

# Sound and Chaos in Della Porta's *Natural Magic*

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**Abstract:** Given the encyclopedic nature of Giovan Battista Della Porta's *Natural Magick*, it may seem surprising that the volume devotes so little attention to sound, a field explored at length by other natural philosophers of the sixteenth and seventeenth centuries. The bulk of Della Porta's statements about sound occupies about four pages of the final book of *Natural Magick*, titled "Chaos"—a catch-all category that, the author explained, lacks the systematic organization of the rest of the volume. I argue that Della Porta's "Chaos" is designed to elicit a certain kind of response in his reader—in particular, to encourage the metaphorical thinking that would link one epistemic field to another. In this respect, his approach mirrors that of the numerous other early modern natural philosophers who, as Wendy Beth Hyman has discussed, used literary metaphors as a means of creating new disciplines and unearthing new discoveries. The "Chaos" served to juxtapose sound and the other senses—a sensory-scientific manifestation of the *paragone* among the arts that was theorized by Italian humanists and artists from the Middle Ages through the eighteenth century. Della Porta's "Chaos" reenacted the stories of creation recorded by Plato, Ovid, and the Hebrew Bible, in which all matter was originally unified and unformed, and the divine Artisan sought to disentangle one kind of matter from another. By deploying this image of chaos before creation, Della Porta reaffirmed the connection between the *magus* and the Creator, and he also invited his reader to participate in the development of a theory of sound as a component of his natural magic. Indeed, through the rhetorical framing of chaos, Della Porta presented sound as a question—as an invitation to further exploration<sup>1</sup>.

**Keywords:** Music, Sound, Chaos, Natural Philosophy, Experiment, Experience, Paragone, Rhetoric, Creation.

## 1. Introduction

Given the encyclopedic nature of Giovan Battista Della Porta's *Magia naturalis*, it might seem strange at first glance that the volume—even in its expanded version of 1589—has so little to say about sound. In contrast to contemporaries like Vincenzo Galilei and successors such as Athanasius Kircher, who experimented extensively, wrote prolifically, and waxed rhapsodic about acoustics and music, Della Porta seems to have been remarkably tentative on these topics. Despite his assurance that the *Magia naturalis* would "set forth all the riches and delights of the natural sciences,"<sup>2</sup> the volume contains only a handful of state-

<sup>1</sup> I am indebted to H. Floris Cohen for his comments on an earlier version of this essay.

<sup>2</sup> Della Porta 1589, title page. All translations of this treatise are from Della Porta 1658.

ments about sound. There are entire books in the expanded edition of *Magia naturalis* devoted to the other media and senses, including perfuming, cookery, and “strange glasses” or catoptrics. By contrast, the bulk of Della Porta’s dealings with sound occupies about four pages of the final book, titled “Chaos”—a catch-all category, a jumble of topics for which Della Porta apologized in his introduction:

I Determined at the beginning of my Book to write Experiments [*experimenta*], that are contain’d in all Natural Sciences, but by my business that called me off, my mind was hindred, so that I could not accomplish what I intended. Since therefore I could not do what I would, I must be willing to do what I can. Therefore I shut up in this Book, those Experiments that could be included in no Classes, which were so diverse and various, that they could not make up a Science, or a Book; and thereupon I have here heaped them altogether confusedly as what I had overpassed; and if God please, I will another time give you a more perfect Book. Now you must rest content with these.<sup>3</sup>

In this explanation, Della Porta was simply too busy to research and write a complete book about each of the subjects contained in the “Chaos;” he was prevented from devoting the necessary time to this project by his “business that called [him] off.” It followed, then, that his “experiments” in this category lacked the weight and systematization of the other topics covered in the *Natural Magick*: as he writes, “they could not make up a Science, or a Book.” He leaves them in a disorderly collection, where they await further investigation. (Indeed, throughout the book, Della Porta used the term *experimenta* to refer to activities that did not entirely coincide with what the modern term “experiment” suggests).<sup>4</sup> Della Porta had been educated in the courtly art of music—probably with an emphasis on singing and perhaps playing instruments—yet his training evidently did not allow or inspire him to participate in the field of speculative music theory that flourished as a key element of the learned, humanist tradition.<sup>5</sup> Nevertheless, through his demonstrations with musical instruments, some of which were clearly based on his first-hand experience or observation, he helped open the way to empirical thought about music and acoustics (Cypress 2016).

<sup>3</sup> “Constitueramus ab initio libri experimenta omnia describere, quae in scientijs naturalibus omnibus continerentur, sed impendunt negotia voluntatem infirmarunt, ut quod velimus minus assequi possimus, unde quum illud non possim, quod velim, id necesse est velim, quod possim. Hoc igitur libro ea experimenta clausimus, quae nullis classibus concludi poterant, quae adeò varia, & diversa erant, ut non scientiam, aut librum conficere poterant, quae etiam quasi paralipomena huc coacervavimus, in chaos fortasse. Deo dante alias perfectiorem dabimus librum. Nunc autem his contenti eritis.” Della Porta 1589, 292; translated in Della Porta 1658, 395.

