



Becoming Dr. Franklin: Benjamin Franklin's Science, Manuscript Circulation, And "Anti-Authorship" In Print

By: **Colin T. Ramsey**

Abstract

Early in his *Autobiography* Benjamin Franklin remarks, "Prose writing has been of great Use to me in the Course of my Life, and was a principal Means of my Advancement." The statement has both literal and figurative dimensions: much of Franklin's wealth derived from his success as a printer, and he wrote a significant amount of the content for some of the most lucrative products of his own press, such as the *Poor Richard* almanacs and the newspaper *The Pennsylvania Gazette*.

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Becoming Dr. Franklin

BENJAMIN FRANKLIN'S SCIENCE, MANUSCRIPT CIRCULATION, AND "ANTI-AUTHORSHIP" IN PRINT

COLIN T. RAMSEY

EARLY IN his *Autobiography*, Benjamin Franklin remarks, "Prose writing has been of great Use to me in the Course of my Life, and was a principal Means of my Advancement."¹ The statement has both literal and figurative dimensions: much of Franklin's wealth derived from his success as a printer, and he wrote a significant amount of the content for some of the most lucrative products of his own press, such as the *Poor Richard* almanacs and the newspaper the *Pennsylvania Gazette*. But this assertion is also a broader expression of Franklin's sophisticated understanding of his own practice of using written discourse to create a variety of self-promoting personae over the course of his life.² Writing was key to Franklin's construction of what Mitchell Breitwieser has described as his "representative personalities."³ Perhaps because Franklin was such a successful printer, scholars have typically focused on his printed texts when considering the ways he used writing to manage his image, often arguing that he was uniquely dependent on the medium of print for his "advancement." Among the most influential articulations of this argument is that of Michael Warner, who in his still frequently cited *Letters of the Republic* argues that Franklin's modernity was defined by his exploitation of the apparent incorporeality of printed discourse. Following the model of a print "public sphere" articulated by Jürgen Habermas, and with what Rolf Englesing described as an eighteenth-century "reading revolution" providing implied historical context, Warner concludes that Franklin was "preeminently the republican man of letters" precisely because he was "the citizen of print."⁴

But as important as printing was to Franklin's "advancement" in life, he also understood that the medium of manuscript could sometimes be an even better tool for influencing how readers perceived his authorial personae.⁵ In the context of his early scientific writing, for example, Franklin used both print and manuscript to disseminate his ideas, but it was manuscript that proved the essential medium through which his scientific work first earned the serious attention it deserved and his ambition demanded. Circulating his science in manuscript helped Franklin overcome his geographic and social disadvantages—he was a colonial printer and was thus considered rather lowly—as he attempted to enter the genteel world of Enlightenment natural philosophy. To demonstrate how this was so, in the essay that follows I compare Franklin's use of print publication and manuscript circulation to disseminate some of his most important early scientific work, for it was through this science that Franklin transformed himself from a colonial printer, a "mere mechanic," into a celebrity participant in the Republic of Letters, the feted "Dr. Franklin" and winner of the British Royal Society's Copley Medal. More specifically, I compare Franklin's circulation of his printed pamphlet *An Account of the New Invented Pennsylvanian Fire-Places* (1744) to his reliance on manuscript circulation to disseminate his now much more famous work, *Experiments and Observations on Electricity, Made at Philadelphia* (1751). The first work was a pamphlet Franklin printed to explain the scientific theories behind his improved heating stove, and the latter a detailed explanation of Franklin's experiments with and theories about electricity. However, Franklin limited the latter work to manuscript circulation for a considerable period of time. He agreed to print *Experiments* only after it had been effectively "scribally published," to use Harold Love's phrase for the phenomenon of manuscript publication.⁶ Franklin's differing media choices and dissemination strategies for these two scientific works suggest he learned it was necessary to communicate his scientific ideas in manuscript, at least initially, if he was to have his work seriously reviewed by the transatlantic community of natural philosophers. Moreover, the form in which the printed version of *Experiments* did ultimately appear—with a paratext

that emphasized the priority of the work's earlier circulation in manuscript—was essential to Franklin's establishment of credibility as a scientific author.

AN ACCOUNT OF THE NEW INVENTED PENNSYLVANIAN FIRE-PLACES: THE "ERRATA" OF SCIENCE IN PRINT

Given the state of what we now call science in the early eighteenth century, it is not surprising that Franklin's earliest forays into scientific experimentation concerned what might be described as proto-thermodynamics. The behavior of air when energized had been a core subject of experimental study since the mid-sixteenth century, marked by Robert Boyle's 1660 account of his "air-pump," *New Experiments Physico-Mechanical, Touching the Spring of the Air and Its Effects*. As work by Boyle and others became widely available in print, artisans in London and other cities, such as Philadelphia, formed a growing segment of the audience for this literature. Eric Foner has argued that the distinct training and labor conditions typical to the artisan trades explain why these "mechanics," as they were sometimes called, were attracted to the new science. As Foner puts it, "The very nature of craft work required dexterity with tools, mastery of physical materials, and a technical knowledge which often stimulated a further interest in science."⁷ Franklin, an artisan printer, was thus fairly typical for having an interest in science and experimentation; what was unusual was the degree of his scientific ability and ambition.

