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ESTABLISHING AN EXPERIMENTAL AGENDA AT THE *ACCADEMIA DEL CIMENTO*: CARLO RINALDINI'S BOOK LISTS¹

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Abstract

Information on the origins of the *Accademia del Cimento* is extremely limited. Almost all of the surviving correspondence relating to the year before the Academy began its activities variously concerns print culture. Lists of books (read, studied, purchased, and researched), handwritten notes on old or new publications, vernacular translations of edited passages, and inquiries about new works punctuate the archive. The study of these lists and of the relationship between reading practices and ones related to annotation and knowledge production leads to a reinterpretation of certain aspects of the *Accademia del Cimento*, suggesting the pursuit of a more flexible agenda.

Through the analysis of some book lists, this contribution aims to shed light on the presence in Florence of interconnected groups of scholars, common epistemic practices, and a kind of methodological unity centered on the sharing of materials and agreement concerning the need to subject theories to experimental verification.

Keywords: Early Modern Academies, *Accademia del Cimento*, Early Modern experimentalism, Book lists

1. Introduction

1.1. A courtly academy: the received view of the *Cimento*

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It has been 40 years since the publication of Paolo Galluzzi's seminal essay on the Accademia del *Cimento*.² In clear contrast to the previous historiography, in 1981 Galluzzi looked at the *Cimento* as a courtly phenomenon and an instrument of propaganda for its patron, Prince Leopoldo de Medici who, for political reasons, had skillfully combined a 'Galileian' component and an 'Aristotelian' one within the Academy, thus achieving the formation of a balanced, and hence 'neutral', group.

Galluzzi's essay was the first study to show the complexity of the Florentine experimental academy. It drew attention to the lack of formal statutes and regulations, the heated debate on natural philosophical principles that took place within the Academy, the rivalries and discontents emerging in Giovanni Alfonso Borelli's letters, and the precautionary mechanisms adopted vis-à-vis censorship authorities. By doing so, it also questioned the very possibility that the *Cimento* could in any way be related to 'modern' scientific institutions such as the Royal Society or the Parisian *Académie Royale des Sciences*.³

This work quickly became an obligatory reference point for every scholar who approached the development of science in Tuscany. It led to the consolidation of a common and still prevalent perception of what the *Cimento* was. 'I gusti del Principe' ('The Prince's tastes') is undoubtedly the result of a new focus on manuscript sources, particularly correspondence with the Prince and between academicians. Yet, it was also developed within the historiographical context of a new and growing interest in courts and patronage mechanisms that was still largely influenced by a political historiography dominated by a top-down approach. Through these lenses, the Academy became first and foremost an instrument of the princely state: it was imposed, shaped, and molded by the Prince for propaganda purposes, even against the will and wishes of the members themselves -- who remained primarily courtiers.

Attention to the 'courtly' nature of the *Accademia del Cimento* also pervades later studies. Emphasis has been placed, for example, on the material display of science in Tuscany: the study of nature was to be made 'lavish, costly, and entertaining'.⁴ There has also been a stress on the more sociological dimension, based on the assertion that the experimental narratives produced and disseminated by scholars in Tuscany were designed to be worthy of patrons' status in terms of both content and style.⁵ Certainly the historical-political context in which the Academy took shape and developed influenced its activity and fortune. Through this emphasis on aristocratic patrons' impact on experimental practice and its dissemination, however, the *Accademia del Cimento* has been reduced to a mere expression of court culture and of the will of an absolute prince, diverting attention from a number of other important aspects.

Over the past two decades, some scholars have put forward different perspectives, highlighting mechanisms of internal collaboration between academicians, similarities with

² Paolo Galluzzi, 'L'Accademia del Cimento: "gusti" del principe, filosofia e ideologia dell'esperimento', *Quaderni storici*, 48 (1981), 788-844.

³ On this point, and particularly on the possibility of profitably comparing certain aspects of the *Cimento* and the Royal Society, see: Mordechai Feingold, 'The Accademia del Cimento and the Royal Society', in *The Accademia del Cimento and its European Context*, ed. by Marco Beretta, Antonio Clericuzio, Lawrence M. Principe (Sagamore Beach: Science History Publications, 2009), 229-242. For analyses that consider the process of institutionalization of science in Europe by also taking account of the Florentine case, see: Mario Biagioli, 'Le prince et les savants: la civilité scientifique au XVIIe siècle', *Annales. Histoire, Sciences Sociales*, 50-6 (1995), 1417-1453; Mario Biagioli, 'Etiquette, Interdependence, and Sociability in Seventeenth-Century Science', *Critical Inquiry*, 22 (1996), 193-238; and Marco Beretta, 'At the source of western science: the organization of experimentalism at the Accademia del Cimento (1657-1667)', *Notes Rec. R. Soc. Lond.* 54-2 (2000), 131-151.

⁴ Paula Findlen, 'Controlling the Experiment: Rhetoric, Court Patronage and the Experimental Method of Francesco Redi', *History of Science*, 31 (1993), 35-64.

⁵ Biagioli, 'Etiquette, Interdependence, and Sociability'.

more famous and long-lasting institutions, and the complexity of certain theoretical positions within the Academy.⁶ Through the analysis of book lists, this paper aims to contribute to the revision of the established image of the *Cimento* by showing how, within the Academy, shared practices for setting an experimental agenda and a common interest in experimental testing were developed.

1.2. A wide variety of surviving sources: the purpose of this work

The *Cimento* has bequeathed an enormous amount of records, mainly preserved in the Galileo collection at the *Biblioteca Nazionale Centrale* in Florence (BNCF). This immense archive is filled with documents of an extremely varied nature: thousands of scientific and private letters, experimental diaries by different hands, drawings of instruments, geometric diagrams, astronomical sketches, tables, mathematical computations, notes and drafts for the *Saggi di naturali esperienze* (1667), travel reports, etc.

This legion of records should be seen as a gateway to the study of the Academy beyond the neutral facade with which it presented itself in the *Saggi*, the only publication issued in the Academy's name at the end of its official activity. So far historians have mainly paid attention to portions of the correspondence (highlighting, for instance, internal disagreements and divergence on principles) and to the drafts of the *Saggi* (analyzing individuals' contributions to the publication process). A large number of documents remain essentially unexplored.

Undoubtedly, members of the *Cimento* often had diverging views on the interpretation of the experiments performed. This is a relevant element, frequently overlooked by the earlier historiography, which was too closely tied to a perspective that aimed to present the Academy as a direct legacy of Galileo.⁷ Nevertheless, the focus on internal debates about principles and on the lack of any formal foundation charter or regulations -- wisely placed at the center of the debate by Galluzzi -- has led much of the subsequent historiography to ignore a number of other significant aspects and records. The abundance and complexity of the documents left by Florentine scholars offer endless research paths to study this early and embryonic phase in the process of institutionalization of science in Europe, and of the development of a new experimental method and language. Revisiting the archives by bringing to light still unknown or little-studied documents makes it possible to go beyond entrenched views and provide new elements for a better

⁶ See especially Feingold, 'The Accademia del Cimento'; Mordechai Feingold, 'Confabulatory Life', in *Duncan Liddel (1561-1613). Networks of Polymathy and the Northern European Renaissance*, ed. by Pietro D. Omodeo (Leiden, Boston: Brill, 2016), 22-34; Ugo Baldini, 'Tra due paradigmi? La Naturalis philosophia di Carlo Rinaldini', in *Galileo e la scuola galileiana nelle Università del Seicento*, ed. by Luigi Pepe (Bologna: CLUEB, 2011), 189-222; Domenico Bertoloni Meli, 'Authorship and Teamwork around the Cimento Academy: Mathematics, Anatomy, Experimental Philosophy', *Early Science and Medicine*, 6-2 (2001), 65-95.

⁷ These are the seminal but often hagiographic studies of the 18th-19th centuries that established the Accademia del Cimento as the first great scientific society in modern Europe. See Vincenzo Antinori, 'Introduzione', in *Saggi di naturali esperienze fatte nell'Accademia del Cimento* (Florence: Tipografia Galileiana, 1841), i-cxxxiv; Angelo Fabroni, *Lettere inedite di uomini illustri per servire d'appendice all'opera intitolata Vitae Italarum doctrina excellentium* (Florence: Stamperia di F. Mouücke, 1773-1775); Giovan Battista Clemente Nelli, *Saggio di Storia letteraria fiorentina del secolo XVII scritta in varie lettere* (Lucca: Giuntini, 1759); Giovanni Targioni Tozzetti, *Atti e memorie inedite dell'Accademia del Cimento* (Florence: Tofani, 1780). The influential study by Middleton is the first attempt to recast the main features of the Academy from a modern perspective. By relying on the wealth of information contained in the new edition of the *Saggi di naturali esperienze* (1667), Middleton presents new documents discovered in the Florence State Archives and pays special attention to the extraordinary instrumental turn that characterized Florentine society: William Edgar Knowles Middleton, *The Experimenters: A Study of the Accademia del Cimento* (Baltimore-London: The Johns Hopkins Press, 1971).

understanding and contextualization of a multifaceted reality which is hardly comprehensible according to modern categories.

Lists of books (read, studied, purchased, and researched), handwritten notes on old or new publications, vernacular translations of book excerpts, and requests for information on new works also punctuate the archive. The study of these lists and of the relationship between the practices of reading and those of annotation and knowledge production can enhance our knowledge of the early stages of the *Accademia del Cimento*.

This paper will focus specifically on two known book lists that Carlo Rinaldini sent Prince Leopold in November 1656. In addition to presenting the context in which they were compiled and the type of volumes they mention, an attempt will be made to show what role these lists played in the construction of an experimental agenda in Florence. This will be made possible by drawing upon other documents, such as annotations and comments by different hands on Rinaldini's survey, and the experimental diaries kept by the academicians. Attention will also be paid to the lists of books requested by Vincenzo Viviani between 1654 and 1660, with a special focus on two 1657 lists that mention for the first time works that specifically touched upon natural philosophy topics.

Rinaldini's book lists are the first tangible sign of the project of building an experimental agenda. An analysis of the books they mention and of the way they were used suggests the pursuit of a flexible agenda and a (partly) bottom-up construction of the experimental enterprise, not lacking horizontal solidarity. By examining some little-studied documents kept at the BNCF, this contribution aims to shed light on the presence in Florence of interconnected groups of scholars, common epistemic practices, and a kind of common method centered on the sharing of materials and on agreement with respect to the need to submit theories to experimental verification: Borelli's dissatisfaction with the functioning and composition of the group and the presence of disagreements over 'principles' do not in themselves imply any lack of internal convergence on method.⁸

2. From Rinaldini's book list to experimental activity

Particularly significant in this context are the two lists of books 'concerning experimental matters'⁹ that Carlo Rinaldini sent Prince Leopold in November 1656. The lists are attached to the first two surviving letters addressed to the Prince by Rinaldini and were published by Galluzzi and Torrini in the volume devoted to the correspondence of Galileo's disciples.¹⁰

The figure of Carlo Rinaldini and his role within the *Accademia del Cimento* have often been underestimated.¹¹ Originally from Ancona, he arrived in Pisa in 1649, after Ferdinando II de' Medici had offered him the position of First Lecturer in Natural Philosophy at the *Studio*. According to Cosimo Galilei (1636-1672), Rinaldini was forced there to teach 'against Galileo' despite being a 'mere Galilean' among friends and in private lessons.¹² And when Giovanni Battista Quaratesi, during his mandate as supervisor of the Pisan Studio (1658-62),

⁸ Furthermore, rivalries and contrasts also existed within the Royal Society or the *Académie Royale des Sciences* in Paris.

⁹ [...] in proposito delle cose sperimentali'. Rinaldini to Leopoldo, November 6th, 1656. BNCF, MS Gal. 275, fols 44^r-47^r.

¹⁰ *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, ed. by Paolo Galluzzi and Maurizio Torrini (Florence, Giunti-Barbera, 1984), 377-383.

¹¹ One exception is Ugo Baldini's seminal essay (Baldini, 'Tra due paradigmi?').

¹² Cosimo Galilei to Viviani, January 3rd, 1658, BNCF, MS Gal. 161, fols 119^{rv}.

tried to have a teaching chair of Galileian philosophy established, Rinaldini was his first choice.

