

# How to Be in Two Places at Once: A Search for the Immersive Experience in Renaissance Music and Visual Arts.

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## Abstract

Immersion is a hot topic, but it is often invoked in a vague or shallow way. This essay aims to arrive at a more nuanced consideration of the immersive experience by presenting some perhaps surprising arguments from the past—from Renaissance music and visual arts—drawing parallels with our own time, and positing that the Network Arts can take inspiration from this history to enhance its own immersive endeavours. Four interrelated topics serve as the basis for this investigation: miniature devotionalia, polyphonic canons, anamorphic puzzles, and early cosmology. By using perspective to disclose hidden meanings, ideas, and realities, these varied practices draw their practitioners into a kind of immersive epistemic procedure—repeated again and again across disciplines—that speaks to notions of self, presence, and locality. They each communicate a deep interest in the practitioner's inner world, revealing a historical immersion discourse in the process. This essay calls for a more thoughtful integration of these insights into modern artistic practices. By deconstructing immersion and reframing it via historical examples, it offers new perspectives that highlight the potential of Network Arts to foster immersive experiences that are unique to its platforms.

## Introduction

The word “immersion” features prominently in contemporary conversations about audience engagement, performer experience, and the curation of artistic heritage. This essay looks to the past in order to bring a fresh perspective to those conversations. The widespread desire and promise of greater and greater immersivity is itself cause for reflection in the present moment. Asking history about this unique state of mind is our attempt to reflect and to stay oriented amidst an ever-changing landscape. This essay addresses traditions and practices of the European artistic and scientific Renaissance: a somewhat fuzzy label, typically applied to the years 1450 to 1650.<sup>2</sup> The period and geographies in question will also be treated broadly in order to account for the length and breadth of that intellectual tradition, while searching for a common thread.

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<sup>2</sup> David Woodward, *The History of Cartography, Volume Three: Cartography in the European Renaissance* (Chicago and London: University of Chicago Press, 2007).

Network Arts in particular has a vested interest in understanding immersion. In embracing virtuality and distance collaboration, it has inevitably traded in some of the more traditional paths available to the localized arts. If representation and presence are not accommodated, participants can potentially feel isolated and disembodied. Immersion can so easily go wrong; the risk is not limited to this venture. Immersive museum exhibits, for example, built with the best of intentions, can unwittingly elicit a superficial reading or even block a patron's experience of the moment. New technology can draw participants in, but it can also distract them. If the network arts are concerned with curating artistic experience in a virtual environment, then understanding that experience is just as important as translating it. Thus the project of immersion in the network arts means pursuing alternative artistic experiences, drawing in practitioners by novel means, and capitalizing on the unique space in which they find themselves. The successful implementation of immersion in this arena will help to unpack it for the larger community, revealing new facets, and injecting a new level of thoughtfulness into the conversation.

While the word "immersion" is first attested in English as early as the 1450s, it did not adopt the metaphorical sense of being engrossed or absorbed in until nearly two centuries later.<sup>3</sup> Pre-modern modes of viewing did not necessarily make space to discuss artistic immersion in a way that would be relatable today. Renaissance composers and theorists rarely commented explicitly on the listener's inner world, focusing their literary efforts instead on the creation of didactic manuals.<sup>4</sup> Lively discourse on internal states and emotions are strangely silent when it comes to the immersive experience. While historical commentary on immersion may come in a different guise, the idea of being drawn in and engulfed seems so attractive to us now, that it is worth searching for clues in some unexpected places.

This essay will investigate the potential for immersive experiences in four interrelated topics in the Renaissance: miniature devotionalia, polyphonic canons, anamorphic puzzles, and early cosmology. While each topic can stand alone, there is an important overlap around the idea of perspective; all four can be said to tinker with the relationship of the viewer to the viewed, revealing something in the process. These topics also posit a gap between what is visible and what must be resolved. Finally, as this essay will argue, they each provoke a kind of revelatory immersive experience in the participant. Devotionalia, canons, anamorphosis, and cosmology may at first appear incongruous. In one sense canons catch the eye, being non-visual; in another sense the outlier is cosmology, being non-artistic. Devotionalia and anamorphosis straddle a kind of spiritual-artistic divide. Nevertheless they all four represent, each in their own way, practices that articulate the underlying artistic, scientific, and religious paradigm. In concerning themselves with the perspective of a participatory practitioner these topics give us enough of a through-line to get started.

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<sup>3</sup> Oxford English Dictionary, s.v. "immersive (adj.)," September 2023, <https://doi.org/10.1093/OED/9377978778>.

<sup>4</sup> Grantley McDonald, "The Reception of Ficino's Theory of World Harmony in Germany," in *Sing Aloud Harmonious Spheres: Renaissance Conceptions of Cosmic Harmony*, ed. Maude Vanhaelen and Jacomien Prins, (London: Routledge, 2017), 160.

## 1. Miniature Devotionalia.

From the grandiose to the intimate, sixteenth-century European religious practice is a multileveled affair. The majestic gothic cathedrals and extravagant altarpieces that housed and embellished communal rites have a more personalized counterpart in the form of devotionalia. Devotionalia are religious objects owned, carried, and used by individuals in the private practice of their faith. They often contain detailed carvings and virtuoso puzzles, referencing familiar stories or abstract geometries. In practice devotionalia invite game-like interaction and exploration. Rotating rosary beads, openable containers, and moveable rings seduce the user, according to historian Frits Scholten, into “creating a subtle connection between his real, moving world and that of the make-believe game in the miniature scene.”<sup>5</sup>

Games are not just for children, and losing oneself in prayer is not restricted to the religious; puzzles and play have always been wrapped up in the numinous. Reported experiences of online gamers for example, characterized by forms of make-believe, role-play, and identification with avatars have an intensely spiritual quality, associated with total immersion and incorporation into the alternative world.<sup>6</sup> The Renaissance imagination harbored a healthy appreciation of games, riddles, and puzzles.



**Figure 1:** Prayer Nut (closed), c. 1500–1530. Adam Dircksz (Netherlandish, active c. 1500), and Workshop. Boxwood. 5.8 x 4.8 cm (2 5/16 x 1 7/8 in.). The Cleveland Museum of Art. <https://www.clevelandart.org/art/1961.87>. Permissions: CC0 1.0 UNIVERSAL.

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<sup>5</sup> Frits Scholten, “Immersive Play: Perception and Use of Small Devotionalia in the Late Middle Ages,” *Queeste: Journal of Medieval Literature in the Low Countries* 26, no. 2 (2019): 167.

<sup>6</sup> *ibid.* 168–170.

