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Scientific Academies and the Civilizing Process

The establishment of scientific academies in Italy, England, and France in the seventeenth century was paralleled by discussions about the polite protocols academicians should follow in presenting, assessing, or publishing claims about nature. Because these institutions produced knowledge through a sharing of evidence and a collective witnessing or evaluation of reports and experiments, impoliteness threatened the very conditions of possibility of that kind of knowledge. Also, good philosophical manners were central to maintaining the academies' relationship to their princely patrons—a relationship that might have been negatively affected, for instance, by the academicians' publication of contentious claims and by the controversies that might have ensued.[1] This was a serious matter as princes provided academies with authority, not just financial support.

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1. While disputes were quite acceptable when staged as entertaining performances in courtly or noble settings, they could threaten the prince's name and honor if they travelled outside of those circumscribed stages, became impolite, or conveyed the impression that the prince had acted as a certifying witness rather than just as a noncommittal (though often appreciative) spectator.

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In early modern societies, one's credibility reflected one's social status, and many scientific practitioners did not have high social status by birth but increased it by entering into patronage relationships with princes and aristocrats.[2] Increasing one's credibility by enhancing one's social status was particularly important for the new natural philosophers and innovative physicians because their mathematical or experimental methodologies were often at odds with the dominant and usually university-based Aristotelian philosophy and Galenic medicine.[3] Patronage and the fluid social space of the princely court provided some of the new philosophers with crucial resources for the legitimation of their claims and of the new socioprofessional identities they were trying to fashion.[4]

2. See Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago, 1993), pp. 15–19.

3. On the physicians' strategies, see Biagioli, "Scientific Revolution, Social Bricolage, and Etiquette," in *The Scientific Revolution in National Context,* ed. Roy Porter and Mikuláš Teich (Cambridge, 1992), pp. 11–54. Remarks about the prince's role in legitimizing the new anatomy and physiology are in *The Correspondence of Marcello Malpighi,* ed. Howard B. Adelman, 5 vols. (Ithaca, N. Y., 1975), 1:156, 190, 193. The legitimation of experimental practices faced similar disciplinary difficulties as they rested on non-Aristotelian notions of evidence. Because of the Aristotelian privileging of natural (formal) causes over artificial (efficient) causes, instrument-produced evidence might be downgraded by traditional philosophers and could be, in principle, dismissed as an artifact. Also, the acceptance of experiments required a shift from a notion of evidence linked to everyday experience (upheld by Aristotle) to a more specialized one that rested on singular experiences produced through an experimental apparatus; see Peter Dear, "Jesuit Mathematical Science and the Reconstitution of Experience in the Early Seventeenth Century," *Studies in History and Philosophy of Science* 18 (Mar. 1987): 133–75.

4. Among the works on science and court culture, see Robert S. Westman, "The Astronomer's Role in the Sixteenth Century: A Preliminary Study," *History of Science* 18 (June 1980): 105–47 and "Proof, Poetics, and Patronage: Copernicus's Preface to *De Revolutionibus,*" in *Reappraisals of the Scientific Revolution,* ed. David C. Lindberg and Westman (Cambridge, 1990), pp. 167–205; Jay Tribby, "Cooking (with) Clio and Cleo: Eloquence and Experiment in Seventeenth-Century Florence," *Journal of the History of Ideas* 52 (July–Sept. 1991): 417–39 and "Body/Building: Living the Museum Life in Early Modern Europe," *Rhetorica* 10 (Winter 1992): 139–63; Paula Findlen, "Controlling the Experiment: Rhetoric, Court Patronage, and the Experimental Method of Francesco Redi," *History of Science* 31 (Mar. 1993): 35–64 and *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley, 1994); Bruce T. Moran, *The Alchemical World of the German Court: Occult Philosophy and Chemical Medicine in the Circle of Moritz of Hessen, 1572–1632* (Stuttgart,

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The establishment of scientific academies was the next step in this process. Eventually, the transition from patronage to academies entailed the replacement of the flesh-and-blood patron with the *persona ficta* of the corporation. Within academies, credibility was no longer exclusively linked to one's personal status, personal relationship with a prince, or competence in the specific patronage or courtly etiquette necessary to develop and maintain such a connection.[5] In this new institutional context, it was the practitioner's membership in the scientific corporation and his ability to produce knowledge according to the "institutional etiquette" that constituted him as a credible practitioner or corresponding member. Furthermore, while the kind of legitimation obtainable through personal patronage was most effective within the prince's court and patronage networks, the credibility derived from institutional membership and adherence to related protocols of knowledge making could gain wider currency within the republic of letters.[6]

Recently, historians of science have begun to look at the role of polite discourse and behavior within scientific societies and, more generally, at the moral economy of the republic of letters.[7] These studies, by creating a comparative framework, suggest a relationship between local scientific etiquettes and the regimes of princely power within which they were articulated. As a working hypothesis whose full corroboration would require more evidence than I am able to provide here, I suggest that the development of these academy-based forms of scientific politeness may

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1991); *Patronage and Institutions: Science, Technology, and Medicine at the European Court, 1500–1750,* ed. Moran (Rochester, N. Y., 1991); and Pamela H. Smith, *The Business of Alchemy: Science and Culture in the Holy Roman Empire* (Princeton, N. J., 1994).

5. See Biagioli, *Galileo, Courtier,* pp. 353–62.

6. Examples of the site-specific character of princely legitimation and of the modalities of its transmission to other environments are in ibid., pp. 54–59, 96–100, 103–39.

7. Besides some of the literature on science at court (listed in n. 3), issues of politeness and etiquette are addressed in Steven Shapin, "Pump and Circumstance: Robert Boyle's Literary Technology," *Social Studies of Science* 14 (Nov. 1984): 481–520, "The House of Experiment in Seventeenth-Century England," *Isis* 79 (Sept. 1988): 373–404, "'A Scholar and a Gentleman': The Problematic Identity of the Scientific Practitioner in Early Modern England," *History of Science* 29 (Sept. 1991): 279–327, and *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago, 1994); Simon Schaffer, "Self Evidence," *Critical Inquiry* 18 (Winter 1992): 327–62, rpt. in *Questions of Evidence: Proof, Practice, and Persuasion across the Disciplines,* ed. James Chandler, Arnold I. Davidson, and Harry Harootunian (Chicago, 1994), pp. 56–91; Lorraine Daston, "Baconian Facts, Academic Civility, and the Prehistory of Objectivity," in *Rethinking Objectivity,* ed. Allan Megill (Durham, N. C., 1994), pp. 37–63 and "The Moral Economy of Science," *Osiris* 10 (forthcoming); Biagioli, "Tacit Knowledge, Courtliness, and the Scientist's Body," in *Choreographing History,* ed. Susan L. Foster (Bloomington, Ind., 1995), pp. 69–87; and Christian Licoppe, "The Crystallization of a New Narrative Form in Experimental Reports (1660–1690): The Experimental Evidence as a Transaction between Philosophical Knowledge and Aristocratic Power," *Science in Context* 7 (Summer 1994): 205–44.

be related to what Norbert Elias has described as the symbiotic development of polite manners, court society, and political absolutism.[8]

In particular, I argue that the codes of civility associated with political absolutism framed the *conditions of possibility* of a range of scientific sociabilities, forms of authorship, and notions of evidence. These codes did not determine the truth-value of specific claims about nature but structured how legitimate candidates for true or false claims ought to look.[9] Civility may be seen as a microprocess (in Foucault's sense) through which the power regimes of absolutism shaped their subjects and their discourses (including those of savants working within princely academies) through fine-grained disciplining. This process was not without tensions, nor did it simply reproduce the power regime that framed it. As we know, the very meaning of *subject* changed in time. While natural philosophers were, quite literally, princely subjects, they eventually managed to legitimize methodologies, disciplines, and institutions that later became emblematic of modern subjectivity, not of baroque reason of state.

This essay looks at the first decades of scientific academies and relates the sociabilities and scientific styles developed in Italy, France, and England to the different degrees of princely involvement in those institutions, to the power of those various princes, and to the different institutional structures regulating the relationship between practitioners and princes. By doing so, I trace the transformation of the codes of princely etiquette that framed the legitimation of individual practitioners through dependence on individual princes into the academic politeness that, by structuring the interdependence among practitioners, informed their subjectivities, practices, and claims as members of scientific institutions.

Tensions, Constraints, and Options

The homologies between academic and courtly civility resulted from the specific protocols of socialization shared by many savants and courtiers. In this period, the boundaries between polite or courtly circles and the so-called republic of letters were still porous. Aristocrats and courtiers participated in scientific academies, and most of these gatherings (especially the private ones) were assembled by aristocrats or gentlemen well versed in diplomacy and civility—for example, Lorenzo Magalotti, the secretary of the Medici-sponsored Accademia del Cimento, opened a

8. See Norbert Elias, *The Court Society,* trans. Edmund Jephcott (Oxford, 1983). I sketched this argument in "Scientific Revolution, Social Bricolage, and Etiquette," pp. 15–39. The existence of a cross-national trend toward philosophical politeness and its link with Elias's "civilizing process" have been discussed by Daston in "Baconian Facts, Academic Civility, and the Prehistory of Objectivity," pp. 53–54.

9. On the notion of candidates for true or false claims, see Ian Hacking, "Language, Truth, and Reason," in *Rationality and Relativism,* ed. Martin Hollis and Steven Lukes (Cambridge, Mass., 1982), pp. 48–66. See also Hacking, "'Style' for Historians and Philosophers,"

school for diplomats later in his life.[10] Moreover, the early international networks of correspondence that structured the scientific republic of letters overlapped and sometimes coincided with diplomatic networks because they were often developed by savants travelling on diplomatic missions or in the entourage of young aristocrats on a grand tour.[11]

However, just because etiquette was second nature to most of the managers of the emerging philosophical community does not mean that upper-class civility uniformly permeated the practitioners' subjectivity, nor that there was always a stable consensus about how scientific etiquette ought to look. Besides differences in national canons of civility and politeness, there was a fundamental tension (within both court society and the emerging scientific community) between accepting etiquette protocols and trying to change the rules of the game to one's advantage. As etiquette and civility reflected social distinctions and hierarchies, the emergence of new social groups and the decline of others entailed a redrawing of those protocols.[12] In the case of science, debates between proponents of different philosophical "forms of life" (for example, between Galileo and the scholastics on cosmology, or Robert Boyle and Hobbes on the vacuum) displayed rifts about manners of argumentation.[13] Furthermore, as patrons and practitioners tended to come from different backgrounds, they brought with them different views of philosophical propriety.

Studies in History and Philosophy of Science 23 (Mar. 1992): 1–20 and "La metafisica degli stili di ragionamento scientifico," *Iride* 4–5 (1990): 7–22, and Davidson, "Styles of Reasoning, Conceptual History, and the Emergence of Psychiatry," in *Disunity and Contextualism,* ed. Peter Galison and David Stump (forthcoming).

10. See Stefano Fermi, *Lorenzo Magalotti, scienziato e letterato, 1637–1712* (Piacenza, 1903), p. 73.

11. To this category belong Christiaan Huygens, Henry Oldenburg, John Locke, Martin Lister, Samuel Sorbière, Balthasar de Monconys, Otto von Guericke, Cassiano dal Pozzo, Lorenzo Magalotti, and Gottfried Leibniz. On the overlap between diplomatic and philosophical networks of correspondence, see Biagioli, *Galileo, Courtier,* pp. 54–59. On networks of correspondence within the republic of letters, see *Commercium Litterarium, 1600–1750: Forms of Communication in the Republic of Letters,* ed. Hans Bots and Françoise Waquet (Amsterdam, 1994).

12. On the tensions inherent to categories of civility, etiquette, and politeness, see Jacques Revel, "The Uses of Civility," in *Passions of the Renaissance,* trans. Arthur Goldhammer, ed. Roger Chartier, vol. 3 of *A History of Private Life,* ed. Philippe Ariès and Georges Duby (Cambridge, Mass., 1989), pp. 167–205; Frank Whigham, *Ambition and Privilege: The Social Tropes of Elizabethan Courtesy Theory* (Berkeley, 1984); and Peter France, *Politeness and Its Discontents: Problems in French Classical Culture* (Cambridge, 1992), pp. 53–73. On the relationship between changes in etiquette and changes in courtly hierarchies see Elias, *The Court Society,* p. 88.

13. See Biagioli, *Galileo, Courtier,* pp. 189–207 and 214–42, and Shapin and Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, N. J., 1985), pp. 22–154. On the etiquette dimensions of the dispute between Newton and Robert Hooke on the nature of light, see Schaffer, "Glass Works: Newton's Prisms and the Uses of Experiment," in *The Uses of Experiment: Studies in the Natural Sciences,* ed. David Gooding, Trevor Pinch, and Schaffer (Cambridge, 1989), pp. 80–96.

The scandal Gilles Personne de Roberval precipitated in December 1658 in the Montmor academy in Paris, one of the earliest philosophical gatherings, exemplifies some of these tensions. According to the savant and astronomer Ismael Boulliau,

> M. de Roberval . . . has done a very stupid thing in the house of M. de Montmor who is as you know a man of honor and position; he was so uncivil as to say to him in his own house, having taken offense at an opinion of M. des Cartes which M. de Montmor approved, that he had more wit than he, and that he was less only in worldly goods and the office of Maître des Requêtes, and that if he were Maître des Requêtes he would be worth a hundred times more. Monsieur de Montmor, who is very circumspect, said to him that he could and should behave more civilly than to quarrel with him and treat him with contempt in his own house. The whole company found the boorishness and pedantry of M. de Roberval very strange.[14]

Although Roberval never participated in that gathering again, the company was slow to recover from the shock and, marred by continuing disagreements, eventually closed down in 1664 (see *SO,* p. 133).[15]

If Roberval's rudeness was unacceptable in the house of a gentleman like Henri Louis Habert de Montmor, it would have been disastrous in a courtly setting.[16] Because of their high social status and sensitivity about blunders in etiquette, princes worried about their practitioners' manners, the possibly controversial nature of their claims, and other embarrassments that may have resulted from scientific disputes—as is shown by

14. Quoted in Harcourt Brown, *Scientific Organizations in Seventeenth-Century France (1620–1680)* (Baltimore, 1934), p. 87; hereafter abbreviated *SO.* See Ismael Boulliau, letter to Christiaan Huygens, 6 Dec. 1658, *Oeuvres complètes de Christiaan Huygens,* 22 vols. (La Haye, 1888–1950), 2:287. Such scandals were precisely what etiquette handbooks were teaching people to avoid when in the presence of the powerful. According to Antoine de Courtin, "when one is to contradict any person of quality, and to answer in the negative, it is not to be done bluntly with a *No, Sir, that is not so,* but by circumlocution, as *Pardon me Sir, I beg your pardon, Madam, if I presume to say*" (Antoine de Courtin, *The Rules of Civility, or, Certain Ways of Deportment Observed in France Amongst All Persons of Quality upon Several Occasions* [London, 1675], p. 32; hereafter abbreviated *RC*). This work was originally published as *Nouveau traité de la civilité qui se pratique en France parmi les honnestes gens* (Amsterdam, 1671). English etiquette handbooks offered identical advice; see *The Art of Complaisance, or, the Means to Oblige in Conversation* (London, 1677), p. 55. No author is listed, but the preface is signed "S. C."

15. After the scandal, Jean Chapelain wrote Huygens that "the Academy which met in his house [Montmor's] has languished somewhat since the outburst which occurred between him and M. de Roberval" (quoted in *SO,* p. 108).

16. For instance, in 1611, Galileo's patron, Cosimo II de' Medici, reprimanded him for his conduct in the dispute on buoyancy even though, by that time, the exchange had been taking place outside of the court and not in the presence of the Grand Duke. That his mathematician and philosopher had engaged in public verbal disputations seemed inappropriate to Cosimo, who wanted Galileo to express his ideas in print, which, eventually, Galileo did. See Biagioli, *Galileo, Courtier,* pp. 178–80.