From the first years of his stay in Tuscany, together with other courtiers, including Candido del Buono (1618-1676), Rinaldini joined Grand Duke Ferdinando II and Prince Leopoldo de' Medici in a series of experiments of various kinds carried out in Pisa and Florence. He also became the tutor of Cosimo III de' Medici, Ferdinando II's son, and worked, together with Vincenzo Viviani (1622-1703), on the first edition of Galileo Galilei's works, which was printed by Carlo Manolessi in Bologna in 1655-1656 (and naturally did not include those works banned by the Holy Office).

Rinaldini's position within the Academy has often been undervalued mainly because of his controversy with Borelli, who considered him a 'rotten and moldy Peripatetic', even going so far as to label him a 'Simplicius'.¹³ Indeed, Rinaldini systematically disputed the validity of experiments that seemed to prove the existence of vacuum and atmospheric pressure, often proposing alternatives. On several occasions, however, he declared that he had been the first to suggest to Prince Leopold that he set up an experimental academy.¹⁴ Although the surviving documents do not allow us to confirm this claim, his involvement in the Academy's activities was undoubtedly significant.

A large number of experiments were then proposed by Rinaldini throughout the Academy's period of activity. The refinement of an 'esperienza' that had already been carried out in Florence was suggested to the Prince by Rinaldini in November 1657, along with a series of other tests. A letter to Leopoldo dated December 19th of the same year lists several possible experimental tests, including some deemed very useful 'for philosophizing in the way of the Galileo' and 'for shaving off some maxims of the Peripatetics'.¹⁵ Moreover, in November 1656 Rinaldini drew up a list of books on 'experimental matters' for Prince Leopoldo, with the aim of identifying issues and theories related to natural philosophy that could be analyzed through experiments. Although Rinaldini's lists are mentioned by Middleton as a possible sign of an early plan to create the Academy,¹⁶ they are often ascribed to the Prince's mere desire to enrich his library by refining his interests in the area of experimental philosophy.¹⁷ At any rate, these lists are often deemed to be so broad that they can only be considered the product of a pedantic scholar, reflecting the thirst for erudition at the time.¹⁸ Indeed, in its most extensive version (see: Appendix 1), the list includes 87 volumes ranging from Classical *opera omnia* (Plutarch, Seneca, Pliny, Galen, Lucretius...) to commentaries (such as the Coimbra Aristotle or the Collegium Complutense) and works

¹³ Borelli to Paolo del Buono, October 10th, 1657, published in Fabroni, II, p. 95. See also: Galluzzi, 'L'Accademia del Cimento'.

¹⁴ See, among others, Carlo Rinaldini, 'Commercium epistolicum ab eodem cum viris eruditione, doctrinaque praestantibus olim habitum...' in Id., *Mathematicae analyticae artis pars tertia, in qua secretiora cum arithmeticae tum geometriae mysteria deteguntur eademque ars prorsus absolutur* (Padua: Frambotti, 1684), p. 44. [...] Ma come cresca di mole l'acqua nell'agghiacciarsi, resta ch'io brevemente spieghi, in grazia di che mi convien riferire quel tanto s'aspetta al modo dell'agghiacciamento tanto naturale, quanto artificiale tratto dall'osservazioni, da me più, e più volte fatte col Serenissimo Principe Leopoldo appresso il quale (sia detto senza iattanza) io fui il primo à persuaderlo intraprendere l'esperienze delle cose naturali, onde per commandamento del medesimo, diedi principio all'impresa, d'onde ne seguì, per secondare il genio del Serenissimo Gran Duca l'istituzione dell'Accademia del Cimento all'esempio della quale altri intrapresero à far l'esperienze, che poi hanno divulgate, à noi già prima note'.

¹⁵ Fabroni, I, pp. 56-59.

¹⁶ Middleton, p. 47.

¹⁷ Luciano Boschiero, *Experiment and Natural Philosophy in Seventeenth-Century Tuscany: The History of the Accademia del Cimento* (Dordrecht: Springer, 2007), p. 111.

¹⁸ See: Maurizio Torrini, 'La biblioteca di Galilei e dei galileiani', *Intersezioni*, 21-3 (2001), 545-55, p. 557; and, again, Middleton, p. 56.

by contemporaries (Athanasius Kircher, René Descartes, Pierre Gassendi, Robert Fludd...). But the intended purpose and function of these lists -- compiled in two stages -- are clarified by Rinaldini himself in his letters. An analysis of the content of the letters, the context in which they were written, the volumes included in the list, and the actual use that was made of them sheds new light on the figure of Rinaldini and on the daily practices and shared aims of the *Accademia del Cimento*.

2.1. Rinaldini's selected authors

A wide variety of texts and authors appear in the list. Aristotelian literature of various kinds and from different periods takes up about a third of the *Index*. Among the ancient and medieval classics, only the works of Aristotle, Avicenna, and Aquinas are mentioned in a generic way. More conspicuous and circumstantial is the presence of commentaries on Aristotle published from the mid-16th century onward (especially by members of the Jesuit Order) and widely used as textbooks in the Baroque era, as well as widespread university texts that brought the *cursus philosophicus* into print. Among them are: the commentary on Aristotle's *Metaphysics* (the eight books IV-X and XII) by the Dominican Paolo Barbo (*Acutissime questiones methaphisicales*, 1498); the works of Crisostomo Javelli (1470-1538), a Dominican professor at Bologna who defended a Thomistic interpretation of Aristotle against that of his Averroist contemporaries;¹⁹ the opera omnia of the Scotist Pierre Tartaret; the works of Jacopo Zabarella, closely tied to Padua's medical tradition; the extensive and seminal *Commentarii Collegii Conimbricensis* (1592); Francisco Suarez's systematic handbook *Metaphysicarum disputationum* (1605); Francesco Buonamici's *De alimento libri V* (1603); the brief yet influential survey of late scholastic Aristotelianism produced by the Reformed Cistercian Feuillant Eustachius of Saint-Paul (*Summa philosophiæ quadripartite*, 1609); Rodrigo de Arriaga's widely read *Cursus philosophicus* (1632), covering the canonical three-year Jesuit philosophy curriculum; the *Disputationes in universam philosophiam* (1614) by Pedro Hurtado de Mendoza, Arriaga's likely teacher in Valladolid; Julius Caesar Scaliger's commentaries on Aristotle's *History of Animals* (1619); the *In Aristotelis Mechanicas commentarii* (1627) by the *praepositus generalis* of the Clerics Regular Minor, Giovanni Guevara; the systematization of Thomist philosophy that was produced by the Discalced Carmelite College of St. Cyril at Alcalá de Henares (Complutum) and then published in a number of successive editions under the title of *Cursus artium* (1624-1628); the *In Aristotelis Problemata commentaria* by the physician Lodovico Settala; the Dominican John of St. Thomas' *Cursus philosophicus thomisticus* (1638); the works of the Spanish Jesuit Antonio Rubio (1548-1615), who published some popular commentaries on Aristotle, emblematic of the 17th-century trend to gradually shift the focus from Aristotle's own accounts to discussions of specific issues and opposing viewpoints; the *Philosophia metaphysicam physicamque complectens, quaestionibus contexta* (1625-27) by the Cleric Regular Minor Raffaele Aversa; the *Integer cursus philosophicus, ad unum corpus redactus* (1640) by the "Zenonist" Francisco Oviedo; Claude Guillermet de Bérigard's atypical *Circulus Pisanus* (1643), written in dialogue form; Niccolò Cabeo's commentary on Aristotle's *Meteorologica*, (1646); the *Cursus philosophia* published by the Franciscan John Punch in 1646; Jesuit Thomas Compton Carleton's *Philosophia universa* (1649); the *cursus philosophicus* by the Minim Emanuel Maignan (1653) and the one prepared by Bishop Juan Juárez de Echelaz (1654).

¹⁹ Rinaldini makes a general reference to Javelli's 'opera omnia'.

These texts perfectly reflect the complexity and variety of the late scholastic tradition, Jesuit production, and Aristotelian and Thomistic commentaries of the Baroque age.²⁰ Through the publication, reissuing, and circulation of textbooks and commentaries, scholastic thought was confronted in various ways with the new ideas, sometimes attempting to integrate them, at least partially, into Aristotelianism. One thing is certain: the structure of these books was well suited -- at least in theory -- to the work that Rinaldini was pursuing. They summarized and laid out centuries-old debates, placing them in a rigorously systematic framework and offered easy-to-follow indexes.

Despite this -- with the exception of Cabeo -- no clear traces remain of Rinaldini's annotations on these authors. Indeed, in the second 'more extensive' list that Rinaldini sent the Prince nine days later, the works by Oviedo, Echalaz, Javelli, and Arriaga are no longer included. Also missing from this second list are the works by Gregor Reisch, Giovanni Battista Benedetti, William Harvey, Pietro Andrea Mattioli, Claude Guillermet de Bérigard, Francesco Piccolomini, Nicolas Forest-Duchesne, Paolo Casati, and Thomas Hobbes -- suggesting that ultimately Rinaldini did not work on them. In contrast, Plato and Plotinus make an appearance, along with a number of authors recommended to Rinaldini 'by some physicians' as 'more appropriate to what is desired'.²¹ Among the ancient classics, Rinaldini had already selected Seneca, Galen, Vitruvius, Lucretius, Pliny, and Plutarch (evidence of Rinaldini's annotations on the last two authors survives). The initial list also included early-modern treatises on Optics (Aguilon 1613, Nicéron 1646, Kircher 1646, Maignan 1648, Zucchi 1652), Astronomy (Brahe 1648, Fernel's *opera omnia*), and Magnetism (Cabeo 1629, Gilbert 1600, Kircher 1641, Zucchi 1649); it featured works related to Renaissance hermetic knowledge, natural magic, and the literature of secrets (Agrippa 1600, Della Porta 1589, Rucellai's work, Cardano 1550, 1557, and 1653, but also Scaliger 1557 with its debate with Cardano over the *De subtilitate*).

Finally, there were also a number of ancient and modern authors who variously discussed forms of atomism and corpuscularianism (Lucretius, Sébastien Basson, Bérigard, Maignan, Daniel Sennert).

The works added to the list sent to the Prince a little more than a week later have a certain homogeneity. In addition to the complete works of Plato and Plotinus mentioned above, Rinaldini expands the previous list with: Bartolomeo Sibilla's *Speculum peregrinarum quaestionum* (1493), in the third part of which the Dominican monk discusses demonology, astrology, magic and esotericism, leaning on the thought of Apuleius, Hermes Trismegistus, and other ancient writers; Paracelsus' *opera omnia*; the famous and frequently reissued *Coelum philosophorum* (1526) by German physician Philipp Ulstad, which addresses the topic of distillation through excerpts from Arnald of Villanova, Ramon Llull, Albertus Magnus, and John of Rupescissa; the *Thesaurus* (1552) by the Swiss Conrad Gesner, who sets out from a view of nature anchored in Aristotle and Pliny, and meticulously collects references to alchemically prepared drugs, mainly referring to Hippocrates, Galen, Avicenna, and Mesue; the Latin translation of the highly celebrated book of secrets by Alexis of Piedmont, published by Johannes Jacob Wecker in 1560; *Li meravigliosi secreti di medicina e chirurgia* (1577) by physician Giovanni Battista Zapata; the *Tractatus Medico-Chymici septem* (1634) by the

²⁰ Among the most recent studies, see: *Jesuit Philosophy on the Eve of Modernity*, ed. by Cristiano Casalini (Leiden, Boston: Brill, 2019); Hellen Hattab, 'Renaissance Aristotelianism(s)', in *The Cambridge History of Philosophy of the Scientific Revolution*, ed. by Dana Jalobeanu and David Marshall Miller (Cambridge: Cambridge University Press, 2022); *A Companion to the Spanish Scholastics*, ed. by Harald Ernst Braun, Erik De Bom, and Paolo Astorri (Leiden, Boston: Brill 2022).