Interacting with devotionalia engages with the specific narrative content of the miniature and brings this small-scale world into connection with the everyday world. They are fundamentally versatile and context-dependent, exhibiting a certain temporal, geographical, and intentional mobility.<sup>7</sup> A particular devotional object may correspond to different things or elicit different reactions in different times and places. They can allow access to the supernatural, or an aid in achieving focused concentration during prayer.<sup>8</sup> They provide, in the words of Susan Stewart, “the experience of interiority.”<sup>9</sup>

### In a Nutshell

Miniature devotionalia, for literal and symbolic reasons, are often referred to as “prayer nuts.” Just as devotional puzzles present themselves to be deciphered, the shell of a nut asks to be cracked. In a song from the popular collection “*Een Devoot en Profitelyck Boecxken / A Devout and Profitable Booklet*” (1539) the nut takes on an allegorical quality, offering a sweet core when its hard shell is cracked:

Segt haer  
 Si moet de herde note  
 Der bitter doot ierst craken  
 Eer si die kraal der soeticheynt  
 Van mijnre godheyt mach smaken

Tell her  
 She must first crack the hard nut  
 Of bitter death  
 Before she can taste the sweet bead  
 Of my godhead<sup>10</sup>

The instruction is clear, and its promise evident. Lexical games, puzzles and *double entendre* hold pride of place in 16th century visual, material, and literary culture; things are seldom what they seem. According to Scholten, the opening and closing of a boxwood prayer nut is a “symbolic and

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<sup>7</sup> Anne Mariss, “Mobile Matters of Religion. Devotional Objects in the Early Modern Era,” Conference Regensburg, 21.04.2022 - 23.04.2022, <https://www.hsozkult.de/conferencereport/id/fdkn-128002>, accessed April 8th, 2024.

<sup>8</sup> Charles H. Lippy, *Being Religious, American Style: A History of Popular Religiosity in the United States* (Westport: Greenwood Publishing Group, 1994), 89.

<sup>9</sup> Susan Stewart, *On Longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection*. (Durham, NC: Duke University Press, 1993), 69.

<sup>10</sup> Transl. Reindert L. Falkenburg, “Prayer Nuts Seen Through ‘the Eyes of the Heart’,” in *Small Wonders: Late-Gothic Boxwood Micro-Carvings from the Low Countries*, ed. Frits Scholten, (Amsterdam: Rijksmuseum, 2016), 129.



performative act” associated with the revelation and internalization of the divine mystery.<sup>11</sup> For us it reveals something about the history of likeness itself. As signifiers, devotional objects need bear no resemblance to their referent. Even the word “nut,” calls upon the image of a much larger tree, without actually resembling that tree. As the influential theorist known as pseudo-Dionysius the Areopagite says: “dissimilar similitudes” or “figures without resemblance” elevate our minds better than resemblances do because they do not mislead us into taking images literally.<sup>12</sup> In devotional art such dissimilar similitudes could thus provoke active engagement in the viewer, eliciting the search for further meanings.



**Figure 2:** Prayer Nut (opened) with scenes from the Life of St. James the Greater, c. 1500–1530. Adam Dircksz (Netherlandish, active c. 1500), and Workshop. The Cleveland Museum of Art. <https://www.clevelandart.org/art/1961.87>. Permissions: CC0 1.0 UNIVERSAL

<sup>11</sup> Scholten, “Immersive Play,” 157.

<sup>12</sup> Caroline Walker Bynum, *Dissimilar Similitudes: Devotional Objects in Late Medieval Europe*. (New York: Zone Books, 2020), 57; see also Colm Luibheid and Paul Rorem, *Pseudo-Dionysius: The Complete Works*, New York: Paulist Press, 1987.

## Dissolution of Scale

Sometimes a nut is not a nut. English mystic Julian of Norwich received a vision in 1373, in which she describes a transcendence of scale:

Also in this He showed me a little thing, the quantity of a hazelnut, in the palm of my hand, it seemed, and it was as round as a ball. I looked thereupon with the eye of my understanding, and I thought, "What may this be?" And it was answered generally thus: "It is all that is made."<sup>13</sup>

The experience of holding the universe in the palm of her hand, observing all creation while remaining part of it herself, evoked in Julian an impossible synthesis of scale, one that bridged the human and divine.<sup>14</sup> This is not an uncommon way of conceptualizing the paradoxical quality of God and Nature during the Middle Ages, as that which both penetrates and embraces.<sup>15</sup>

Nicholas of Cusa (or "Cusanus" 1401-1464), was a polymath whose work enjoyed a wide reception over the course of his lifetime and afterwards. His writings are an important resource in the study of theology, philosophy, geometry, and early science. For us they provide a glimpse into the fifteenth century mind. Cusanus also imagined the creator of the universe as being both around and inside everything.<sup>16</sup> Working within a late medieval Christian framework, he believed the nature of redemption was a fundamentally geometric affair: since God, in Christ, became a human who nevertheless embodies totality. So in a microcosmic redeemer there is also an inversion of scale; all is contained in Christ, who is contained in all. That peculiar topology, for Cusanus, is the reconciliation between creator and created.<sup>17</sup>

Across the ages, descriptions of transcendence have often included distortions of time as well as space. Julian's sublime vision recalls the opening lines of William Blake's "Auguries of Innocence":

To see a World in a Grain of Sand  
And a Heaven in a Wild Flower  
Hold Infinity in the palm of your hand  
And Eternity in an hour.<sup>18</sup>

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<sup>13</sup> Grace Warrack, *Revelations of Divine Love, Recorded by Julian, anchoress at Norwich, Anno Domini 1393*. (London: Methuen & Co., 1901), chapter V.

<sup>14</sup> Scholten, "Immersive Play," 153.

<sup>15</sup> Piergiorgio Odifreddi, *Il Vangelo Secondo la Scienza / The Gospel According to Science*, (Milan: Einaudi, 1999) 159.

<sup>16</sup> *ibid.*

<sup>17</sup> Nicholas of Cusa, *De Docta Ignorantia / On Learned Ignorance*, 1440. Transl. Jasper Hopkins Second edition, (Minneapolis: The Arthur J. Banning Press, 1985) 3.3.

<sup>18</sup> William Blake, "Auguries of Innocence." 1803 (published 1863) in David V. Erdman et al., *The Complete Poetry and Prose of William Blake*. (New York: Anchor Books, 1988).

Psychological experiments have shown that meditation itself produces overestimated durations in tested subjects, an effect which seems to scale proportionally when focusing on different sizes of miniature representations.<sup>19</sup> There may thus be an empirical basis upon which to build a phenomenology of scaled representation.

Creative artists know this phenomenon well. The term “flow” describes an immersive state of mind, in which tasks and ideas come easily, time evaporates, and all impediments to the work at hand seem to dissipate.<sup>20</sup> The practitioner becomes entangled with the practice, and forgets their own time and space.<sup>21</sup> Transformations of scale suggest a feeling; to invoke such puzzles in the context of spiritual activity might even be described as revelatory. The experience would be part mystic and part epistemic, affirming and fortifying the connection between vastness and wisdom.<sup>22</sup> The act of decoding a miniature representation, in which the participant themselves is embedded, could mean simply illuminating an already immersed position.

### As Above so Below.<sup>23</sup>

Attempts to tease out of this kind of relationship feature prominently in pre-modern epistemology. In *The Order of Things*, Michel Foucault (1926-1984) posits that the pre-modern episteme oriented itself around similitudes; it was the task of scholarship to discover these hidden correspondences between seemingly discrete things.<sup>24</sup> Devotional micro-carvings, for example, might suggest a similitude between the miniature representation and its full-size referent. Da Vinci’s famous depiction of the *Vitruvian Man* depicts the celestial geometry contained within human proportions: another similitude often referred to as the microcosm/macrocosm analogy. Renaissance theorists like Marsilio Ficino, Franchino Gafori and Gioseffo Zarlino pondered the significance of the *Musica Universalis* or “Universal Music:” a long-standing belief that musical intervals are mirrored in the

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<sup>19</sup> Robin S.S Kramer, Ulrich W. Weger, and Dinkar Sharma, “The Effects of Mindfulness Meditation on Time-Perception,” *Consciousness and Cognition* 22, (2013): 846. Alton J. DeLong, “Phenomenological Space-Time: Toward an Experiential Relativity,” *Science (New series)* 213: 4508, (1981): 681-683.