Grand Duke Ferdinand II de' Medici, who feared "diplomatic incidents" between him and the princely patrons of his savants' opponents.[17] For similar reasons, princes and high-status patrons tended to act as arbiters rather than judges and generally assumed a "nominalist" attitude about the claims being debated.[18]

For instance, when Leopold de' Medici, the founder of the Accademia del Cimento, became unwillingly involved in the debate between Christiaan Huygens and Honoré Fabri on Saturn's rings in 1660, he delayed acknowledging Huygens's dedication of his 1659 *Systema Saturnium* for more than a year, told him that he was not a "judge apt to issue pronouncements over his doctrines," and eventually passed the matter on to his academicians.[19] Responding to Leopold's concerns, the academicians constructed mechanical models after the two competing hypotheses and, without passing final judgment, reported what their findings (about the *models,* not Saturn itself) suggested about the tenability of the contenders' claims.[20] The reports were never published.[21]

Practitioners did not always share the cautious civility and "nominalist" attitudes of patrons and princes. Although Roberval's daring impoliteness seems to have been unique, elements of his ethos were not alien to Galileo, Newton, Edme Mariotte, and Robert Hooke, who often sought to increase their professional distinction by emphasizing the epistemological status or priority of their claims and who could be impolite in criticizing their opponents. Tensions around property and propriety were not limited to patron-client interactions but also emerged in debates between practitioners belonging to different social groups and moral economies. In the dispute between Huygens and Hooke on the spring watch in 1675, Huygens (a patrician) followed the protocols of gentlemanly politeness espoused by the Royal Society, assuming that Hooke would do the same.[22] But Hooke—who abided by an artisanal rather than

17. See Giovanni Alfonso Borelli, letter to Malpighi, 10 Jan. 1664, *The Correspondence of Marcello Malpighi,* 1:193.

18. See Biagioli, *Galileo, Courtier,* pp. 73–84.

19. Leopold de' Medici, letter to Huygens, 14 Sept. 1660, *Lettere inedite di uomini illustri per servire d'appendice all'opera intitolata vitae Italorum doctrina excellentium,* ed. Angelo Fabroni, 2 vols. (Florence, 1773–75), 2:82; hereafter abbreviated *LI.* See Paolo Galluzzi, "L'Accademia del Cimento: 'Gusti' del principe, filosofia, e ideologia dell'esperimento," *Quaderni Storici,* no. 48 (Dec. 1981): 788–844.

20. See Albert Van Helden, "The Accademia del Cimento and Saturn's Ring," *Physis* 15, no. 3 (1973): 237–59. The etiquette concerns raised by that dispute also emerge in the letters exchanged between Leopold and his collaborators; see *LI,* 2:82, 87, 97, 98, 101, 103, and 109.

21. See Maria Luisa Righini Bonelli and Van Helden, *Divini and Campani: A Forgotten Chapter in the History of the Accademia del Cimento* (Florence, 1981), p. 13. In a letter to Malpighi dated 18 Sept. 1660, Borelli mentioned that he was testing the hypotheses of Huygens and Eustachio Divini and Fabri and that he would have informed him of the result had Leopold allowed him to do so; see *The Correspondence of Marcello Malpighi,* 1:44.

22. Huygens is a very interesting figure. Son of a prominent politician and diplomat from the Netherlands, Huygens displayed a hybrid moral economy that incorporated both

gentlemanly moral economy—did not share Huygens's manners, insulted him, and precipitated a crisis that forced the Society to reconsider its ability to provide a forum for the polite negotiation of disputes.[23]

Although conflicts between different moral economies and notions of civility were widespread throughout society, they were more serious among natural philosophers, as received notions of truth provided only a very limited leeway to negotiate those tensions. Writing from Paris in February 1658, Boulliau contrasted the styles of the scientific academy that met at the house of Monsieur de Montmor with a literary gathering assembled by the Venetian ambassador:

> From certain persons I have learned that the Venetians are more agreeable, more polite, more urbane, and use complimentary words in discussion. The Montmorians are sharper, and dispute with vehemence, since they quarrel about the pursuit of truth; sometimes they are eager to rail at each other, and jealously deny a truth, since each one, although professing to inquire and investigate, would like to be the sole author of the truth when discovered. And if anyone in the course of his hunting find that truth, the others will not in the end share in the spoils of their own free will and pleasure, because each one considers that his own fame and glory has lost something if he grant even a blade of grass to the victor and acknowledge him as the real discoverer. [Quoted in *SO*, pp. 78–79][24]

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noble and artisanal traits: he abided by gentlemanly protocols of behavior while being very sensitive about credit and intellectual property. Also, he was not hesitant to pursue economically rewarding activities such as the solution of the problem of longitude and the patenting of mechanical inventions (such as the spring watch)—pursuits that led him into conflict with artisanally minded practitioners like Hooke. Huygens's "bricolage" is not, I think, idiosyncratic but may indicate the kind of negotiations required by the fashioning of the role of the noble practitioner—of somebody who didn't just practice natural philosophy as a hobby but sought to engage with and gain recognition from other practitioners. Elements of Huygens's ethos are discussed in the essays by H. J. M. Bos, A. G. H. Bachrach, M. B. Hall, Van Helden, J. H. Leopold, and Michael S. Mahoney, in *Studies on Christiaan Huygens: Invited Papers from the Symposium on the Life and Work of Christiaan Huygens, Amsterdam, 22–25 August 1979*, ed. Bos et al. (Lisse, 1980).

23. See Rob Iliffe, "'In the Warehouse': Privacy, Property, and Priority in the Early Royal Society," *History of Science* 30 (1992): 41–55, and Adrian Johns's excellent "Wisdom in the Concourse" (Ph.D. diss., Downing College of Cambridge University, 1992), pp. 170–80. On Roberval's similar moral economy, see the evidence presented in *SO*, pp. 82–89. For an unflattering portrait of Roberval by a contemporary, see Lorenzo Magalotti, *Relazioni di viaggio in Inghilterra, Francia, e Svezia*, ed. Walter Moretti (Bari, 1968), p. 194.

24. I believe that what Boulliau says about discovery may be applicable to invention as well. Priority disputes about inventions (such as that between Huygens and Hooke on the spring watch) could be quite bitter not only because of the financial rewards one could derive from patents or privileges but because both contenders assumed that they were dealing with precisely the same device. By assuming an "essentialistic" view of a device, the contenders would be disposed to see the similarities between the two inventions as deriving from appropriations—a perception that might then dispose them to see the contender as unethical and therefore undeserving of being treated politely.

The impoliteness stemming from believing that there was only one truth was made worse by a commitment to comprehensive philosophical and cosmological systems (mostly Aristotle's and Descartes's), as they predisposed people to take dogmatic stances by turning their assumptions into unproblematic axioms.[25] As Joseph Glanvill put it in his 1665 *Scepsis Scientifica* (a book he dedicated to the Royal Society), "The *Dogmatist* gives the *lye* to all dissenting apprehenders, and proclaims his judgement fittest, to be the *Intellectual Standard.*"[26] Glanvill's perception of the dangers of dogmatism was shared by most proponents of scientific institutions and informed the (somewhat rhetorical) refrain found in academic literature and correspondence about the contentiousness and impoliteness of Aristotelian syllogistic disputations.[27]

The tactics pursued by academies to control the many threats to phil-

25. Roger Ariew, "Damned If You Do: Cartesians and Censorship, 1663–1706," *Perspectives on Science* 2 (Fall 1994): 255–74, shows that Pierre Gassendi's corpuscular philosophy, while in some ways similar to Descartes's, was not the target of much criticism and censorship because, unlike Cartesian philosophy, it was seen as undogmatic.

26. Joseph Glanvill, *Scepsis Scientifica, or, Confest Ignorance, the Way to Science* (London, 1665), p. 170.

27. See Bernard le Bovier de Fontenelle, *Histoire de l'Académie Royale des Sciences depuis son établissement en 1666 jusqu'à son renouvellement en 1699,* 2 vols. (Paris, 1733), 1:16, hereafter abbreviated *HAR;* and John Milton Hirschfield, *The Académie Royale des Sciences, 1666–1683* (1957; New York, 1981), p. 127. Presenting a volume of conferences delivered at the Bureau d'Adresse, Théophraste Renaudot remarked, "[our] discussion could not be reconciled to the manner of arguing of the Schools, because these disputes and contradictions not only obscure all the grace and pleasure of the exchange, but often end up in riots and pedantic insults" (Théophraste Renaudot, "Avis au Lecteur," in *Première centuries des questions traitées aux conferences du Bureau d'Adresse* [Paris, 1634], p. 3). The Royal Society's stance against any type of dogmatism is a leitmotif of Thomas Sprat, *History of the Royal-Society of London for the Improving of Natural Knowledge* (London, 1667). In 1668, Oldenburg wrote to Pierre de Carcavy, the moderator of the Académie Royale des Sciences, that the purpose of scientific academies was to oblige people "wholly to desert the quodlibetic learning of the schools which serves no other purpose than to befog the spirit and drag out disputes which are not only useless but often very pernicious" (Henry Oldenburg, *The Correspondence of Henry Oldenburg,* trans. and ed. A. Rupert Hall and Marie Boas Hall, 13 vols. [Madison, Wis., 1965–86], 4:101; hereafter abbreviated *CHO*). Magalotti, in his "Elogio del Cardinal Leopoldo," presented the founder of the Accademia del Cimento as being opposed to the "servile [that is, scholastic] approach to doing philosophy" (Magalotti, "Elogio del Cardinal Leopoldo," in *LI,* 1:2). On the courtly contempt of scholastic modes of thinking, see also Biagioli, *Galileo, Courtier,* pp. 112–20, 269–73.

The (nominal) exclusion of Cartesians or members of religious orders from the ranks of the Académie Royale des Sciences was also connected to the ban on philosophical systems. On the ban against Cartesians, see Roger Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1666–1803* (Berkeley, 1971), p. 15. On early bans against Jesuits and Paracelsians, see Alice Stroup, *A Company of Scientists: Botany, Patronage, and Community at the Seventeenth-Century Parisian Royal Academy of Sciences* (Berkeley, 1990), p. 17. Bans preventing religious people from gaining academic membership were enacted by the Roman Accademia dei Lincei; see Baldassare Odescalchi, *Memorie istorico critiche dell'Accademia de' Lincei e del Principe Federico Cesi, Seconda Duca d'Acquasparta, Fondatore e Principe della Medesima* (Rome, 1806), p. 213.

osophical civility focused on two distinct but interrelated problems: how to maintain constructive interaction among practitioners within the academies and the emerging republic of letters, and how to preserve princely support and legitimation of those academies. While both goals were crucial to creating the possibility for legitimate knowledge, they were given different priorities in different contexts depending on institutional settings and degrees of princely involvement in the academies.

Responses to the first concern included not only rejecting dogmatic philosophical systems but also proposing less contentious methodologies. Samuel Sorbière, the secretary of the Montmor academy and a proponent of the Académie Royale des Sciences, put forward a nominalist epistemology justifying how different opinions could be legitimately held about the same phenomenon.[28] Boyle's articulation of experimental philosophy in England (and its partial adoption by the Royal Society) also reflected an attempt to introduce protocols of argumentation and a related notion of evidence (the "matter of fact") that would allow practitioners to negotiate their different views in a polite manner.[29] While not all academies subscribed to Boyle's comprehensive proposal, the "politeness potential" of experimental practices (or more generally of arguments based on local rather than system-laden evidence) was explicitly recognized throughout Europe.[30] A focus on experimentally produced evidence facilitated the closure of debates not only because it helped avoid potentially dogmatic system-laden arguments but also because it allowed critics to ask a range of questions about the production of that evidence before questioning the author's personal integrity. Then, if the differences remained unresolved, the claimant could still be given the benefit of the doubt about the experimental conditions, the details of the apparatus, its calibration, and so on. For instance, Hooke in his 1665 *Micrographia* (a book sponsored by and dedicated to the Royal Society) avoided giving the "lie" to an author whose observations he questioned by stressing the difficulties involved in the proper setting of the microscope: "the Eyes of a Fly *in one kind of light* appear almost like a Lattice . . . which . . . may be the Reason, why the Ingenious *Dr. Power* seems to suppose them such."[31]

While the maintenance of a polite sociability among practitioners also helped preserve the connection between academies and their princely patrons, other strategies were specifically aimed at shielding the

28. See Samuel Sorbière, "De la source des diverses Opinions sur une mesme matière," *Lettres et discours de M. Sorbière sur diverses matières curieuses* (Paris, 1660), pp. 701–4. His nominalism also emerged in "De la Verité de nos connoissances Naturelles," ibid., pp. 694–700, esp. p. 699. A comparable proposal (though not one targeted to natural philosophy) is found in *The Art of Complaisance,* p. 54.

29. See Shapin and Schaffer, *Leviathan and the Air-Pump,* pp. 22–109.

30. On the politeness of "singular facts," see Daston, "Baconian Facts, Academic Civility, and the Prehistory of Objectivity," pp. 38–58.

31. Robert Hooke, *Micrographia: Or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses* (London, 1665), p. [30]; first emphasis added.

princes' honor by avoiding discourses that might endanger the legitimacy of political absolutism. The routine exclusion of politics and theology from the list of acceptable subjects of scientific academies reflected this concern.[32] Federico Cesi, founder of the Accademia dei Lincei (a body to which Galileo belonged) claimed that his academy's statutes were "all rooted in Politics and Reason of State."[33] While other academies did not explicitly put reason of state at the center of their concerns, they shared the Lincei's cautious demarcation of their fields of inquiry and of the kinds of questions one could ask about nature. Although the exclusion of politics and theology was directly aimed at respecting the authority of princes and churches and, in some countries, at avoiding fueling religious tensions, it was justified philosophically in statements that both "mysteries of religion" and "mysteries of state" were beyond human understanding and that, therefore, their pursuit was not just dangerous and impious, but also hopeless. The legitimacy of the power of the absolute prince (and the discourse of reason of state that went with it) was presented as something as opaque as the nature of God, to which it was usually linked by the doctrines of divine rights of kings. These political and religious axioms were, at the same time, unquestionable facts and impenetrable mysteries.[34] For instance, Théophraste Renaudot, the con-

32. On Renaudot's Bureau d'Adresse, see Howard M. Solomon, *Public Welfare, Science, and Propaganda in Seventeenth-Century France: The Innovations of Théophraste Renaudot* (Princeton, N. J., 1972), p. 65. On the Lincei, see Odescalchi, *Memorie istorico critiche dell'Accademia de'Lincei,* p. 218. Oldenburg wrote that "the Royal Society says it is not its concern to have any knowledge of scholastic and theological matters, for it is its sole business to cultivate knowledge of nature and useful arts by means of observation and experiment. . . . These are bounds to which the Royal Charter limits this British assembly of philosophers" (*CHO,* 2:111). In the project for a "Compagnie des Sciences et des Arts" we find that "one shall never discuss in the Meetings the mysteries of Religion nor the affairs of the State" (quoted in Huygens, *Oeuvres complètes de Christiaan Huygens,* 4:325, 328). I think that if the Académie Royale des Sciences was not explicit in leaving theology and reason of state out of its subjects for discussion, it was because such a position was too obvious to state. However, the Académie did take a stance against discussions of metaphysical matters and the pursuit of final causes; see Hahn, *The Anatomy of a Scientific Institution,* pp. 32–33.

33. Quoted in Giuseppe Gabrieli, "Il Carteggio Linceo, Parte I (anni 1603–1609)," *Atti della Reale Accademia Nazionale dei Lincei, Memorie della classe di scienze morali, storiche, e filologiche,* ser. 6, no. 7 (1938): 65.