<sup>4</sup> On the relationship between Della Porta’s *Magia naturalis* and experimental science, see Verardi 2018; Jalobeanu 2020; Borrelli 2020.

<sup>5</sup> On music as a component of Della Porta’s education, see Clubb 1965, 8, and Gabrieli 1927, 424. Della Porta was a friend and mentor to Fabio Colonna, whose treatise *La sambuca lincea* was among the most important contributions of the *Linicei* to the study of music and musical instruments. See Colonna 1991 and Barker 2015.

Della Porta's "Chaos" evokes creation stories, including those in Plato's *Timaeus*, Ovid's *Metamorphoses*, and the Hebrew Bible. In this essay, I will approach Della Porta's treatment of sound by considering its place in this constellation of sources and ideas related to chaos. I argue that Della Porta's "Chaos" is designed to elicit a certain kind of response in his reader—in particular, to encourage the metaphorical thinking that would link one epistemic field to another. In this respect, his approach mirrors that of the numerous other early modern natural philosophers who, as Wendy Beth Hyman has discussed, used literary metaphors as a means of creating new disciplines and unearthing new discoveries.<sup>6</sup> The "Chaos" served to juxtapose sound and the other senses—a sensory-scientific manifestation of the *paragone* among the arts that was theorized by Italian humanists and artists from the Middle Ages through the eighteenth century. The "Chaos" reenacted the stories of creation, in which all matter was originally unified and unformed, and the divine Artisan sought to disentangle one kind of matter from another. In these stories, sight and sound are interconnected and interdependent. By deploying this image of chaos before creation, Della Porta reaffirmed the connection between the *magus* and the Creator, and he also invited his reader to participate in the development of his natural magic. Indeed, through the rhetorical framing of chaos, Della Porta presented sound as a question—as an invitation to further exploration.

## 2. The *Paragone* of the Senses in *Natural Magick*

By Della Porta's generation, the *paragone* of the arts had accumulated a long history. Horace's dictum "ut pictura poesis" ("as painting, so poetry") was expanded during the Renaissance into a broad understanding of the complementary relationship of the various media and modes of expression that flourished in early modern Europe (Lee 1940). Likewise, the notion first recorded by Plutarch that poetry was "eloquent painting" and painting constituted "mute poetry" was widely repeated and used as a prompt to logical elaboration and theoretical approaches to the arts.<sup>7</sup> Increasingly, Renaissance artists turned to the theme of the *paragone* as the basis of their work, exploring the relationship among the human senses in the experience of the world (Quiviger 2010).

Music, too, had a place in the *paragone* of the arts. The opening of Silvestro Ganassi's *Opera intitulata Fontegara* (1535), a treatise on the performance of wind instruments, is representative of the sixteenth-century idea that music was analogous to painting, and, moreover, that vocal music—music with words—was superior to instrumental music precisely because of vocal music's proximity to the "natural," human medium of speech:

<sup>6</sup> Hyman, 2017, 33. Hyman's theory draws upon Fahnestock 1999, 37.

<sup>7</sup> See, for example, Lomazzo 1585, 486; the source is Plutarch, *De gloria Atheniensium* 3, 346f (cf. 1936).

You must know that all musical instruments, in comparison to the human voice, are lacking; therefore we must attempt to learn from it and imitate it. You will object, saying, “How is it possible for this thing to produce words? Because of this [deficiency] I do not believe that this flute could ever be similar to the human voice”. And I respond that, just as a worthy and perfect painter imitates everything created in nature through variety of colors, so with this instrument of wind [or] strings you can imitate the utterances of the human voice.<sup>8</sup>

The widely theorized *paragone* of the arts may have served as a prompt to natural philosophers of the early modern era as they sought to expand their understanding of the workings of the natural world. Still in its infancy,<sup>9</sup> the field of acoustics benefited from the metaphorical thinking that the *paragone* offered. The monochord had long been used as an instrument of music-theoretical thought, especially to explore classical ideas about the numeric ratios that defined musical-acoustic intervals and to articulate new theories of the tuning and temperament of musical instruments with fixed pitches, such as the harpsichord and organ (see Rehding 2016). But the monochord was primarily a theoretical and pedagogical instrument, not one used for musical performance. In the latter half of the sixteenth century, Vincenzo Galilei, father of Galileo and a professional musician, helped to revolutionize the field of music theory by deploying practical musical instruments to demonstrate and explain acoustic phenomena (see Palisca 1992). In discussions of the emerging field of acoustics, the *paragone* of the arts was extended to a *paragone* of the senses more broadly: theorists built the field of acoustics, in part, through metaphorical thinking that related it to the field of optics.<sup>10</sup>