<sup>20</sup> J. Nakamura, and M. Csikszentmihalyi, (2002). “The Concept of Flow.” *Handbook of positive psychology*, 90.

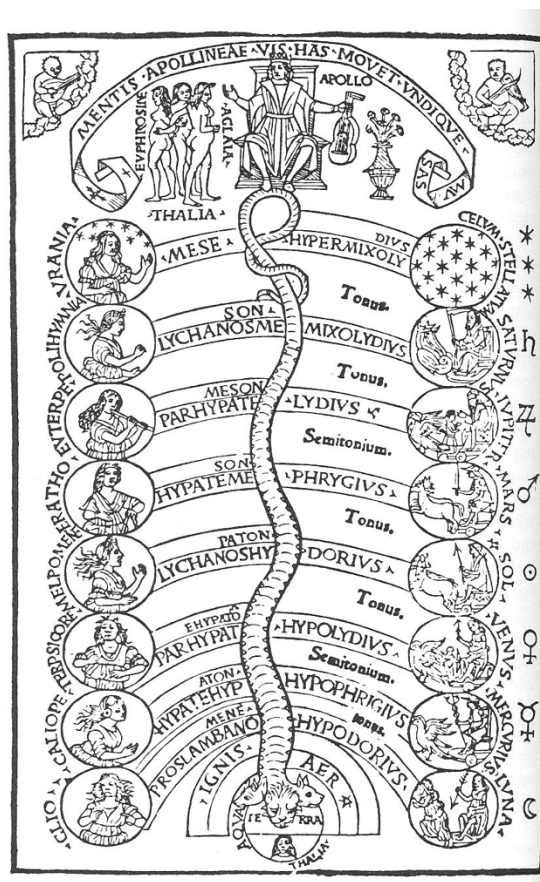
<sup>21</sup> Scholten, “Immersive Play,” 158. Descriptions of similar states predate the term Flow, which was introduced in the early 2000’s by Nakamura and M. Csikszentmihályi. Abraham Maslow’s (1964) “peak experiences,” for example, were transcendental experiences that induced a sense of altered time and a loss of self-consciousness.

<sup>22</sup> Leopoldine Prosperetti, *Landscape and Philosophy in the Art of Jan Brueghel the Elder (1568-1625)*, (Farnham: Ashgate, 2009), 93, note 88.

<sup>23</sup> “As above, so below” is a popular modern paraphrase of the second verse of the “Emerald Tablet” by Hermes Trismegistus: *Quod est superius est sicut quod inferius, et quod inferius est sicut quod est superius.* /That which is above is like to that which is below, and that which is below is like to that which is above. Robert Steele and Dorothea Waley Singer, “The Emerald Table,” *Proceedings of the Royal Society of Medicine*, 21 (3) (1928): 42/486 (English), 48/492 (Latin).

<sup>24</sup> Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*, (New York: Pantheon Books, 1970), chapter 2 “The Prose of the World.”

heavens.<sup>25</sup> During the revival of classical learning known as Neoplatonism, this harmony has been at times literal, at times metaphorical. Later, in the hands of astronomer Johannes Kepler, harmony even referred to planetary orbital speeds. According to Kepler, “Man, the imitator of the Creator,” had emulated the polyphony of the heavens so as to enjoy “the continuous duration of the time of the world in a fraction of an hour.”<sup>26</sup> Kepler’s musical microcosm therefore also enjoys a contraction of time.



**Figure 3:** Engraving from Franchino Gafori’s *Practica Musice / Practical Music* (1496), showing Apollo, The Muses, the planetary spheres, and the musical modes—the heavens and the earth joined in one construction. Gafori was a composer and theorist whose work enjoyed a wide reception throughout the Renaissance. Source: Wikimedia Commons.

[https://commons.wikimedia.org/wiki/File:The\\_music\\_of\\_the\\_spheres.jpg](https://commons.wikimedia.org/wiki/File:The_music_of_the_spheres.jpg)

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The accounts of Julian, Blake, Kepler, and Cusanus describe the integration of individual experience into the story of the universal. It is the experience of being part of, contained by, and connected with. For those sympathetic to Pythagoras’s and Aristotle’s ideas—as translated by Boethius

<sup>25</sup> Ian Leask, “Performing Cosmic Music: Notes on Plato’s *Timaeus*” *REA: A Journal of Religion, Education and the Arts*, Issue 10, “Sacred Music,” (2016).

<sup>26</sup> Max Caspar, *Kepler*, transl. C. Doris Hellman, (New York: Dover Publications, 1993), 284.

in the 6th century AD—mathematical proportions and geometric relationships revealed information about themselves and linked their earthly lives to the cosmos.<sup>27</sup> There is a dual epistemic/experiential claim here: firstly, that knowledge about one level of reality can be obtained by attempting to decipher another, and secondly that musical consonances derive their pleasing quality from universal proportions.<sup>28</sup> Thus the feel of earthly music is shaped by this similitude. Prayer nuts induce transcendence, abstract topologies become personal redemption, and cosmic correspondences describe musical quality; these are dissolutions of scale. Arising through the effort to bridge two levels of reality, these procedures draw a clear line from knowing to feeling.

## 2. Polyphonic Canons.

Any discussion of music, riddles, and games of scale will only profit from the mention of canons. This technique, which has both precomposed and improvised forms, weaves its way through much of the polyphonic repertoire from about 1450 and 1600. The word “canon” simply means rule; all canons begin with a single melody and the rule gives rise to various processes that transform that melody—in present times called algorithmic music.<sup>29</sup> According to convention the terms “leader” and “follower”—in Latin, *dux* and *comes*—are used to differentiate the initial material from the transformations of it.<sup>30</sup> Improvised canons, though unwritten, still play out this dialog between the character who leads, and the character(s) who follows.<sup>31</sup> The transformation of the initial material sometimes introduces a delay—referred to as *fuga* in the Renaissance. Sometimes the new material is rendered slower or faster than the original—usually called proportional canon. Sometimes the performer who follows is even required to read the notated line backwards. Regardless of procedure, all canons produce a simultaneous rendering of material and transformation.

Canonic lines sport an uncanny identity, which may be overt, concealed, or embedded in the

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<sup>27</sup> The order found within the cosmos was the same as that found in the human body and in audible music, and that all three reflect the beauty of God. Scruton, Roger (April 1, 2013). “Musical Beauty: Negotiating the Boundary Between Subject and Object”. *The British Journal of Aesthetics*. 53 (2). Oxford University Press: 249–250.

<sup>28</sup> Anicius Manlius Torquatus Severinus Boëthius, *De Institutione Musica*, I. 2. / Fundamentals of Music, (6th century AD), book IV 301-2. transl. Calvin M. Bower, ed. Claude V. Palisca, (New Haven and London: Yale University Press, 1989), 116-16.