34. As Louis XIV put it, reason of state explained everything, though only princes could know what reason of state was about: "Ce qu'ils [les rois] semblent faire quelquefois contre le loi commune est fondé sur la raison d'État, la première des lois par le consentement de tout le monde, mais la plus inconnue et la plus obscure à tous ceux qui ne gouvernent pas" ("That which [the kings] sometimes seem to do against ordinary law has its roots in reason of state, the law that everyone puts first, though one that remains most obscure and misunderstood by those who do not rule") (quoted in Paul W. Fox, "Louis XIV and the Theories of Absolutism and Divine Right," *The Canadian Journal of Economics and Political Science* 26 [Feb. 1960]: 139). Similarly, Gabriel Naudé's 1639 *Considerations politiques sur les coups d'État* claimed that "la consideration du bien et de l'utilité publique pass assez souvent par-dessus celles du particulier" ("considerations of public

vener of the lectures on natural philosophy at the Parisian Bureau d'Adresse and a client of Richelieu (a pivotal figure in the establishment of reason of state), claimed that "the mysteries of matters of state share in the nature of divine things, and therefore it is best to talk about them the least."[35]

The stance against inquiries into the mysteries of religion and state mirrored the academies' bans on metaphysics, comprehensive philosophical systems, and on the search for the final causes of natural phenomena. As Roberval put it during a discussion on the nature of weight at the Académie Royale des Sciences, "one should not . . . pronounce on such mysteries. Their roots are completely impenetrable, and to cast light on them we would need a special intellectual ability which we lack."[36] Scientists were supposed to describe phenomena and discuss their proximate causes but, like princely subjects who were not allowed to probe the mysteries of reason of state, they did not seek final causes. In short, the limits scientific academies imposed on their inquiries mirrored the similarly cautious boundaries the neostoic philosophers of the period drew around their political analyses.[37] The instrumentalist orientation of the subjects of absolute rulers that disposed them against probing allegedly metaphysical mysteries was, I think, a disciplined subjectivity that reflected the regime of power of absolutism and of related doctrines of reason of state of which those mysteries were constitutive.[38]

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good and utility often supersede those of the interests of the individual subject"), and Daniel de Priezac's 1652 *Discours politiques* stated that the legitimacy of reason of state derives from the fact that the prince perceives things "par une raison universelle que les sujets ne connaissent pas" ("according to a universal reason that the subjects do not grasp") (both quoted in Henri Eugène Sée, *Les Idées politiques en France au dix-septième siècle* [1923; Geneva, 1978], pp. 82–83).

35. Renaudot, preface to *Première centuries des questions traitées aux conferences du Bureau d'Adresse,* p. 2.

36. Quoted in Joseph Bertrand, "Les Académies d'autrefois," review of *L'Ancienne Académie des sciences,* by Alfred Maury, *Journal des Savants* (June, July, Sept., Nov. 1866): 349. Bertrand does not give the date of the session, but it seems to be from 1669.

37. With the important exception of Hobbes's *Leviathan,* which tried to dispel the aura of mystery surrounding the foundations of the state and of princely power, literature on reason of state reiterated the sharp distinction between ordinary reason and reason of state. The latter was linked to the actions necessary to the stability of the state—actions that often defied individual or ordinary reason, thus "proving" the superior and mysterious nature of princely decisions. Beginning with Justus Lipsius, most of this literature reinterpreted Tacitus's stoicism and proposed a sharp distinction between the individual's need to develop a detached attitude about his or her predicament as a princely subject and his or her public acceptance of reason of state and its mysteries; see Gerhard Oestreich, *Neostoicism and the Early Modern State,* trans. David McLintock, ed. Brigitta Oestreich and H. G. Koenigsberger (Cambridge, 1982), pp. 28–75. See also Nanerl O. Keohane, *Philosophy and the State in France: The Renaissance to the Enlightenment* (Princeton, N. J., 1980), pp. 119–82.

38. Interestingly, probability theory emerged under political absolutism, and Pascal's elaboration of that theory was directly connected to his reflections in the *Pensées* on truth and justice as they related to the power and function of the absolute prince; see Matthew

To summarize, at the time the first academies were being established, the republic of letters was a quite porous configuration of differently powerful patrons and differently polite practitioners. The participants' different interests, backgrounds, and methodologies ensured that civility was, as we say today, a contested category. At the same time, civility could not be overlooked without endangering the sociability of the emerging republic of letters, the legitimation of claims about nature, the distribution of credit and distinction and, more generally, the social structures within which natural philosophers were trying to create their communities and networks. While in the long run the sociabilities of the republic of letters and court society diverged, I believe that the conditions of possibility of scientific etiquette remained framed by the processes through which authority and subjectivity were constructed within court society.

Etiquette, or How to Insulate Honor and Make It Work

Aristocratic and court cultures were characterized by great worries about etiquette violations and sensitivity about honor, status, and relative rank. Men could get into duels over their seating order at court events, and bitter disputes could emerge around perceived misuses of honorific titles. This resulted not simply from inflated, hypersensitive egos but also from the inherent opaqueness and contestability of categories of identity, honor, and status.

Early modern debates on the nature of nobility indicate that definitions of honor or virtue could only be operational; one could not determine exactly what the essence of honor was but only how honor could be gained or lost. Baldassare Castiglione's *Book of the Courtier,* for example, argued that *sprezzatura* (that which characterized the perfect courtier) was a natural gift, a form of bodily knowledge that could not be spelled out in words.[39] Similar views continued to be expressed more than a century later by Antoine de Courtin in his classic, *The Rules of Civility:*

> the *bonne Grace,* or the neat and becoming air; which is as it were natural to some persons, who by a particular bounty of Nature, have a way of pleasing in what ever they do, and displeasing nobody. Precepts for the acquisition of this Air, and agreeableness, are not to be given, it being a peculiar gift (expressed in this sentence *(Gaudeant benenati)* which Nature reserves to her self, and is almost the only thing which Art cannot imitate. [*RC,* p. 3]

Jones, "Pascal's Coeur and Louis' Cour: Justice and Probability in the *Pensées,*" unpublished manuscript, Department of History of Science, Harvard University, 1993.

39. See Baldassare Castiglione, *The Book of the Courtier,* trans. Charles S. Singleton (Garden City, N. Y., 1959), p. 96.

The unspeakability of that which constituted a "person of quality" indicates that identity was not a stable category but depended on how one was able to perform his or her own status and on how that display was confirmed or contested by the surrounding community—a community that needed to be very local as status symbols did not travel well. Because attire, demeanor, and access to and position within privileged court spaces were all body-dependent features, the construction and maintenance of one's status and identity was rooted in continuous ritualized physical interactions within a relatively small and highly interconnected community—court society itself.[40] However, what looked like a polite display was a hostile game that tied everyone to everyone else in an attempt, on everyone's part, to distinguish themselves from the rest and yet remain part of that society.[41] In this sense, princes and subjects were inherently tied to each other within a framework of tense interdependence that had the prince as its focal point.

Social distinction meant not just power but personhood itself. Elias has argued that individuality was not opposed to society but that the experience of oneself as a *distinct* individual resulted from a subjectivity constituted by peer-recognition of one's social distinction—a subjectivity one developed precisely by being enmeshed in a tightly interconnected social figuration.[42] Therefore, the prince was the most "individualized" and distinct member of court society because, being the node of the most important network of social recognition in that domain, his uniqueness was reluctantly recognized by all the other courtiers. Etiquette was the system of rituals through which that recognition was daily choreographed.

Honor and distinction were inherently linked. To have honor meant to be a noteworthy individual placed high on the social scale, that is, to be different from those placed below. It meant being different in ways that made a difference. Louis Marin has argued that signs of distinction (like expensive attire) signified power because they meant that one had the control over the people whose labor had produced those signs.[43] Individuality was constituted by wearing inscriptions that showed one had subjects from whom one differentiated oneself. Consequently, the prince's body, gestures, and actions needed to convey marks of distinction that represented him as the most distinct and therefore most powerful person—a unique individual entitled to power over his subjects. Common signs would have ruined the prince's "absolute individuality."

Honor, therefore, was not only an opaque and contestable category, but it was as fragile as it was great. To Castiglione, the fragility of honor

40. See Elias, *The Court Society,* pp. 78–116.

41. See ibid., pp. 99, 103, 144.

42. See Elias, *The Society of Individuals,* trans. Jephcott, ed. Michael Schroter (Oxford, 1991), pp. 3–66, esp. pp. 37–38, 59–60.

43. See Louis Marin, *Portrait of the King,* trans. Martha Houle (Minneapolis, 1988), pp. 26–36.

was the true mark of nobility:

> it is far less unbecoming for one of low birth to fail to do virtuous things than for one of noble birth, who, should he stray from the path of his forebears, stains the family name, and not only fails to achieve anything but loses what has been achieved already. For noble birth is like a bright lamp that makes manifest and visible deeds both good and bad, kindling and spurring on to virtue as much for fear of dishonor as for hope of praise.[44]

The apparently paradoxical symbiosis between power and fragility may be easily explained. Signs of princely power had to be fragile in order to convey the uniqueness of the prince—a uniqueness that, in turn, legitimized his power. Consequently, their reading was inherently unstable, an instability that was further enhanced by the fact that the readers of these signs were the people from whom the ruler was trying to differentiate him or herself while making them subjects. At the same time, as shown by Louis XIV, the prince's material resources helped him stabilize the reading of these fragile signs of power by disciplining rebellious aristocrats into reading them "correctly" and accepting his self-representation as somebody who had legitimate access to those resources. Authority was both produced by and necessary to the management of fragile signs of distinction.

The tense relationship between power, honor, and distinction explains the princes' and aristocrats' extreme sensitivity to insults and their reliance on etiquette as a means to control such occurrences. While commoners might overlook slightly inappropriate gestures and expressions or marginal violations of established rituals, princes were strongly predisposed to read them as insults and, sometimes, even as instances of *lèse-majesté*.[45] As we will see, the princes' fundamental sensitivity to insults can be traced, *mutatis mutandis,* to their caution about associating themselves with possibly controversial or problematic claims about nature.

I find it useful to think metaphorically of honor as electricity. Such a metaphor helps us visualize the predicament of a scientific practitioner (or any member of court society) whose discourse was framed by that of the prince's honor and authority. The more electric power you have, the more things you can do with it, but by the same means you are also at higher risk of devastating short circuits.[46] To make great honor work, one needed to insulate it properly and make it flow through carefully crafted

44. Castiglione, *The Book of the Courtier,* p. 28; trans. mod.

45. According to de Courtin, it was a "great dis-respect to speak the least immodest word before any, but more especially persons of Honour" (*RC,* p. 71).

46. Francesco Liberati warned courtiers not to get too close to princes because "they are like fire which, when placed at the appropriate distance, provides light and warmth, but burns and blinds when one gets too close to it" (Francesco Liberati, *Il perfetto Maestro di Casa* [Rome, 1668], p. 9).

social technologies. Etiquette was such a technology, as is indicated by Elias's remark that Louis XIV's self-representation as absolutely powerful was reflected in the great complexity of the court etiquette regulating access to his person and managing the interaction among the many high-status members of the court.[47] Etiquette allowed for the construction of complex webs of interdependencies, hierarchies, and forms of distinction by making the prince's electricity flow constructively without being touched, that is, without being questioned.[48]

In principle, a short circuit had the potential to undermine not only the prince but also the entire system of legitimation of claims, identities, and social hierarchies that rested on the prince's authority—that extraordinarily effective bluff staged by mutually dependent princes and subjects that, eventually, was collectively called during the French Revolution. Princely power maintained its legitimacy insofar as its roots were insulated by being presented as a mystery not to be questioned but simply believed. As with related categories such as honor, virtue, nobility, or *sprezzatura,* princely authority remained legitimate only by being presented as opaque and beyond verbalization and probing. To function as the roots of ancien régime society, these categories were represented as a form of tacit knowledge.

Frameworks of Interdependence and Sociability

Let me jump ahead of my story to give an example (which I will expand later) of how the processes that underlay these courtly scenarios of tense interdependence, fragile marks of distinction, and construction of princely authority through a hostile collusion of princes and subjects also framed the sociability and distribution of professional distinction within early prince-supported academies. Paradoxically, it was the Royal Society—the academy that, retrospectively, seems to best approximate a prince-independent corporation of natural philosophers—that constituted its authority in the republic of letters most like a king within his court.

The *Philosophical Transactions of the Royal Society* was a fundamental

47. See Elias, *The Court Society,* pp. 137–38.

48. Throughout this essay I employ two topoi to discuss the construction of authority: electricity and capital. While my use of electricity is completely metaphorical, that of capital is less so because, following Pierre Bourdieu, I include in this category marks of distinction that are not directly reducible to cash value. While I tend to use these two different topoi to analyze different issues, I do not see them as unrelated. Rather, through the metaphor of electricity I try to visualize the instability of the processes through which credit, authority, and capital are constituted. However, although electricity is valuable for discussing some dimensions of power, I am also aware that it is not a pliable enough metaphor to represent the ways the nature of power and authority changed in the period and environments discussed in this essay.

resource for the credibility of the Royal Society as a corporation—a resource that allowed it to give credit to its members and correspondents.[49] But if the *Transactions* gave credit to those who published there, it did so by recycling credit. The Royal Society was not naturally endowed with authority but became a central node of the republic of letters by enticing its "subjects" to "submit" their work (as gifts) to its journal.[50] It was this scientific sovereignty that the *Transactions* was then able to bestow back as credibility onto its contributors.[51] To use a different analogy, the Royal Society acted like a bank that gave out credit precisely because there were enough authors who were giving (depositing or contributing) their papers (Bourdieu might say their cultural capital) to the *Transactions*. While both the prince and the Royal Society displayed and were credited with authority, such authority rested on the subjects' trading their recognition of such authority for a distinct place in those social figurations that could not operate without nodes recycling those gifts of submission into marks of social or professional distinction.[52]

If the Royal Society, like a prince who needed many subjects to be powerful himself, sought contributions to the *Transactions* and exchanges with foreign correspondents, its distribution of credit and priority among the correspondents and members created tensions and conflicts analogous to those caused by the king's granting privileges to some of his subjects but not to others.[53] For instance, during the dispute between Hooke and Newton on the nature of light in the 1670s, or between Johannes Hevelius and Adrien Auzout on the comets of 1664–65, Henry Oldenburg and the Society found themselves in the very delicate position of having to assign different credit (that is, marks of philosophical distinc-

49. Some of the points made here derive from Iliffe, "Author-Mongering: The 'Editor' between Producer and Consumer," in *Word, Image, Object,* vol. 3 of *Commodities and Culture,* ed. Anne Bermingham and John Brewer (forthcoming) and "Foreign Bodies: 'Strangers' and Natural Philosophy in the Restoration," unpublished manuscript, History of Science Program, Imperial College, London, 1992.

50. Warren O. Hagstrom, "Gift Giving as an Organizing Principle in Science," in *Science in Context: Readings in the Sociology of Science,* ed. Barry Barnes and David Edge (Cambridge, Mass., 1982), pp. 21–34, argues that scientists' "gifts" of articles to journals still play a crucial role in the construction of credit in modern science.

51. Before the *Transactions* was published in 1665, I would say that the reward expected by those who submitted their work to the Society was to have their work presented to that community and to derive credit from that. However, the *Transactions* vastly amplified the kind of rewards the Society could bestow on its contributors because it could act as a public (rather than local) register of claims, discoveries, and inventions; see Johns, "Wisdom in the Concourse," pp. 162–63.

52. Pierre Bourdieu's *Distinction: A Social Critique of the Judgement of Taste,* trans. Richard Nice (Cambridge, Mass., 1984) has been an important and ongoing source of insights throughout this essay. On the Society's difficult negotiation of the culture of printers and booksellers to establish the role of "author" in natural philosophy, see Johns's "Wisdom in the Concourse," esp. chap. 4, "Piracy and Usurpation: Natural Philosophy in the Restoration," pp. 135–88.

