97, p. 6112)

Indeed, the 'civility' corresponding to a real gentleman's discourse implied the adoption of a fair attitude towards his interlocutors, and respect for the people whose opinions he was arguing against. This behaviour was meant to follow the rules typical of polite conversation among gentlemen, according to

which participants speak in an appropriate way, paying compliments even to the people they are disagreeing with. What distinguished a gentleman's behaviour, therefore, was his respect for the person whose views he was criticising and the fact that he limited his objections to the points he saw as incorrect without any unfair recourse to excessive aggressiveness. According to this criterion, *ad hominem* argument was considered unacceptable, as criticism should be directed towards the issue under debate rather than the opponents. This objective approach is confirmed by the fact that at the end of the dispute, the 'challenger' usually acknowledged satisfaction of the motivations and explanations provided by the other party:

> I am quite satisfied with Mr Newton's new answer to me. The last scruple which I had, about the Experimentum Crucis, is fully removed. And I now clearly perceive by his figure what I did not before understand. When the experiment was performed after his manner, every thing succeeded, and I have nothing further to desire. (Pardies, 1672, *PT* VII, 85, p. 5018; translation Baddam, 1738, 1, p. 379)

4. Conclusion

The analysis carried out in this paper has shown the great variety and importance of the functions performed by communal correspondence and early scientific publications, and the relevant role they played in the construction of a new scientific community. The purpose of this writing activity was not limited merely to the informative aspect, as specialized communication also fulfilled other important goals linked to socialization purposes, favouring the creation of a spirit of solidarity among the members of a new social group sharing innovative intellectual interests and professional practices. The texts published in early scientific publications and the letters exchanged within this new discourse community also served a stylistic purpose, as the metatextual considerations expressed in them helped the creation of new discursive practices.

Moreover, the discussion of the texts taken into consideration here has highlighted a remarkable degree of consistency in the various functions of the writing activity in this period, as it has shown how all the aspects observed

–ethical, methodological, linguistic and stylistic– greatly contributed to the harmonious creation of the new patterns of scientific communication required by the specialized community that had gathered in England in the seventeenth century.

References

Baddam, B. (1738). *Memoirs of the Royal Society*. London.

Bazerman, C. (1988). *Shaping written knowledge: The genre and activity of the experimental article in science*. Madison: The University of Wisconsin Press.

Bazerman, C. (2000). Letters and the social grounding of differentiated genres. In D. Barton & H. Nigel (Eds.), *Letter writing as a social practice* (pp. 15-29). Amsterdam: Benjamins.

Boas Hall, M. (1965). Oldenburg and the art of scientific communication. *The British Journal for the History of Science, 2*(8), 277-290.

Boas Hall, M. (1991). *Promoting experimental learning: Experiment and the Royal Society 1660-1727*. Cambridge: Cambridge University Press.

Boas Hall, M. (2002). *Henry Oldenburg: Shaping the Royal Society*. Oxford: Oxford University Press.

Boyce, G., Curran, J., & **Wingate, P.** (Eds.) (1978). *Newspaper history from the seventeenth century to the present day*. London: Constable.

Frisinger, H. H. (1977). *The history of meteorology to 1800*. New York: Science History Publications.

Garrison, F. H. (1934). The medical and scientific periodicals of the 17th and 18th centuries. *Bulletin of the Institute of the History of Medicine, 2*(5), 285-343.

Gotti, M. (2006a). Communal correspondence in Early Modern English. In M. Dossena & S. Fitzmaurice (Eds.), *Business and official correspondence: Diachronic perspectives* (pp. 17-46). Bern: Peter Lang.

Gotti, M. (2006b). Disseminating Early Modern science: Specialized news discourse in the Philosophical Transactions. In N. Brownlees (Ed.), *News discourse in Early Modern Britain* (pp. 41-70). Bern: Peter Lang.

Gotti, M. 2(2008). *Investigating specialized discourse*. Bern: Peter Lang.

Gotti, M. (2010). A new genre for a specialized community: The rise of the experimental essay. In H. Dorgeloh & A. Wanner (Eds.), *Syntactic variation and genre* (pp. 85-110). Berlin: De Gruyter Mouton.

Gotti, M. (2011). The development of specialized discourse in the *Philosophical Transactions*. In I. Taavitsainen & P. Pahta (Eds.), *Medical writing in Early Modern English* (pp. 204-220). Cambridge: Cambridge University Press.