Della Porta’s *Natural Magick* participates in this metaphorical thinking about sound. This can be seen in the handful of instances in which he addresses the sound of the human voice before he arrives at the final book of *Natural Magick*. In Book XVI, “Of Invisible Writing,” he suggests that one may, “with open voyce, shew some things to those that are confederate with us.” “It is wonderful,” he writes, “that as the Light, so the Voyce is reverberated with equal Angles.” He notes that it is “common” knowledge that that voice can travel along circular walls, but “if it be at liberty, it is beaten back by the wall it meets with in the way, and is heard, as we see in an Eccho.” He gives an account of communicating with his friends in this way, and likewise of sending messages to and

<sup>8</sup> “Voi havete a sapere co[m]e tutti li instrumenti musicali sono rispetto & co[m]paratione ala voce humana ma[n]cho degni p[er] tanto noi si afforzeremo da q[ue]lla i[m]parare & imitarla; onde tu potresti dire co[m]e sara possibile conciosia cosa che essa proferisce ogni parlare dil che no[n] credo che dito flauto mai sia simile ad essa humana voce & io te rispondo che cosi come il degno & p[er]fetto dipintor imita ogni cosa creata ala natura con la variation di colori cosi con tale instrumento di fiato & corde potrai imitare el proferire che fa la humana voce.” Ganassi 1535, 2–3. On Galileo’s approach to the *paragone*, see Bolland 2000 and Cypess 2016b, 15–19.

<sup>9</sup> On the rise of acoustics, see, for example, Palisca 1994; Cohen 1984; Gozza 2000, and Moyer 1992.

<sup>10</sup> For examples of this phenomenon, see Cypess 2016b and Valleriani 2012.

from a friend over 50 miles away across a calm sea: he claims (however dubiously) that “the words came clearly to me, carried on the plain superficies of the water.”<sup>11</sup> The phenomenon of the echo comes up again in Book XVII, in Della Porta’s discussion “of strange glasses”—that is, catoptric lenses—where he explains how one may “reflect heat, cold, and the voice too, by a Concave-Glass.” Such a glass, he explains,

will not onely reverberate heat and cold, but the voice too, and make an Eccho; for the voice is more rightly reflected by a polite and smooth superficies of the Glass, and more completely by any wall.<sup>12</sup>

Both these passages present sound in metaphorical terms: “equal angles” reflect sound as they reflect light. The concave glass or mirror reflects not only light, heat, and cold, but the sound of the voice as well.

Metaphor also serves as the framing device in Della Porta’s plan for creating an ear trumpet, in Book XX, the “Chaos.” He derives the design for his ear trumpet by observing the construction of the ears of animals, surveying all those known to have excellent hearing: “For Nature takes care for their safety, that as they have no great strength, yet they might exceed others in hearing, and save themselves by flight.” This survey of animals’ ears leads Della Porta to conclude that

the Form of the Instrument for hearing, be large, hollow, and open, and with screws inwardly. For the first, if the sound should come in directly, it would hurt the sence [sic]; for the second, the voice coming in by windings, is beaten by the turnings in the ears, and is thereby multiplied, as we see in an Eccho.

Yet he introduces this ear trumpet by drawing an analogy between hearing and sight: “In my Opticks I shewed you Spectacles, wherewith one might see very far. Now I will try to make an Instrument, wherewith we may hear many miles.” And he concludes the section by returning to the same metaphor: “Therefore fit your Instrument to put into your ear, as Spectacles are fitted to the eyes.”<sup>13</sup>

<sup>11</sup> “Voce in apertum delata significare consiis aliqua”; “Mirum profecto dictu, ut sicut lumen, ita etiam vocem ad parem angulum reflecti”; “si libera, obice muro reflectitur & auditur, ut in echo apparet”; “verba per planam superficiem aperta progrediebantur.” Della Porta 1589, 257; translated in Della Porta 1658, 352.

<sup>12</sup> “Calorem, frigus, & vocem speculo concavo reflectere”; “non solum calore[m] & frigus, sed vocem refringet, atque echi officio fungitur, reflectitur enim vox à polita, terasque speculi superficie rectius, integrius, quàm à quovis pariete.” Della Porta 1589, 264; translated in Della Porta 1658, 361.

<sup>13</sup> “Natura enim eorum saluti cavit, ut quae minus viribus valerent, saltèm auditu praestantia fuga saluti consulerent”; “Forma igitur instrumenti auditus oportet sit ampla, & concava & aperta, & intus cochleata, duplici de causa. Prima si soni intus rectè ferrentur, oblaederent sensum, secundo quia per cochleam circumferuntur, & allisa vox per aurium anfractus, multiplicatur, ut de echo videmus”; “In opticis specilla demonstravimus, quibus satis longè videre poteramus, nunc instrumentum construere tentabimus, quo etiam per multa miliaria audire possimus”; “Accommodetur igitur instrumentum, ut commodè auribus indatur, ut specilla oculis.” Della Porta 1589, 296–97; translated in Della Porta 1658, 400–1.