²¹ 'Invio a V.A.S una lista più copiosa di quella che già le trasmisi, havendovvi aggiunto alcuni libri che da qualche medico mi vengono rappresentati per più opportuni a quanto si desiderava [...]'. Rinaldini to Leopoldo, November 15th, 1656. BNCF, MS Gal. 275, fol. 48^r. Published in: *Le opere dei discepoli di Galileo Galilei*, II, p. 381.

German physician Matthias Untzer; and Oswald Croll's opus magnum *Basilica Chymica* (1611).

These are volumes related to the tradition of books of secrets, Paracelsism, and the development of iatrochemistry recommended to Rinaldini by 'some physicians'. Books of secrets as well as alchemical and Paracelsian motifs were part of a long tradition in Medici Tuscany. The cluster of volumes added by Rinaldini to the second list fit into a long-standing series of research works on glass, ceramics and porcelain, gem carving, and goldsmithing. Prominent examples are the workshops of the Fonderie of the *Casinò di San Marco* and the *Uffizi*.²²

2.2. The context in which Rinaldini drafted his list

Although it is impossible to identify the names of these 'physicians' with certainty, it is useful to recall the presence of a lively group of anatomists in Pisa in those same months. By the late 1650s, Borelli's house in this city had become a meeting place for physicians: it served as an anatomical workshop that brought together scholars with different backgrounds and levels of expertise, who practiced dissection and engaged in discussions.²³ In the Latin version of Marcello Malpighi's autobiography, published posthumously by the Royal Society in 1697,²⁴ a section is devoted to the *Cimenti Accademia origo*. As in his earlier notes in the Italian vernacular,²⁵ Malpighi relates his arrival in Pisa in 1656 -- where he received the chair of Theoretical Medicine from Ferdinand II. He describes his meetings with illustrious figures such as Francesco Uliva and Count Lorenzo Magalotti, but also the busy activity that was going on there. In particular, he explains that the convergence of Alfonso Borelli, Claude Aubry, and Tilman Trutwyn in Pisa during his early years there led to frequent discussions and anatomical dissections, which took place mainly in Borelli's house. Malpighi then suggests that it was this intense Pisan activity that stimulated the Medici brothers' curiosity about physical and anatomical matters and led them to undertake daily anatomical exercises at Palazzo Pitti that resulted in the creation of the *Accademia del Cimento*.²⁶

Certainly, the link between Pisan anatomical activities and the birth of the Academy would deserve further investigation.²⁷ However, Rinaldini himself was teaching at the Studio

²² Georgiana D. Hedesan. 'Alchemy and Paracelsianism at the Casino di San Marco in Florence', *Nuncius* 37 (2022), 119–143; Marco Beretta. 'Material and Temporal Powers at the Casino di San Marco (1574–1621)', in *Laboratories of Art*, ed. by Sven Dupré (Cham: Springer, 2014), 129–156.

²³ Domenico Bertoloni Meli, *Mechanism, Experiment, Disease: Marcello Malpighi and Seventeenth-Century Anatomy* (Baltimore: Johns Hopkins University Press, 2011); Bertoloni Meli, 'Authorship and Teamwork'; Maria Conforti, 'The Experimenters' Anatomy', in *The Accademia del Cimento and its European Context*, ed. by M. Beretta and others, 31–44.

²⁴ Marcello Malpighi, 'Vita a seipso scripta' in *Opera posthuma* (London: A.&J. Churchill, 1697).

²⁵ Marcello Malpighi, *Memorie di me Marcello Malpighi ai miei posteri fatte in villa l'anno 1689*, ed. by C. Zanichelli (Bologna: Zanichelli, 1902).

²⁶ 'Interea pro exercenda, exponendaque Anatome Clarissimus D. *Claudius Auberius Patavio Pisas* evocatur, qui Doctissimi D. *Borelli* domi frequentes habebat animalium sectiones, inter quas celebris est ea, qua me praesente innotuit testium structura intestinalis compaginata in apro deprehensa, & sub nomine *Vavelii Dathirii Bonclari* evulgata. Tunc pariter in Serenissimis M. D. Principibus ingens excitata est curiositas rerum Anatomicarum, & Physicarum, unde quotidianae in aula ipsa exercitationes anatomicae in variis brutis exercebantur, quibus interpositis graviores politicae curae temperabantur. Hinc famosa celebrisque *Cimenti* Academia excitata est'. Malpighi, 'Vita a seipso scripta', p. 4.

²⁷ Curiously, for instance, in 1681 the Florentine astrologer Francesco Barzini referred to an 'Academy of Philosophers and Physicians' in relation to experiments conducted at Palazzo Pitti: 'Nella Corte di queste Altezze Serenissime, fino al tempo di Ferdinando II di gl. Mem. fioriva nel Palazzo dei Pitti un'Accademia di Filosofi e Medici, dove si ventilavano degl'Insetti con sottil Anatomia tutte le parti, nel qual tempo, e dai

at the time and was in various ways in contact with scholars active in Pisa. It was precisely from Pisa, moreover, that he sent his letters about books to the Prince. Several records testify to the presence in Pisa and Florence of different and intertwined groups of scholars engaged in experimental activities before 1657. Evidence survives, for instance, of sound experiments performed in the fall of 1656 by Borelli, Viviani, Ottavio Ricci, Johann Philipp Treffler, and Guglielmo Gargioli.²⁸ In October of the same year, Andrea Arrighetti regretted that he had not been in Florence to witness the experiments reported to him by Viviani, as he instead had been for the experiments on crossbows.²⁹ In October 1655 Viviani reminded Bérigard of some discussions about ‘curious experiments’ that had taken place one evening at the workshop of bookseller Andrea Cecchi in the presence of Carlo Rinaldini.³⁰ Certainly, the vibrant anatomical and experimental milieu developed in Pisa and Florence in those years is part of the context in which the book list originated and developed. What is also part of this context -- as Mordechai Feingold has already pointed out -- is the presence of Isaac Barrow in Tuscany.³¹ Barrow, who befriended Rinaldini during his stay,³² was one of the members of the lively experimental circle that revolved around Trinity College in the early 1650s. As in Oxford, the new natural and experimental philosophy was making its way through Cambridge University, leading to the emergence of groups of scholars that would later flow into the Royal Society.³³ Interestingly, Seth Ward’s description of the Oxford Philosophical Club’s genesis in 1652 refers precisely to an effort to extract and collect experimental facts and blueprints from published books. Certainly, list-making and scribal exchanges were endemic to early scientific academies. The process of accumulating information, observations, and experiments on the workings of nature occurred through a combination of observational skills and philological learning.³⁴ Although little trace remains of Barrow’s stay in Tuscany and the exchanges that took place in Pisa and Florence between 1655 and 1656, the coincidence is at least noteworthy. Scholars who gravitated around the Medici court in those years taught at the same university and met regularly, and much of their exchange of information took place through oral conversations. Within this ‘confabulatory life’ -- to use Mordechai Feingold’s powerful expression --³⁵ it is crucial to bear in mind the physical contacts between these scholars: the presence of Isaac Barrow in Tuscany, the meetings held at Borelli’s house, the scholars’ visits to the same bookstore, their living together in the same city and university...

medesimi, e dall’istesso Principe, furono fatte per mezzo del Microscopio osservazioni di questi Bachi nell’Aceto, perché è cosa ordinaria che l’Aceto abbia in se sempre i Bachi’. Francesco Barzini, *Dichiarazione della vera causa de’ bachi che si vedono nell’aceto, e della moria degli animali* (Florence: Vincenzio Vangelisti, 1681), p. 3.

²⁸ See: BNCF, MS Gal. 268, fols 155^r-165^r, partially published in: *Le Opere dei discepoli di Galileo Galilei: L’Accademia del Cimento*, ed. by G. Abetti and P. Pagnini (Florence: Barbera, 1942), 449-52.

²⁹ Arrighetti to Viviani, October 27th, 1656. BNCF, MS Gal. 254, fols 46^r-47^r. Published in: *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, p. 373.

³⁰ Viviani to Bérigard, October 30th, 1655. BNCF, MS Gal. 98, fol. 62^r. Published in: *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, pp. 270-1.

³¹ Feingold, ‘The Accademia del Cimento’; Feingold, ‘Confabulatory Life’, pp. 31-3.

³² Mordechai Feingold, *Before Newton. The Life and Times of Isaac Barrow* (Cambridge: Cambridge University Press, 1990), p. 49.

³³ See, among others, Sarah Hutton, *British Philosophy in the Seventeenth Century* (Oxford: Oxford University Press, 2015), pp. 26-50.

³⁴ See, for instance, *Historia: Empiricism and Erudition in Early Modern Europe*, ed. by Gianna Pomata and Nancy G. Siraisi (Cambridge, Mass.: MIT Press, 2005), p. 17.

³⁵ Feingold, ‘Confabulatory Life’. In his essay, Feingold also quotes Henry Guerlac: ‘[...] as historians of ideas we are happiest when we can navigate from the firm ground of one document to the next, and we are prone to forget how great a part travel, gossip and word-of-mouth have played in the diffusion of scientific knowledge, indeed of knowledge of all sorts’. Henry Guerlac, Henry, *Newton on the Continent* (Ithaca and London: Cornell University Press, 1981), p. 46.

Rinaldini compiled his list in the context of these meetings, exchanges, and anatomical or experimental activities carried out by different groups and scholars who were in contact with each other.

2.3. The declared scope of the list and its use

Rinaldini's list consists of more than 70 books. As a research project, it draws a very broad picture. The sources range from ancient to modern one, but with a clear predominance of Renaissance and contemporary literature. A few disciplinary lines also remain identifiable. Some thematic clusters emerge clearly from the list, such as meteorology, alchemy, optics, magnetism, iatrochemistry, and atomism. Tradition and innovation balance each other, with great Aristotelian classics running alongside works by *novatores*, as well as hybrid texts such as those by the Jesuits Cabeo and Zucchi who -- while faithful to their doctrinal allegiances -- conducted experimental research on electrical and magnetic phenomena. This wide collection of sources, in itself, reflects more of an attempt to select a large spectrum of topics than any adherence to a specific philosophy of nature.

In the letters to the Prince accompanying the book list, Rinaldini provides some valuable insights into its purpose. The list was sent to the Prince 'so that others whom His Serene Highness entrusts with doing the same will not avail themselves of the same books'.³⁶ This was therefore a task that the Prince planned to assign others as well, or so Rinaldini thought. The evidence does not rule out that the list was Rinaldini's own idea, something he had discussed with Leopoldo. However, it does suggest that, if only in Rinaldini's mind, this was a job that would involve other scholars too. Moreover, after listing the books he was making use of, Rinaldini explains in detail how he is selecting from them topics related to 'physical speculations'.³⁷ First of all, Rinaldini was extracting passages on theories whose validity needed to be tested. He quoted, for instance, some claims made by Cabeo concerning the isochronism of the pendulum, the floating of eggs in salt water, the heating of the saw (but not of the wood) during cutting, and the presence of worms in vinegar. Next to these various 'sentences', Rinaldini noted the sources he had drawn them from.³⁸ Likewise, he was taking note of theories whose validity was already known and established by experience, but which required further investigation as to their causes.³⁹ Topics mentioned by way of example include: 'Coelum et mare cur caeruleis appareant coloris. Refractio luminis generat ignem et cur. Sonora corpora minora et leviora cur acutius sonent. Fabae virgultum satum, et aratro

³⁶ 'Per ubbidire ai comandamenti di V.A.S. l'invio la nota di quei libri de' quali mi son servito e sono per servirmi in proposito delle cose sperimentali, ad effetto che altri, a' quali l'A.V.S. dia incumbenza di fare il medesimo, non si vagolino degl'istessi libri'. Rinaldini to Leopoldo, November 6th, 1656. BNCF, MS Gal. 275, fols 44r-47r; published in: *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, p. 377.

³⁷ 'Il modo nel quale mi contento nel notare le cose attenenti alle speculazioni fisiche è questo'. Ibid. p. 380.