Gotti, M. (Forthcoming). Managing disputes with civility: On 17th-century argumentative discourse. In U. Busse & A. Hübler (Eds.), *The meta-communicative lexicon of English now and then: A historical pragmatics approach*. Amsterdam: Benjamins.

Hacking, I. (1983). *Representing and intervening*. Cambridge: Cambridge University Press.

Hartley, H. (Ed.) (1960). *The Royal Society: Its origins and founders*. London: The Royal Society.

Heilbron, J. L. (1983). *Physics at the Royal Society during Newton's Presidency*. Los Angeles: William Andrews Clark Memorial Library.

Houghton, B. (1975). *Scientific periodicals: Their historical development, characteristics and control*. London: Clive Bingley.

Hunter, M. (1981). *Science and society in Restoration England*. Cambridge: Cambridge University Press.

Hunter, M. (1989). *Establishing the new science: The experience of the Early Royal Society*. Woodbridge: Boydell Press.

Hunter, M. (1999). Robert Boyle (1627-91): A suitable case for treatment? *British Journal for the History of Science, 32*, 261-275.

Jardine, L. (1999). *Ingenious pursuits: Building the scientific revolution*. London: Little & Brown.

Johns, A. (2003). Reading and experiment in the Early Royal Society. In K. Sharpe & S. Zwicker (Eds.), *Reading, society and politics in Early Modern England* (pp. 244-271). Cambridge: Cambridge University Press.

Klein, L. (1994). 'Politeness' as linguistic ideology in late seventeenth- and eighteenth-century England. In D. Stein & I. Tieken-Boon van Ostade (Eds.), *Towards a Standard English, 1600-1800* (pp. 31-50). Berlin: Mouton de Gruyter.

Kronic, D. A. (1976). *A history of scientific & technical periodicals*. Metuchen: The Scarecrow Press.

Kronic, D. A. (1988). Anonimity and identity: Editorial policy in the early scientific journal. *Library Quarterly, 58*, 221-237.

Manten, A. A. (1980). Development of European scientific journal publishing before 1850. In A. J. Meadows (Ed.), *Development of science publishing in Europe* (pp. 1-22). Amsterdam: Elsevier.

McKie, D. (1979). The scientific periodical from 1665 to 1798. In A. J. Meadows (Ed.), *The Scientific Journal* (pp. 7-17). London: Aslib.

Oldenburg, H. (1965-77). *The correspondence of Henry Oldenburg*. A. R. Hall & M. Boas Hall (Eds.), 11 vols. Madison: University of Wisconsin Press.

Rigaud, S. J. (1965). *Correspondence of scientific men of the seventeenth century*. 2 vols. Hildesheim: Georg Olms Verlag.

Rusnock, A. (1999). Correspondence networks and the Royal Society, 1700-1750. *British Journal for the History of Science, 32*, 155-169.

Shapin, S. (1984). Pump and circumstance: Robert Boyle's literary technology. *Social Studies of Science, 14*, 481-520.

Shapin, S. (1994). *A social history of truth: Civility and science in seventeenth-century England*. Chicago: University of Chicago Press.

Shapiro, B. (2000). *A culture of fact: England, 1550-1720*. Ithaca: Cornell University Press.

Sprat, T. (1667). *A history of the Royal Society of London for the improving of Natural Science*. London: Martyn; rpt. London: Routledge & Kegan Paul, 1959.

Turnbull, G. H. (1952). Samuel Hartlib's Influence on the Early History of the Royal Society. *Notes and Records of the Royal Society of London, 10*, 101-130.

Ultee, M. (1987). The republic of letters: Learned correspondence, 1680-1720. *The Seventeenth Century, 2*(1), 95-112.

Valle, E. (1999). *A collective intelligence: The life sciences in the Royal Society as a scientific discourse community, 1665-1965*. *Anglicana Turkuensia* 17. Turku: University of Turku.

Valle, E. (2003). "Let me not lose yr love & friendship". The negotiation of priority and the construction of a scientific identity in seventeenth-century

Natural History. In R. Hiltunen & J. Skaffari (Eds.), *Discourse perspectives on English: Medieval to Modern* (pp. 197-234). Amsterdam: Benjamins.

Valle, E. (2004). "A Nice and Accurate Philosopher": Interactivity and evaluation in a historical context. In G. Del Lungo Camiciotti & E. T. Bonelli (Eds.), *Academic discourse: New insights into evaluation* (pp. 55-80). Bern: Peter Lang.

Vickers, Brian (Ed.) (1987). *English science: Bacon to Newton.* Cambridge: Cambridge University Press.