<sup>29</sup> Alfred Mann, J. Kenneth Wilson, and Peter Urquhart. “Canon (i).” Grove Music Online. 2001; Accessed 8 Apr. 2024. The 17th century Jesuit scholar and polymath Athanasius Kircher is typically credited with the first algorithmic music: his *Arca Musarithmica* or “Musical Ark” was a machine that would create new compositions based on simple inputs. There are earlier devices in the literature, but none with such varied output as Kircher’s.

<sup>30</sup> The terms *Dux* and *Comes* “were introduced by Sethus Calvisius (Melopoeia, 1592) as direct translations of Zarlino’s *Guida* and *Consequente*. For Calvisius and Zarlino, *dux*, or *guida* referred to the first voice to enter in a canonic or fugal passage, and *comes* or *consequente* referred to each of the remaining voices that enter subsequently and follow after the first.” Walker, First. “Dux comes (Lat.: 'leader', 'guide'), (Lat.: 'companion', 'follower').” Grove Music Online. Edited by Deane Root. Accessed April 8th, 2024.

<sup>31</sup> To “follow” can be read metaphorically in this case, not necessarily implying a sequence in time.

surrounding polyphony. Unlike normal polyphony, which balances linear independence and coordination—the *raison d'être* of the practice—a canonic construction portrays the same line fundamentally, interacting with versions of itself in functional counterpoint. The initial subject has been stretched, skewed, stratified, and warped, sometimes beyond recognition; it is that identical-yet-transformed ontology which presents a teasing contradiction, a glitch, that potentially prompts the listener to engage with the material on multiple planes. Canon practice is thus at home among the various puzzles of linear perspective, so fashionable in sixteenth-century visual culture.

Performing a canon is a realtime, generative process. The resulting polyphonic lines appear not on the page but through performance, and the emergent soundscape is both auditory and ephemeral (a point easily overlooked when working from an edition in which the “follower” has already been written out). The composer’s hand is partly concealed. To comment on the experience of canonic practice is to comment on the feelings of an active participant; it is the music-maker who experiences the quality of a puzzle.<sup>32</sup> The fun of canons is in the participation. The listener may hear that strict imitation or proportional re-presentation is being employed and even be moved by the ingenuity, but it is the practitioner who engages with the riddle itself.<sup>33</sup> The decoding of canons is the performance, and the performance is the decoding.<sup>34</sup> This way of framing performance—as a decoding—is not unlike the use of miniature devotionalia in prayer; the moment that a nut is cracked is the moment something is revealed.



**Figure 4:** “*Omne Trinum Perfectum / All Three are Perfect*” by Ludwig Senfl. Realization by the author.

<sup>32</sup> Often the canon rule itself is more of a puzzle than a cypher, requiring first a verbal decoding. Katelijne Schiltz, *Music and Riddle Culture in the Renaissance*, (Cambridge University Press, 2015), 40.

<sup>33</sup> *ibid.*, 214.

<sup>34</sup> In some cases, especially in partbooks, the *comes* has been written-out by the scribe—serving as a kind of surrogate performer.



**Figure 5:** The same piece as printed in Heinrich Glarean’s *Dodecacordon* (1547), page 444. In this case, the three mensuration signs act as the canon rule, instructing the performers to render the printed line in three different meters. München, Bayerische Staatsbibliothek. <https://www.digitalesammlungen.de/en/view/bsb00084107?page=,1>. Permissions: CC BY-NC-SA 4.0 DEED

The practice of composing, improvising, and performing canons can be quite intense, demanding mental agility and focus. The imitative texture can at times feel like a reverberation, immersing the practitioners in a sort of virtual acoustic space. The individual characters implicated in the practice have individual experiences. Because the “follower” is—mostly—not written out, its performance feels almost generated on the spot; there is a sense of becoming uncoupled from the apparent notation—parroting or parodizing it. On the other hand the experience of composing or improvising an effective “leader” is of being vigilant for contrapuntal consequences—or deferring to intervallic conventions that effectively do so—whilst a distorted echo plays out in the background. By conscripting the musician in this way, canon technique blurs the boundaries between execution and creation—kind of dissolution also present in the flow state—which will, in the following section, find itself instantiated in the visual arts.<sup>35</sup>

### 3. Anamorphic Puzzles.

Anamorphosis is a term for representational (non-abstract) art that has been distorted in some way by the artist.<sup>36</sup> This can take the form of a stretching of the painted subject along one or more planes, splitting it up into many segments, or warping it in a refracted lens-like manner. Anamorphic images are designed to be viewed obliquely or examined through various corrective devices, mirrors, and prisms called anamorphoscopes.

As the anamorphic example *par excellence*, Hans Holbein’s painting *The Ambassadors* does not

<sup>35</sup> Flow as outlined in the original research by Nakamura and Csikszentmihalyi, “The Concept of Flow.” 90.

<sup>36</sup> Oxford English Dictionary, s.v. “anamorphosis (n.),” July 2023, <https://doi.org/10.1093/OED/8328892789>. accessed April 8, 2024.

disappoint in its technical virtuosity. The two sitters have been identified, through a variety of clues in the painting itself, as the diplomats Jean de Dinteville (left) and Georges de Selve (right).<sup>37</sup> Strewn about the tables behind them is a collection of globes, dials, draperies, musical instruments, and books. In contrast to these hyper-realistic renderings, an otherworldly, elongated skull hovers eerily in the foreground, out of place yet unmissable. Standing face-to-face with Holbein's sitters, a viewer will likely be unable to make much sense of the smeared gray blob, but upon shifting position to the upper right-hand corner of the painting that same viewer will observe the once-sensical world of the ambassadors deformed, and the skull rectified.<sup>38</sup> As a hyperdimensional *memento mori*—a reminder of death—the skull in Holbein's painting speaks not only to the subjects of this portrait but to something quintessentially human.<sup>39</sup> The viewer is thus implicated in the work, both rhetorically and physically: conscripted into action at the service of an invisible yet universal truth.<sup>40</sup>

Anamorphosis is also referenced in the literature of the time. In Shakespeare's *King Richard II*, Bushy, the courtier, compares the apprehensions of his queen to the images hidden in an anamorphic painting:

Like perspectives, which rightly gazed upon  
Show nothing but confusion,  
Eyed awry distinguish form.<sup>41</sup>

By “perspectives,” Shakespeare is referring to anamorphic paintings—sometimes called “curious perspectives.” Captured here is a general recommendation: for greater clarity, try a different angle. To decipher an anamorphic painting it is the viewer who must take action, reconsidering the plane of the canvas. Apparent distortion signals that reality is not as it seems. Any trace of illusion or deception, visual or otherwise, should therefore be taken as a call to greater levels of scrutiny.<sup>42</sup>

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<sup>37</sup> Sophia Hervey and Mary Frederica, *Holbein's "Ambassadors," The Picture and the Men*. (London: Bell and Son, 1900).

<sup>38</sup> David Topper, “On Anamorphosis: Setting Some Things Straight,” *Leonardo*, Vol. 33, No. 2 (2000): 116.

<sup>39</sup> Marta Faust, “‘Eyed Awry’: Blind Spots and Memoria in the Zimmern Anamorphosis,” *Journal of Historians of Netherlandish Art* 10:2 (Summer 2018): 5.