³⁸ 'Se ritrovo la sentenza da poterla racchiudere in breve parole, la noto con additare il luogo dell'autore, come sarebbe a dire: "Pendula ex filo undantia aequali velocitate moveri semper, sive pendent ex longiori, sive ex breviori filo. Ova supernatant in aqua salsa. Serra incalescit dum secat, lignum vero non. Acetum est verminibus plenum. Motus localis non est sensibilis in re nisi simul cognoscantur duo stantia. Frigus ante auroram augetur. Ferrum contusione incandescit frigido remanente malleo. Ferrum ignitum fit maius. Flumina velocius fluunt, dum tument non tamen tota illa aqua velocius fluit. Flumina retardata a vento non excrescunt pro ratione retardationis. Salis quantitas, quae in aqua solvitur est pro medietate aquae. Salsedo non facit aquam crassiorem". E così dell'altre somiglianti, notando in ciascheduna il luogo dell'autore di dove io l'ho prese'. Ibid.

³⁹ 'Quando poi si ricerca la cagione di qualche cosa, che si suppone esser così [...] quantunque siano note e già manifeste per l'esperienza, nulladimeno si richiede meditatione non ordinaria per investigarne la loro cagione; sì che dall'altre non saran differenti, salvo che in questo di non aver bisogno d'esser sperimentate'. Ibid.

sepultum cur foecundet terram. Fimus cur eandem foecundet. Sol in hyeme cur minus calefaciat' etc.

The various statements were recorded in an abridged form, along with the names of their authors and the works in which they occurred, 'for the sake of brevity': 'wishing in due course to investigate them with experiments and to discuss what the author asserted, it will be useful to reread them in the passages cited'.⁴⁰ This was therefore a genuinely wide-ranging project, intended to be taken up during academic sessions.

Rinaldini's book annotations are unfortunately lost.⁴¹ Evidence of Rinaldini's work on these books and their use, however, has survived. His perusal of such volumes is mentioned explicitly in some diaries. These consist in a series of still unpublished manuscripts from different periods.⁴² Various hands can be identified -- especially those of Magalotti, Rinaldini, Segni, and Viviani -- evidencing a collaborative, polycentric archive. Reference to Rinaldini's list is made in the entries for June 25th and 26th, 1660. About a month earlier (on May 22nd), after a long break in its sessions, the Academy had been reopened under the leadership of a new secretary, Lorenzo Magalotti. A series of experiments on electrical properties, gemstones, the elevation of various liquids in siphons and their exhalations, the behavior of smoke in a vacuum, and various other phenomena, made for some lively new sessions. It would seem like at this stage the list compiled by Rinaldini served as a starting point for reorganizing the Academy's experimental activity and setting its agenda. Indeed, when the academicians met to examine 'part of Rinaldini's book annotations, they had some clear goals in mind: to note what seemed testable, to confirm what had been proven to be true through previous experiments, to reject what had already been proven to be false, and to eliminate items that did not seem consonant with the aims of the Academy because they reported statements that seemed either implausible or impossible to test experimentally'.⁴³ The next day, several experiments from those mentioned by Rinaldini in his list were selected

⁴⁰ 'Le vado notando in questa forma per più brevità, perché ad ogni modo volendosi a suo tempo esaminare con l'esperienza e discorrere sopra quanto viene da esso autore asserito converrà di ritornarlo a vedere a' luoghi citati'. Ibid.

⁴¹ A *Spoglio di autori diversi fatto dal Sig. Dott. Carlo Rinaldini l'anno 1656, con indice dei suddetti autori* appears in the *Inventario dei libri manoscritti dell'Accademia del Serenissimo Principe Leopoldo di Toscana* (BNCF, MS Gal. 290, fols 1r-6r). It was probably given to Lorenzo Magalotti by Alessandro Segni when the former succeeded the latter in the role of secretary. A *Spoglio abbondantissimo di diversi autori fatto dal Rinaldini* is also present in the *Nota di libri e manoscritti di Alessandro Segni* (BNCF, MS Gal. 290, fol. 7r). Targioni Tozzetti claims to have found it in the Archives of the Regio Fisco while he was consulting the manuscripts of the Segni bequest; he describes it as 'un Codice in foglio, alto tre dita, dove con ottimo Carattere e con buon' ordine, si ha un diligente Spoglio di molti Autori Antichi, che trattano di Cose Fisiche'. Targioni Tozzetti, I, p. 377.

⁴² What remains of the unpublished diaries written by the Academy's members is preserved in the Galileo Collection at the BNCF. A single manuscript (Gal. 260) collects the reports of experiments carried out in the years 1657, 1658, 1660, 1661, and 1662, which were subsequently used to compile the diaries. Various hands can be identified, most notably those of Magalotti, Rinaldini, Segni, and Viviani, who also made an incomplete copy of the diary for 1657. Moreover, there are two further copies of the diaries in an unknown hand. The first (Gal. 261), presumably coeval with the Academy, records the experiments conducted from June 1657 to January 1658, with brief descriptions and accurate drawings of the instruments. The second copy (Gal. 262), dating from a later phase, is the only one to cover the Academy's entire span of activity, given that the original diary is lost; this copy records experiments from 19 June 1657 to 6 March 1667. A further manuscript (Gal. 259) collects the experiments conducted from 1653 to 1658, which Middleton (1971) ascribes to an earlier academy, under the patronage of Ferdinand II. The diaries amount to ca. 850 folios.

⁴³ 'Si scorse parte dello spoglio degli autori fatto dal Signor Rinaldini a fine di notare ciò che pareva sperimentabile, confermare ciò che vi si ritrovava di vero autenticato dalle nostre esperienze, rigettare le cose riconosciute per false e resecare quelle notizie che non conducevano al nostro fine, o si rendevano strane a credersi, o parevano affatto aliene dal potersi ridurre a esperienza', June 25th, 1660. BNCF, MS Gal. 260, fol. 108v.

in order to be performed.⁴⁴ These are the only passages in the diaries where the survey is openly mentioned. Nevertheless, references to authors such as Gassendi, Gilbert, Pecquet, Roberval, Pliny, Archimedes, Wecker, and Niccolò Zucchi pervade the *Accademia's* experimental records. At different times, but particularly in the summer of 1657 (when it was beginning its activities) and in 1660 (after its reopening), a number of claims drawn from the list of books compiled by Rinaldini were subjected to experimental scrutiny. Moreover, a series of notes by different hands, collected in the Academy's archives under the heading 'selection of experiments from those included in Mr. Rinaldini's survey',⁴⁵ comment on quotes taken from works by Plutarch, Pliny, Gassendi, and Gilbert (all names on the 1656 lists). This was possibly the result of the analysis and selection work that the academicians carried out on the basis of Rinaldini's list in June 1660. The annotations on Gilbert, Pliny, Gassendi, and Plutarch are the only surviving ones, either because the others were lost or because these were the only ones considered by Rinaldini's colleagues, or even the only ones that Rinaldini had actually provided. Excerpts from Cabeo, however, are quoted in the letter accompanying the first list, and Targioni Tozzetti claims that he consulted Rinaldini's now lost survey and found 'some passages from Aristotle, Pliny, Gilbert etc.'⁴⁶ The list of excerpts must therefore have contained at least Aristotle as well.

The document with annotations on the list is difficult to consult. The sections on Pliny and Plutarch are in Viviani's hand, the section on Gassendi by Carlo Roberto Dati, and the one on Gilbert by Alessandro Segni. Notes such as 'not true', 'believed', 'tested and the opposite is believed [to be the case]', 'not deemed feasible', and 'tested but not exactly' follow each statement proposed for verification or simply the number corresponding to it in the original list. In some cases, the annotations are slightly more specific and make it possible to follow, at least to some extent, the path that links the excerpt chosen by Rinaldini, his colleague's annotation, the experiment performed and recorded in the diaries and – when applicable – its publication in the *Saggi*. As an example, let us take Viviani's annotations regarding Plutarch (Fig. 1-2).

⁴⁴ 'Si scelsero diverse esperienze di quelle dello Spoglio degli autori fatto dal Sig.r Rinaldini quali si noteranno a suo luogo'. Ibid., fol. 109r.

⁴⁵ See: *Scelta dell'esperienze messe nello spoglio dal Signor Rinaldini fatta da S. A. S, et un foglio con altre strutture dal Signor Alessandro Segni*, BNCF, MS Gal. 268, fols 184r-196r.

⁴⁶ Targioni Tozzetti, I, p. 377.

I

Stanzas impare di

186
178

1. H. J.

2. F. *Si nono xristico tanto ricco
e tanto vno. H. J. quanto
d'ogni cosa. H. J. non si vede
differenza*

3. F. *credendi si*

4. N. J.

5. F.

6. N. J.

7. F.

8. N. V. *espriare ad d'p.*

9. N. J.

10. H. J.

*in libri di
stoppa
sotto*

11. F. *uno picato sonarino*

12. *si dico uno non pigate ne se piu
hanno riposte*

13. H. J.

14. H. J.

15. H. J.

16. F. *credendi si*

17. H. J.

18. H. J.

19. H. J.

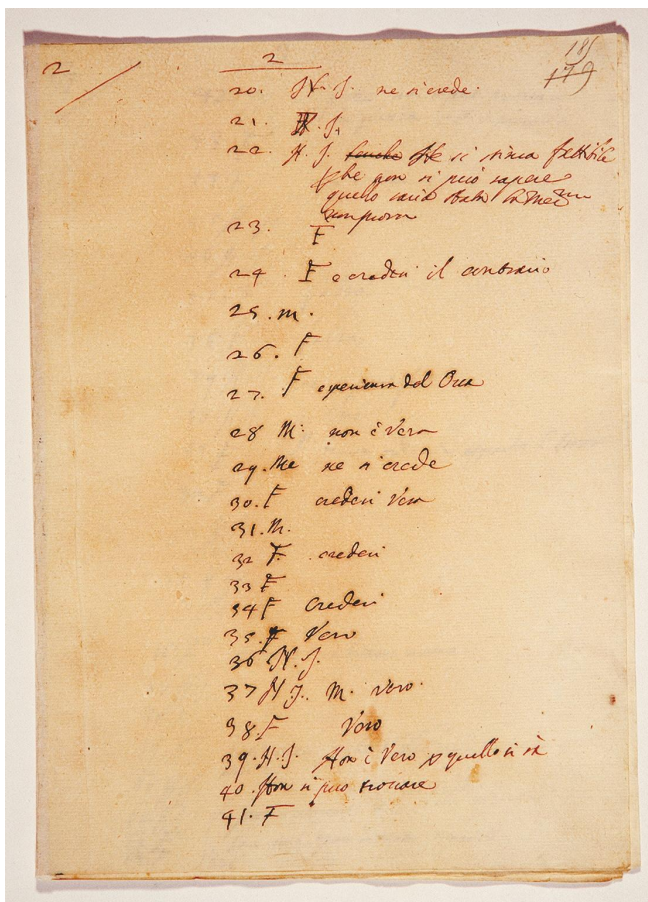


Fig. 1-2. The first two leaves with Viviani's annotations to the excerpts from Plutarch. BNCF, MS Gal. 268, fols 184^r-185^r.

This document consists of five leaves with a list of 106 numbered points. Next to each number are abbreviations such as 'F' ('Fatta', i.e. 'Done'), 'N.F.' ('Non Fatta', i.e. 'Not Done'), 'N.V.' ('Non Vera', i.e. 'Not True'). Sometimes, the acronyms are followed by a few lines of text. Most often, these are very short sentences that do not provide any way to identify the experiment/extract to which the number refers (e.g. 'can't be tested', 'believed to be true'...). However, in rare instances, Viviani provides a brief reference to experiments already carried out within the Academy. For example, next to No. 2 -- marked with an 'F' for 'Fatto' ('Done') -- he writes: 'we tried mixing as much vinegar as wine, in the same amount of hot water and observed no difference'.⁴⁷ The experiment Viviani is referring to is recorded in the diary entries for July 21st, 1657. Although there is no absence of references to ancient and modern authors in the records, Plutarch is not mentioned here. There is only a generic statement about the fact that 'many' believe vinegar to be more powerful than any other fluid in extinguishing fire. The reference is to *quaestio* V of the third book of Plutarch's *Questiones convivales* ('acetum frigidum esse temperatura').⁴⁸ In the diary, a brief exposition of the reasoning on which the experiment was based precedes the account of its execution: if it were true that vinegar is more powerful than any fluid in extinguishing fire, then, when

⁴⁷ 'Si provo mescolare tanto aceto e tanto vino, nell'istessa quantità d'acqua calda [...] non si vedde differenza'. BNCF, MS. Gal. 268, fol. 184^r.