Although Della Porta's bricolage of sonic demonstrations seems oriented toward the nascent field of acoustics, as he demonstrates the sonic wonders that emerge from experience with the natural world, his analogies between sight and sound—coupled with his references to echoes—invite consideration in light of the fanciful world of classical and humanist literature. Indeed, in contrast to the epistemological categories that developed in later centuries, early modern natural philosophy moved easily between the empiric and the mythological, between observation and imagination. Della Porta alludes to the long history of the *paragone* between sight and sound through his references to Echo. In Ovid's telling of the myths of Echo and Narcissus, sight and sound are complementary, even serving as inverses of one another. Echo had been condemned by Juno to cease her endless, distracting chattiness, and instead only speak by repeating back the words of others. Narcissus was likewise condemned by prophecy of Tiresias: "If he but fail to recognize himself, a long life may he live." Yet the two are consumed by their own flaws, and they end as complementary shadows of themselves—and reflections of one another. Rejected by Narcissus, Echo's body withers until all that is left of her is her voice: "though we hear her calling in the hills, 'tis but a voice, a voice that lives among the hills". Similarly, Narcissus is consumed by a vision without a body: "this that holds your eyes is nothing save the image of yourself reflected back to you" (Ovid *met.* 3, 339–508). Reflected sound and reflected sight become eternal companions.<sup>14</sup>

The links between sight and sound to which Della Porta alludes formed part of a larger trend in early modern Europe, in which practitioners of natural philosophy, scientific recipes, and proto-experiments understood the natural world in terms of play. As Paula Findlen has suggested, the story of Narcissus formed an essential point of reference for this understanding. This playfulness was evident in the reflective lenses that Della Porta valued so highly—and in the great changeability of nature as a whole. As Findlen writes,

It appeared that nature was constantly in flux, always in the process of becoming something else. [...] The scientific playfulness of mirrors was a conscious attempt to rewrite the fable of Narcissus, blending "poetic fiction" and scientific fact (Findlen 1990, 312, 322).

Moreover, it was the constant juxtaposition of the various components of nature—animals, plants, rocks and minerals—that demonstrated the playfulness of nature as well as the playfulness of its Creator. For Findlen, "Nature, in this conception, was cast as Narcissus—forever looking at herself in the mirror that the juxtaposition of the three kingdoms provided" (Findlen 1990, 313).

For Horst Bredekamp, human exploration of these juxtapositions—especially in collections such as the *Kunstammer*, where all the wondrous variability of nature was on full display—allowed the human observer to think creatively and playfully, and this playfulness was a form of creation, of *imitatio Dei* (see Bredekamp

<sup>14</sup> A discussion of natural philosophers' interest in the myth of Echo and Narcissus appears in Gozza 2010; see also Galson 2016.

1995). Della Porta was himself a collector of curiosities, and his *Magia naturalis* may be understood as a literary equivalent to such collections. Casting himself in the treatise as a *magus*, he claimed special insight into the process of creation. In understanding the sympathies and antipathies of all forms and matter, he understood how to unlock nature's secrets, thus channeling the power of creation for the benefit of humanity. Leaving his "Chaos" in an apparently unfinished, unsystematic form effectively invited his readers to join him in the playground of creation.

### 3. The Meanings of Chaos

What might Della Porta have meant when he titled Book XX of *Magia naturalis* "Chaos"? At least superficially, the magus himself provided an answer, as noted above: the "Chaos" contained "those Experiments that could be included in no Classes, which were so diverse and various, that they could not make up a Science, or a Book." Yet this statement cannot be taken at face value; informed by courtly *sprezzatura*, Della Porta may have feigned disorder as a rhetorical device, while using the term "chaos" to call up a range of associations to go far beyond his simple definition. I will suggest that his use of the term "chaos" underscores the potential of the *paragone* of the senses as a means of creating new knowledge. By evoking creation stories from Plato's *Timaeus*, Ovid's *Metamorphoses*, and the biblical book of Genesis, Della Porta presents Book XX of *Magia naturalis* as a collection of explorations of the world, the generative power of which have yet to be realized. In these creation stories, all elements and forms of matter are juxtaposed seemingly at random, and this juxtaposition enables the metaphorical thinking that yields new kinds of knowledge.

In Plato's *Timaeus*, creation encompassed everything within it; on the eve of creation, all matter was unified, and it was the role of the divine Artisan to disentangle one part from the other, so that they would assume independent, distinct forms:

Now the creation took up the whole of each of the four elements; for the Creator compounded the world out of all the fire and all the water and all the air and all the earth, leaving no part of any of them nor any power of them outside (Plato, *Timaeus* 30bc; cf. 1959).