<sup>40</sup> *ibid.*

<sup>41</sup> Shakespeare, *King Richard II*. act 2, scene 2. 1595

<sup>42</sup> Grootenboer recommends treating even non-anamorphic images to the “anamorphic gaze”, in order to reveal linear perspective's otherwise invisible mechanisms. Hanneke Grootenboer, *Rhetoric of Perspective: Realism and Illusionism in Seventeenth-Century Dutch Still-Life Painting*, (University of Chicago Press, 2005), 132–33.





**Figure 6:** *The Ambassadors* by Hans Holbein the Younger (1533). This painting is famous for containing a rather spectacular visual illusion, which, when viewed at an oblique angle, is revealed to be a human skull. Medium: Oil on oak, Dimensions: 207 cm × 209.5 cm (81 in × 82.5 in). National Gallery, London. <https://www.nationalgallery.org.uk/paintings/hans-holbein-the-younger-the-ambassadors>. Permissions: CC BY-NC-ND 4.0 DEED

In a sense, anamorphic illusions are performed. As with canons, the big reveal appears not on the page or canvas, but through this performance. On encountering such an illusion, according to literary historian Anna Riehl, an interpretive drama unfolds in three acts, advancing from mystery to revelation. The exposition begins with the recognition of faulty proportions, followed by a physical adjustment of the viewer. Once acquired, both images coexist in the mind's eye—a denouement—forcing the viewer to reconsider the relationship between the two irreconcilable images.<sup>43</sup>

Reconciliation of the irreconcilable takes maximum creative effort. For Riehl, this is the fundamental difference between anamorphic puzzles and metaphor; the former represents two realities joined not by surface-resemblance but by a larger composite reading.<sup>44</sup> This recalls pseudo-Dionysius's

<sup>43</sup> Anna Riehl, "Eying the Thought Awry: The Anamorphosis of John Donne's Poetry," *English Literary Renaissance*, vol. 39, no. 1, *Studies in English Poetry*, (Winter 2009): 143.

<sup>44</sup> *ibid.* 161.

preference for dissimilar similitudes; irreconcilability encourages a deeper reading, which subsequently immerses the viewer in the world of the painting.

### **Rhetorical applications.**

Anamorphic works are interactive. When the viewer is called to action, their experience changes too; what was monolithic becomes multifaceted. There is a term for this rather peculiar interconnectedness of subject and object: “parallax” describes the apparent change in position of an object when viewed from different positions.<sup>45</sup> An important concept in early modern astronomy, parallax was used for gauging and comparing astronomical distances; nearby stars can be observed to change their positions slightly against the backdrop of stars when measured in different times of the year, and thus a distance can be derived.<sup>46</sup> Parallax—or the concept of parallax—is also invoked quite often as a philosophical metaphor, which will be elaborated later in the works of Shakespeare and Cusanus.<sup>47</sup> Even polyphony exhibits this effect to some degree, in situations where a particular musical line feels changed in context.

In calling for the simultaneous rendering of different meters, such polyphonic parallaxes can be rather disorienting, especially when they involve familiar tunes heard at unfamiliar scales (e.g. Figure 4). What appears fluid and melodic on the page, may sound syncopated or off-kilter in performance.<sup>48</sup> Just as anamorphic puzzles rely on distorted misrepresentations of once-familiar objects, the contours of a known melody become the key to recognizing it in peculiar contexts.<sup>49</sup>

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<sup>45</sup> Oxford English Dictionary, s.v. “parallax (n.),” March 2024, <https://doi.org/10.1093/OED/9237620318>.

<sup>46</sup> The accuracy of this method falls-off as distance decreases, leaving the background stars somewhat fixed.

<sup>47</sup> For a philosophical treatment see Slavoj Žižek, *The Parallax View*, (Cambridge: MIT Press, 2006), 17.

<sup>48</sup> Emily Zazulia, *Where Sight Meets Sound: The Poetics of Late-Medieval Music Writing*, (Oxford University Press, 2021), 149.

<sup>49</sup> Sometimes this effect capitalizes on the unique peculiarities of the notation itself, and sometimes it is only evident in the gestural character of the melody. For more on the intersection between puzzles, poetics, and notation see Schiltz, *Music and Riddle Culture in the Renaissance*, and Zazulia, *Where Sight Meets Sound*.

The image displays four staves of musical notation for a Credo. The top two staves represent the vocal parts in a quick duple meter, while the bottom two staves represent the tenor part in a slow triple meter. The lyrics are in Latin, including "Qui deum omnipotentem facit coelum et terram" and "Et ex patre nato ante omnia saecula deum deum hunc de lumine dei veri deo vero verum".

**Figure 7:** Credo by Pierre de la Rue (1452–1518) from “*Missa Pourquoi non*” (formerly *Missa Almanca*) laid out in choir book format. The tenor part (lower left) is notated in *tempus perfectum* (a slow triple meter), while the other three parts are notated in *tempus imperfectum diminutum* (a quick duple meter). The tenor, based on the chanson *Pourquoi non*, also by la Rue, feels transplanted, upon performance, into a contrary metrical world. Source: Brussels, KBR, ms. 9126, ff. 62v–63r. Copyright KBR (Brussels) / Alamire Digital Lab (Leuven), Used with permission. Image altered for clarity.

Historian Marta Faust has also observed that, in the viewing of anamorphic illusions, a layering of realities occurs, filtering “otherwise disparate events through each other.”<sup>50</sup> In the performance of polyphony, with all lines sounding together, different metrical worlds are also experienced “through” each other—each line constituting its own unique reference frame. Polyphony of this sort seems to hover between worlds. Faust continues:

Oscillation between different vantage points leads not only to reckoning with the contingent nature of sight but also to comparing multiple subject positions. Images that appear to change before the eyes prompt viewers to assimilate what is temporally apart.<sup>51</sup>

<sup>50</sup> Faust, “Eyed Awry,” 21, note 49.

<sup>51</sup> *ibid.*, 21, note 50.

Anamorphosis represents discovery through parallax. It reveals the otherwise invisible mechanisms of linear perspective, in a way that is both literal and allegorical.<sup>52</sup> Like the use of miniature devotionalia, anamorphosis provokes the practitioner to reconsider their own gaze and position, offering insight in return. In Faust's words, it "alerts viewers to the changeability of human perception."<sup>53</sup>

Anamorphosis is also employed in early modern literature. Its use in language exhibits the same features as in visual arts: a deliberate lexical opacity which signals a hidden meaning and a call to decode and incorporate two contradictory readings. Insight, in the words of poet John Donne (1571/2–1631), is to "look upon it (the work) in another line, in another angle."<sup>54</sup> In Donne's poem "The Extasie" for example, two realities coexist, represented by an apparent and a philosophical reading. Opposing vantage points, body and soul, are resolved in the final lines as two halves of the same form: "Love's mysteries in souls do grow, / But yet the body is his book."<sup>55</sup> Anamorphosis traverses the divide, seeping from the poem's narrative into its argument in an attempt to evoke the ecstatic experience itself.<sup>56</sup> According to historian Ernest B. Gilman, anamorphosis is part of literary wit:

The language of wit is to the rules of logical discourse... as the curious perspective is to the Albertian rules of perspective drawing... Wit delights in breaking the rules of the rational game, or at least putting them under strain... By a kind of parodic internal subversion, wit deforms the conventions of expository logic in the one case, and of linear perspective in the other.<sup>57</sup>

Anamorphosis seems almost intrinsic to the period's rationality, internalized as a form of rhetoric.<sup>58</sup> Rather than espousing the primacy of any particular gaze however, the idea of similitudes asks for a reckoning of realms. It is the persistence of the no-longer-seen form which allows one image to be seen through the other, expanding the experience beyond mere visual trickery into the realm of the metaphysical. Historian David Topper even brings physiology and visual-processing to bear, interrogating the cognitive nature of perception itself, of the included middle and the default capacities of the mind's eye—and perhaps ear—to rectify distortions internally.<sup>59</sup> All representational art, through the reliance on shape constancy and visual compensation in the viewer, taps into inbuilt mechanisms of dual perceiving.<sup>60</sup> Thus a kind of included middle is made present, both semantically and perceptually. To affirm this included middle is to allow for the same kind of transcendence sparked by miniature

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<sup>52</sup> Grootenboer, *Rhetoric of Perspective*. 112–33.

<sup>53</sup> Faust, "Eyed Awry," 5.

<sup>54</sup> George R. Potter and Evelyn M. Simpson, "*The Sermons of John Donne*," ed. 10 vols. (Berkeley, 1953–1962), VI, 105–06.

<sup>55</sup> Riehl has observed that Donne's work is so notoriously enigmatic that the interpretive history itself also seems to represent a "struggle for revelation." *ibid.* 142

<sup>56</sup> Riehl, "Eying the Thought Awry," 161

<sup>57</sup> Ernest B. Gilman, *The Curious Perspective: Literary and Pictorial Wit in the Seventeenth Century*, (New Haven-London: Yale University Press, 1978), 86–87.

<sup>58</sup> *ibid.* 154.

<sup>59</sup> David Topper, "On Anamorphosis: Setting Some Things Straight." *Leonardo* Vol. 33, No. 2 (2000): 116.

<sup>60</sup> *ibid.*

devotionalia and marked by the reckoning of cosmic truth with individual human experience.

Anamorphosis makes use of the very same techniques that allow three-dimensional scenes to be captured on a two-dimensional canvas; it involves an extension of the Albertian rules of proportion, not a departure from them.<sup>61</sup> In doing so, anamorphosis applies the familiar to unfamiliar ends. Along with illusionism and *trompe l'oeil*, and in more recent times hyperrealism and optical illusion, anamorphosis situates itself amid a slew of techniques that use representational methods to undermine apparent reality. However, such subversions are never the end goal; the sixteenth century play of perspective points to a higher calling.

#### 4. Cosmic Implications.

Whether considering anamorphic rhetoric, the microcosm, similitudes, or canonic technique, the whole of Renaissance thought, in one way or another, seems to have been engaged with the seemingly magical offerings of perspectival insight. Cosmography was no exception. In 1543 Nicholas Copernicus published his “*De Revolutionibus Orbium Coelestium* / On the Revolutions of the Heavenly Spheres,” a hypothesis which displaced the earth from the center of the solar system.<sup>62</sup>

Just as anamorphosis offers insight to the repositioned gaze,<sup>63</sup> the simplified orbital paths of the Copernican model affirm at once the comprehensibility of the cosmos and the potential for large-scale theorizing.<sup>64</sup> Increasingly accurate data and the refinement of the telescope put pressure on the pre-Copernican paradigm. A three-stage anamorphic drama unfolds, advancing from mystery to revelation. Observational inconsistencies—the epicyclic orbits for Copernicus or the “Motions of the Star Mars”<sup>65</sup> for Kepler—signal fault, a glitch in the geocentric matrix. In order to “distinguish form”—in Shakespeare's words—the earth-bound viewer is compelled to stand aside and “eye” the situation “awry.” The earth then yields place and the groundwork is laid for Kepler's three laws of planetary motion, Galileo's

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<sup>61</sup> Leon Battista Alberti was a 15th century architect and polymath. His thoughts on perspective and visual harmony, detailed in *De pictura* (1450) influenced the development of illusionism in the visual arts, and can be traced back to Pythagoras; Kelly-Gadol, J. "Leon Battista Alberti." *Encyclopedia Britannica*, February 12, 2024. <https://www.britannica.com/biography/Leon-Battista-Alberti>.

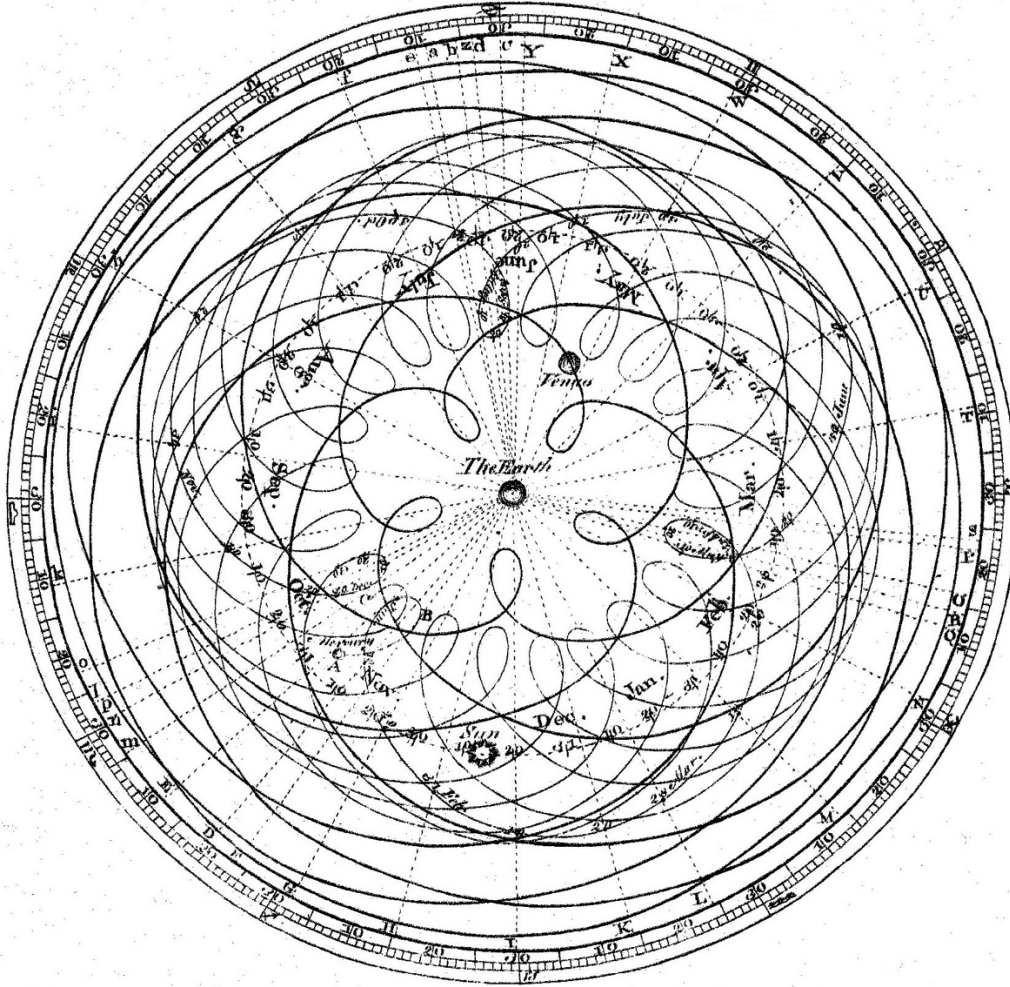
<sup>62</sup> Westman, R. S. "Nicolaus Copernicus." *Encyclopedia Britannica*, March 11, 2024. <https://www.britannica.com/biography/Nicolaus-Copernicus>.