⁴⁸ 'Praeterea acetum vini quaedam natura est et vis. De omnibus autem restinguentibus nihil est, quod igni magis adversetur: omnium maxime id flammam vincit et comprimit ob exsuperantem frigiditatem'. Plutarch, *Quaestionum convivialium*, lib. 3, Quaestio 5, 13.

infused in hot water, it would make it colder than any other fluid. For this reason, the academicians put the same quantity of hot water into two different basins, making sure that the water in the two basins had the same temperature. Then they poured wine into one basin and -- simultaneously -- poured an equal amount of vinegar into the other. After letting the water in the two basins stand for an hour, they observed that no difference in temperature could be discerned between the two. Hence, they deduced that vinegar cannot be said to be more effective than wine in reducing heat. The experiment just described is not published in the *Saggi*, where Plutarch is instead cited with regard to an experiment on the power of attraction of amber that cannot be identified among Viviani's notes to Rinaldini's survey.

Although many of the points in the notes do not allow us to identify the issues defined by Rinaldini (and consequently scrutinized within the Academy), it is nonetheless possible to establish a web of cross-references. Gassendi is mentioned in both the diaries and the *Saggi*, and references to the verification of claims taken from the *Animadversiones* and found in the notes to the survey can be found in the diaries with no explicit reference to Gassendi. The same is true for Pliny and Gilbert. The diaries also include references to authors belonging to Rinaldini's list but no mention of whom is to be found in the notes to the survey (e.g. Zucchi and Wecker).

When combined, these elements (the references and quotations in the diaries, the academics' notes to the survey, the letters with which Rinaldini sent the Prince his lists of authors) all point to the list as a veritable working tool. Nevertheless, while the list served as a guiding instrument for the establishment of an experimental agenda, it was probably not the only one. Several experiments were proposed independently by other academicians, and authors not included in Rinaldini's list are cited in the diaries.

Regarding this last aspect, it is interesting to recall Rinaldini's claims about the possibility that other scholars may have made use of the same books. To begin exploring this connection, the final part of this article will briefly consider Viviani's book requests during those years.

2.4. Beyond Rinaldini: Vincenzo Viviani's lists of books to purchase

Viviani lived his life surrounded by books. In 1638, the Grand Duke Ferdinand II offered him a stipend of 50 *scudi* a year to allow him to further his education through the purchase of books on speculative mathematics.⁴⁹ A partial inventory of his library⁵⁰ and a list of books purchased⁵¹ have survived. In the former, more than 500 volumes are listed, including commentaries on Aristotle, works on ancient history (such as those by Livy and Paulus Orosius), rhetoric treatises (e.g. Bartolomeo Cavalcanti's *Retorica* (1559)), and literary and poetic volumes (such as the works of Dante and Petrarch). As for the latter list, it includes a hundred books, along with the price paid for each. The titles are divided into four

⁴⁹ See the long autobiographical letter written by Viviani to the abbot and marquis Salvati on April 5, 1697 in Fabroni, II, 4-22, p. 6.

⁵⁰ *Indice di libri del Signor Viviani*, BNCF, MS Gal. 155, fols 44^r-54^v. Favaro reports having consulted a more detailed catalog; unfortunately, the document has probably been lost: Antonio Favaro, *Documenti inediti per la storia dei manoscritti galileiani nella Biblioteca nazionale di Firenze* (Roma: Tipografia delle scienze matematiche e fisiche, 1886), p. 49. See also Simon Dumas Primbault, 'Un milieu d'encre et de papier. Brouillons, notes et papiers de travail dans les archives personnelles de Vincenzio Viviani (1622-1703)', *Cahiers François Vite*, 3-10 (2021), 21-54.

⁵¹ *Elenco dei libri acquistati*, BNCF, MS Gal. 217, fols 15^r-24^v. This is a detailed list of books purchased by Viviani probably up to 1661, since their publication dates range from 1476 to 1661 (Viviani also reports the price of each volume). See Dumas Primbault.

‘casse’ (crates) on a thematic basis:⁵² the first one collects 33 volumes on ancient and modern geometry, the second one 30 books on astronomy, the third one 18 texts on geography, perspective and music, and the last one 24 volumes on civil and military architecture and fortifications.

The books on the latter list rather faithfully reflect Viviani’s interests in relation to his best-documented activities: on the one hand, his role as an engineer for the Guelph party’s magistracy (responsible for public works, the water supply, roads and buildings, and the defense of the territory); on the other hand, his position as court mathematician to the Grand Duke of Tuscany. But hundreds of books are also mentioned in Viviani’s letters.

Viviani’s correspondence is punctuated with inquiries regarding new publications or books he would like to purchase: information on publications he cannot find in Florence, advice on works that might deal with this or that topic, and even actual lists of books he would like to buy. The main intermediaries through whom he sought to acquire books were undoubtedly Elia Diodati (1576-1661) in Paris and Rasmus Bartholin (1625-1698) in Padua.⁵³ Viviani also relied on booksellers. His correspondence with Carlo Manolessi in Bologna mainly concerns the publication of Galileo’s oeuvre, but for book purchases Viviani also frequently turned to the Combi-Lanou publisher in Venice (particularly after 1667). In addition to countless volumes on mathematics, geometry, perspective, cartography, and astronomy, as well as to the works that Viviani requested in order to prepare an edition of the Galilean works for submission to Carlo Manolessi, we find some books on natural philosophy.

June 1656 saw a spike in Viviani’s correspondence regarding requests for books and information on publications in the field (Fig. 3).

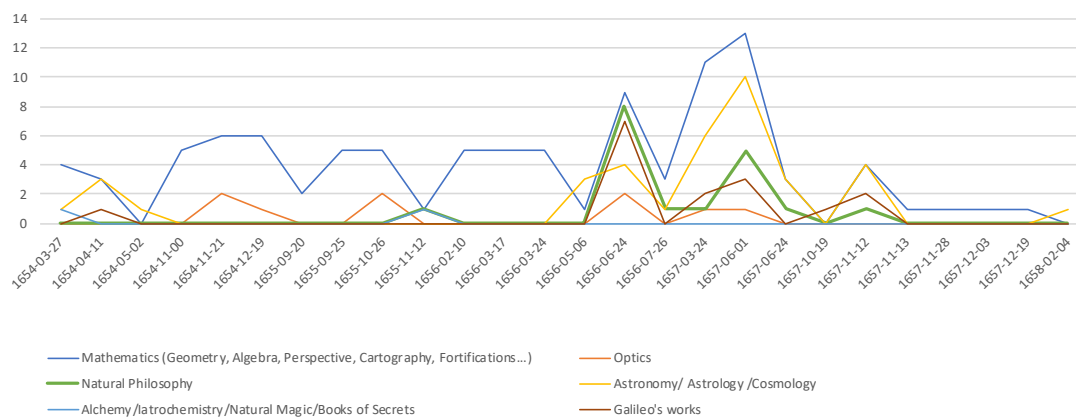


Fig. 3. Books cited in Viviani’s correspondence by topic and period

⁵² On the organizing of these ‘casse’ see, again, Dumas Primbault.

⁵³ References can also be found, however, in his letters to other correspondents. See, for example, his correspondence with Giovanni Bellincioni (BNCF, MS Gal. 254, fols 21^r, 23^r-26^v, 48^r-49^v) or his letter of July 16th, 1644, to M elchisedec Thevenot, in which he inquires about works by Roberval and Gassendi (among others). BNCF, MS Gal. 252, fols 1^r-v, published in: *Le opere dei discepoli di Galileo Galilei. Vol. I, Carteggio 1642-1648*, ed. by Paolo Galluzzi, and Maurizio Torrini (Florence, Giunti-Barbera, 1975), pp. 145-6.

On June 24 -- four and a half months before Rinaldini dispatched his list to Prince Leopold⁵⁴ -- Diodati sent Viviani a long list of books with their prices.⁵⁵ Many of them deviate from Viviani's usual reading tastes. It is in this list that we find -- for the first time in Viviani's correspondence -- titles more specifically pertaining to natural philosophy.⁵⁶ In addition to William Gilbert's *De Magnete* (1600), the list includes the most significant French books on developments related to the Torricellian experiment (an experiment to which Viviani himself had contributed). Among these books, Viviani seems to have explicitly requested only Pascal's *Expériences Nouvelles touchant le vuide* (1647), but Diodati was unable to find a copy of it.⁵⁷ The other volumes were added by Diodati on the basis of what he presumed to be Viviani's interests.⁵⁸ A year later, the books chosen by Viviani left Paris in a crate and traveled through Lyon, Marseilles, and Livorno, reaching Florence in early 1658.⁵⁹ Among them were: *Le plein du vuide* by Etienne Noel (1648), the *Observation touchant le vuide* by Pierre Petit (1647), and *Ad experientiam nuperam circa vacuum ... responsio* by Jacobus Pierius (1648).

Before June 24th, 1656 -- through the bookseller Cocchi -- Viviani had also requested a copy of the *Expériences nouvelle touchant le vuide* by Pascal (1647) from Lyon. He asked to make a 'particular search' for this book, as well as for Roberval's *Traité de mécanique* (1636), specifying that, if it could not be found in print, he would also accept a corrected manuscript copy with the exact figures.⁶⁰ Between 1656 and 1657, Viviani thus displayed a special interest in a series of works related to the experimental observation of nature.

⁵⁴ On this point, see the following section.

⁵⁵ Diodati to Viviani, June 24th, 1656. BNCF, MS Gal. 97, fols 17^r-20^v, published in *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, pp. 349-355.

⁵⁶ These titles are not included in the partial inventory of his library or in the above-mentioned list of books purchased.

⁵⁷ In the list, Diodati highlights in red the books noted by Viviani in an earlier letter, now lost. See: Galluzzi, and Torrini (1984: 352-355). Although the letter could not be found, a copy of the books Viviani requested from Diodati on March 17th, 1656 has been preserved. The titles listed in it match those underlined by Diodati. See: *Copia di nomi di libri chiesti all'eccellentissimo signor Elia Diodati con lettera del 17 marzo 1656*, BNCF, MS Gal. 97, fols 48^r.

⁵⁸ 'Circa i libri domandatimi, pochi se ne sono trovati di quelli che V.S. mi ha notati, de' quali, come de gl'altri che mi è paruto dover confarsi col suo genio, V.S. ne vedrà i pretii, de' quali potrà farne la scelta et darmene l'ordine, il quale sarà da me puntualmente esseguito', *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, pp. 351-2.

⁵⁹ See: Diodati to Viviani, June 1st, 1657, BNCF, MS Gal. 97, fols 38^r-40^r. The crate did not reach Viviani until early 1658. See: Viviani to Diodati, November 12th, 1657; Diodati to Viviani, December 14th, 1657; Diodati to Viviani, December 28th, 1657; Viviani to Diodati, January 6th, 1658 (BNCF, MS Gal. 97, fols 51^{rv}); Diodati to Viviani, May 3rd, 1658 (BNCF, MS Gal. 97, fols 46^r-48^v, 49^{rv}, 50^r, 51^{rv}, 52^r).

⁶⁰ 'Di tutti q.ti è pregata V.S. instantem.te a farne particular ricerca e principalmente de i notati con * de quali non ne trovando stampati procuri di grazia di farne far copie manuscritte ben corrette, e con le figure esatte avvisando la spesa etc'. BNCF, MS Gal. 97, fols 47^{rv}. The same kind of request to obtain a manuscript copy, should a printed one not be found, is made with regard to Pascal's text in the above-mentioned *Copy of names of books requested to the most excellent Mr. Elia Diodati by letter of March 17th, 1656*, probably sent to Diodati on November 12th, 1657.