Understandably, access to a steady supply of scientific texts was important to Franklin's scientific development, and he leveraged his social and business networks to that end. As a young man Franklin cofounded the Junto, a group of mostly artisan men who came together to form a kind of autodidactic debating society. A particular advantage of the Junto was that its members were able to share funds to purchase books, an arrangement that developed into one of the first subscription libraries in British North America: the Library Company of Philadelphia. The Library Company frequently purchased works on natural philosophy, and Franklin consumed this literature with relish.⁸ He began to see a connection between a routine subject of such texts—the behavior of air when energized by heat—and his long-standing interest in medicine and the prevention of disease.⁹ By the early 1740s, Franklin had become convinced that cold and drafty rooms significantly contributed to illness, so he applied his theories on convection to a new heating stove design that warmed rooms more efficiently than other devices in common use. He completed his design in the winter of 1739–40 and named it the "Pennsylvanian Fire-Place." Franklin had his friend Robert Grace, an ironmonger and fellow member of the Junto, cast the iron plates to build the stoves, and Grace was soon doing so regularly. Franklin advertised the stoves in the *Pennsylvania Gazette* and sold them out of his print shop.¹⁰

Not long after sales began, Franklin wrote a pamphlet to explain the scientific theories behind his design, the 1744 *Account of the New Invented Pennsylvanian Fire-Places*. *Account* features two distinct stylistic registers—one pragmatic, even folksy, and the other erudite and technical. However, perhaps as a consequence of the text's sometimes informal tone, the scholarly view has long been that *Account*'s chief purpose was to advertise stoves. For instance, Leo Lemay notes, "Franklin wrote *Account* to promote the stove," while the editors of *The Papers of Benjamin Franklin* call it a "promotion brochure" that "encouraged [the stove's] sale."¹¹ Yet the text itself challenges this narrow view. Although at times humorous and informal, it is also scientifically sophisticated: it is replete with detailed references to other scientific literature, for instance, including some lengthy quotations in the original Latin, and it offers detailed descriptions of several experiments, inviting readers to replicate those experiments to test Franklin's evidence for his theoretical claims. Moreover, Franklin disseminated the work far beyond the geographical sphere of potential stove buyers in and near Philadelphia. He sent copies to several leading natural philosophers around British North America, and he was supportive when they sent it to others in Europe. All of this strongly suggests that *Account* was a much more ambitious project than a simple advertisement for a heating appliance. In important ways, it was a scientific treatise.

Account markedly reflects the experimental approaches popularized by Boyle and others that had become normalized by Franklin's time, and it draws on the previous scientific literature on air and heat. Franklin references Nicholas Gauger's *Mechanique de fue* (1713), for instance, a work translated into

English by John Theophilus Desaguliers as *Fires Improved* (1715). Such references suggest Franklin self-consciously saw his pamphlet as contributing to this particular body of scientific literature. Indeed, Desaguliers seems to have been especially important to *Account*.¹² Franklin recognizes “the ingenious and learned Dr. Desaguliers, to whose instructive Writings, [he] acknowledges himself [to be] much indebted.”¹³ It may even be that Franklin hoped his pamphlet would attract Desaguliers’s personal attention, given the man’s substantial scientific influence as one of the leading *virtuosi* of the British Royal Society. In particular, Franklin describes at length an experiment from Desaguliers’s pamphlet *Physico-Mechanical Lectures: or An Account of What Is Explain’d and Demonstrated in the Course of Mechanical and Experimental Philosophy* (1717). The experiment employed an air-pump and a bird, and Franklin notes Desaguliers’s result approvingly: the bird lived when placed in a bottle filled with air that had passed through hot iron, but it died in a bottle of air that had passed through heated brass, proving that hot iron does not emit noxious fumes.

Franklin also provides instructions for a series of experiments of his own design, again following the models established by Boyle and Desaguliers. Early in *Account*, Franklin explains:

Tis necessary to understand well some few properties of Air and Fire, vis. 1. Air is rarified by *Heat*, and condens’d by *Cold*; i.e. the same Quantity of Air takes up more Space when warm than when cold. This may be shown by several very easy Experiments. Take any clear Glass Bottle . . . place it before the Fire, and as the Air within is warm’d and rarified, part of it will be driven out of the Bottle; turn it up, place its Mouth in a Vessel of Water, and remove it from the Fire; then, as the Air within cools and contracts, you will see the Water rise in the Neck of the Bottle, supplying the Place of just so much Air as was driven out.¹⁴

In providing this experiment, Franklin offers observational evidence for the physical principles that underlie his stove design. In so doing, he demonstrates his mastery of the accepted experimental principles used by members of the Royal Society—that is, he provides the sort of “virtual witnessing,” what Steven Shapin and Simon Schaffer describe as the “production in a reader’s mind of an image of an experimental scene,” that scientific texts were expected to feature in support of their claims.¹⁵ After providing additional experiments along the same lines, Franklin concludes this section of the pamphlet with a summary of his theoretical principal, noting, “Air rarified and distended by Heat, is specifically lighter than it was before, and will rise in other Air of greater Density. . . . Body or Matter of any sort is said to be *specifically* heavier or lighter than other Matter, when it has more or less Substance or Weight in the same Dimensions.”¹⁶ The inclusion of so much material of this sort makes plain that *Account* is as much a scientific treatise—one in a tradition of the scientific literature Franklin had been reading for some time—as a text written to sell stoves. In fact, we might consider the stove itself something of an experimental proof of concept that could confirm the validity of Franklin’s broader theories about convection while also demonstrating the pragmatic usefulness of those theories. That is to say, Franklin’s “fireplace” may have been something akin to Boyle’s original air pump: an experimental apparatus that helped prove the validity of theoretical models, albeit, in Franklin’s case, an apparatus that had the practical benefit of more efficient home heating.