53. See Elias, *The Court Society,* pp. 84–85, 89, and esp. p. 131.

tion) among its subjects while maintaining the integrity of that figuration so as to avoid its own loss of authority that might have resulted from some of its contributors' losing face and honor.[54] The stabilization of scientific claims was as tricky as that of courtly signs of distinction.

Therefore, the legitimation of one's claims and status as a credible author was predicated on the fragile stability of a dense network of natural philosophers whose contributions constituted the Royal Society as a center of authority.[55] While, retrospectively, we might be tempted to place the contributors to the *Transactions* in the category of modern scientific authors rather than of princely subjects, they were simply a different kind of subject—subjects not of a prince or within a specific court or country but of an interdependent figuration spread over different countries. The explicit tensions between coexisting local interests and pride and an international outlook show that the Society was caught between two inherently linked and conflicting needs: to strengthen its authority as a nationally situated institution by developing international networks.[56]

What the Society tried to develop was not increased independence but new modes of dense interdependence that, underneath the obvious morphological differences, still constituted individual distinction through etiquette-based processes of mutual dependency that were structurally analogous to those shaping courtly identities. Unlike an absolute prince who embodied the power of the surrounding social figuration, Oldenburg only helped manage the authority of the network centered on the Royal Society.[57] However, he shared in the princely role insofar as he effectively directed the development of the etiquette protocols that structured such a fragile emerging figuration.[58] As argued by Rob Iliffe,

54. See Shapin, "O Henry," review of *CHO,* by Oldenburg, *Isis* 78 (Sept. 1987): 417–24 and *A Social History of Truth,* pp. 267–91. See also Iliffe's and Johns's analyses of the tensions caused by the dispute between Hooke and Huygens on the spring watch.

55. The privilege the king granted the Society to publish with its own imprimatur was fundamental for the Society to construct itself as a center of power within the republic of letters. On the grant of the imprimatur, see the 1662 charter in *The Record of the Royal Society of London for the Promotion of Natural Knowledge* (London, 1940), p. 234.

56. On the tension between national and international outlooks within the republic of letters, see Daston, "The Ideal and Reality of the Republic of Letters in the Enlightenment," *Science in Context* 4 (Autumn 1991): 367–86.

57. I do not claim that Oldenburg's policies were unproblematic reflections of the Society's corporate will. While his role necessitated impartiality and transparency, Oldenburg tended to privilege the interests and views of some members of the Society (such as Boyle, his patron) rather than others (such as Hooke). Moreover, the role of the secretary was still a fluid one, and Oldenburg himself helped fashion it, sometimes in ways that other fellows found problematic. In fact, the duties and powers of the secretary were quickly reframed after Oldenburg's death, largely as a result of the tensions and conflicts of interest that had emerged during the dispute between Hooke and Huygens; see Johns, "Wisdom in the Concourse," pp. 178–80.

58. On Louis's ability to direct the evolution of etiquette and the social mobility of certain groups over others, see Elias, *The Court Society,* pp. 71, 89, and esp. p. 153.

it was Oldenburg who, by exercising his editor-function, decided how and when to turn his correspondents into the *Transactions*'s individual authors—a function structurally similar to a prince's distribution of marks of distinction.[59]

The transition from a princely patron to a corporation of interdependent practitioners as the primary agent of legitimation was not a linear process. In the seventeenth century, only the Royal Society approximated that format and obtained the legal status of corporation; for several decades it remained the only institution to recognize individual authorship and to publish with its own imprimatur. As we will see, other academies, such as the Accademia del Cimento and the Académie Royale des Sciences, exemplified hybrid frameworks of legitimation and authorship. While to some extent these continental academies addressed the wider international philosophical community, for a few decades the prince (rather than peer recognition) remained their most direct source of legitimation, as in the previous patronage environment. One might say that initially the recognition these savants may have received from the republic of letters did not constitute them as individual authors but tended more to be turned into cultural capital for their princely patrons. By and large, these academicians remained princely subjects, and the great international visibility of some of them (like Huygens or Gian Domenico Cassini) benefited their patron's distinction as much as their own. Consequently, the etiquette of these institutions was primarily concerned with maintaining or shielding the status of their patron rather than with developing and managing a broad community of interdependent practitioners.

If in time scientific academies managed to replace the princes as the central nodes of networks of interdependence and legitimation, this process was neither external nor opposed to the logic of princely power and etiquette but was predicated precisely on the emergence of prince-supported academies and on their ability to articulate new figurations and sociabilities within such frameworks. In a sense, the academies were able to use the "seed authority" (as in seed money) provided by the princes to develop networks that would eventually constitute them as "scientific courts" of a new (but equally etiquette-bound) realm: the scientific community.

The metaphor of princely power as electricity may help us understand how different institutional frameworks and modes of interdependence became historically viable and were articulated in different European countries in the seventeenth century. The relative distance between the prince and the practitioners as well as the power (the voltage) of the princes who sponsored or chartered the early scientific academies framed the different technologies of insulation and possible interdepen-

59. See Iliffe, "Author-Mongering."

dence developed in those institutions. European princes were not equally powerful, did not articulate identical discourses about their power, and had different degrees of investment in the academies they supported.

In general, the more the production and legitimation of the academicians' claims were represented as dependent on the prince, the more polite (insulated) they tended to be, and the more the practitioners were represented as subjects rather than authors. Symmetrically, a relatively large distance between practitioners and princes or a relatively low princely power allowed the practitioners to represent themselves more as authors than as subjects. However, there were limits to how distant one could get from the prince, as excessive distance would have prevented the legitimation of both the practitioners and their claims. One could not step outside the system altogether, as that would have produced not freedom but the disruption of the conditions of possibility for the new subjectivities the natural philosophers sought to articulate.

Participating Princes, Disappearing Practitioners

The Accademia del Cimento exemplifies the etiquette problems and forms of sociability (and subjectivity) framed by a prince's direct participation in an academy, that is, a scenario in which the practitioners worked with and around the power source.

Between 1657 and 1667, the Cimento—usually considered Europe's first academy of experimental science—gathered at the Florentine court around Prince Leopold de' Medici, the younger brother of Ferdinand II, Grand Duke of Tuscany.[60] Leopold called his academy into session whenever he desired, set its experimental agenda, paid for the instruments, and drew his academicians from mathematicians and philosophers who were already on the Medici payroll. The academy never received a legal charter. It began to meet around 1657, slowed down its activities after 1662, and stopped convening after 1667 when Leopold became cardinal. The very name Accademia del Cimento was a retrospective invention connected to the publication, in 1667, of the *Saggi di naturali esperienze*—a book presenting a selection of experiments conducted at the (by then) defunct academy.[61]

Leopold, a junior prince with very little hope of becoming Grand Duke, fashioned a role for himself by celebrating the house of Medici as the great patron of European science and by linking the Cimento to the

60. Standard sources on the Accademia del Cimento include Giovanni Targioni Tozzetti, *Notizie degli aggrandimenti delle scienze fisiche accaduti in Toscana nel corso di anni LX. del secolo XVII*, 3 vols. in 4 (1780; Bologna, 1967), and W. E. Knowles Middleton, *The Experimenters, a Study of the Accademia del Cimento* (Baltimore, 1971). Several elements of my discussion draw from Galluzzi, "L'Accademia del Cimento."

61. See Galluzzi, "L'Accademia del Cimento," pp. 790–93.

tradition of two previous Medici scientists, Galileo and Evangelista Torricelli. Much of the work conducted at Leopold's academy was represented as linked to Galileo's mechanics (but not, of course, to his controversial astronomy) and to Torricelli's early crucial experiments on the vacuum. Basically, Leopold strove to present the Medici as the European trendsetters in science.[62] His active celebration of Florentine (that is, Medicean) art reflected analogous goals and strategies, as shown by his sponsorship of Filippo Baldinucci's monumental six-volume *Notizie de' professori del disegno da Cimabue in qua* as a much needed update to Giorgio Vasari's *Lives of the Artists*—a move aimed at constituting Florence as the capital of European art.[63]

The Cimento's unofficial status may have reflected Leopold's participation in it. A prince of his rank could easily taint his image by working together with his subjects (some of whom were of quite low social background) in an official professional context, but such participation could instead be justified by presenting the academy as a sort of sport, that is, an activity in which standard codes of etiquette were greatly relaxed.[64] Similar concerns can be found at play behind the public, textual presentation of the academy's work, the 1667 *Saggi,* where Leopold was presented as a princely supervisor rather than the hands-on participant he often was.[65]

Similarly, the members of the Cimento were not allowed to display their association with the academy by using titles such as Accademico del Cimento. They could not become academicians, that is, members of an official corporate body, because Leopold's status required them to be, so to speak, his scientific servants—agents of his celebration of Medicean science. Leopold's encomiastic agenda can also be read in the distribution pattern of the *Saggi,* which was neither sold nor made widely available to members of the republic of letters. Rather, this elegantly illustrated volume celebrating the continuing wealth of Medicean science through a selection of the academy's experiments was usually given out as a sort of

62. See ibid., pp. 793–97.

63. See Filippo Baldinucci, *Notizie de' professori del disegno da Cimabue in qua,* 6 vols. (Florence, 1681–1728). On Leopold and Baldinucci, see Edward L. Goldberg, *After Vasari: History, Art, and Patronage in Late Medici Florence* (Princeton, N. J., 1988). On the broader dimensions of this project, see Tribby, "Club Medici: Natural Experiment and the Imagineering of 'Tuscany,'" *Configurations* 2 (1994): 215–35.

64. For brief biographical sketches of the participants in the Cimento, see Middleton, *The Experimenters, a Study of the Accademia del Cimento,* pp. 26–40. On Antonio Oliva—the most "picturesque" of the academicians—see Ugo Baldini, *Un libertino accademico del Cimento: Antonio Oliva* (Florence, 1977).

65. This, in fact, is how Leopold was presented in the preface to the *Saggi:* see *Saggi di naturali esperienze fatte nell'Accademia del Cimento sotto la protezione del Serenissimo Principe Leopoldo di Toscana e descritte dal segretario di essa Accademia* (Florence, 1667); rpt. in *L'Accademia del Cimento,* ed. Giorgio Abetti and Pietro Pagnini (Florence, 1942), p. 85.

coffee-table book to members of the European princely and aristocratic community.[66]

The academy committed itself to the experimental method, that is, to the description of experimentally produced effects rather than to the identification of their ultimate causes. If the *Saggi* included occasional interpretations and hypotheses that went beyond the mere description of experiments, these were not presented as essential components of the text but as devices to ease "the transition from one experiment to another" and were explicitly cast as "the idea or opinion of individual academicians, but never of the Academy, whose sole goal is to experiment and describe."[67] This cautious position was not only a result of Leopold's desire to keep clear of possible conflicts like those experienced by Galileo with theologians; it reflected the politeness of the philosophical etiquette to which he was bound by his own status.[68] By having his subjects perform and describe experiments rather than seek their causes, Leopold made sure that the activity of the Cimento would not lead to status-tainting disputes—a goal made explicit in the *Saggi*'s prologue, which stated that "above all, we are committed not to ever pick a fight with anyone by entering in subtle disputes or contentious contradictions."[69]

The care Leopold dedicated to the various replications of Torricelli's experiment on the vacuum and their textual representation in the *Saggi* bear out his caution most clearly. The existence of the vacuum was a very contentious issue as it went against fundamental assumptions of both Aristotelian and Cartesian philosophy. For instance, Michelangelo Ricci, an etiquette-conscious Roman mathematician who eventually became a cardinal, warned Leopold about the attacks that might have been elicited by the *Saggi*'s discussion of the vacuum—attacks that he perceived as particularly embarrassing because of the prince's explicit patronage of the academy.[70] Although sharing Ricci's worries, Leopold wanted to claim the Torricellian (that is, Medicean) priority of this discovery, which had been widely replicated and discussed throughout Europe after the initial experiment in 1643. In the end, he found himself in a difficult position: he could either claim the existence of the vacuum (thus maximizing the Medici's prestige for having patronized such a philosophically important discovery), or make a "softer" claim that would give the Medici both less credit and less trouble.

66. See Galluzzi, "L'Accademia del Cimento," pp. 796, 798. I believe the *Saggi* could not be bought because it was not appropriate for a prince to be perceived as somebody who sold books.

67. "Proemio a' lettori," preface to the *Saggi;* rpt. in Targioni Tozzetti, *Notizie degli aggrandimenti delle scienze fisiche,* 2:2:381. This stance against speculative attitudes was repeated in Magalotti's "Elogio del Cardinal Leopoldo," in *LI,* 1:2.

68. See *L'Accademia del Cimento,* pp. 83–87, 124. A further example of Leopold's commitment to polite exchanges is in a 10 Feb. 1667 letter to Huygens, *LI,* 1:220.

69. "Proemio a' lettori," 2:2:381.

70. See Michelangelo Ricci, letter to Leopold, 8 July 1663, *LI,* 2:117–18.

Eventually, Leopold's concern with avoiding embarrassing disputes outdid his desire for distinction, and the academy limited itself to reclaiming Torricelli's priority for the experiment but not for the discovery of the vacuum. While the *Saggi* reported that the Torricellian cylinder displayed a space "empty of air," it admitted that such a space could be filled by something else.[71] While the Italian term *vuoto* means both "empty" and "vacuum," the *Saggi* made sure to use it as an adjective, not as a noun. Interestingly, the claim that Torricelli had discovered the vacuum was made only in a tract "privately" published by a Medici client, Carlo Dati, who, erring on the side of caution, never mentioned the academy and signed himself as Timauro Antiate.[72] However, Leopold's concern with avoiding controversial claims was not shared by all academicians; Giovanni Alfonso Borelli, for example, thought that the prince's caution was preventing the academy from making more relevant contributions.[73]

Also, in the *Saggi* Leopold made sure that the academy's activity was represented as having proceeded as smoothly as possible, undisturbed by internal disputes. The strong tensions and disagreements (sometimes punctuated by colorful insults) recorded in both the academicians' and Leopold's private correspondence were made invisible in the book.[74] Moreover, no name of any academician was made explicit. The only voice found in the *Saggi* is that of the secretary who compiled the volume, whose name, however, was also left unmentioned. Similarly, the "Relation de l'Eclipse Horizontale de Lune observée en l'isle de Gorgone le 16 Juin 1666 par l'ordre du Serenissime Prince Leopold," printed in the *Journal des Sçavans,* mentioned neither the academy as an official body nor the names of any of the academicians sent by the prince to the island and to two other sites in Tuscany.[75] By stressing that the expedition originated from the desires (and resources) of the prince, the report presented Leopold as the implicit author. The authorship of the academicians was erased (or "insulated" until it was extinguished) because they were too close to the prince.

The *Saggi*'s textual strategies allowed Leopold to efface himself sufficiently from the academy's activities to preserve his princely status and yet not enough to delegitimize the academy's results. Unlike the Royal Society, which committed itself to certifying knowledge by collective witnessing, the Cimento's results were granted credibility simply by virtue

71. Quoted in Galluzzi, "L'Accademia del Cimento," p. 806.

72. See ibid., pp. 805–11.

73. See ibid., pp. 795–97.

74. See Leopold, letter to Ricci, n.d., *LI,* 2:131; Borelli, letter to Paolo del Buono, 10 Oct. 1657, *LI,* 1:94–95; and Galluzzi, "L'Accademia del Cimento," pp. 806–7.