<sup>63</sup> “Anamorphosis shows... that they were aware that the normative ‘rightly gazed’ viewing mode... sometimes had to be exchanged for a more flexible approach.” Marta Faust, “Eyed Awry,” 2.

<sup>64</sup> According to Brecher: “Kepler's *Mysterium Cosmographicum* sought to provide reasons behind what had heretofore been mainly a descriptive science.” Kenneth Brecher, “Kepler's *Mysterium Cosmographicum*: A Bridge Between Art and Astronomy?” *Bridges: Mathematics, Music, Art, Architecture, Culture*, (2011): 379.

<sup>65</sup> Johannes Kepler, *Astronomia Nova AITIOΛOΓHTOΣ seu physica coelestis, tradita commentariis de motibus stellae Martis ex observationibus G. V. Tychonis Brahe* / *New Astronomy Based upon Causes or Celestial Physics Treated by Means of Commentaries on the Motions of the Star Mars from the Observations of Tycho Brahe*, 1609. Johannes Kepler, *Astronomia Nova*, transl. William H. Donahue, (Santa Fe: Green Lion Press, 2015).

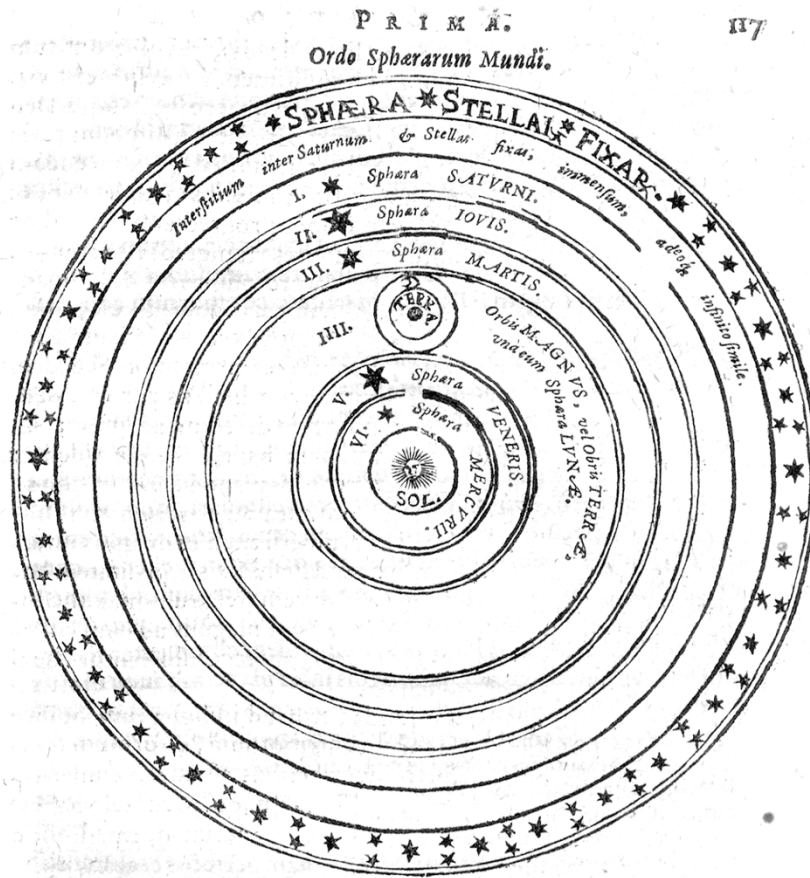
Parabolic Trajectory, and eventually Newton's Law of Universal Gravitation.<sup>66</sup> This is anamorphic logic and rhetoric on a grand scale.



**Figure 8:** The geocentric cosmos, as described by Ptolemy. Observations of planetary motion from an earthly vantage point show a complex series of epicyclic orbits; but such a model obscures the reason why planets would move in this way. from James Ferguson, *Astronomy Explained upon Sir Isaac Newton's Principles*, 1756. Wikimedia Commons. [https://commons.wikimedia.org/wiki/File:Cassini\\_apparent.jpg?uselang=en#Licensing](https://commons.wikimedia.org/wiki/File:Cassini_apparent.jpg?uselang=en#Licensing). Permissions: CC 0 Public Domain.

<sup>66</sup> Furthermore Kepler increasingly employs the term “force” to address the causes of planetary motion—rather than the more traditional *anima* (soul). *Mysterium Cosmographicum*, 1621 edition, Engl. trans. p. 203, note 3; Galileo Galilei then builds on this usage of “force” when he replaces impetus with parabolic trajectory—uniting lunar and sub-lunar mechanics. Daniel A Di Liscia, “Johannes Kepler”, in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta and Uri Nodelman, (Winter 2022 Edition), 265.





**Figure 9:** The heliocentric cosmos, as proposed by Copernicus. Re-arranged from the sun’s perspective the orbital situation is revealed as more straightforward; this model facilitates explanation. Engraving from Johannes Kepler’s *Mysterium Cosmographicum*, (1596). Shared with permission of the University of Oklahoma History of Science Collections. Wikimedia Commons. <https://commons.wikimedia.org/wiki/>. File: Kepler\_image\_of\_planetary\_system\_(1596).tif . Permissions: CC BY-SA 4.0

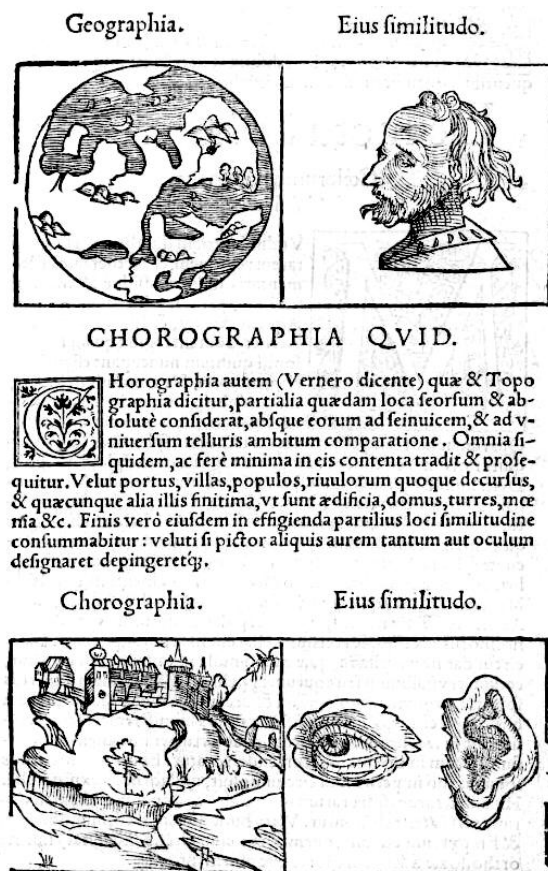
### The Cartographer’s Gaze

The artistic gaze held an important role in sixteenth century mapping practices; such an artful conception of the planets and their orbits would not have seemed out of place. For historian Katharina N. Piechocki, the idea of a “cartographer’s gaze” is one that mediates “between the poetic and cartographic registers, allowing the protagonist to explore a landscape halfway between reality and imagination.”<sup>67</sup> Something unseen is revealed to the mind’s eye, and then reconciled with the literal eye.