However, regardless of its scientific content—and to say nothing of Franklin’s personal ambitions for the work—Desaguliers did not read *Account*, having died in early 1744. Moreover, even if Desaguliers had lived long enough to read a copy, the text’s form—a printed pamphlet—was problematic for a scientific work, especially one printed by its own colonial author. Desaguliers probably would have responded to Franklin’s work in a manner similar to how the natural philosophers who did read it responded: in their view, it was not serious science to be examined and formally tested but simply a novelty. It was an interesting text, written by an “ingenious man,” but one prosaically focused on home heating. Part of the difficulty Franklin faced lay in a general ambivalence toward scientific authorship in print during the early modern period. Adrian Johns has argued that this ambivalence stemmed from the widespread piracy of printed scientific texts—“piracy” covering a range of unauthorized printing practices—and associated fears

about the loss of authorial, and thus reputational, control. For instance, printers often produced scientific texts without a review by or the approval of their original authors and, even if a printing had been authorized, printers sometimes issued altered additional copies for public sale far in excess of the original, authorized run. In addition, printers sometimes produced unauthorized abridged and summarized editions of scientific texts, works known as “epitomes,” as well as unauthorized translations.¹⁷ As Johns notes, such “piratical practices made [scientific] authorship intensely problematic. How could a gentleman . . . natural philosopher become an author?” One common suggestion was that “gentlemen should abjure the vocation altogether” because “to become an author [in print] one had to subject oneself to tradesmen . . . [who] had their own views.”¹⁸ As Johns summarizes the ambivalence of genteel scientific authors toward their work appearing in print, “The good name of a gentleman could never rest safe” in the power of printers and booksellers.¹⁹

There were two main techniques for coping with this ambivalence. One was to eschew print altogether, relying wholly on manuscript circulation to publicize one’s work, as Johns points out both Isaac Newton and Boyle sometimes chose to do. But this was far from a perfect solution: texts circulated in manuscript were not absolutely secure from unauthorized printing, and even if manuscript circulation did sometimes constitute a form of publication, the quicker and broader reach afforded by print could in some cases be desirable. Thus, the other common solution was explicitly to inscribe into printed texts a posture that Johns calls “anti-authorial,” an approach that “resulted in enhanced credibility” for scientific authors who did appear in print. That is to say, gentleman natural philosophers would include statements as part of their printed texts that deemphasized their authorization of that very printing, sometimes even going so far as to deny they had authorized any such printing at all.²⁰

Abnegation of one’s own authorship in print was in keeping with broader social expectations for scientific authors: that they be modest and public spirited rather than self-interested, and that they always remain “gentlemanly.”²¹ Boyle himself took such an anti-authorial stance in the printed work that made his air-pump apparatus famous. The title page of his *New Experiments* asserts the work was first “Written by way of Letter To the Right Honorable Charles Lord Viscount of Dungarvan.” Boyle also included a prefatory note, “To the Reader,” in which he remarked, “If it be demanded why I publish to the World a Letter . . . [I answer] I could not without quite tiring more then [*sic*] one Amanuensis, give out half as many Copies of them as were earnestly desired, that I could not civilly refuse them,” adding, “Intelligent Persons in matters of this kinde perswaded me, that the publication of what I had observed touching the Nature of the Air, would not be useless to the World.”²² Boyle’s paratext apologizes for print by casting the act of printing as a kind of secretarial service. It claims that since his own assistants could not keep up with the demand for manuscript copies, printing saved gentleman readers the labor of having to make their own. Likewise, one of Franklin’s specific models for *Account*, Desaguliers’s *Physico-Mechanical Lectures*, also included an anti-authorial paratext. At the beginning of *Physico-Mechanical* there is a prefatory note marked “To the READER” that makes a claim similar to that of Boyle: that Desaguliers only printed his work to save others the labor of copying by hand, and at their specific request: “The following Papers, being only Minutes of my Lectures for the use of such Gentlemen who have been my Auditors, were printed at their Desire; to save the trouble of Writing them over for every Person.”²³ Thus we can see even that figures as deeply embedded within the community of Enlightenment natural philosophers as Boyle and Desaguliers considered it necessary to frame their printed texts in an anti-authorial manner.

This background suggests that if Franklin did see *Account* as a work of serious science, which the text itself strongly implies, he was mistaken in choosing, first, to print it without having earlier circulated it in manuscript, and, second, to not include any anti-authorial paratexts with the printed pamphlet. While Franklin had been cultivating a network of scientific correspondents for a number of years when he wrote *Account*, there is no evidence that he circulated any part of the work in manuscript prior to printing it, nor did *Account* include any introduction, preface, or note to readers that would frame the pamphlet, even fictitiously, as having earlier been circulated in manuscript, or even any claim that Franklin was at all reluctant to see the work printed. Indeed, the fact that Franklin printed the pamphlet himself, in his own shop, would make any such anti-authorial veneer especially difficult to assert. In 1744, Franklin was still a working printer, and as such he was deeply and obviously embedded within exactly the “craft community” that genteel natural philosophers hesitated to engage for fear of damaging their credibility and reputations.