75. See "Relation de l'Eclipse Horizontale de Lune observée en l'isle de Gorgone le 16 Juin 1666 par l'ordre du Serenissime Prince Leopold," *Journal des Sçavans,* 6 Sept. 1666, pp. 426–30; hereafter abbreviated *JS.*

of having been implicitly certified by somebody of Leopold's status. As Lord William Brouckner, the president of the Royal Society, stated in 1668, "having been examined with the help and patronage of a prince so great, splendid, and wise, one could not doubt that they had been well corroborated and clarified."[76] Although Leopold was never explicitly presented as a participant or a certifying witness, his effaced and yet effective presence freed the *Saggi* (or the report on the expedition to Gorgona) from the need to reproduce the names of the witnesses and experimenters or provide the painstakingly detailed experimental report proposed by Boyle and the Royal Society—something that lower-ranking practitioners would have had to do to gain assent from their peers. Finally, because the *Saggi* did not mention the name of any academician in particular, the credit for the work of the academy fell by default to the prince. Leopold became the author in absentia—the only way in which he could enhance (rather than jeopardize) his distinction.

The Roi Soleil *as Remote Legitimizer*

Louis XIV's establishment, in 1666, of what became known as the Académie Royale des Sciences was a grand patronage gesture fitting the power image of the *Roi Soleil.* He did not support one specific discipline or a few practitioners but, with a gesture of noblesse oblige, he patronized all the natural sciences, representing himself as conquering yet another realm: the republic of letters.[77]

Because of Louis XIV's self-representation as the *Roi Soleil,* that is, as somebody much more powerful than Leopold, his active participation in the Académie (had he wished it) would have posed serious etiquette problems. Louis's voltage, I believe, would have been too high to be insulated in a potentially contentious environment like a scientific academy.

76. Quoted in Magalotti, letter to Leopold, 13 Mar. 1668, *LI,* 1:303.

77. On Louis's policies of cultural control, see, for instance, Jean-Marie Apostolides, *Le Roi machine: Spectacle et politique au temps de Louis XIV* (Paris, 1981), esp. chap. 2, "L'Organisation de la culture," pp. 23–40. On the place of the Académie within Louis's cultural politics, see Hahn, *The Anatomy of a Scientific Institution,* pp. 12–13, 52–53. The alternative plans Jean-Baptiste Colbert considered before 1666 were equally grand or even grander, like the more technology-oriented Compagnie des Sciences et des Arts; see "Project de la Compagnie des Sciences et des Arts," in *Oeuvres complètes de Christiaan Huygens,* 4:325–29; or Charles Perrault's Académie Générale, a body encompassing all branches of erudition except the more practical subjects; see Charles Perrault, "Note de Charles Perrault à Colbert pour l'établissement d'une Académie Générale," in *Lettres, instructions, et mémoires de Colbert,* ed. Pierre Clément, 7 vols. in 8 (Paris, 1861–70), 5:512–14. While the technological advantages the state may have reaped from the Académie may have played a role in its establishment, Colbert and Louis seemed to be more concerned with glory than with technology as they did not choose to support the more practical Compagnie des Sciences et des Arts. Also, the Académie Royale des Sciences took a more practical bent only after the death of Colbert, under the protectorship of the Marquis de Louvois.

Then, unlike Leopold who could enhance his distinction by celebrating the history of Medicean patronage of famous Italian scientists, Louis did not have a comparable French scientific tradition to mythologize and probably saw the Académie as just another jewel in his rich collection of royal academies. In fact Louis did not participate in his scientific academy and visited it only briefly in 1681 at the Royal Library and in 1682 at the Observatory. Both visits were ceremonial. Louis was given a tour and was shown only a few unproblematic demonstrations.[78] From court rituals to experiments, nothing was supposed to go wrong in front of the *Roi Soleil.*

Unlike Leopold, who participated in his academy and witnessed its results (though his involvement was carefully effaced in the Cimento's public presentation in the *Saggi*), Louis, probably because of his higher status, never acted as a certifying witness for the Académie. While he observed his academicians at work during his visits, he acted as a spectator to already stabilized experiments, not as a witness involved in the knowledge-making process. Similarly, when Louis watched "science in action" during the dissections of exotic animals at Versailles, those events were framed as spectacles, not as research sessions. Furthermore, those dissections did not take place in the Académie's locales, but in the king's residence, that is, in his "private" space.[79] It was not the king who went to the Académie, but the academicians who, summoned by their prince, went to entertain him at "home"—a scenario that seems to reflect the same etiquette protocols that allowed Boyle's instrument makers and assistants to visit him and work in his locale, but prevented Boyle (an aristocrat) from visiting his assistants in their workshop.[80]

If the etiquette regulating Leopold's, Boyle's, and Louis's involve-

78. The description of the visit of 5 December 1681 is in *HAR,* 1:319. That the chemical experiments Samuel Cottereau Duclos showed the king were quite easy to perform may be inferred from their quantity. Also, they seemed to have been selected for their unambiguous nature ("M. Du Clos executa en presence de Sa Majesté plusieurs expériences; il fit *en un instant* la coagulation de l'eau de mer par le moyen de l'huile de tartre" ["Monsieur Du Clos performed several experiments in front of His Majesty and coagulated seawater with oil of tartar, which happened *in an instant*"]) and for their striking olfactory and visual outcome ("il redusit après plusieurs lotions en une terre insipide, des sels *très-acres,* comme le sel de tartre; . . . il fit voir de la Manganese, qui étant verte oue la *couleur verte* au verre" ["he then reduced several solutions of *very acrid* salts such as the salt of tartar, to an *insipid* earth; . . . he showed some *green* Manganese, which gives that color to the glass"]) (*HAR,* 1:319; emphases added).

79. "L'Académie fut mandée sur le lieux, et le roi ne dédaigna pas d'être présent à l'examen de quelques-unes des parties" ("The Académie was sent there, and the king did not disdain to be present at the examination of some of the parts") (Bertrand, "Les Académies d'autrefois," p. 345).

80. See Shapin, "The House of Experiment in Seventeenth-Century England," p. 382. Similarly, although Leopold worked with his academicians, such interaction tended to take place in his private rooms, and he did not join the academicians when they debugged experiments in their own residences; see Middleton, *The Experimenters, a Study of the Accademia del Cimento,* p. 57. The Cimento also performed in front of the court, but I believe that these events fell into the category of spectacle, not knowledge making.

ment in the knowledge-making process was structurally analogous, their voltage was quite different and required different levels of insulation. While Boyle (a noble) could be an author, attach his name to his printed works, and publicly represent himself as working with his assistants, Leopold (a prince) publicly effaced his involvement and fashioned himself as an author in absentia. Louis, by far the most powerful of the three, removed himself physically from the knowledge-making scene (not just textually, as Leopold had done) and yet, thanks to his greater power, he could continue to legitimize his academicians' work from a distance.

Still, because of his status, Louis tended to keep his relationship to (and distance from) his academicians somewhat ambiguous—an ambiguity that resembles the informal features the Cimento had adopted as a result of Leopold's participation in it.[81] For instance, until 1699 the Académie shared many of the private and somewhat secretive features of Leopold's academy: it tended to efface individual authorship, lacked statutes and explicit protocols regulating its activities, and, for some time, even lacked an official name.[82] An aura of secrecy shrouded its activities, and visitors were admitted to the Académie's meetings only very rarely.[83] While one might have visited the Observatory, savants who tried to gather information about the internal workings of the Académie had their curiosity frustrated.[84] Official communication with the republic of letters or with other scholarly societies was initially very limited, a situation that frustrated some academicians who, like the members of the Ci-

81. Of course, this tendency fits well with the prince's interest—clearly displayed by court structure—to centralize power in his hands by keeping the rules fluid and by limiting the development of a relatively independent bureaucracy.

82. Until 1672, it was referred to in the *Journal des Sçavans* not as the Académie Royale des Sciences but rather as "those who meet in the royal library" (quoted in Elmo Stewart Saunders, "The Decline and Reform of the Académie des Sciences à Paris" [Ph.D. diss., Ohio State University, 1980], p. 110, and Hirschfield, *The Académie Royale des Sciences, 1666–1683,* p. 21).

83. See Stroup, *A Company of Scientists,* p. 211.

84. See Hirschfield, *The Académie Royale des Sciences, 1666–1683,* pp. 68, 119, and Bertrand, "Les Académies d'autrefois," p. 339. Even as late as 1698, a well-introduced English savant like Martin Lister was able to meet many of the academicians only privately and could gather only minimal information about the Académie's protocols; see Martin Lister, *A Journey to Paris in the Year 1698* (London, 1699), p. 78; hereafter abbreviated *JP.* In 1709 Fontenelle acknowledged the early secrecy of the Académie in his *Histoire de renouvellement de l'Académie Royale des Sciences en 1699,* in *Histoire de l'Académie des Sciences,* vol. 6 of *Oeuvres complètes,* ed. Alain Niderst (Paris, 1994), p. 66. Such secrecy had been a policy, not an accident. In the minutes of the session of 15 January 1667 (one of the very first) we find that "toutes les choses qui seront proposées dans l'assemblée demeureront secrèttes, que l'on ne communiquera rien au dehors que du consantement de la Compagnie" ("everything that was proposed in the assembly stayed secret, so that no one could communicate anything without the consent of the Company") (Archives de l'Académie des Sciences [Paris], *Procès-Verbaux des Séances de l'Académie des Sciences,* Registre de Physique, vol. 1, p. 200).

mento before them, saw some of their authorial claims go unrecognized by the wider philosophical community.[85]

Between 1666 and 1699 the Académie met regularly and produced books, and yet it did not quite exist legally. While official statutes were formulated in 1699, they were accompanied by a royal letter-patent only in 1713.[86] All Louis did in 1666 was to give verbal approval to the academic project put forward by his minister, Colbert.[87] This pattern of informality, similar to what we have already encountered in the Cimento, extended to the character of the sites in which the academy gathered. It first met in a private space (Colbert's library), then it moved to a semi-official site (the Royal Library), and it was only *after* its formalization in 1699 that it moved to the Louvre and began to have meetings open to the public twice a year.[88]

The development of views on authorship and publication reflected the Académie's slow but consistent articulation of protocols of internal interdependence.[89] Individual authorship was explicitly addressed as an

85. The tensions between the academic policy of secrecy and the savants' concerns with claiming priority for their work are discussed in Stroup, *A Company of Scientists,* pp. 204–17. In the case of the Cimento we find that Borelli developed authorial feelings about his work on testing Huygens's and Divini and Fabri's hypotheses about Saturn's rings; see Targioni Tozzetti, *Notizie degli aggrandimenti delle scienze fisiche,* 1:385. He was also criticized by Magalotti in a letter to Vincenzo Viviani dated 4 Dec. 1661 for "treating as his own the experiments made in the Accademia del Cimento on the positive lightness of bodies, disregarding the laws of that same academy which claim that everything should be treated as communal" (quoted in Fermi, *Lorenzo Magalotti, scienziato e letterato, 1637–1712,* p. 83).

86. "En vertu de ce Réglement, l'Académie des Sciences devient un Corps établi en forme par l'autorité royale, ce qu'elle n'étoit pas auparavant" ("By virtue of this Statute, the Académie des Sciences becomes a body formally established by royal authority, something it was not before") (Fontenelle, *Histoire de renouvellement de l'Académie Royale des Sciences en 1699,* p. 66).

87. See Hirschfield, *The Académie Royale des Sciences, 1666–1683,* p. 19.

88. See Jack A. Clarke, "Abbé Jean-Paul Bignon: 'Moderator of the Academies' and Royal Librarian," *French Historical Studies* 8 (Fall 1973): 219. It is also telling that the papers to be presented in those public meetings were selected (that is, screened) by the president, the Abbé Bignon—that is, by the king's representative within that body; see Saunders, "The Decline and Reform of the Académie des Sciences à Paris," p. 148.

89. Until 1699, the Académie was not a corporation but at best a consultative body that the king ran through Colbert and his successors. The various *surintendants* (who were not practitioners themselves) acted less as mediators between the Académie and the king and more as its directors. Moreover, there were no clear-cut protocols regulating daily activities, which increased the power of the *surintendant;* see Hirschfield, *The Académie Royale des Sciences, 1666–1683,* pp. 63, 118. Like Leopold with the Cimento, Colbert and his successors ultimately decided the fate of publications and research programs, assigned tasks, adjudicated grievances and disputes, and, in general, set the body's agenda. When a *surintendant* died, the Académie went through serious crises not unlike those experienced by individual clients upon the death of their patron; see Saunders, "The Decline and Reform of the Académie des Sciences à Paris," pp. 105, 185.

issue in 1688 and was formalized only in 1699, that is, after the Académie had become more of an institution.[90] Instead, collective authorship was dominant in official publications during the early decades, and Louis's ministers had direct control over the Académie's official publications "to preserve the purity of the company's reputation."[91] Unlike the Royal Society, the Académie could not publish with its own imprimatur. While the academicians had access to less official (or foreign) venues of publication, the format of these communications also reflected tensions around the issue of authorship.[92] For instance, while short reports of the Académie's work (usually a few pages long) were published in the *Journal des Sçavans*, they tended to be reviews rather than official papers. Curiously, these reviews did not refer to the Académie Royale des Sciences as an official body but limited themselves to saying that the work was done or shown at the king's library by an "assemblée" that met there.[93] Then, at first,

90. On tensions around authorship, publication, and communication with outsiders see Stroup, *A Company of Scientists,* pp. 200–209. On the Académie's slow development of a network of correspondents, which, according to Fontenelle, had become sizeable by 1686, see ibid., p. 212. In 1688 the Académie decided that its members could not publish their books (and claim individual authorship for them) without approval; see ibid., p. 205. Individual authorship was explicitly recognized in the 1699 statutes; see the 1699 "Réglement ordonné par le Roi pour l'Académie Royale des Sciences," item 20; rpt. in Fontenelle, *Histoire de renouvellement de l'Académie Royale des Sciences en 1699,* p. 59.

91. Hahn, *The Anatomy of a Scientific Institution,* p. 27. Other institutions tried to reduce the risk of placing themselves in a potentially embarrassing situation or of insulting their interlocutors by controlling publications or by having their members use pseudonyms. The cautionary tactics adopted by the Accademia dei Lincei are discussed in Odescalchi, *Memorie istorico critiche dell'Accademia de'Lincei,* pp. 219–20, 230. On the Society of Jesus' publication policies, see Baldini, "Una fonte poco utilizzata per la storia intellettuale: Le 'censurae librorum' e 'opinionum' nell'antica Compagnia di Gesù," *Annali dell'Istituto Storico Italo-Germanico in Trento* 11 (1985): 37.

92. In 1677, Duclos's manuscript on the principles of natural mixts was not accepted for official publication because it might have offended "some delicate Philosophers." Three years later, Duclos had the book privately printed in Amsterdam (quoted in Stroup, *A Company of Scientists,* p. 206).

93. See, for instance, "Extrait d'une lettre de Mr Pecquet à Mr de Carcavi," *JS,* 4 Apr. 1667, pp. 81–84; "Observations faites sur un grand Poisson," *JS,* 28 Nov. 1667, pp. 157–60; "Extrait d'une lettre écrit à Monsieur de la Chambre," *JS,* 5 Dec. 1667, pp. 171–74; "Extrait d'une lettre de M. P. à M.***," and "Extrait du registre de mathématique," *JS,* 30 July 1668, pp. 68, 69–72; "Nouvelle découvert touchant la Veuë" and "Lettre de M. Pecquet sur la nouvelle Découvert touchant la Veuë," *JS,* 17 Sept. 1668, pp. 79–84; "Observation de Saturne," *JS,* 11 Feb. 1669, pp. 11–12; "Nouvelle manière géometrique," *JS,* 2 Sept. 1669, pp. 32–36; "Description anatomique d'un Caméleon," *JS,* 16 Dec. 1669, pp. 37–42; and "Nouvelle manière de balance," *JS,* 10 Feb. 1670, pp. 9–12. I have used the original edition printed in Paris by Jean Cusson. While some of these articles were based on letters to the editor, most of them tended to be either summaries (probably supplied by academicians) or reviews of pamphlets (probably a few pages long) that had been printed "Chez Frederic Leonard." Leonard was an "Imprimeur ordinaire du Roy," that is, someone authorized to print for the king material that could not be handled by the official printing house, the Imprimerie Royale. The choice of printer and the format of the printing (quarto, rather

when academicians sent letters to the *Journal des Sçavans,* they were printed without presenting the authors as members of the Académie.[94] This effacement of official status becomes more striking once we realize that Abbé Jean Gallois, an academician since 1668, had been put in charge of the *Journal des Sçavans* by Colbert and that, therefore, it could have been practically feasible for the publication to become the Académie's official link to the republic of letters.[95] That this was not the case suggests that, unsurprisingly, princely caution overrode the academicians' desire for individual credit and professional distinction.