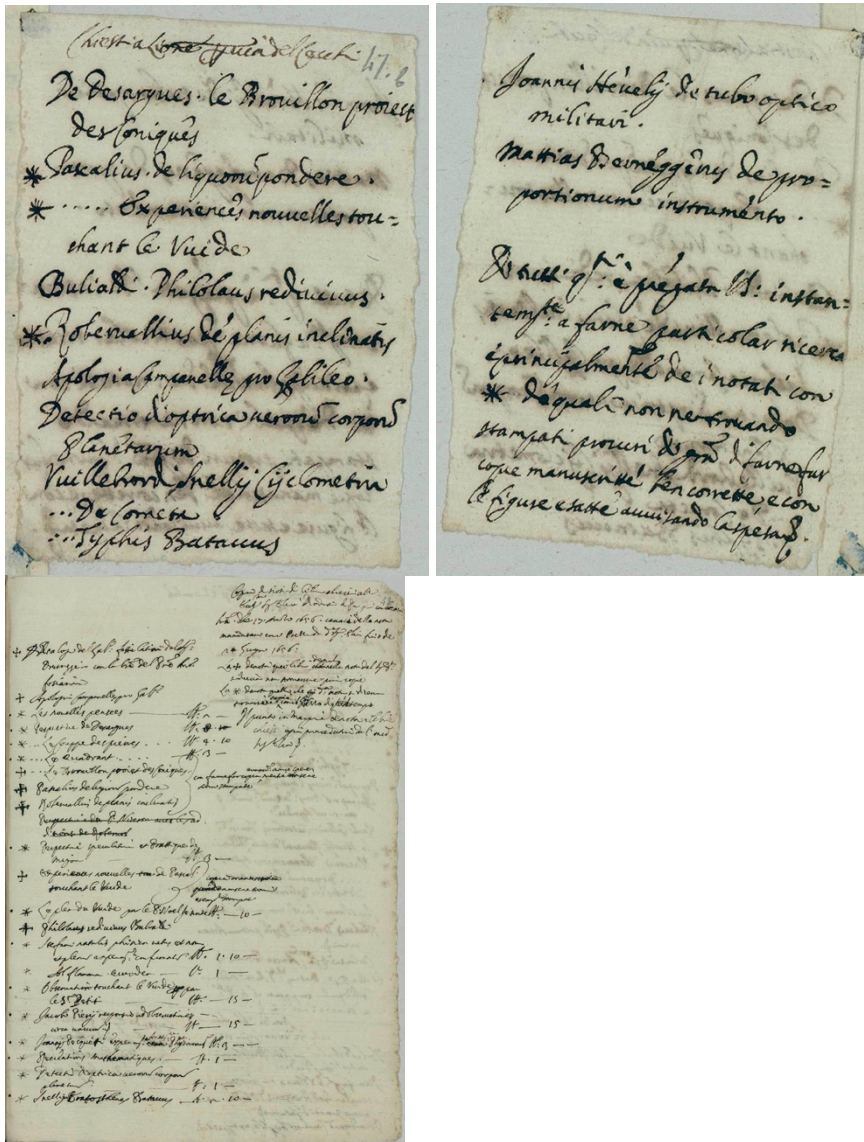


Fig. 4-6. Copy of a list of books requested from Cocchi and Diodati. BNCf, MS Gal. 97, fols 47^r-48^r.

Especially significant in this context is the cluster of books concerning the problem of vacuum and air pressure produced in France in the 1640s and 1650s: Petit (1647), Pascal (1647), Noel (1648), Pierius (1648), and Pecquet (1651) all appear in Viviani's lists.

Experiments on vacuum and air pressure form an important part of the work carried out in Florence between 1657 and 1667. Most of this activity is also reflected in the *Saggi*. After the proem and a description of some of the instruments used in Florence, the *Saggi* opens precisely with experiments concerning air pressure. In addition to Torricelli -- mentioned in the very first lines of the book -- Roberval and Pecquet are cited. The experiments described in this first section of the *Saggi* mainly date from the summer of 1657. Following a series of experiments on the weight of water, the effects of cold and heat, and the flow of liquids, Torricelli's tube apparently made its first appearance in Palazzo Pitti on July 24th, 1657; then on August 2nd, the beginning of 'experiments presented by the French' and of 'others added anew to [investigate] the question of the compression of air' was announced. The academicians replicated some experiments carried out in France a few years earlier by drawing on descriptions of them published in Jean Pecquet's *Experimenta nova*

anatomica. The repetition of these experiments -- particularly Roberval's and Auzout's famous experiments of the carp's bladder and the vacuum in a vacuum -- were only the beginning of a series of tests primarily aimed at investigating the reasons for the suspension of mercury in a tube. More than 150 experiments were performed by members of the *Cimento* between June 19th and December 22nd, 1657. At least a quarter of them were applications of Torricelli's experiment and specifically concerned the influence of air pressure.

References to the 'French' experiments and especially to what Pecquet's work reported about them are quite frequent, both in the diaries and in printed works. In September 1657, the Florentines also repeated the Puy-de-Dôme experiment. The barometric experiment was performed on the roof of the Artimino villa and at the foot of the nearby hill. The purpose was to confirm 'what is being written in France', namely, that the real reason for the rise of mercury in the tube was to be found in air pressure.

Published in 1651 and soon reprinted in several editions, the *Experimenta nova Anatomica* was essentially a treatise on physiology. However, a long section devoted to the discussion of experiments on vacuum made this work one of the most extensive and accessible accounts of the experiments performed in France during those years. As we have seen, Viviani had expressed particular interest in this book as early as March 1656.⁶¹

Viviani was not only an avid book collector, but thousands of sheets of notes now crowd his archive. Among them are notes, transcripts, and translations stemming from his readings. This kind of philological practice had long characterized the work of intellectuals and Viviani engaged in it throughout his life. Identifiable among Viviani's papers are, *inter alia*: a transcription of Huygens' *Horologium* (The Hague, 1658),⁶² a translation of the opening five paragraphs of the second chapter of Descartes' *Dioptrique*,⁶³ some notes from Francesco Betti's translation of Galen's *Del modo da conoscere et medicare le proprie passioni dell'animo* (Basel 1587),⁶⁴ remarks on sound from Gassendi's *De Vita, moribus et placitis Epicuri, seu Animadversiones in librum X Diogenis Laertii*,⁶⁵ a translation of the first book of Nicéron's *La perspective curieuse*,⁶⁶ and notes from St. Bonaventure's *Proemiales quaestiones primi libri sententiarum*.⁶⁷ One folio collects some undated notes from Etienne Noel's *Plenum experimentis novis confirmatum*.⁶⁸ Viviani records a series of passages, contained in *capita* VI-VII. From *caput* VI, for example, Viviani extracts the passage in which Noel narrates how, by pouring water over the mercury contained in a basin and then lifting the tube so that its opening remains

⁶¹ Although the copy requested through Diodati probably did not reach him until early 1658, Viviani had also sought one in Lyon through the bookseller Cocchi, but there is no information as to the outcome of this request. Moreover, in a letter dated January 17, 1654, Giovan Battista Baliani announced to Famiano Michelini in Pisa the reprinting of Pecquet's work in Genoa and promised to send him a copy as soon as it would be available. *Le opere dei discepoli di Galileo Galilei. Vol. II, Carteggio 1649-1656*, p. 122. There are no further traces of this promise either, but the possibility that the copy was actually sent to Tuscany cannot be ruled out. This letter, as well as Viviani's interest in Pecquet's work in relation to vacuum experiments, is also mentioned by Bertoloni Meli: Domenico Bertoloni Meli, 'The Collaboration Between Anatomists and Mathematicians in the Mid-Seventeenth Century', *Early Science and Medicine*, 13-6 (2008), 665-709, p. 667.

⁶² BNCF, MS Gal. 248, fols 116^r-123^r.

⁶³ BNCF, MS Gal. 248, fols 154^r-157^r. See also: *Principi meccanici del Descartes copiati dal Viviani in pag. e 6*, BNCF MS. Gal. 221, fols 1^r-6^v. On the latter, see: Luigi Guerrini, 'Note sulle traduzioni manoscritte delle opere cartesiane', *Giornale critico della filosofia italiana*, 16, pp. 500-507; Paolo Galluzzi, 'Il dibattito scientifico in Toscana (1666-1686)', in *Niccolò Stenone e la scienza in Toscana alla fine del '600. Mostra documentaria ed iconografica*, ed. by Lionello Negri, Nicoletta Morello, Paolo Galluzzi (Florence: Biblioteca Medicea Laurenziana, 1986).

⁶⁴ *Dalla traduzione del trattato di Galeno del modo da conoscere e da medicare le proprie passioni dell'animo fatta vulgare per Francesco Betti*, BNCF, MS Gal. 248, fols 158^r-161^v.

⁶⁵ *Appunti sulla velocità del suono*, BNCF, MS Gal. 246, fols 79^r-80^r.

⁶⁶ BNCF, MS Gal. 246, fols 66^r-69^v.

⁶⁷ BNCF, MS Gal. 156, fols 4^r-5^v.

⁶⁸ *Appunti autografi intorno alle Experiences Nouvelles touchant le vuide*, BNCF, MS Gal. 259, fol. 5^r.

in the water, we cause the mercury to drop completely and the water to rise to the top, filling the entire tube. This experiment -- attributed by Noel to Petit but already described by Torricelli in his letters to Michelangelo Ricci⁶⁹ -- was published in the *Saggi* to demonstrate the absence of air at the top of the tube.⁷⁰ The book lists in Viviani's correspondence -- shortly analyzed here-- suggest that Rinaldini's reading work was not an isolated endeavor. The spike in requests for pneumatic books in Viviani's letters in 1656 is probably related to the annotation work which Rinaldini was pursuing. Whether or not one scholar was aware of the other's work, throughout the year 1656 Rinaldini and Viviani actively engaged in the search for phenomena worthy of experimental testing by finding and reading books.

A broader reconstruction of the books requested and owned by participants in the *Cimento* enterprise would further broaden our understanding of the roots of the Academy's work. A catalog, probably compiled by Antonio Magliabechi (1633-1714) upon the death of Francesco Maria de' Medici (1660-1711), lists 3,168 books collected by Prince Leopold (1617-1675) during his lifetime. The titles are divided by the compiler into 30 thematic sections and reflect the many interests that characterized the life of the prince (and future cardinal). Alongside literary, historical, ecclesiastical, and legal texts, there are numerous scientific volumes. The catalog collects 297 'books on geometry, astronomy, and astrology', 49 'books on plants, animals, and other parts of natural history', 75 'books on medicine, surgery, anatomy, chemistry', and 92 'books on philosophy'.⁷¹ Antonio Magliabechi, the librarian of the Medici court, is certainly an essential figure for understanding Florence's relationship with print culture.⁷² Leopold's book purchases took place mainly through his mediation, which scholars in that circle often relied on. This was certainly the case with Giovanni Alfonso Borelli. Borelli's correspondence with Magliabechi consists of 26 letters sent between 1660 and 1664, when Borelli was teaching at the University of Pisa and participating in the *Cimento's* work.⁷³ In 1996, Ugo Baldini attempted an initial reconstruction of Borelli's library by identifying some of the books he owned and which are now stored at the Biblioteca Nazionale Centrale in Rome (BNCR).⁷⁴ Among them are some of the books mentioned in Rinaldini's 1656 list. Baldini's list includes about 120 volumes. But at least as many can be added to it on the basis of the bookplate featured on the title page of some of the volumes preserved at the BNCR. It would also be important to distinguish the volumes acquired by Borelli according to when they were purchased or researched. Reports of Borelli's book acquisitions are later than 1656, the moment on which this paper intends to focus. The

⁶⁹ Torricelli to Ricci, June 11th, 1644, BNCF, MS Gal. 154, fols 1r-2v.

⁷⁰ Lorenzo Magalotti, *Saggi di Naturali Esperienze* (Florence: Giuseppe Cocchini, 1667). English translation in Middleton, p. 108.

⁷¹ See: Alfonso Mirto, *La biblioteca del Cardinal Leopoldo De' Medici. Catalogo* (Firenze: Olschki, 1990).