The title page of *Account* prominently features Franklin's brand trademark as a printer: "Philadelphia: Printed and Sold by B. Franklin. 1744" (see fig. 1).²⁴ Thus, *Account*'s title page actually highlights how Franklin had collapsed the roles of scientific author and commercial printer into a single, presumptuous entity, significantly reducing his work's credibility in the process.

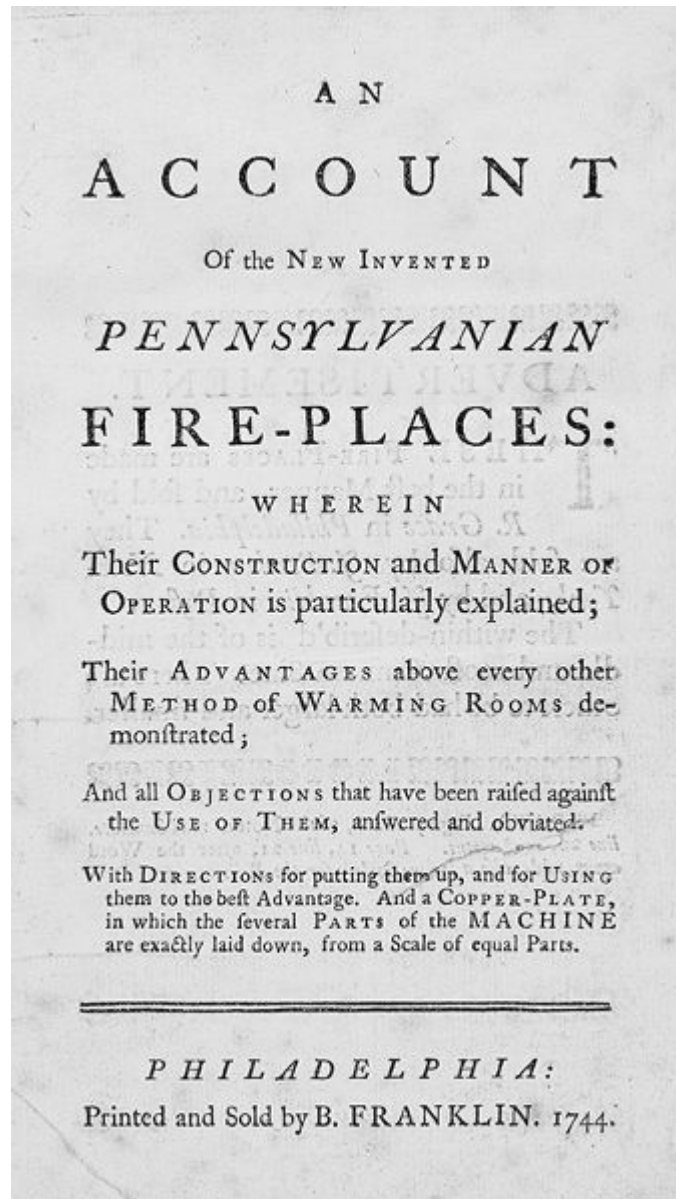


Figure 1. Title page of Franklin's 1744 *An Account of the New Invented Pennsylvania Fire-Places*. (Franklin 381 Ac2 1744; General Collection, Beinecke Rare Book and Manuscript Library, Yale University)

It is thus not surprising that readers did not generally respond to *Account* as a work of serious science, even if some were enthusiastic about Franklin and his stove. When Franklin sent *Account* to a number of his regular scientific correspondents, they tended to respond to it as a curiosity rather than as a treatise of experimental science. For example, Franklin cultivated a correspondence with Cadwallader Colden—a Scottish physician who was the lieutenant governor of New York—as early as 1742, and he duly sent Colden a copy of *Account* once he had printed it.²⁵ Colden was himself a regular correspondent with many well-known British and continental natural philosophers, including the Dutch botanist Johann Gronovius, to whom he forwarded a copy of Franklin's pamphlet. Colden's description of the work in his letter to Gronovius is revealing. He mentioned Franklin's pamphlet only at the very end of a letter otherwise

focused almost exclusively on Colden's prior exchanges with a third correspondent of substantial scientific reputation, Carl Linnaeus. At the conclusion of this letter, we find a brief mention of the enclosed copy of Franklin's pamphlet:

You cannot expect much new in Literature from this part of the world. I send with this [letter] a curious & new invention for warming a room with a small fire more effectually than can be done by a large fire in the common method & is free of the inconveniencies which attend the Dutch and German Stoves; because by this contrivance there is a continual supply of fresh warm air. It may be particularly usefull to you & Dr. Linneus, by preserving your health while it keeps you warm at your studies. It is the invention of Mr. Benjamin Franklin of Philadelphia, the printer of it, a very ingenious man.²⁶

Colden reflected a general sense that the British American colonies did not produce much in the way of legitimate scientific literature, and, by way of compensation, he offered an amusing alternative: Franklin's pamphlet, the "curious" work of an "ingenious man." The pamphlet was entertaining, perhaps even useful, but it was not "new [scientific] Literature." Even Colden, one of Franklin's earliest and most supportive patrons, appears to have all but ignored *Account's* sophisticated scientific content, focusing instead on the text's utilitarian value: better home heating. Typical to the rhetorical style of Enlightenment correspondence, Colden framed Franklin's work as supportive of the always wished-for good health and happiness of the letter's recipient, the "fireplace" serving as material emblem that concretized the metaphoric warmth of friendship with which Colden closed the letter. Yet, while the author Franklin was "ingenious," his science, *qua* science, was either unseen or ignored.