As with the Cimento, during the Académie's informal period the king directly shared the credit for the work of his "agents." This was particularly evident in the 1686 medal celebrating Cassini's discovery of new satellites of Saturn. Nowhere on the medal is Cassini's name to be found, as the motto is limited to "V.SATURNI SATELLITES PRIMUM COGNITI." The erasure of Cassini's name was not a sign of royal unfairness but rather of Louis's noblesse oblige toward him. As with the Cimento, a direct affiliation with the prince might have caused the subject's authorial effacement. It is telling that Cassini's discoveries were not quite represented as contributing to Louis's glory. Rather, the medal's description suggests that it was Louis who—by having that medal struck—was honoring the discovery by allowing it to be recorded "among the events of the reign of His Majesty."[96]

The limited authorship granted to the members of the Académie

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than the folio used for the Académie's early official publications) indicate that although these short pamphlets (which I have not been able to locate) were not published incognito, they were given a much less official status (consonant with the unofficial picture they presented of the Académie and of its members). Probably they were meant for a Parisian market—allowing the king and the academicians to receive some credit for their works and patronage without exposing them to the risk connected to an official publication.

94. Huygens, whose letters and reports the *Journal des Sçavans* had published since 1666, was identified as belonging to the Académie Royale des Sciences only in the February 1672 issue to which he contributed a letter "touchant la Lunette Catoptrique de M. Newton." See "Extrait d'une lettre de M. Hugens de l'Academie Royalle des Sciences à l'Auteur du Journal des Sçavans, touchant la Lunette Catoptrique de M. Newton," *JS,* 29 Feb. 1672, pp. 53–55. This designation (which was not given to any of the other academicians who published in the *Journal* before 1672) became common after that date.

95. See Betty Trebelle Morgan, *Histoire du "Journal des Sçavans" depuis 1665 jusqu'en 1701* (Paris, 1929), pp. 127–74.

96. Académie Royale des Medailles et des Inscriptions, *Medailles sur les principaux événements du regne de Louis de Grand* (Paris, 1702), p. 214. On this event, see also I. Bernard Cohen, "G. D. Cassini and the Number of the Planets: An Example of Seventeenth-Century Astro-Numerical Patronage," in *Nature, Experiment, and the Sciences: Essays on Galileo and the History of Science,* ed. Trevor H. Levere and William R. Shea (Boston, 1990), pp. 199–205. The description of the medal as published by the Académie des Inscriptions was also silent about the author of the discovery, which was collectively indicated as the "Scavants Hommes, que le Roy entretient à l'Observatoire" (Académie Royale des Medailles et des Inscriptions, *Medailles sur les principaux événements du regne de Louis de Grand,* p. 214).

during its early decades may reflect the same princely concerns expressed in the authorial effacement of the Cimento's academicians. While Louis's savants had their names mentioned in their collective works, their individual contributions were initially subsumed under corporate authorship. The authorship of Leopold's academicians may have been effaced more than that of the members of the Académie because Leopold got closer to the Cimento than Louis to his academicians. In short, the collective authorship of the early Académie may not only have reflected a Baconian ethos of collective work but may also have been a form of partial anonymity that created an ambiguous author-function, by which both the academicians and the king could share in the credit.[97] The academicians tended to be effaced as authors of individual books but remained visible as a *royal* body, and the king received credit because he sponsored and legitimized the academy that had produced that knowledge. While the academicians were not made nameless (as they were in the Cimento's *Saggi*), they were still presented as princely subjects.

The analogies with the Cimento can be traced further. Like the *Saggi,* the early publications of the Académie were not aimed at the members of the republic of letters (who could rarely get hold of them). Instead, they were large and elegant folios, often lavishly illustrated, printed by the Imprimerie Royale "en grand papier," aimed at celebrating Louis's glory in the eyes of other princes.[98] Then, the definition of membership remained quite hazy during the first decades, not unlike what we have seen in Leopold's academy.[99] The Académie also tried to represent itself as

97. The first line of the "Avertissement" of the *Mémoires pour servir à l'histoire des plantes* (Paris, 1676) states that "this book is the work of the Académie as a whole" (p. 1). While the title page credits Denis Dodart with having "dressez" (that is, prepared) the volume, the "Avertissement" (written by Dodart himself) lists the various contributors to the project and describes their tasks as having been equally important to the conception and completion of the project. On the other hand, the *Récueil de plusieurs traitez de mathématique de l'Académie Royale des Sciences* (also published in Paris in 1676) lists the names of the individual authors of its chapters while stressing, at the same time, that the volume is a publication of the academy, not of some of its members. The third major publication of the early Académie, the *Histoire des Animaux* (Paris, 1676), reverted to a more collective view of authorship. While these works do not present identical views of authorship (and some of those differences may reflect the different scales of the projects and the different levels of collaboration required by their completion), they do share a tension between presenting themselves as the work of a royal body and the work of the individual members of that body. On the tensions between individual and collective authorship in the Académie, see Stroup, *A Company of Scientists,* p. 207; Hahn, *The Anatomy of a Scientific Institution,* p. 26; Bertrand, *L'Académie des Sciences et les académiciens de 1666 à 1793* (Paris, 1869), p. 45; and Hirschfield, *The Académie Royale des Sciences, 1666–1683,* p. 146.

98. See Saunders, "The Decline and Reform of the Académie des Sciences à Paris," p. 76, and Hirschfield, *The Académie Royale des Sciences, 1666–1683,* p. 69. Even the first edition of the *Récueil de plusieurs traitez de mathématique de l'Académie Royale des Sciences* was not reviewed in the *Philosophical Transactions,* indicating how poor its diffusion must have been.

99. See Saunders, "The Decline and Reform of the Académie des Sciences à Paris," p. 183. While some people received pensions for their participation in that body (though these

devoid of controversies, although we find considerable evidence of internal disputes.[100] When disagreements became public, as with the debate on the site of vision among Edme Mariotte, Jean Pecquet, and Claude Perrault in 1668–76, history was aptly rewritten by the Académie's secretary, Bernard le Bovier de Fontenelle, so as to recast it as a "beautiful" dispute characterized by "infinite fine and ingenious reflexions, and very delicate details" that expressed "all the subtlety of the contestation" (*HAR,* 1:103).[101] Finally, as with the Cimento, the Académie was very care-

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payments were presented as generic gratifications and not as academic stipends), others drifted in and out of its meetings; see *Lettres, instructions, et mémoires de Colbert,* 5:470–98. To be an academician was not seen as a job but as a favor, some sort of gratification, and no taxes were levied on that income; see Stroup, "Royal Funding of the Parisian Académie Royale des Sciences during the 1690s," *Transactions of the American Philosophical Society* 77, pt. 4 (1987): 22. On the porousness of the membership during the early decades of the Académie, see Saunders, "The Decline and Reform of the Académie des Sciences à Paris," pp. 183–88. Only in 1699 did the statutes spell out the number, classes, and hierarchies of membership as well as the protocols for selecting new members, whose election, however, was still decided by the king; see the 1699 "Réglement ordonné par le Roi pour l'Académie Royale des Sciences," pp. 55–66.

100. When disputes broke out in its meetings, the Académie did its best to keep them from reaching the republic of letters, something the Cimento had also done, and for the same reasons; see Stroup, *A Company of Scientists,* p. 208. In the Académie's early years, Colbert intervened to settle various disputes, showing that the academicians had not yet developed internal protocols to manage such occurrences; see Saunders, "The Decline and Reform of the Académie des Sciences à Paris," pp. 115–17, 118–20, 209–11. In the case of the dispute on the speed of light between Cassini and Olaus Roemer we see that, while the manuscript *procès-verbaux* claim that the differences between the two academicians had been resolved during an academic meeting, Cassini later went to print rejecting Roemer's claims; see Bertrand, "Les Académies d'autrefois," p. 423. Auzout's departure from the Académie seems to be related to unresolvable internal disputes; see Alessandro Segni, letter to Leopold, n.d., *LI,* 1:310. Prescriptions for polite behavior were eventually inscribed in the 1699 statute: "L'Académie veillera exactement à ce que dans les occasions où quelques Académiciens seront d'opinions différentes, ils n'emploient aucun terme de mépris et d'aigreur l'un contre l'autre, soit dans leur discours, soit dans leur écrits" ("The Académie will watch carefully so that when some academicians are of different opinions, they shall not use any harsh or derogatory word against each other, neither in conversation nor in their writings") ("Réglement ordonné par le Roi pour l'Académie Royale des Sciences," item 26, p. 60). Items 37 and 38 also dealt with politeness-related issues; see p. 63.

101. That the dispute went public may be due to the fact that Mariotte was not an official member of the Académie when he communicated his findings to that body early in 1668. His letter to Pecquet, summarized in the *Journal des Sçavans* and followed by Pecquet's reply, is signed from Dijon and cites a Father Jacques de Billy (a Jesuit from Dijon) as a witness to Mariotte's experiments; see "Nouvelle découverte touchant la Veuë" and "Lettre de M. Pecquet sur la nouvelle Découvert touchant la Veuë." Mariotte was officially admitted to the Académie only at the end of that year; see René Taton, "Mariotte et l'Académie Royale des Sciences," in *Mariotte, savant et philosophe (d. 1684): Analyse d'une renommée* (Paris, 1986), p. 14. Therefore, Pecquet may have printed his reply to Mariotte not as part of a dialogue with a fellow academician but as an opinion about the work of an outsider. However, the Académie corroborated the striking empirical finding on which Mariotte was rooting his claim that the choroid was the site of vision: the discovery of the blind spot at the place where the optical nerve entered the eye. This allowed for a representation of the

ful not to pursue controversial lines of inquiry and methodologies but maintained an instrumentalist epistemology that fit well the requirements of reason of state. In one case, we have evidence that Louis himself intervened on this issue.[102] Skepticism about or outright condemnation of philosophical systems and metaphysical arguments remained a mainstay of the Académie, inquiries into final causes were ruled out, eclecticism reigned, and the general methodological orientation became, as Roger Hahn has termed it, that of "phenomenological positivism."[103]

Unlike the Cimento, which stopped convening only ten years after its inception, the Académie's continuity enabled it to slowly become more of an institution, that is, a more interdependent figuration of practitioners—a path marked, in 1699, by the development of statutes and protocols regulating its internal activity. The members of the Cimento were never able (nor did they have the time) to achieve that format, as Leopold remained too close and too involved. The Académie's move toward self-regulation was parallel to its becoming more of a node in the republic of letters. If, in the beginning, its status had rested on the prince's, by 1699 it had produced a number of texts, had published official reports of its activities (though only for two years in 1692–93), and was developing its networks of correspondence with savants in other countries.

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dispute as a matter of subtle *interpretation* of the visual function of two very thin contiguous membranes (the retina and the choroid). With a humorously revisionist twist, Fontenelle wrote that the two different positions were as distant as those two membranes, each as thin as a thin sheet of paper and finely attached to each other; see *HAR,* 1:103. However, the feelings generated by the dispute seemed inversely proportional to the distance between the two membranes. Furthermore, Mariotte did not soften his preacademic position after joining the Académie but responded to new criticism coming from Perrault (in a letter that was initially kept within the bounds of the Académie) to accuse his critics of prejudice; see Edme Mariotte, "Réponse de Monsieur Mariotte à la lettre de Monsieur Perrault," *Oeuvres de Mr. Mariotte, de l'Académie Royale des Sciences,* 2 vols. (1711; Leide, 1717), 2:522–34. Interestingly, Mariotte responded only after Pecquet's death in 1674. In short, he displayed an ethos similar to that of Borelli or Hooke, that is, of academicians who brought their preacademic "combative" disposition into a body that tried to discipline it. All the texts pertaining to the dispute were eventually published in 1676 in the Académie's official *Récueil de plusieurs traitez de mathématique de l'Académie Royale des Sciences,* pp. 1–26—a decision that may have resulted from Mariotte's acquired power within the academy (four of the six pieces in the *Récueil* were by Mariotte) and from the fact that the volume was about mathematics, not anatomy (the "class" to which Pecquet and Perrault belonged). On the dispute, see Mirko D. Grmek, "Mariotte et la physiologie de la vision," in *Mariotte, savant et philosophe,* pp. 153–203.

102. Fontenelle attributed to Louis the prescription that in its forthcoming collective work on mechanics the Académie should stay clear of physical (that is, philosophical) issues (see *HAR,* 1:99) and that "all that might be a cause for dispute should be enclosed in a manner of introduction to the entire work" (quoted in Licoppe, "The Crystallization of a New Narrative Form in Experimental Reports," p. 226).

103. Hahn, *The Anatomy of a Scientific Institution,* p. 32. On the Académie's rejection of philosophical systems, see Hirschfield, *The Académie Royale des Sciences, 1666–1683,* pp. 125, 127, and Bertrand, "Les Académies d'autrefois," p. 349.

In retrospect, the initial relative isolation of the Académie from the republic of letters appears not just as an obstacle but also a productive trial period. In fact, unlike England where the codes of civility did not conflict explicitly with the sociability of experimental philosophy, in France we see that the dominant conversation-based civility tended to clash with more technical or experimental approaches to natural philosophy. These tensions between experimentalists and conversationalists had become particularly intractable within the Montmor academy.[104] Therefore, the early isolation of the Académie Royale des Sciences from the wider polite society may have allowed the king to keep his potentially impolite academicians safely in the "attic," while de facto providing them with a shielded (and yet legitimate) social space in which to articulate the more professional and experiment-oriented practices they were able to adopt publicly in 1699.[105] By that time, the Académie could state the difference between its protocols and the conversational civility characteristic of earlier private philosophical academies. As Abbé Jean-Paul Bignon, the president of the Académie, put it during its first public meeting: "it is enough that this truth is useful, for [the Académie] can dispense with attractiveness."[106] Fontenelle echoed him:

> It was agreed that academic conferences be given a form quite different from that of public exercises in philosophy, where the purpose is not of elucidating truth, but only of not being reduced to silence. Here one wished that all should be simple, quiet, with no great show of wit or of knowledge. [*HAR*, 1:16]

Continental Shields and English Networks

The Académie's initial inability to sustain the publication of its *Mémoires* and join the international republic of letters more quickly or extensively in fact resulted from its royal status and the honor-saving "shield"

104. These tensions are lucidly discussed in Sorbière's discourse of 3 April 1663 to the Montmor academy, in which he spelled out the serious etiquette problems that marred its meetings and were threatening its continuity; see Sorbière, "À l'ouverture de l'Académie des Physiciens qui s'assemblent tous les Mardis chez Monsieur de Montmor," in *Les Premières Sociétés savantes de Paris au dix-septième siècle et les origines de l'Académie des Sciences*, ed. Guillaume Bigourdan (1900; Paris, 1992), p. 16. Sorbière sent a copy of this discourse to Colbert, suggesting that a royal academy might have provided the solution to these problems; see Hirschfield, *The Académie Royale des Sciences, 1666–1683*, pp. 2–5.