⁷² Some studies have been conducted on the book trade in Florence as well as on Leopold's and Antonio Magliabechi's relationships with bookstores and printers. See, for instance, Ian Maclean, *Episodes in the Life of the Early Modern Learned Book* (Leiden- Boston: Brill, 2021); Beatrice Paolozzi Strozzi, 'Leopoldo De' Medici e la libreria Capponi', *Annali della Scuola Normale Superiore di Pisa. Classe di Lettere e Filosofia*, s. IV, 3-1/2 (1998), 243-259; Alfonso Mirto, 'Librai veneziani del Seicento: i Combi-La Noù ed il commercio librario con Firenze', *La Bibliofila*, 94-1 (1992), 61-88; Id. *Il carteggio degli Huguetan con Antonio Magliabechi e la corte medicea ascesa e declino di un'impresa editoriale nell'Europa seicentesca* (Catanzaro: Rubbettino, 2005); Pieter Blaen: *lettere ai Fiorentini Antonio Magliabechi, Leopoldo e Cosimo iii de' Medici, e altri, 1660-1705*, ed. by Alfonso Mirto and Henk Th. van Veen (Florence, Istituto Universitario olandese di Storia dell'Arte, Amsterdam etc.: APA-Holland University Press, 1993); Marco Cavarzere, 'Commercio librario e lettori nel Seicento italiano: i cataloghi di vendita', *Rivista di Storia del Cristianesimo*, 9 (2012), 363-84.

⁷³ Paolo Galluzzi, 'Lettere di Giovanni Alfonso Borelli ad Antonio Magliabechi', *Physis*, 12 (1970), 267-98.

⁷⁴ Ugo Baldini, 'Libri appartenuti a Giovanni Alfonso Borelli', in *Filosofia e scienze nella Sicilia dei secoli XVI e XVII*, ed. by Corrado Dollo (Catania: Centro Studi per la Storia della Filosofia in Sicilia, 1996), 188-231.

reconstruction of Borelli's book purchases over time and the analysis of them within the broader context of the *Accademia del Cimento* is the subject of a forthcoming article.⁷⁵

3. Conclusion

Book lists are just one example of the complex documents that have been left by Florentine academicians and which have only partially been studied, if at all. Certainly, the dense experimental agenda that characterized the *Cimento's* activities and the choice of experiments to be performed did not draw on these lists alone. A great number of experimental proposals made by various academicians can be identified in the manuscripts preserved at the BNCF. Evidence shows that some of these proposals arose in response to experiments already performed or suggested by other members, either as a means to refine them after unsatisfactory results, or in the wake of conflicting theoretical views.⁷⁶ Far from being a monolithic group, the scholars driving the Florentine Academy were as diverse as their more institutionalized and long-lasting counterparts. As is widely recognized, within the Royal Society, for instance, different political, religious, and intellectual agendas coexisted. This did not preclude the coming together of more than 200 individuals who formed a group for the purpose of practicing a certain intellectual enterprise. In Florence, scholars were informed by often opposing philosophical beliefs. Despite this, the diaries list more than 600 academic sessions, and at least one experiment was carried out during each meeting. This testifies to an enormous investment in terms of research, people, money, and time in an unprecedented campaign of experiments in Tuscany. The emphasis on theoretical clashes between academicians led Boschiero (2007) to reinterpret the activity of the *Cimento* by arguing that experiments were not the main purpose of the Academy, but a mere tool of persuasion to support the particular philosophical-naturalistic beliefs of its members. However, this position is strongly challenged by the historical evidence: it really does not explain the huge investment made by both the Medici family and the scholars involved.

Moreover, the analysis of hitherto little-studied documents shows that, despite the different theoretical perspectives, methodological convergences prevailed and collaborative mechanisms emerged.

Rinaldini's list would not appear to have been driven by any adherence to a particular natural philosophy on his part. As noted above, while there are many works related to Aristotelianism, they account for less than a third of the books selected. Many contemporary treatises, works related to magnetism, optics, and alchemy are listed, and there is no shortage of references to authors linked to forms of atomism. Even if Rinaldini did not systematically annotate all the texts he listed, what his list ultimately outlines is a wide-ranging research program. Moreover, the surviving traces of Rinaldini's annotations concern Pliny, Plutarch, Gilbert, and Gassendi, while authors such as Cabeo and Zucchi (present in the 1656 list) are mentioned in the diaries. Of course, this is not enough to include Rinaldini among the *novatores*, and undoubtedly he often opposed interpretations of experiments that conflicted with Aristotelian theories. The figure of Rinaldini still remains largely ambiguous and requires further clarification. However, his position as an obtuse Peripatetic and his role within the *Cimento* necessarily require a reevaluation; and so does the idea of the *Cimento* as a group

⁷⁵ Giulia Giannini, "The books owned by Giovanni Alfonso Borelli: additions and reflections based on the volumes preserved at the Biblioteca Nazionale Centrale in Rome".

⁷⁶ See, for example, the case of the heated ring experiment involving Rinaldini, Borelli, and Viviani in the fall of 1657: Giulia Giannini, 'Capturing, modeling, overseeing, and making credible: the functions of vision and visual material at the Accademia del Cimento', in *Scientific Visual Representations in History*, ed. by Matteo Valleriani, Giulia Giannini, and Enrico Giannetto. Forthcoming. (Dordrecht: Springer, 2022).

arbitrarily assembled and shaped by the Prince and primarily driven by strong internal contrasts.

Rinaldini claims to have discussed with some “physicians” which works could best serve the Academy’s purposes, and the list was reviewed and further annotated within the ‘institution’. Thus, not only did the list have an influence on experimental activity (at least some of the experiments manifestly originated from it), but it also involved a collaborative process. As has been shown, the list was discussed and annotated in the Academy, with the aim of selecting a number of experiments to be performed. The academicians’ scrutiny of Rinaldini’s survey took the form of a collaborative wish list⁷⁷ with respect to an experimental program. Furthermore, Viviani’s sudden interest, at the dawn of the *Cimento*, in the most important works related to the problem of vacuum and air pressure suggests that Rinaldini’s effort was at least not entirely isolated.

The work of finding and annotating books is surely one of the most tangible surviving traces of the project of founding an experimental academy in Florence. Indeed, information on the origins of the *Cimento* is very limited. Not much has reached us apart from the late accounts and claims of scholars such as Rinaldini or Malpighi. It should not be forgotten that the people involved in the Academy’s activities gravitated between Florence and Pisa, taught at the same university, and/or frequented the same circles. Exchanges of ideas and information inevitably took place mostly through learned informal and oral discussions with colleagues. Scholars had no need to leave written records of these exchanges. Although much information has certainly been lost, knowledge of the relationships between the people involved, the presence of networks, and surviving records can provide some insights. Digging through the archives in search of surviving traces of these exchanges, as well as of the consequences and practices they generated, can help us to reconstruct a coherent and credible picture of the climate, environment, expectations, and aims that marked the birth of the Florentine *Accademia del Cimento*.

The surviving correspondence for 1656 consists of 94 letters. Of these, 67 (more than 70%) have Vincenzo Viviani as their sender or recipient. Most of Viviani’s letters from that period concern the collecting of Galileo’s works for publication by Carlo Manolessi in Bologna (17 letters), exchanges with Elia Diodati (9) or Rasmus Bartholin (10) regarding printed works, and the search for copies of Torricelli’s treatises (2 letters exchanged with Lodovico Serenai) or information regarding certain works (e.g. with Pompeo Serni regarding Casati’s dissertation). Alfonso Borelli’s only remaining letter for 1656 deals with the translation of Apollonius’ *Conics*, and only the two letters to Leopold accompanying the book lists are preserved in Rinaldini’s case. Almost all of the surviving correspondence from the year before the *Cimento* began its activities variously concerns print culture. What are also almost totally absent are exchanges between those scholars who would later participate in the designing and execution of experiments at Palazzo Pitti (after all, we would hardly expect people who met frequently or lived in the same city to communicate by letter).

This makes the book lists we have analyzed a privileged tool for capturing at least part of the intellectual atmosphere in which the Florentine enterprise originated. Rinaldini’s survey and its use within the *Cimento* highlight the presence of horizontal solidarity between members of the Academy and offer a glimpse of a much richer and more interconnected intellectual environment than is normally assumed.

A great number of documents relating to the *Cimento* enterprise remain understudied, when they have been examined at all. Hopefully, they will add new pieces to a picture that still requires clarification and further scrutiny. Indeed, the wealth of intellectual exchanges

⁷⁷ Vera Keller, *Knowledge and the Public Interest, 1575–1725* (New York: Cambridge University Press, 2016).

that accompanied the Florentine venture could also shed more light on the complex process of institutionalization of science in early modern Europe.

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APPENDICES

Appendix 1. Works mentioned in Rinaldini's 1656 lists

The works listed below -- in alphabetical order, based on each author's last name -- are drawn from the manuscript lists that Rinaldini sent Leopold in 1656. In the absence of other indications, the first (complete) edition prior to 1656 has been given for each book. Where it has not been possible to identify the precise volume, only the author has been given (when Rinaldini mentions only the author), or -- within quotation marks -- the additional information, if any, given by Rinaldini. In the case of the various generic references to 'opera omnia', we have chosen to keep Rinaldini's simple indication even when it is possible to find a pre-1656 edition of the author's complete works (e.g. Brahe, Tycho. 1648. *Opera omnia* (Frankfurt: Schönwetter)).

The * symbol indicates works absent from the first list and added in the second. The ° symbol, on the other hand, indicates works present in the first list and no longer featured in the second one. All other works listed appear in both the first and the second list.

1. Agrippa, Heinrich Cornelius. 1600. *Opera in duos tomos concinne digesta* (Lyon: Bering)
2. Aguilon, François de. 1613. *Francisci Aguiloni opticarum libri sex* (Antwerp: Moretus)
3. Aquinas, Thomas. 'Opera omnia'
4. Aristotle, 'opera omnia cum comentariis diversis'
5. Arriaga, Rodrigo de. 1632 *Cursus philosophicus* (Antwerp: Moretus)^{oo}
6. Asseline, Eustache
7. Aversa, Raffaello. 1625-27. *Philosophia metaphysicam physicamque complectens, quaestionibus contexta* (Rome: Mascardi)
8. Avicenna. 'Opera omnia'
9. Barattieri, Battista. 1656. *Architettura d'acque* (Piacenza: Bazachi)
10. Barbo, Paolo. 1498. *Acutissime questiones methaphisicales* (Venice: Bevilacqua)
11. Basson, Sébastien. 1621. *Philosophiae naturalis adversus Aristotelem libri XII* (Geneva: La Rovière)
12. Benedetti, Giovanni Battista. 1585. *Diversarum speculationum mathematicarum et physicarum liber* (Turin: Bevilacqua)^{oo}
13. Bérigard, Claude Guillermet de. 1643. *Circulus pisanus...de veteri et peripatetica philosophia* (Udine: Schiratti)^{oo}
14. Brahe, Tycho. 'Opera omnia'
15. Buonamici, Francesco. 1603. *De alimento libri V* (Florence: Sermartelli)
16. Cabeo, Niccolò. 1629. *Philosophia magnetica in qua magnetis natura penitus explicatur* (Ferrara: Suzzi)
17. Cabeo, Niccolò. 1646. *In quatuor libros meteorologicorum Aristotelis commentaria* (Rome: Corbelletti)
18. Cardano, Girolamo. 1550. *De subtilitate libri XXI* (Nuremberg: Petreius)
19. Cardano, Girolamo. 1557. *De rerum varietate libri XVII* (Basel: Henricus Petrus)
20. Cardano, Girolamo. 1653. *De venenis libri tres* (Padua: Paolo Frambotti)
21. Casati, Paolo. 1655. *Terra machinis mota* (Rome: Corbelletti)^{oo}
22. Complutenses. 1624. *Complutensis artium cursus* (Alcalà: Ioannem de Orduña)
23. Compton Carleton, Thomas. 1649. *Philosophia universa* (Antwerp: Meursium)