This same idea appears in the proem to Ovid's *Metamorphoses*, which describes the chaos at the beginning of time: "a rude and undeveloped mass, that nothing made except a ponderous weight; and all discordant elements confused, were there congested in a shapeless heap" (Ovid *met.* 1, 5–7; cf. 1953). These ideas resonate with Della Porta's magical approach to the various materials and elements of the universe, all of which he understood as inherently interconnected, and which the *magus* was tasked with disentangling. Peter Kelly has identified numerous points of overlap between Ovid's account and Plato's, even suggesting that the *Metamorphoses* refers specifically to the *Timaeus* in framing its creation story. Of special note is the image of the Creator as *fabricator* ("artisan") and *opifex* ("craftsman") (see Kelly 2020, 742), which, Kelly argues, Ovid uses to connect his account to Plato's. Artisanry played an important role in Della

Porta's approach to natural magic, as I will discuss further below. The "Chaos" allows him to link himself to these creation stories and cast himself as a creator.

The term "chaos" would have called up other ideas, as well. As Eric M. MacPhail notes, in the early modern era, "chaos" was used to refer to literary miscellanies or collections, and it was often used interchangeably with the Latin *sylva* and the Greek *hyle*, both meaning "forest."<sup>15</sup> To twenty-first-century readers, the term *chaos* might seem to carry a negative valence, but MacPhail emphasizes that such a connotation was absent during the early modern period. In fact, chaos "appeals to the esthetic variety that was so crucial to the humanist miscellany and its classical models." In capturing "grace without order,"

the randomly disposed contents of *Chaos* delight us with their variety. Thus, chaos participates in the long tradition of natural metaphors, such as flowers, meadows, or gardens, that are routinely associated with any kind of compilation or anthology (MacPhail 2014, 8).

Likewise, Maria Fabricius Hansen observes, chaos constitutes "evidence of the learned scholar's grasp of the comprehensive interrelationship of this world's phenomena" (Hansen 2020, 246).

Paradoxically, then, "chaos" was also a signal of the scholar's ability to organize and recall all accumulated knowledge. Drawing on the classical art of rhetoric, Medieval and Renaissance scholars constructed their *ars memorativa* ("art of memory") around the production of order from chaos. Thus, Peter of Ravenna used the word "chaos" to describe all the knowledge he had memorized, which he could pronounce aloud to astonished listeners. Appearing in his *Foenix*, Peter's chaos encompassed a performative aspect that both celebrated variety and brought order to it (see Peter of Ravenna 1491). Paolo Rossi has expounded upon the link between chaos, order, and memory, arguing that the encyclopedic ideal of natural philosophy in the sixteenth and seventeenth centuries relied upon the creation of order from chaos:

The arts and sciences seem, at first glance, to be like a disordered and chaotic forest, but behind this chaos we can vaguely discern the outlines of a hidden order. The rigid distinctions between the sciences are only provisional: on closer inspection the tangled undergrowth of the forest reveals itself to be the orderly ramifications of a single common tree of knowledge, from which the branches of the particular sciences and arts diverge according to a rational order. In order to construct a new universal method one needed to restore order, coherence and system to the chaos, advancing courageously into the forest of knowledge, explaining the orderly structure of the branches, and discovering the trunk and roots which they share in common (Rossi 2000, 131–32).

The image of the tree of knowledge to which Rossi refers is drawn from sources from the thirteenth through sixteenth centuries. It seems deliberate

<sup>15</sup> I have discussed the distinctions between *sylvae* and *florilegia* in collections of music in the sixteenth and seventeenth centuries in Cypess 2022.

in its evocation of another aspect of the creation story, this time from the Hebrew Bible. Just as the tree of knowledge tempted Adam and Eve with the promise of divine understanding, deep knowledge of the world lay in the process of creating order from the apparent chaos of human perception. Moreover, the tree of knowledge reflected the image of collected wisdom as a forest; knowledge was an aesthetic experience rooted in variety and akin to the variety of the natural world.

The *ars memorativa* that led to universal knowledge could not be enacted by a solitary natural philosopher. Its usage by Peter of Ravenna and other writers who engaged the art of memory illustrates how chaos became a performance—a social act that depended on the cooperation of a receptive audience. Peter required interaction with an audience to recite his chaos in an orderly way. From this perspective, it is significant that Della Porta's own treatise on memory, the *Ars reminiscendi* (1602), frames recollection as an act of rhetorical performance, deriving many of its principles from the writings of Quintillian and other rhetoricians. Della Porta's art of memory links the things to be remembered to the images of bodies, their physiognomies and gestures, and the ways in which ideas must be communicated by an orator to a group of listeners. For Lina Bolzoni, Della Porta's art of memory bears a "strong theatrical aspect," with "those who practice the art of memory" functioning "like directors or playwrights," effectively creating worlds of their own in order to share those with others.<sup>16</sup>

The performativity of Della Porta's art of memory sheds light on an important aspect of his "Chaos," and, indeed, of *Natural Magick* as a whole. As Della Porta makes clear in the preface to the 1589 edition, his *experimenta* were rooted in collaborative experience—not solitary contemplation—enacted together with the members of the academy that he convened at his home:

I never wanted also at my House an Academy of curious Men, who for the trying of these Experiments, cheerfully disbursed their Moneys, and employed their utmost Endeavours, in assisting me to Compile and Enlarge this Volume, which with so great Charge, Labour, and Study, I had long before provided.<sup>17</sup>

Convened during the period between the issuing of the first and second editions of *Natural Magick*, and thus presumably contributing to the "Chaos," Della Porta's *Accademia dei Secreti*

was formed with the express purpose of trying out the experiments Della Porta had proposed in the first edition [...] and of expanding the scope of that earlier work with the addition of new experiments (Eamon 1994, 200).