105. For instance, Roberval (whom we have seen creating serious trouble at Montmor's) became a member of the Académie despite his lack of etiquette in polite conversational settings. I believe that his participation would have been problematic if, in its early years, the Académie had not shielded itself from the rest of polite society.

106. Quoted in Clarke, "Abbé Jean-Paul Bignon," p. 219.

that surrounded it. Martin Lister, a member of the Royal Society, recalled that the Marquis de L'Hôpital—an academician whom he had met in Paris in 1698—told him that "it was not possible for them to continue the Monthly Memoirs, as they had done for two years only, because they were but very few in number of that Society, and had very little correspondence" (*JP,* p. 95). To this situation Lister opposed the predicament of the late Oldenburg, who had been able to manage the Society's vast correspondence network for the very reason that it was so vast. As Oldenburg told Lister, his trick was to make "one Letter answer another" (*JP,* p. 78). The *Philosophical Transactions* was a self-sustaining chain reaction (of publication and credit), which Oldenburg needed only to moderate.

In general, the Cimento and the Académie tended to efface individual authorship and remained both internally unstructured and relatively isolated from the republic of letters—an insulation that was directly proportional to the princes' stakes in their academies. Open communication with the outside remained limited (at least initially) both because it was not crucial to the legitimation of the academies' work (which was mostly rooted in the status of their princes) and because, being directly connected to a prince, the academies' protocols of external communication (like any form of diplomatic interaction) were constrained by princely etiquette (fig. 1).[107]

On the other hand, a greater relative distance between the academy and the prince (as in the case of the Royal Society) allowed not only for the recognition of individual authorship but—the prince's role in the legitimation of the academicians' work being less crucial—it effectively allowed the academicians to articulate *institutional protocols* so that they could legitimize their work more through their own interdependence rather than through their dependence on the prince.[108] The develop-

107. Brown discusses these tensions in *SO,* pp. 180–81.

108. The Society emphasized individual authorship even in connection with works it sponsored and licensed for publication under its own imprimatur—as in the case of Hooke's 1665 *Micrographia.* On 6 July 1663 the *Council Book* of the Society reported that "Mr. Hook was charged to show his Microscopical Observations in a handsome book to be provided by him for that purpose" (Archives of the Royal Society [London], *Council Book,* vol. 1, p. 19; hereafter abbreviated *CB*). But rather than worrying about receiving credit for the book, the Society seemed concerned with developing a polite distance from the author—not unlike the insulation it had established between itself and the *Transactions.* For instance, according to a *Council Book* entry from 23 November 1664, it was

> ordered that Mr. Hook do give notice in the Dedication of his Microscopical Treatise to the Society, that though they have licensed that Book, yet they own no Theory, nor will be thought to do so: also, that the overall Hypotheses and Theories laid down by him therein are not delivered as certainties, but as conjectures, and that he intends not at all to obtrude or expose them to the world as the Opinion of the Society. [*CB,* 1:82]

Hooke obliged. In the dedication of *Micrographia* to the Society he stated that

> there may perhaps be some *Expressions,* which may seem more *positive* then YOUR Prescriptions will permit: And though I desire to have them understood only as *Conjectures*

ment of its network of correspondents resulted, I believe, from the same predicament; the Society may have branched out so as to balance the power it did not receive from its prince (fig. 2). It needed to colonize the republic of letters (or rather help constitute that republic as that which could sustain colonization). My use of the topos of colonization is not completely metaphorical. In its transition from a "closed" (perhaps "mercantilistic") economy of credit characteristic of princely continental academies to an "open" framework of "philosophical commerce" (as Oldenburg and Thomas Sprat used to call scientific communication), the Royal Society's tactics required a republic of letters in the same way as the development of capitalistic economies relied on a colonial system or, at least, on an international market. Since its very beginning, the Society seemed to understand the need to develop such a market, as it promptly and successfully asked the king for permission to correspond with foreign savants and to publish with its own imprimatur.[109]

The Society's relative distance from the prince made such a branching out not only necessary but possible. In fact, its limited official character and the relatively low stakes the prince had in its correspondence (except when issues of national security were involved in these exchanges) increased Oldenburg's leeway in communicating with outsiders.[110] For instance, the ambiguous status of the *Transactions* (effectively the journal of the Royal Society but officially represented as Oldenburg's own enterprise) and the allegedly private nature of Oldenburg's correspondence allowed for room to maneuver that the journal would not have had had it been represented as the official organ of the Royal Society, or had Oldenburg always represented himself as the official speaker of that body.[111] Had the king been closely connected to the Society, those

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and *Queries* (which YOUR Method does not altgether disallow) yet if even in those I have exceeded, 'tis fit that I should declare, that it was not done by YOUR Directions. For it is most unreasonable, that YOU should undergo the *imputation* of the *faults* of my *Conjectures*. [Hooke, *Micrographia*, p. (4)]

109. Both wishes were granted in the first charter of 1662; see *The Record of the Royal Society of London for the Promotion of Natural Knowledge*, pp. 234–35.

110. Scientific correspondence could cause diplomatic concerns because it often contained relevant political information, and in fact Oldenburg was detained in the Tower for three months in 1667 under suspicion of improper handling of information about the Dutch Wars. The charter of 1662 explicitly prohibited the Society from corresponding on topics outside "things philosophical, mathematical, or mechanical" (quoted in ibid., p. 235).

111. That the *Transactions* was not just Oldenburg's brainchild is indicated by a 6 September 1661 letter to Huygens from Sir Robert Moray, a prominent member of the Royal Society, in which he mentioned that the Society was planning to print responses to the letters it received and to develop a journal because it was becoming unable to keep up with the mounting correspondence; see *SO*, p. 185. That the Society did exercise control over the content of the *Transactions* is indicated, for instance, by the minutes of the council meeting of 29 March 1665:

The Papers of the next Philosophical Transactions, having been considered of, and the account therein given concerning the Structure and Advantages of Sir William Petty's

ambiguous arrangements would have been very difficult. The *Journal des Sçavans,* unlike the *Transactions,* never developed even pseudo-official ties with the Académie though it shared its editor and several contributors with that institution.

The different narrative structures of the experimental reports of the Académie Royale des Sciences and of the Royal Society analyzed by Christian Licoppe reflect, I believe, the different degrees of princely involvement in these institutions. Licoppe has shown that the minutes of the Académie's early meetings do not adopt a narrative form aimed at compelling the reader to give his or her assent to the writer's claims by producing the type of "virtual witnessing" called for by Boyle (and usually adopted by the *Transactions*).[112] That is, they do not seem to attempt to make the reader feel as if he or she could witness the experiment with his or her own eyes by providing highly detailed descriptions of the experimental circumstances, nor do they usually provide the name of the author of the experiment or observation. Rather, these reports (which tended to adopt the structure "*x* did and *x* saw," where *x* is generally not a personal name but a pronoun) seem to reflect the Académie's confidence in its own authority as expressed by the collective voice inscribed in them—an authority that the Académie had as a royal body of handpicked experts. This stance stands in sharp contrast with the Royal Society's tendency (inscribed in its experimental narratives and reports), not to take its institutional authority for granted, but to develop and maintain it through the assent its members and correspondents would give to reports read in its meetings or published in the *Transactions.*

While agreeing with Licoppe's analysis of the authorial voice, structure, and apparent insensitivity to readers of the Académie's minutes, I suggest that what he has interpreted as a statement of authority was also a sign of impotence. As mentioned, when the Académie was writing these narratives, it was not officially sharing these claims with the republic of letters. These were internal reports aimed at an audience (the Académie) that had written them itself. The Académie was uninterested in creating an effect of virtual witnessing in the readers not just because it did not need to but, more important, because its dependence on the prince and the prince's stake in its claims made it difficult to engage with an external audience. On the other hand, because of the relatively small stakes the

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Doublebottomed ship; it was resolved, that the Publication of them should be deferred, till his Majesty had been more acquainted with the particulars therein relating to the said ship. [*CB,* 1:91]

On the ambiguous status of the *Transactions,* see also E. N. da C. Andrade, "The Birth and Early Days of the Philosophical Transactions," *Notes and Records of the Royal Society of London* 20 (1965): 9–27.

112. See Licoppe, "The Crystallization of a New Narrative Form in Experimental Reports (1660–1690)." The notion of "virtual witnessing" was introduced by Shapin, "Pump and Circumstance," pp. 490–97.

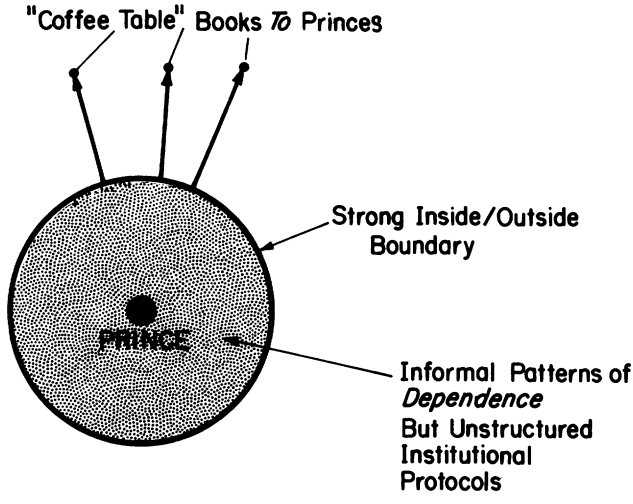

FIG. 1.—Continental Academies

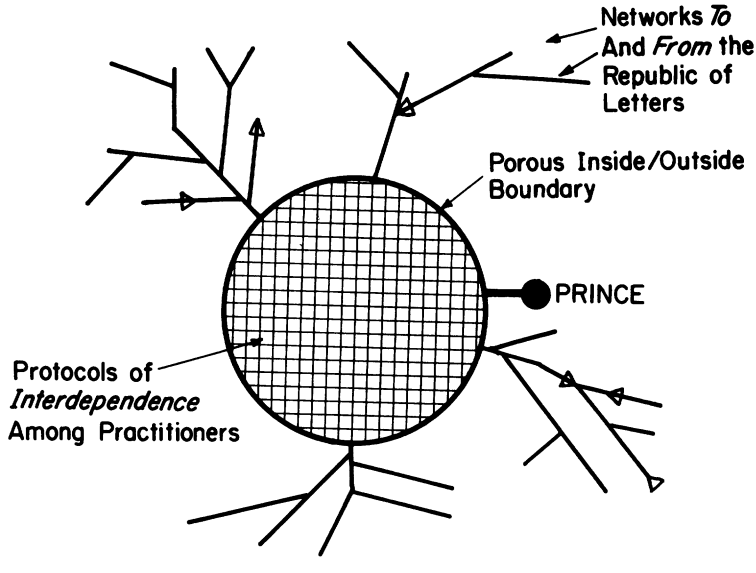

FIG. 2.—The Royal Society

prince had in the institution, the Royal Society's experimental reports could travel outside of its boundaries, and, I would argue, they had to do so to allow the Society to develop the authority it did not receive from the prince. In a sense, the Académie's narratives embodied the authority of the prince and, for that reason, they could not easily travel outside of its shielded space, as there was no etiquette yet that could appropriately manage that transition and the possible refutations (that is, embarrassments) that move might have entailed. The Académie was authoritative within its royal turf but could not easily project its authority outside.[113] As with the monarch who gave it credibility, the Académie's power and fragility went hand in hand.

Insular Politeness

Since its inception in 1662, the Royal Society privileged a specific methodology, one that was officially inscribed in the first charter granted by Charles II: "We look with favour upon all forms of learning, but with particular grace we encourage philosophical studies, especially those which by actual experiments attempt either to shape out a new philosophy or to perfect the old."[114] The Society's emphasis on experiments and plainly formulated empirical reports (which might have been problematic in several conversation-prone continental academies) reflected the English political context and the ways in which that power regime structured the relation between the Society and the prince. Charles II was no *Roi Soleil,* and the English monarchy did not display the typical traits of political absolutism. As royal power was not the crucial source of legitimation, natural philosophers did not seem particularly concerned with attuning their activities to the demands of princely etiquette. Then, although Charles II played an important role in legitimizing the Society by granting it royal charters and the status of legal corporation, his financial support and input into its program remained minimal.[115] He

113. Similarly, the Académie could act as a judge in matters of patents and technological innovations, but, again, its jurisdiction was limited to the king's realm.

114. Quoted in *The Record of the Royal Society of London for the Promotion of Natural Knowledge,* p. 226.

115. Such a choice may reflect not so much his own intellectual interests but rather the limited benefits his relatively modest royal image might have gained from the sponsorship of a grand academic project (as in Louis's case) or from a direct investment in the celebration of his national scientific tradition (as with Leopold). Testimonies of Charles's strong interest in natural philosophy can be found in Sorbière, *Relation d'un voyage en Angleterre: Où sont touchées plusieurs choses, qui regardent l'estat des Sciences, et de la Religion, et autres matieres curieuses* (Cologne, 1669), pp. 32–33, hereafter abbreviated *RV;* trans. under the title *A Voyage to England: Containing many Things relating to the State of Learning, Religion, And other Curiosities of that Kingdom* (London, 1709), pp. 61–62, hereafter abbreviated *V.* Because this translation is not always faithful to the French text, I have entered occasional corrections.

never visited the Society but, like Louis who observed dissections of exotic animals at Versailles but not in the Académie's locales, limited himself to discussing natural philosophy with the fellows when they visited him at court.[116]

The specificity of the etiquette and political system of the English were noticed by continental visitors. For instance, Sorbière was surprised to find Sir Robert Moray (a prominent courtier and member of the Royal Society) dirtying his hands with science in a public space:

> It was a wonderful, or rather a very edifying Thing, to find a Person imploy'd in Matters of State, and of such Excellent Merit, and one who had been engaged a great Part of his Life in Warlike Commands, and the Affairs of the Cabinet, apply himself in making Machines in St. *James Park,* and adjusting Telescopes. All this we have seen him do with great Application, and undoubtedly to the Confusion of most of the Courtiers, who never mind the Stars, and think it a Dishonour to concern themselves with any thing, but inventing of new Fashions. [*V,* p. 30; *RV,* p. 57]

Sorbière was also struck by the peculiar nature of the English monarchy and remarked that "as the Court of *England* is not so great as ours, there is the easier Access to the Prince" and that "the King must maintain a good report with the Nobility and Gentry, in order to preserve their Affection and Esteem, these last are also obliged to use the same Practice toward merchants"—a scenario that differed sharply from the French (*V,* p. 50; *RV,* pp. 93, 94). Being a good subject of an absolute ruler, Sorbière was also puzzled by the political role of the English Parliament, which—probably to the dismay of his hosts—he called a "bizarre body."[117]

According to him, the English had a somewhat "wild" temperament—something that reminded him of the Romans who, like the English, indulged in violent sports—and such a temperament made them unable to accept stronger forms of government.[118] Sorbière's perceptions

116. Then, when it seemed that Charles might visit the Society, the fellows planned an event that would have resembled Louis's ceremonial visit to the Académie in 1681. Like Louis, who did not participate in the knowledge-making process but observed only unproblematic and well-debugged demonstrations, Charles was not to witness experiments but to enjoy a show, as indicated by the council minutes, which described the event in terms of the "King's Entertainment." Then, to avoid embarrassments to the royal guest and his academy, the council "ordered that Mr. Hook and the Operator take care so to prepare the Compressing-Engin, *that it may not fail in the trying of Experiments therein*" (*CB,* 6 July 1663, 1:18; emphasis added).

117. "Corps bigearre" (*RV,* p. 100). This passage was not included in the English edition.