"Ingenious" is a particularly important word in this context. While it was an adjective of approbation among the *virtuosi* of the Royal Society, at this stage in Franklin's career his scientific correspondents appear to have applied it to him in a rather more qualified way, underscoring that he was not himself yet a full member of that community. For instance, in a letter to William Strahan in December 1743, Colden described having met a printer (it was Franklin) the previous summer, a man who was "the most ingenious in his way . . . of any in America." In his response to Colden in May 1744, Strahan guessed Colden had met Franklin and noted that Franklin was already known to him for the quality of his printing, agreeing that Franklin was, indeed, "a most ingenious Man in his Way." As Leo Lemay notes, both Colden and Strahan were simultaneously offering high praise for and condescension toward Franklin, the qualifier "in his way" marking Franklin's status as a colonial printer rather than as a gentleman of the metropole, a person in whom genius would be both more expected and capacious.²⁷

As this exchange of letters suggests, Franklin faced a number of challenges as a scientific author. A colonial printer, Franklin was a "leather apron man" and thus decidedly not a "gentleman." To be sure, this social status posed significant challenges for Franklin's credibility as a scientific author, regardless of the medium in which he communicated his work. But the fact that he circulated *Account* in print, and that he did not include the conventional and expected anti-authorial paratext as part of the work, certainly did not make it any easier for the ideas he articulated to be seen as serious experimental science by the Royal Society's *virtuosi* and the other genteel natural philosophers he seems to have hoped to impress with the pamphlet. Franklin had failed to account for the continuing importance of manuscript circulation in mid-eighteenth-century science, a fact that influenced the pamphlet's reception then and continues to do so now.

ELECTRIC LETTERS AND A PARATEXTUAL APOLOGY FOR PRINT

If *Account's* form as a printed pamphlet, combined with Franklin's status as a colonial printer who had himself printed the work, hurt the credibility of Franklin's theories about heat energy, his broader scientific ambitions were not much dampened, and neither was the pamphlet a total failure. The novelty and

enjoyable style of the writing, as well as the evident “ingeniousness” of its author, seem to have helped Franklin insert himself into the correspondence networks of Enlightenment science. The pamphlet made clear, as another of Colden’s correspondents put it, that Franklin was “a man of Sense & of a good Stile.”²⁸ Indeed, Joyce Chaplin argues that *Account’s* appealing style gave Franklin an opportunity to use his pamphlet as “a kind of calling card . . . a way to introduce himself” to natural philosophers who were his social superiors.²⁹ Moreover, even though *Account* did not result in a formal testing of Franklin’s theories by the likes of Desaguliers, Franklin seems to have learned an important lesson from the tenor of the work’s reception: print was not the best medium to communicate scientific ideas in the Republic of Letters, at least not initially.

Franklin continued his program of scientific experimentation and, having sold active control of his printing business for a considerable sum in the late 1740s, devoted much of his greatly increased free time to a thorough study of electricity. Unlike his work on convection, Franklin’s experiments on electricity did earn him a formal review by, and shortly thereafter the enthusiastic accolades of, the British Royal Society. Revealingly, however, Franklin disseminated his work on electricity in a manner quite different from his circulation of *Account*: no pamphlet was issued from Franklin’s press describing his electrical work—no printed text we might imagine to have been entitled *An Account of the New-Invented Electrified Kite*. Moreover, and also unlike *Account*, when Franklin’s work on electricity did appear in print, he included a substantial anti-authorial paratext claiming that he was largely unaware his work was being printed. That is, when Franklin agreed to print his work on electricity, he used both of the strategies genteel scientific authors deployed to deal with the general ambivalence about scientific work appearing in print.

Franklin circulated his work on electricity in manuscript letters for some years before any printed edition appeared. He kept detailed notes of his experiments and included copies of those notes in letters to his philosophical correspondents. Among the most important of those correspondents was Peter Collinson, a Londoner and member of the Royal Society whom Franklin had come to know well. Collinson had agreed to serve as the Library Company’s book-buying agent in London as early as the 1720s, and he had increasingly become a patron to the group, sending it the first scientific instrument Franklin used for experiments with electricity: a glass cylinder that, when rotated, generated a static charge. Franklin’s earliest letter to Collinson on any electrical subject, written in 1747, was a warm thank you for the device and Collinson’s detailed instructions about how to use it. Collinson, intrigued by Franklin’s interest, sent additional instruments from London and encouraged Franklin to continue and expand his electrical experiments.³⁰