<sup>16</sup> Della Porta, *Ars reminiscendi*; the quoted passages are in Bolzoni 2001, 162–63.

<sup>17</sup> "Nec domi meae defuit unquam curiosorum hominum Academia; qui in his vestigandis experiendisque collato aere strenuam alacremque operam navarent; quique hoc opere concinendo augendoque maximo mihi fuere adjumento. Haec igitur tantis impensis, labore, & studio parata, num in lucem venire paterer." Della Porta 1589, "Praefatio," s. p.; translated in Della Porta 1658, "The Preface to the Reader," s. p.

William Eamon notes that the attendees of the academy included members of the Neapolitan nobility as well as craftsmen who assisted with the practical aspects of the recipes and demonstrations that the academy tested. With his emphasis on *experimenta*—practical experience—Della Porta identifies himself with that tradition of artisanship. Indeed, even if his “experimental method” required refinement in subsequent generations, one of its most remarkable aspects is its embrace of *technē* as an epistemological system.

Among the *experimenta* that the academy must have worked out were those in the “Chaos” involving musical instruments. These acoustical wonders take as their starting point an instrument that Della Porta calls the *lyra*. While the 1658 English translation of *Natural Magick* renders *lyra* as “harp,” it is likely that he had another instrument in mind—the *lira da braccio*, an instrument that was often used in Italian academies—including, apparently, the one that Della Porta convened—to accompany the recitation of epic poetry.<sup>18</sup> A courtly instrument, the *lira da braccio* epitomized the refined civility espoused by the Neapolitan nobility; it is possible that study of the *lira* formed part of Della Porta’s own musical education as a youth. In the context of his academy, one might easily imagine how musical performance on the *lira* merged with Della Porta’s acoustical demonstrations: the instrument could be used in a wide variety of ways, as musical artistry could dovetail with the open-ended exploration of the instrument as an object with epistemological potential.<sup>19</sup>

In deploying the *lyra* within his academic gatherings as a component of his “Chaos,” Della Porta reminded his colleagues that sound was an important part of creation—one that could not be ignored. Indeed, the performative nature of memory—of chaos that gradually becomes organized through the disposition and practice of the *magus*—relies on sound as much as on the other senses. As I will show, the acoustical wonders presented in Della Porta’s “Chaos” seem designed to provoke the metaphorical thinking that would link one epistemic field to another, thus inviting his fellow academicians to contemplate how the topics that he had “heaped” together “confusedly” could be compared, connected, and separated again to generate new modes of thought.

#### 4. Della Porta’s Acoustical Wonders and the *Paragone* of the Senses

As is common throughout the *Magia naturalis*, some of Della Porta’s acoustic phenomena are codified from Classical sources; many of these are concerned with sympathetic effects transmitted from one material to another and from one sensory realm to another. For example, if one wishes to frighten sheep, Della Porta recommends playing on a *lyra* “strung with Sheep strings, mingled with

<sup>18</sup> A discussion of the *lira da braccio* as an instrument used in Italian academies is in Nosow 2002. A video in which the *lira da braccio* is used to accompany verse by Poliziano can be found in the recording *Sulla lira* by Le Miroir de Musique.

<sup>19</sup> For a discussion of how musical instruments were used as vehicles of discovery in the early seventeenth century, see Cypess 2016.

strings made of a Wolfs guts," since the instrument "will make no Musick, but jar, and make all discords."<sup>20</sup> Here, the material of the strings is transformed into the emotional effect of fear. He notes further that pregnant women will miscarry if they hear music played on an instrument strung with strings made of serpents, thus proposing that the material of the strings has a physical impact on the body. To fight off the plague Della Porta recommends the use of a *lyra* made of

no other Wood than the Vine-tree; since Wine and Vinegar are wonderful good against the Pestilence, or else of the Bay-tree, whose leaves bruised and smelled to, will presently drive away Pestilent contagion.<sup>21</sup>

Ingestion, smell, and touch of these natural objects transmit their material properties to the person who experiences them. As Della Porta summarizes,

If we would seek out the cause of [these effects], we shall not ascribe it to the Musick, but to the Instrument, and the wood they are made of, and to the skins; since the properties of dead beasts are preserved in their parts, and of Trees cut up in their wood.<sup>22</sup>

To be sure, it would be difficult to believe that indeed Della Porta had tested all of these wondrous effects of his musical instrument. Underlying them, however, is a central principle of chaos: all matter and forms, united before creation, retain their fundamental relationships and pass from one sensory realm to another.