118. Commenting on the weakness of the English monarchy, Sorbière remarked that "the Genius of the *English* does require they should be governed after this gentle manner" (*V,* p. 50; *RV,* p. 94). Also,

> they are fond enough of a King, for the greater Glory of their Country; they love the Title, and prefer Regal Government before any other. But they own their over-free

were analogous to those of Magalotti, who visited England in 1668.[119] Sorbière linked the "strong spirit" of the Englishmen not only to their political structure but to their thinking styles and forms of politeness. He did appreciate the "matter of factness" and modesty of the English, which he saw at the roots of the orderly proceedings of the Royal Society: "I took special notice of this Conduct, in a Body consisting of so many Persons, and of such different groups: For they admit them all into their Society" (*V,* p. 37; *RV,* p. 70). However, he also thought that this "spirit" was responsible for a certain rustic arrogance—a "careless Air" that Sorbière claimed the English assumed toward foreigners.[120] His perception of the English nobility as "rustic" also emerged in his labelling a fellow of the Royal Society as a "Country Gentleman" (*V,* p. 31; *RV,* p. 59). Basically, he saw the English as clearheaded, strong-minded, and modest but also as a bit unpolished and somewhat isolated from continental civility—a representation that recalls the French courtly occasional praise of peasants' pure (though, of course, uncivil) life.[121]

The publication of Sorbière's diary touched a raw nerve in Thomas Sprat, the future historiographer of the Royal Society. In his 1665 rebuttal, Sprat agreed with Sorbière only on the point that one should link English etiquette and philosophical attitudes to their unique "spirit." However, he saw Sorbière's report on the somewhat rustic manners of the English as reflecting a distinct continental bias, and branded him as "a *vain Traveller,* an *empty Politician,* an *insolent Pedant,* and an *idle pretender to Learning.*"[122] According to Sprat, the French were too caught up in ceremonies—something he also linked to their "papist" and ritual-bound religion. Writing about his visit to Paris a few decades later, Lister too commented on "the Obsequious Humor and Capacity of the People to

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> and too arrogant Temper requires some restraint, so as that it may not salley out to an Excess of Rudeness; and they pretend that their King ought to apply himself entirely to maintain the Publick Peace, to promote the Happiness of his People, and to advance the Honour and Reputation of his Country abroad, as much as possibly he can. [*V,* p. 54; *RV,* pp. 101–2]

He then traced this pattern of widespread "democracy" or uneasiness about social hierarchies down to the army where, to his great surprise, low-ranking officers addressed their superiors without uncovering; see *V,* p. 50; *RV,* p. 94.

119. See Magalotti, *Lorenzo Magalotti at the Court of Charles II: His "Relazione d'Inghilterra" of 1668,* trans. and ed. Middleton (Waterloo, 1980), p. 17.

120. Sorbière stressed the effect that geographical isolation has had on English manners: "Hence arises that careless Air wherewith they look upon Strangers, or make Answer to them" (*V,* p. 46; *RV,* p. 86).

121. As he put it, the English have a certain "natural Roughness incident to them in their own" (*V,* p. 45; *RV,* p. 85). On the pure peasant trope, see France, *Politeness and Its Discontents,* pp. 35–36, 38.

122. Sprat, *Observations on Monsieur de Sorbier's Voyage into England* (London, 1665), p. 255; hereafter abbreviated *OS.*

perform [ceremonies]" and argued that "the People of *England* seem to have less Manners and less Religion" (*JP,* pp. 25, 16).[123]

According to Sprat, the French were also overly rhetorical, while the English were inclined to *do* things rather than simply *talk* about them: "[compare] the Chastity, the newnesse, the vigour of many of our *English* Fancies, with the corrupt, and the swelling Metaphors, wherewith some of our Neighbors, who most admire themselves do still adorn their Books" (*OS,* p. 265).[124] In particular, both in his response to Sorbière and in his *History of the Royal-Society,* Sprat saw the Englishmen's natural inclination toward experimental philosophy as a sign of their masculinity (a perception he shared with Oldenburg):

> The temper of the *English* is free, Modest, Sincere, Kind, hard to be provok'd: if they are not so talkative as others, yet they are more carefull of what they speak: if they are thought, by some of their neighbours, to be a little defective in the gentleness, and the pliableness of their humour; yet that want is abundantly supplied, by their firme and Masculine virtues. [*OS,* pp. 289–90][125]

If Sorbière's representation of the English was colored by the French trope of the pure peasant, Sprat's and Oldenburg's views of French philosophers fit squarely in the anticourt genre, which depicted courtiers as effeminate by too much polishing.[126] On the other hand, as Sprat put it, hard things (like Englishmen) were hard to polish (see *OS,* p. 290).

Therefore, by local standards of politeness, it was quite appropriate for English natural philosophers to do experiments and produce matters of fact rather than engage in conversations about philosophical doctrines

123. He also remarked that "'tis certain the French are the most Polite Nation in the World, and can Praise and Court with a better Air than the rest of Mankind" (*JP,* pp. 3–4).

124. He made a similar point in his *History of the Royal-Society of London for the Improving of Natural Knowledge,* p. 40. The French, in turn, tended to accuse Italians and Spaniards of the same verbal excesses; see France, *Politeness and Its Discontents,* p. 16. Fontenelle joined the chorus:

> Enfin le renouvellement de la vraye Philosophie a rendu les Académies de Mathématique et de Phisique si necessaires, qu'il s'en est établi aussi en Italie, quoique d'ailleurs ces fortes des sciences ne regnent guère en ce pais-là, soit à cause de la delicatesse des Italiens, qui s'accomode peu de ces épines. (The renewal of the true philosophy has made it necessary to establish academies of mathematics and physics, and they have also been founded in Italy, though such strong sciences did not thrive for long in that country because the Italians, being so delicate, adjust badly to the demands of those disciplines.) [*HAR,* 1:5]

125. He mentions Thomas More and comments on "the Masculine easinesse of his stile" (*OS,* p. 267). The trope of the masculinity of science also emerges in Sprat's *History of the Royal-Society of London for the Improving of Natural Knowledge,* p. 65, as well as in A. Cowley's dedicatory poem, "To the Royal Society," at the beginning of Sprat's book, in which he calls philosophy a "Male Virtu" (p. [v]). On Oldenburg's perception of the masculinity of English science, see *CHO,* 1:287.

126. See France, *Politeness and Its Discontents,* p. 56.

like those characteristic of early Parisian philosophical academies. For the same reasons, low-key, technical, and potentially boring work was not only acceptable but eminently legitimate. Actually, Sprat and Boyle could turn the tables on the continental savants and equate being "showy" with being "unethical."[127] To some, even the experimental reports of the Accademia del Cimento seemed too ceremonious.[128] Symmetrically, Boyle's "literary technology"—the very detailed, painstaking narrative description of experimental apparatus, protocols, results, and failures—might have appeared boring and possibly pedantic to conversation-prone continental savants.

The bureaucratic structure of the Royal Society and the modesty, politeness, and "democracy" of its proceedings shared the same social genesis as English manners and philosophical style. For instance, French and Italian visitors alike remarked on both the civility of the meetings of the Royal Society as well as on the complex protocols that regulated those gatherings and the certification of claims—features that were quite unusual in most of the noisy and unstructured academies of the continent.[129] As Sorbière put it,

> they mind no rank in the Society, and the President sits at the middle of the Table in an Elbow Chair. . . . All the other Members take their Places as they think fit, and without any Ceremony; and if one comes in after the Society is fixed, no Body stirs, but he takes a Place presently where he can find it, so that no Interruption may be given to him that speaks. The President has a little Wooden Mallet in his Hand, with which he strikes the Table when he wants to command Silence: They address . . . him bare-headed, till he makes a Sign for them to put on their Hats; and there is a Relation given in a few Words of what is thought proper to be said concerning the Experiments proposed by the Secretary. There is no body here eager to speak, that makes a long Harangue, or intent upon saying all he knows: He is never interrupted that speaks, differences of opinion cannot be pursued, and no disobliging way of speech can be adopted. There is nothing that seemed to me to be more civil, re-

127. The criticism of "wits" and the praise of "modest" and "sober" philosophers is a recurrent theme of Sprat's *History of the Royal-Society of London for the Improving of Natural Knowledge*.

128. As Oldenburg put it in a letter to Boyle in March 1668, he had seen a copy of the *Saggi*, which he termed "the pompous Book of their Experiments" (*CHO*, 4:248).

129. Magalotti's description of the proceedings of the Royal Society is translated in R. D. Waller, "Lorenzo Magalotti in England, 1668–9," *Italian Studies* 1, no. 2 (1937): 49–66. See also Magalotti, letter to Leopold, 2 Mar. 1668, *LI*, 1:298–301, and Segni, letter to Leopold, 20 Jan. 1668, *LI*, 1:288–90.

spectful, and better managed than this Society. [*V,* pp. 36–37; *RV,* pp. 68, 69–70][130]

The bureaucratic and relatively democratic character of the meetings of the Royal Society (and its ability to elect its own officers) was a sign of its relative independence from the king whose legitimating authority was symbolically present only through the royal mace that was placed near the president once the meetings began.[131] And Sorbière's remarks that the president (though being one of the fellows) remained covered as he was addressing or being addressed by the other fellows (who instead had to uncover) points to the president's status as the representative of the *persona ficta* of the corporation who administered its polite proceedings by managing questions or, when necessary, by striking his mallet like a judge.[132] As noticed by Steven Shapin, the corporate rituals of the Royal Society resembled those of the English Parliament.[133]

If the corporate and knowledge-making etiquette of the Royal Society reflected the English sociopolitical structure and power regimes, so did its notion of evidence: the matter of fact. A matter of fact was not a plain fact but a kind of evidence constructed through a specific etiquette of inquiry. Assumed to be a local claim unconnected to dogmatic philosophical systems, a matter of fact was less likely to trigger disputes that might have threatened the honor and status of the gentlemen involved (actually or virtually) in its construction. I believe that a matter of fact could be accepted precisely because it allowed the gentlemen to act as gentlemen as they constituted it. Adding a layer to Shapin and Simon Schaffer's analysis of this form of evidence, I would say that the matter of fact was a form of "solidified politeness"—a reification of closely knit social and etiquette-regulated relations not unlike those through which marks of distinction and subjectivities were constituted within court soci-

130. Parts of this description appear diametrically opposed to Sorbière's negative account of the meetings of the Montmor academy in his "À l'ouverture de l'Académie des Physiciens qui s'assemblent tous les Mardis chez Monsieur de Montmor." De Monconys, a frequent participant in Parisian philosophical academies who visited the Royal Society in 1663, provided a similar appreciative description of its protocols, politeness, and orderliness; see Balthasar de Monconys, *Journal des voyages de Monsieur De Monconys* (Lyon, 1665–66), p. 26.

131. On the remarkable level of detail of the Society's protocols, see its charters and statutes in *The Record of the Royal Society of London for the Promotion of Natural Knowledge,* pp. 215–301. Magalotti noticed that the mace was a symbol of the king's legitimating presence in the Royal Society; see Waller, "Lorenzo Magalotti in England, 1668–9," p. 54. Sorbière remarked on the ceremonial entry of the mace together with the president, a rite that marked the official beginning of the meeting; see *V,* p. 35; *RV,* p. 67.

132. This etiquette did not develop accidentally but was prescribed by the statutes; see *The Record of the Royal Society of London for the Promotion of Natural Knowledge,* p. 289.

133. See Shapin, "The House of Experiment in Seventeenth-Century England," pp. 392–93.

ety.[134] Self-fashioning and world-fashioning were two sides of the same coin. The "hardening" of a matter of fact resulted from its unthreatening features, which allowed several gentlemen to witness it, argue politely, and eventually stabilize that claim. Matters of fact were a disciplined (one might say choreographed) form of evidence.

The etiquette developed by the Royal Society did not erase tensions around the distribution of credit and distinction, but it provided protocols through which they might be negotiated—at least most of the time. A fundamental constructive feature of such a figuration was that, in the long term, one gained something even by giving credit to a competitor. For instance, the certification that might result from the collective witnessing of one's proposed matter of fact by the gentlemen of the Royal Society rested on the fact that by recognizing that "sign of distinction" and thereby giving credit and status to that practitioner, they were increasing their own credit and status as a corporation of practitioners as well as confirming their own gentlemanly identity. Similarly, if the author of the claim happened to be a nonmember, the Society's approval of that report would end up extending its network by virtue of gaining another contributor. On a more global scale, credit was not taken away from somebody and given to somebody else—as might have been the case within a more local, "mercantilistic" economy of credit. The collective credit circulating within such an open-ended figuration was increased by each new "transaction" of claims and credit—a process that bears structural similarities to the construction of wealth in a capitalist economy.

This process was facilitated by the fact that the sociability they proposed (being more attuned to gentlemanly rather than princely etiquette) helped develop the broad network of correspondents needed for the Society's further legitimation. The tacit knowledge required by these exchanges was less local in the sense that it was not specific to highly localized economies of distinction such as courts or aristocratic society. Because the politeness of this correspondence did not involve body-bound etiquette of the courtly type but just the approximate respect of labor-intensive protocols of "virtual witnessing," the Society's networks could be made to travel relatively far to reach a wide range of practitioners whose competence in civility needed to be just good enough to write a fairly polite letter to Oldenburg, who, in any case, could have smoothed possible rough edges.[135]

Moreover, the correspondents' physical distance from the Society further reduced possible etiquette problems. Correspondents did not necessarily need to be gentlemen because, in any case, they were not go-

134. See Shapin and Schaffer, *Leviathan and the Air-Pump,* pp. 22–26.

135. On Oldenburg's careful editing of incoming letters to be published in the *Transactions,* see Shapin, "O Henry," p. 420.

ing to participate in the Society in person and their competence in more sophisticated and body-bound forms of etiquette could remain largely unprobed. Like Elias who argued that eventually bourgeois economy created an environment in which credit and status could be managed through a fairly impersonal exchange of money rather than by engaging in very local displays and recognitions of body-bound signs of distinction, the Royal Society began to articulate a process by which scientific credit was not primarily established by developing very local patronage ties or by tailoring one's work to the codes of distinction of one specific prince (as in Galileo's fashioning of his discoveries as "Medicean Stars") but by exchanging "generic" paper items—not banknotes but articles, letters, and reports.[136]

Conclusions

The protocols of knowledge production and forms of authorship and communication of the Cimento, the Académie Royale des Sciences, and the Royal Society appear to be rooted in the different forms of etiquette and degrees of corporate interdependence developed within the broader frameworks of social and princely civility that provided their conditions of possibility. Not all these different scientific sociabilities managed to survive. Some disappeared with the political systems that had framed them—a process of social change to which the republic of letters actively contributed. That today's scientific sociabilities resemble that of the Royal Society more than those of the early continental academies may reflect the fact that modern capitalistic political systems in which princes are either absent or given a merely honorific role resemble seventeenth-century parliamentarian England more closely than Versailles or grand-ducal Florence.

However, I have tried to show that the beginning of modern scientific sociabilities was not predicated on a subversion of the processes whereby court society constructed power and distinction through webs of tense interdependence between subjects and princes. Rather, with a timing and speed that depended on the options and resources framed by different regimes of power, the rules of the courtly game were slowly translated (in the literal sense of being moved from one place to another)

136. I am not claiming that scientific texts and letters had not circulated before, or that a practitioner's status was determined exclusively by his patron. Rather, I am trying to stress that, while these were crucial resources with which to build one's credit, such a credit in a courtly environment was ultimately actualized (cashed) through one's prince—the local authority who could convert that work into an official title or prestigious position. See my *Galileo, Courtier,* pp. 103–57, where I argue that patronage niches were local and discuss the effects of their local status on practitioners' tactics for legitimation.

to different arenas and played on a different scale by differently constituted teams. The long-term consequences of this translation were so remarkable that perhaps they have obscured the essential structural analogies between courtly and scientific etiquette and the ways in which they both constructed authority, subjectivity, credit, and distinction.