Bolstered by Collinson’s positive response, Franklin began sending copies of his letters about his electrical experiments to others. His general practice was to keep copies of the letters he first sent to Collinson, making additional copies that he would send to other interested individuals. Colden, for instance, often received copies, and these, with Franklin’s express blessing, Colden sometimes copied and forwarded to his own scientific correspondents. After a few years, this robust copying and exchanging of Franklin’s electrical manuscripts effectively “published” Franklin’s work to the Anglophone scientific community. Eventually, Franklin produced a summary collection of all his experiments and theories on electricity, asking his old friend, the cartographer Lewis Evans (who had drawn the diagrams of Franklin’s stove included in *Account*), to make clean copies of all of Franklin’s letters to Collinson, including the hand-drawn diagrams, and to organize them into a single manuscript book. Franklin then revised that text, making corrections and emendations to the manuscript that Evans had produced. A copy of that book has survived to the present day, one that Franklin sent to James Bowdoin, who was himself interested in electricity and who had requested the copy while visiting Franklin in Philadelphia. As many of the original letters Franklin sent to Collinson and others have now been lost, this manuscript book sent to Bowdoin is considered the most authoritative and complete “edition” of Franklin’s *Experiments and Observations on Electricity*, given its priority to all printed editions. As the editors of *The Papers of Benjamin Franklin* note to explain why they chose to reprint the Bowdoin manuscript over any printed edition of *Experiments*, “The Bowdoin manuscript, though a copy, was supervised and corrected by Franklin. Made in 1750, it antedates the first printed edition of *Experiments and Observations*. It is also in several instances fuller than any printed version.”³¹

Through all of this intense copying and exchanging of manuscripts we can see Franklin self-consciously adapting to the expectations of the *virtuosi* of the Royal Society about how to properly communicate scientific knowledge in the Republic of Letters: that is, Franklin's engagement with the scribal culture of the natural philosophers who were often his social superiors allowed him to project authorial modesty and thus to more easily join what Johns describes as the "learned sociability" of Enlightenment science. The shared practices of experimentation and the reading, copying, and exchanging of manuscripts about those experiments defined a kind of virtuous "public sphere" within which scientific ideas were introduced and tested. Indeed, it was for the most part only work vetted in this manner that was warranted by that community as knowledge. Such practices effectively allowed scientific authors to project the authorial modesty needed to communicate they were the sort of people worth believing and, simultaneously, to demonstrate that the claims of fact found in their texts had been properly socialized through a network of other well-regarded philosophical gentlemen. Thus, Franklin's circulation of his electrical work in manuscript conferred the credibility needed to have his work seriously reviewed within the community of "learned sociability" that defined the Royal Society, and it was only after his work had been publicized and validated in this manner that it became relatively safe to have it printed.

For Franklin, the process of review by the Royal Society occurred in this way: not long after first reviewing Franklin's electrical letters, Collinson showed copies to several other members of the Royal Society, including William Watson, who was the group's principal "electrician." Having been vouched for by Collinson, Franklin's theories were examined and approved of by Watson, who seems mistakenly to have thought they confirmed his own work. Watson subsequently quoted one of Franklin's letters in a formal paper he read before the society, a paper that was later printed in the society's official organ, the *Philosophical Transactions*. With the formal introduction of Franklin's electrical work complete, Collinson read some of Franklin's other electrical letters before the society, which then conducted a formal debate of their merits. Franklin's experiments were then assigned to individual members for attempts at replication. At last, after his experiments had been successfully replicated, Franklin's work received the society's formal approval and imprimatur. At that point, in 1751, Collinson collected all of Franklin's electric letters together, and, with Franklin's express approval (and some additional revisions), had them printed as the pamphlet we know today, *Experiments and Observations on Electricity, Made at Philadelphia in America, by Mr. Benjamin Franklin*.³²

In all of these steps we see Franklin conforming to the reading and writing practices preferred by the *virtuosi* of the Royal Society. As Johns puts it, "Shared practices of reading both constituted a community of experimental philosophers and warranted what that community produced as knowledge."³³ Franklin's decision to first disseminate his work on electricity in manuscripts sent to multiple well-connected correspondents—that is, to engage in "scribal publication" with others of the community of Anglophone natural philosophers—allowed him to transcend his colonial origins and his status as a printer-craftsman. Through manuscript Franklin generated a more credible authorial persona than he had done in the printed pamphlet *Account*; with his texts on electricity he crafted a scientific authorial persona that was both modest and appropriately sociable, and one that was more clearly free from the commercial compromises associated with the act of printing.

Franklin also made sure that when his electrical work eventually was printed, it conformed to the anti-authorial expectations for printed science written by gentlemen. Unlike *Account*, *Experiments* included a substantial paratext that highlighted the work's prior circulation in manuscript. The title page of *Experiments* makes explicit how Franklin's work on electricity had first been circulated in the form of personal correspondence. After "Experiments and Observations on Electricity" in the title, Franklin is credited as the primary experimenter, but his authorship of the printed text is moved into the background: the title continues, "And Communicated in Several Letters To Mr. P. Collinson, of London, F.R.S." Franklin's authorship of those letters, while reasonably assumed, is not mentioned directly, which distances Franklin from the printed pamphlet. Readers are thus put in a voyeuristic position, given the manner in which the paratext casts the pamphlet as a secondary extension of Franklin's manuscript letters addressed to Collinson. In addition, the title page highlights Collinson's expertise and prestige: the

“F.R.S.” suffix that follows his name—Fellow of the Royal Society—makes clear that the original recipient of Franklin’s letters possessed substantial social and scientific credibility, and this, too, supports the text’s legitimacy, despite its appearance in print (see fig. 2).