In addition to acoustic wonders passed down from ancient sources, Della Porta presents another category of demonstrations with sound: those that involve empirical observation through sensory experience. In these demonstrations, Della Porta describes how to create sonic illusions. Through deception and surprise, the *magus* would inspire a sense of wonder in his audience. His simplest acoustical wonder is the playing of instruments by the wind; on a "tempestuous" day one may set instruments outside, such that "the wind will run violently into them, and play low [i.e. quietly] upon them [...] whence if you stand neer and listen, you will hear most pleasant Musick by consent of them all, and will rejoyce."<sup>23</sup> A more complex demonstration concerns the sympathetic resonance of strings:

A harp that is play'd on, will move another harp strung to the same height. Let the strings be stretched alike, that both may come to the same melody perfectly;

<sup>20</sup> "Fides de intestinis ovium, cum fidibus de intestinis luporum permiste non concordant, sed obstrepunt." Della Porta 1589, 299; translated in Della Porta 1658, 403.

<sup>21</sup> "Quod non nisi ex vitigineo ligno esse poterat, quum mire vinum, & acetum contra pestilentiam valeant. Vel ex lauro, cuius folia tusa, & olfacta subinde pestilentie contagia prohibeant." Della Porta 1589, 299; translated in Della Porta 1658, 404.

<sup>22</sup> "Sed si nos huius causam perscrutari velimus: non modis, sed fidibus, & instrumentorum ligno, & pellibus attribuemus, quum mortuorum animalium, & succisarum arborum etiam in membris & lignis proprietates conserventur, ut alibi diximus in hoc libro. Et ut exempla adducamus à notissimis." Della Porta 1589, 298–99; translated in Della Porta 1658, 403.

<sup>23</sup> "Adveniens enim ventus impetu ruit, leviter pulsat, & hiantes calamos percurrit, unde ex omnium sonitu vicinis auribus suavissimum percipies concentum & laetaberis." Della Porta 1589, 300; translated in Della Porta 1658, 405.

if you shall strike one of the base strings, the other will answer it, and so it is in the trebles.<sup>24</sup>

Even a person untrained in music could, using this method, tune an instrument if another just like it had already been prepared. When the two instruments are exactly in tune, the second set of strings will “answer” the first through sympathetic vibrations. If the effects of the experiment are unclear, he advised, one may place pieces of straw on top of the strings to observe their vibrations.

The final examples of Della Porta’s acoustical experiments—and the ones with which his section on musical magic concludes—are again noteworthy for their exploration of the *paragone* of the senses:

That a deaf person may hear the sound of the harp, or else stop your ears with your hands, that you may not hear the sound. Then take fast hold of the instrument by the handle with your teeth, and let another strike on it, and it will make a musical noise in the brain, and may be a sweeter noise. And not onely taking hold of the handle with your teeth, but the long neck, neer the Harp, and by that you shall hear the sound perfectly, that you may say that you did not hear the Musick, but taste it.<sup>25</sup>

In this final demonstration, Della Porta continues to use sensory metaphors as a means of understanding acoustics. Just as the senses of sound and sight are complementary in his framing of the ear trumpet, in this demonstration the senses of sound, touch, and even taste serve to reinforce one another and magnify each other’s effect. Through the mouth and the teeth one can feel physically the sonic vibrations that would otherwise be only audible. The sympathetic play that Della Porta understands as undergirding every natural phenomenon now becomes manifest in the body of the playful *magus*. Just as the divine Creator disentangled sight, sound, taste, touch, and smell in forging the world from Chaos, Della Porta understands the sympathetic, interconnected nature of all these senses and demonstrates how their underlying unity may be deployed to inspire curiosity, play, and discovery. The metaphorical thinking that such demonstrations provoke had the capacity to reorganize systems of knowledge.

Two more instances in which Della Porta discusses sound help to draw these various strains together. In his book of *Magia naturalis* on invisible writing, Della Porta suggests another means of transmitting sound across a distance, using a long pipe made of earth or lead: “whatever you speak at one end, the voice

<sup>24</sup> “Lyra, quae pulsata alteram eiusdem toni immotam moveat. Tendantur in unum nervi, ut ad idem & perfectum perveniat uniusque; melos, si gravium unam pulsabis digitis, altera reboat & movetur gravis in ea, sic acutarum.” Della Porta 1589, 300; translated in Della Porta 1658, 405.