24. Conimbricenses. 1592. *Commentarii Collegii Conimbricensis* (Coimbra: A. Mariz)
25. Croll, Oswald. 1611. *Basilica chymica* (Frankfurt: Tampach)*
26. Duns Scoto, Ioannes. 'Opera omnia'
27. Echalaz, Juan Juárez de. 1654. *Philosophia: continens dialecticam, physicam, animasticam et metaphysicam* (Lyon: sumpt. Phil. Borde, L. Arnaud, & Cl. Rigaud)^{oo}
28. Fallopio, Gabriele. 1582. *Secreti diversi, et miracolosi* (Venice: Franceschini)*
29. Fernel, Jean
30. Ficino, Marsilio. 1576. *Opera et quae hactenus existere et quae in lucem nunc primum prodire omnia...* (Basel: Petri)
31. Fludd, Robert
32. Forest-Duchesne, Nicolas. 1647-1650. *Selectae dissertationes physico-mathematicae* (Paris: Lesselin)^{oo}
33. Galen
34. Gassendi, Pierre. 'Opera omnia'
35. Gesner, Conrad. 1556. *Tesaurus di Eunuomo Filateo de' rimedi secreti* (Venice: Sessa)*
36. Gilbert, William. 1600. *De Magnete, Magneticisque Corporibus, et de Magno Magnete Tellure* (London: Peter Short)
37. Guevara, Giovanni de. 1627. *In Aristotelis Mechanicas Commentarij* (Rome: Mascardi)
38. Harvey, William. 1651. *Exercitationes de generatione animalium* (London: Du-Gard for Octavian Pulleyn)^{oo}
39. Hobbes, Thomas. 1655. *De corpore* (London: Andrew Crook)^{oo}
40. Hurtado de Mendoza, Pedro. 1615. *Disputationes in universam philosophiam* (Valladolid: Juan Godinez de Millis)
41. Javelli, Crisostomo. 'Opera omnia'^{oo}
42. John of St. Thomas. 1638. *Cursus philosophicum* (Cologne: Munich)
43. Kircher, Athanasius. 1641. *Magnes sive de arte magnetica opus tripartitum* (Rome: H. Scheus)
44. Kircher, Athanasius. 1646. *Ars Magna Lucis et Umbrae* (Rome: Lodovico Grignani)
45. Lucretius. *De rerum naturae*
46. Maignan, Emmanuel. 1648. *Perspectiva horaria, sive, De horographia gnomonica tum theoretica, tum practica libri quatuor* (Rome: P. Rubei)
47. Maignan, Emmanuel. 1653. *Cursus philosophicus concinnatus ex notissimis cuique principiis* (Toulouse: Bosc)
48. Mastri, Bartolomeo. 'Disputationes'
49. Mattioli, Pietro Andrea^{oo}
50. Mersenne, Marin. 'Opera omnia'
51. Niceron, Jean François. 1646. *Thaumaturgus opticus seu admiranda optices, per radium directum* (Paris: Langlois)
52. Oviedo, Francisco. 1640. *Integer cursus philosophicus, ad unum corpus redactus* (Lyon: Pierre Prost)^{oo}
53. Paracelsus. 'Opera omnia'*
54. Pasqualis (ed). 1488. *Aristotelis Liber I Metaphisicae* (Bologna)
55. Piccolomini, Francesco. 'Opera omnia'^{oo}
56. Pico della Mirandola, Giovanni. 1572-3. *Opera omnia* (Basel: H. Petrina)
57. Plato. 'Opera omnia'*
58. Pliny
59. Plotinus. 'Opera omnia'*
60. Plutarch. 'Opera omnia'

61. Porta, Giambattista della. 1589. *Magiae naturalis sive de miraculis rerum naturalium* (Naples: Salviani)
62. Punch, John. 1643. *Cursus philosophiae* (Rome: Grignani)
63. Rada, Juan de. 1589. *Sancti Thomae, et Scoti, controversiarum theologiarum quaestionum resolution* (Paris: A. Sittart)
64. Ranconis de Ericinio, Adalbertus. 1346. *Philosophia vera docet*
65. Raxo, Francisco Fernandez. 1578. *De cometis et prodigiosis eorum portentis, Libri Quatuor* (Madrid: Drouy)
66. Reisch, Gregor. 1503. *Margarita philosophica* (Freiburg: Schott)^{oo}
67. Resta, Francesco. 1644. *Meteorologia de igneis, aereis aqueisque corporibus* (Rome: Francesco Moneta)
68. Rubio, Antonio. ‘Comentario’
69. Ruscelli, Gerolamo
70. Scaliger, Julius Caesar. 1557. *Exoticarum exercitationum liber quintus decimus de subtilitate ad Hieron. Cardanum* (Paris: Vascosan)
71. Scaliger, Julius Caesar. 1619. *Aristotelous Peri zoon istorias. Aristotelis Historia de animalibus* (Toulouse: Raymond Colomiez)^{oo}
72. Seneca. ‘Opera omnia’
73. Sennert, Daniel, ‘Opera omnia’
74. Settala, Lodovico. 1632. *In Aristotelis problemata commentaria ab eo latine facta* (Lyon: Claude Landry)
75. Sibilla, Bartolomeo. 1493. *Speculum peregrinarum quaestionum in tres decades distributum* (Rome: Silber)*
76. Suarez, Francisco. 1605. *Metaphysicarum disputationum, in quibus & vniuersa naturalis theologia ordinate traditur* (Venice: Giovanni Battista Colosino)
77. Tartaret, Pierre. ‘Opera omnia’
78. Tassoni, Alessandro. 1612. *Varietà di pensieri* (Modena: Verdi)
79. Ulstad, Philipp. 1528. *Coelum philosophorum seu de secretis naturae liber* (Strasbourg: Grüninger)*
80. Untzer, Matthias. 1634. *Tractatus medico-cymici septem* (Halle: Oelschlegelius)*
81. Vitruvius
82. Wecker, Johannes Jacob. 1560. *D. Alexii Pedemontani de secretis libri sex...traslati per I.I. Wecherum* (Antwerp: Steelsij)*
83. Zabarella, Iacopo. 1587. *Opera, quae in hunc diem edidit* (Heidelberg: Mareschal)
84. Zapata, Giovanni Battista. 1577. *Li meravigliosi secreti di medicina e chirurgia* (Rome: Stampatori Camerali)*
85. Zetzner, Lazarus. 1613-1622. *Theatrum chemicum selectorum auctorum* (Strasbourg: Zetzner)*
86. Zucchi, Niccolò. 1649. *Nova de machinis philosophia: in qua, paralogismis antiquae detectis explicantur machinarum vires* (Rome: Manelfo Menelfi)
87. Zucchi, Niccolò. 1652. *Optica philosophia experimentis et ratione a fundamentis constituta* (Lyon: Guillaume Barbier)

Appendix 2. Rinaldini's lists: Types of books

A classification of books by type was attempted. Some texts could fall into different categories. In this case, we favored the category that seemed most representative either because of the characteristics of the book itself or because of the use made of the book within the Academy.

The pie chart (fig. 7) illustrates the numerical proportion of categories within the most extensive version of Rinaldini's list (that is, the one that includes all the volumes contained in the first and second lists). It was generated from the table below (tab 1).

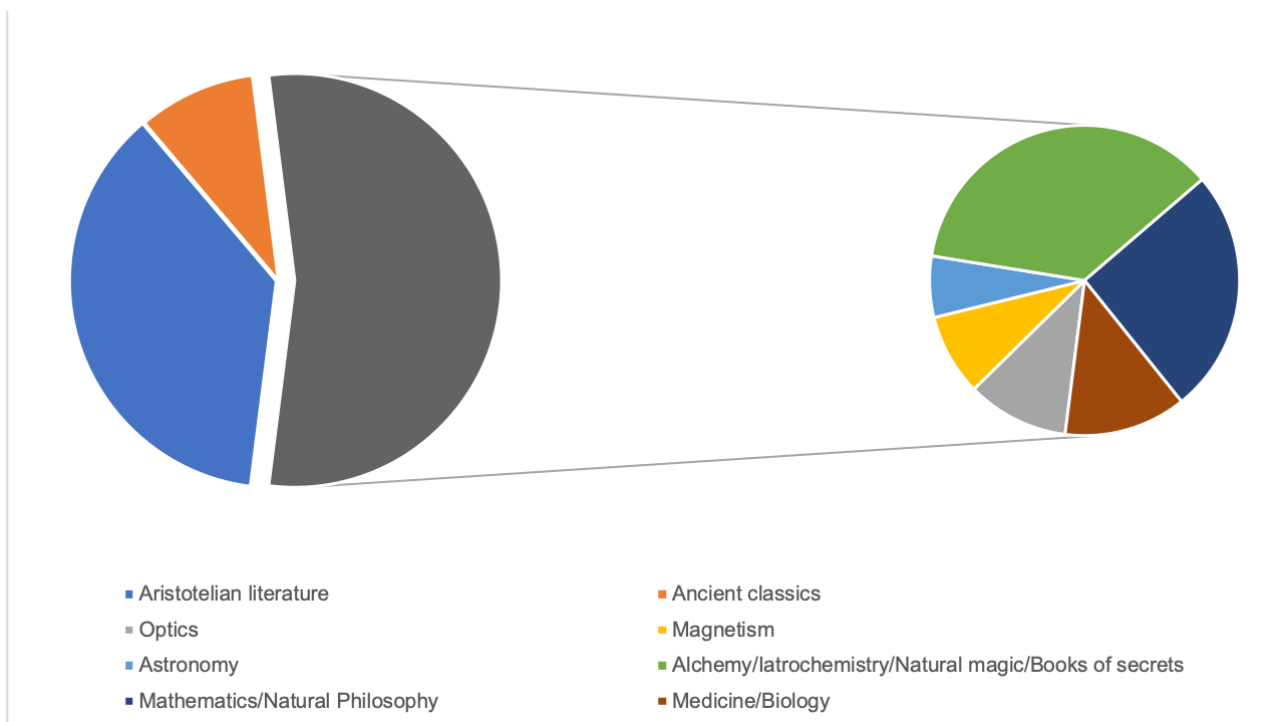


Fig. 7. Proportion of book types in Rinaldini's list

Tab. 1. Classification of the volumes included in Rinaldini's list

Aristotelian literature		Ancient classics	Early Modern Treatises					
Ancient and Medieval Classics	Early Modern Commentaries/ University Textbooks		Optics	Magnetism	Astronomy	Alchemy/ Iatrochemistry/Natural Magic/Books of Secrets	Mathematics/ Natural Philosophy	Medicine/Biology
Aristotle	Arriaga 1632 ^{oo}	Seneca	Aguilon 1613	Cabeo 1629	Brahe 1648	Agrippa 1600	Basson 1621	Harvey 1651 ^{oo}
Avicenna	Asseline	Galen	Niceron 1646	Gilbert 1600	Fernel	Croll 1611*	Benedetti 1585 ^{oo}	Hobbes 1655 ^{oo}
Aquinas	Aversa 1625-27	Vitruvius	Kircher 1646	Kircher 1641	Raxo 1578	Della Porta 1561	Barattieri 1656	Mattioli ^{oo}
Pasqualis (ed) 1488	Barbo 1498	Lucretius	Maignan 1648	Zucchi 1649		Fallopio 1588*	Casati 1655 ^{oo}	Cardano 1550
Duns Scoto	Bérigard 1643 ^{oo}	Pliny	Zucchi 1652			Fludd	Ficino 1576	Cardano 1557
	Buonamici 1603	Plutarch				Gesner 1556*	Forest-Duchesne 1647-1650 ^{oo}	Cardano 1653
	Cabeo 1646	Plato*				Paracelsus*	Gassendi 1658	
	Complutenses 1624	Plotinus*				Pico della Mirandola	Mersenne	
	Compton Carleton 1649					Ruscelli	Piccolomini ^{oo}	
	Conimbricenses 1592					Sennert 1641	Reisch 1503 ^{oo}	
	Echalaz 1654 ^{oo}					Scaliger 1557	Resta 1644	
	Guevara 1627					Sibilla 1493*	Tassoni 1612	
	Hurtado de Mendoza 1615					Ulstad 1528*		
	Javelli ^{oo}					Untzer 1634*		
	John of St. Thomas 1638					Wecker 1560*		
	Maignan 1653					Zapata 1590*		
	Mastri					Zetner 1613-1622*		
	Oviedo 1640 ^{oo}							
	Punch 1643							
	Ranconis de Ericinio 1346							
	Rada 1589							
	Rubio							
	Scaliger 1619 ^{oo}							
	Settala 1632							
	Suarez 1605							
	Tartaret							
	Zabarella 1587							