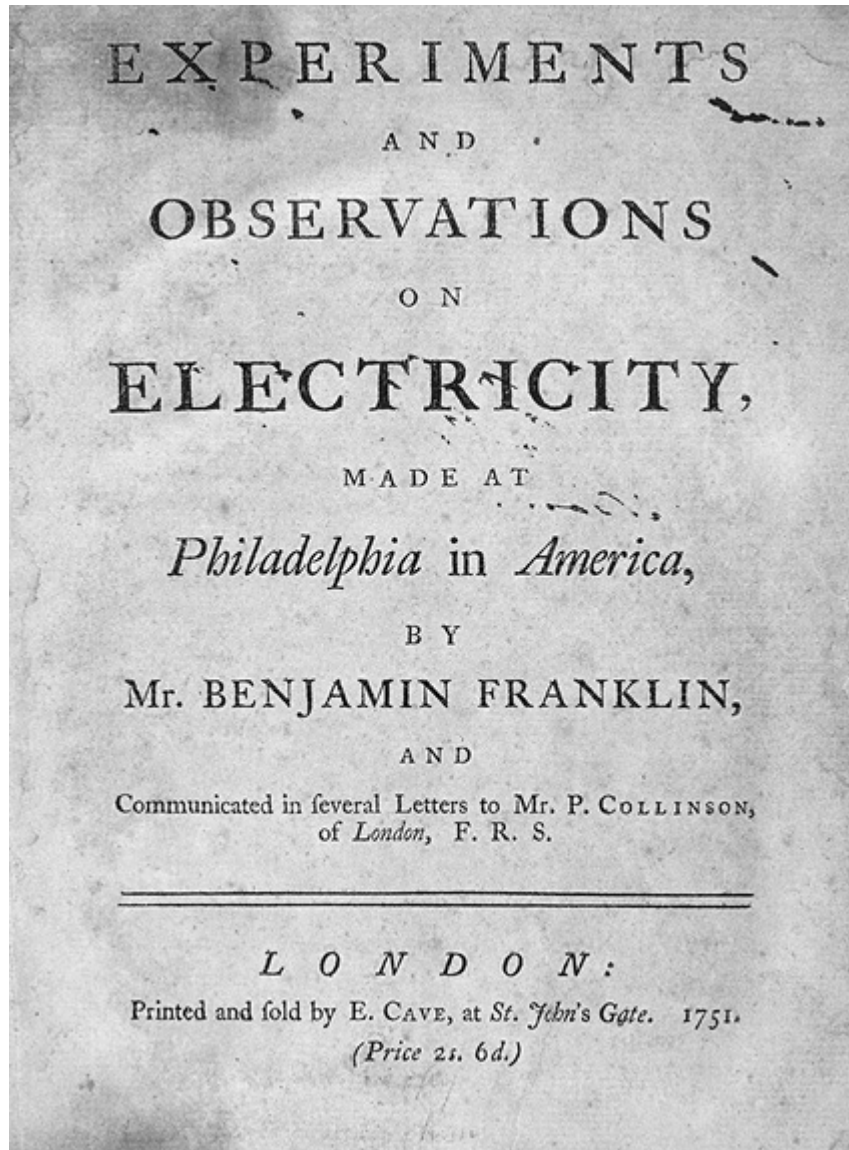


Figure 2. Title page of the first printed edition of Franklin’s *Experiments and Observations on Electricity*. (Franklin 467 1751 1; General Collection, Beinecke Rare Book and Manuscript Library, Yale University)

Reinforcing the priority of manuscript to print in *Experiments*, the pamphlet’s preface describes in detail the process by which Franklin’s work had earlier circulated in manuscript, and it likewise apologizes for the printed pamphlet’s existence by denying Franklin had any intention to print the work:

The following observations and experiments were not drawn up with a view to their being made publick, but were communicated at different times, and most of them in letters. . . . But some persons to whom they were read, and who had themselves been conversant in electrical disquisitions, were of the opinion . . . that it would be doing a kind of injustice . . . to confine them. . . . The Editor was therefore prevailed upon to commit such extracts of letters . . . to the press, without waiting for the ingenious author’s permission to do so. . . . He was only apprized of the step that had been thus taken, while the first sheets were in the press, and time enough for him to transmit some farther remarks, together with a few corrections and additions which are placed at the end.

The message is clear: readers should not think Franklin or his work compromised by appearing in print. Franklin, after all, was informed that his letters were being printed only as the sheets were drying. By that time, the preface suggests, it was too late for Franklin to stop the presses, so he was forced to comply, working only modestly to improve the text's accuracy. Also significant is how the preface calls Franklin "ingenious" without the qualifiers we have seen used by his correspondents at an earlier point in Franklin's scientific career. Franklin's manuscript circulation of his electrical letters and his subsequent use of an anti-authorial paratext in the printed *Experiments* thus appear to have succeeded in making Franklin into a serious and credible scientific author where *Account* had not, and the "in his way" qualifier was no longer seen as necessary or appropriate.

It should be noted that the "epistolary pamphlet" genre engaged by *Experiments* was recognized beyond the realm of scientific readers. Pamphlets that claimed to be printed versions of personal letters were also used for general news and political polemic. As Joad Raymond remarks about the broader genre, "The usefulness of the letter as a pamphlet genre was its ability to create virtual correspondence, an imaginary context that refracted a real one."³⁴ However, the manuscript correspondence upon which *Experiments* was based was not virtual but actual, and the work's paratextual insistence that Franklin's electrical experiments really had been circulated in letters (and, moreover, as a correspondence with the eminently reliable Peter Collinson, "F.R.S.") offered a more specific claim than a general invitation to readers to imagine a fictive exchange of letters. Instead, it made clear that Franklin's work had been properly socialized—that it had been circulated among established and credible scientific authors in accord with the norms of genteel natural philosophy and had been judged to contain information worth believing—before it appeared in print.