<sup>25</sup> “Si vero ut Lyrae surdus audiat sonum Vis, vel manibus aures abde ritè, ne sonum audias, tunc capulum lyrae, vel citharae mordicus praeheposito, pulset eam alter, & concinnum in cerebro dabit sonum, & fortasse suaviolem. Nec solum capulum dentibus captans, sed longissimam hastam, quae lyram tangat, & per eam clarè auditur sonus, dicique poterit non auditus sensu, sed gestu percipere.” Della Porta 1589, 300; translated in Della Porta 1658, 405.

without any difference, as it came forth of the speakers mouth, comes so to the ears of him that hearkeneth."<sup>26</sup> (This type of communication is used in many children's playgrounds today.) Della Porta picks up a similar idea in his book on pneumatic or "wind instruments." There, he describes "Instrumental music made with water." He proposes a demonstration in which water enters a brass tank, creating a vortex that draws air in. The water is expelled at another point, thus ensuring that the brass tank contains a consistent water level, meaning that the music played by the air would likewise be consistent:

when therefore by touching the keys, the stops of the mouths of the Pipes are opened, the trembling wind coming into the Pipes, makes very pleasant trembling sounds, which I have tried and found to be true.<sup>27</sup>

In fact, Della Porta elaborated on this model in his treatise on pneumatics published in 1601; Patrizio Barbieri has shown that Della Porta's model was the same one used at the *fontana dell'organo* at the Villa d'Este, Tivoli.<sup>28</sup>

Organs, whose sound emerges from a series of pipes, were widely understood as evoking another tale in Ovid's *Metamorphoses*—that of Pan. Despite the dark violence of tale of Pan and Syrinx, Pan was often reinterpreted in Renaissance literature as symbolic of the Christian God. Giuseppe Horolloggi's commentary to the widely read Italian poetic translation of Ovid identifies Pan as the symbol of celestial harmony, which creates order out of the great diversity in the universe. As Horolloggi explains,

The fable of Pan and Syrinx is rather well known: for this name "Pan", in Greek, means "everything". So if I say that nature, which is everything, was vanquished by Love, then these events were produced by this [love]. And Syrinx, the beloved of Pan, would be that *conchetto* and that suave harmony produced by the movement of the spheres, so much beloved by nature; these are guided with great order and mastery.<sup>29</sup>

Horolloggi's commentary proceeds to enumerate the physical attributes of Pan, each of which bears a symbolic meaning related to the movements of the heavenly bodies: his horns symbolize the moon; his face the sun; his beard the sun's rays. Therefore, Horolloggi claims, "the instrument"—that is, the organ—"symbolizes the harmony of the heavens, known by the movement of the

<sup>26</sup> "Nam quicquid loqueris ex una parte, vox incorrupta integra, ut ex ore loquentis prodijit." Della Porta 1589, 257; translated in Della Porta 1658, 353.

<sup>27</sup> "Quum igitur ad pinnarum motus reserantur epistomia fistularum, ventus tremulus fistulas subintrans, tremulas & satis iucundas voces facit, quod nos experti sumus, & verum invenimus." Della Porta 1589, 288; translated in Della Porta 1658, 386.

<sup>28</sup> Barbieri 2019, 73–75. Videos of this organ can be found readily online.

<sup>29</sup> "La favola di Pan, e di Siringa e assai nota: perche questa voce Pan, nella lingua Greca significa il tutto. Si dira dunque che la natura che e il tutto figurata per Pan, rimane vinta dall'amore quando ama come fa, le cose prodotte da essa; e Siringa amata da Pan, serà quel *conchetto*, e quell'armonia soavissima de i moti delle sfere, amata molto da essa natura; come quelli, che sono guidati co[n] tanto ordine, e con tanta maestria." (Ovid 1578, 13v–14r).

sun.”<sup>30</sup> In this reading of the myth, the sound of the musical instrument evokes the light of the sun and darkness of the night sky. Again, sound and sight are inherently connected.

Moreover, Horolloggi’s interpretation elides classical mythology with Christian theology. By linking the Greek god Pan with the biblical Creator, Horolloggi participated in a long tradition of such metaphorical readings. This myth, too, points to creation stories as a source of inspiration for Della Porta’s “Chaos.” In biblical book of Genesis, as in Ovid and Plato, all matter in the world was originally combined in what the Bible calls *tohu va-vohu*, or chaos. Like Della Porta’s “Chaos,” the world before the biblical Creator was “heaped [...] altogether confusedly.” It is only when God speaks—when he utters a sound—that order begins to emerge. His first words, significantly, are *va-yehi or*, “Let there be light.” Sound serves as a prerequisite for the visual dimension; acoustic wonder is the precondition for clarity of vision.

## 5. Conclusion

Compared to other music theorists and natural philosophers of the late sixteenth and early seventeenth centuries, Della Porta did not write extensively about music or acoustics. However, he knew how to ask questions. In my reading, this act of asking questions is the purpose of Della Porta’s placement of most of his discussion of acoustics and acoustical experimentation in the final book of the *Magia naturalis*, the “Chaos.” By ending his *Magia naturalis* with the “Chaos,” he indicated that the topics contained in it required a new beginning. Chaos was a rhetorical strategy through which Della Porta called on his readers to disentangle the various areas of inquiry from one another, to play with them, to experience them, and to initiate new discussions. The “Chaos” pointed out those areas—like sound—where Della Porta’s work remained unfinished and where new discoveries awaited.

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<sup>30</sup> “L’instrumento poi figura l’armonia de i cieli, conosciuta per il moto del sole.” (Ovid 1578, 14r).

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