As anyone familiar with Franklin might guess, *Experiments'* image of an author surprised by print is not an accurate one. Franklin actually worked assiduously with Collinson and the printer to prepare his work for the press. But that is somewhat beside the point since, as we have seen, Franklin restricted the work to manuscript for some time before it was printed and, moreover, he deferred to a key member of the Royal Society, Collinson, about when it was proper to move the work into print. If Franklin instead had printed his electrical work immediately, as he did with *Account*, it is quite possible that it would have found a similarly muted reception. Indeed, the way *Experiments* apologizes for its very printedness, and the preface's related insistence that the work did in fact first circulate in manuscript correspondence, suggest that at least in the world of eighteenth-century natural philosophy the medium of print did not create an impersonal, virtuous, and newly rational public sphere; rather, it was suggestive of authors who were compromised by personal ambition and self-interest, and whose claims of fact were therefore not reliable. The rules of gentlemanly etiquette dictated that scientific authors should often use manuscript to publicize and socialize their work, and that they should at least claim to use print only to explicitly serve others. Even Benjamin Franklin, colonial America's foremost printer, had to conform.

NOTES

1. Franklin, *Benjamin Franklin's Autobiography*, 10.
2. Tarantello, "Persona-ly Appealing." The literature on Franklin's creation of multiple and sometimes contradictory personae over the course of his life is substantial, but Tarantello provides an excellent recent summary of that literature.
3. Breitwieser, *Cotton Mather and Benjamin Franklin*.
4. Warner, *The Letters of the Republic*, 77.
5. Mulford, *Benjamin Franklin and the Ends of Empire*, 164–46. Mulford perceptively notes the care with which Franklin developed a correspondence network of well-placed gentlemen through which he could test and refine his political theories in manuscript form before making the decision to have them printed.
6. Love, *The Culture and Commerce of Texts*, 35 and passim.
7. Foner, *Tom Paine and Revolutionary America*, 38.
8. Wrightson, "[Those with] Great Abilities Have Not Always the Best Information."

9. As a teenage apprentice printer, Franklin participated in his brother James Franklin's excoriation in the *New-England Courant* of the Mathers' defense of smallpox inoculation, and Franklin's later *Poor Richard's Almanacks* often featured medical advice. Franklin had also printed, at his own expense, a new edition of *Every Man His Own Doctor: Or, the Poor Planter's Physician* in 1734: Finger, *Doctor Franklin's Medicine*, 2.
10. Franklin, *The Papers of Benjamin Franklin*, 2:419.
11. Lemay, *The Life of Benjamin Franklin*, 2:467; Franklin, *The Papers of Benjamin Franklin*, 2:419.
12. Lemay, *The Life of Benjamin Franklin*, 2:488. Lemay argues that Franklin likely met Desaguliers in London in 1725, introduced by their mutual acquaintance Isaac Greenwood, who was then serving as Desaguliers's experimental assistant: *ibid.*, 1:263.
13. Franklin, *The Papers of Benjamin Franklin*, 2:439.
14. *Ibid.*, 422.
15. Shapin and Schaffer, *Leviathan and the Air-Pump*, 60.
16. Franklin, *The Papers of Benjamin Franklin*, 2:423.
17. Johns, "The Ambivalence of Authorship in Early Modern Natural Philosophy."
18. *Ibid.*, 78–79.
19. *Ibid.*, 80.
20. *Ibid.*
21. Biagioli, "Scientific Revolution, Social Bricolage, and Etiquette," 38. Mario Biagioli argues that gentlemanly status was particularly important in Britain and its colonies, as compared with the rest of Europe, where monarchs were explicit patrons. Gentlemanly status was exemplified socially through rules of etiquette governing how claims of fact should be offered in writing, read, and debated. By engaging in and writing about "experimental philosophy, gentlemen fashioned matters of fact as they were fashioning themselves as gentlemen. . . . [Claims about] matters of fact did not 'insult' anybody because everybody was supposed to have cooperated (actually or virtually) in their production": *ibid.*, 38.
22. Boyle, *New Experiments Physico-Mechanicall*, sig. A3.
23. Desaguliers, *Physico-Mechanical Lectures*, sig. A2.
24. Franklin, *An Account of the New Invented Pennsylvania Fire-Places*.
25. Chaplin, *The First Scientific American*, 95.
26. Colden, *The Letters and Papers of Cadwallader Colden*, 3:91.
27. Lemay, *The Life of Benjamin Franklin*, 2:465.
28. Colden, *The Letters and Papers of Cadwallader Colden*, 3:83.
29. Chaplin, *The First Scientific American*, 92.
30. *Ibid.*, 106.
31. Franklin, *The Papers of Benjamin Franklin*, 3:118.
32. Cohen, *Franklin and Newton*, 464.
33. Johns, "Reading and Experiment in the Early Royal Society," 248.
34. Raymond, *Pamphlets and Pamphleteering in Early Modern Britain*, 217–18.

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