In a 1608 philosophical work called “*Somnium*” (The Dream) Johannes Kepler tells the story of a boy and his mother, taken on a journey to earth’s moon by a demon, in order to show them astronomical

<sup>67</sup> Piechocki, *Cartographic Humanism*, 69.

phenomena from a different perspective.<sup>68</sup> In the notes Kepler observes that if anyone wishes to “argue that the lunatic (moon-based) senses are deceived... I retort, with equal right, that the terrestrial senses of the inhabitants of earth lack reason.”<sup>69</sup> Kepler was the first to see that the planets take elliptical orbits around the sun, and “The Dream” is how he chooses to narrativize this insight.<sup>70</sup>



**Figure 10:** An illustrated example of Ptolemy’s geography and chorography from Peter Apian’s 1545 treatise *Cosmographicus liber*. Chorography is to a single ear or eye as geography is to the whole head.<sup>71</sup> Digital Collections Harvard. <https://digitalcollections.library.harvard.edu/catalog/990038806470203941>. Permissions: CC BY 4.0 DEED

<sup>68</sup> Johannes Kepler, “Somnium, seu Opus Posthumum De Astronomia Lunari / A dream, or a Posthumous Work on Lunar Astronomy” (1608), in *The Dawn of Modern Cosmology: From Copernicus to Newton*, ed. Aviva Rothman, 147-150. Kepler’s *Somnium* has the characteristics of a *menippean satire*, a genre that critiques ideas by submitting them to extreme situations.

<sup>69</sup> Rothman, *The Dawn of Modern Cosmology*, 149, (note 4 in Kepler’s work). An intriguing resonance can be found two centuries earlier in the way Cusanus narrativizes the gaze in his work *De Visione Dei*—expounded upon in the next section of this essay.

<sup>70</sup> The *Somnium* had its beginnings in Kepler’s dissertation; nearly 20 years later the dream framework was added, along with copious notes.

<sup>71</sup> *ibid.*



Cosmography in the Classical tradition was one of three branches of Cartography. Codified by Ptolemy in the second-century AD, cartography included: cosmography, geography, and chorography. While the first two may be more familiar, it is worth expanding upon that third branch, for reasons which will become apparent. While the goal of cosmography, according to Ptolemy, is to show the known world as a single and continuous entity, the goal of chorography is to give an impression of a part.<sup>72</sup>



**Figure 11:** The province of Saxony, represented in chorographic form. Note the presence of multiple vanishing points, the inconsistency of scale, and the general effect of a caricature. Woodblock print with hand coloring, by Hartmann Schedel, from the *Liber Chronicarum* (Nuremberg Chronicle), 1493. 47 x 32.4 cm (18 1/2 x 12 3/4 in.) The National Gallery of Art. <https://www.nga.gov/collection/art-object-page.72046.html>. Permissions: CC0 1.0 DEED.

Chorographic cartography prioritizes regions over accuracy. It attempts to capture the character

<sup>72</sup> Katharina N. Piechocki, *Cartographic Humanism: the Making of Early Modern Europe*, (The University of Chicago Press, 2019), 44.

of a place, often cleverly combining several bird's-eye views in the process.<sup>73</sup> In synthesizing multiple perspectives chorographies depict an almost superhuman gaze. According to historian Denis Cosgrove, the art of chorography inscribes a “divine logic onto the terrestrial canvas.” He continues:

Perspective seemed to many early modern thinkers the inherent constructional principle of space itself, proof that divine handiwork operated with geometrical consistency at all scales of creation, from the universe, through the earthly globe, to the immediately known local landscape.<sup>74</sup>

Viewing the three branches of Ptolemaic cartography through this lens—as an articulation of perspective—makes space for the experience of a participatory viewer. In the case of cosmography, such a viewer becomes entangled with multiple celestial objects in a parallax-driven quest for understanding. In the next section we will examine how such a drama can play out for the musician.

### Physical Theory.

By the end of the sixteenth century, astronomical science was reconsidering more than just the positions of the planets. Notably, Kepler titles his 1609 book *New Astronomy Based upon Causes*.<sup>75</sup> This work represents a reorientation of astronomy around observation and causality. What Kepler achieved in physicalizing the cosmos was to transition astronomy from a geometric concern (number in space), to a musical concern (number in time).<sup>76</sup> In 1638 Galileo Galilei replaces the old Aristotelian idea of Impetus with Parabolic Trajectory: a unified theory, covering everything from orbits to apples. This reform of action sometimes garnered harsh reactions. One is reminded of Galileo's alleged words, after being forced to recant his heliocentric views in 1633: “*Eppur si muove / and yet it moves*” (referring to the earth).<sup>77</sup> Motion had clearly played a part in Lutheran Reformer Philip Melanchthon's earlier critique of Copernicanism:

Some people believe that it is excellent and correct to work out a thing as absurd as did that Sarmatian [i.e., Polish] astronomer who moves the earth and stops the sun. Indeed,

<sup>73</sup> Oxford English Dictionary, s.v. “chorography (n.1),” March 2024, <https://doi.org/10.1093/OED/1653407884>.

<sup>74</sup> Denis Cosgrove, *Geography and Vision: Seeing, Imagining and Representing the World*. (London: I.B. Tauris, 2008), 25.

<sup>75</sup> Kepler's earlier *Mysterium Cosmographicum* had also “sought to provide reasons behind what had heretofore been mainly a descriptive science,” Brecher, “Kepler's *Mysterium Cosmographicum*,” 379.

<sup>76</sup> This is in reference to the Classical quadrivium, under which Kepler was trained. *ibid.* The four arts of the quadrivium are arithmetic, geometry, music, and astronomy. Arithmetic is “number,” geometry is “number in space,” music is “number in time,” and astronomy is “number in space and time.”

<sup>77</sup> This was Galileo Galilei's purported exclamation upon being officially censored in 1633. The event was first reported in English print by Giuseppe Baretta, *The Italian Library*, (London, 1757), 52.

wise rulers should have curbed such light-mindedness.<sup>78</sup>



**Figure 12:** The musical scales which Kepler ascribed to each of the six known planets, and the moon. From *Harmonices Mundi, Libri V.* by Johannes Kepler. Kepler, according to his training under the Classical *quadrivium*, saw music as a metaphor for resonances and concordances within nature.<sup>79</sup> Kepler's scales here depict the difference in orbital speed between perigee and apogee of each of the planet's respective orbits. Mercury has the largest ambitus—eccentricity—and Venus the smallest—with an eccentricity of less than 0.01, so practically a unison.<sup>80</sup> Smithsonian Libraries and Archives - Digital Library, <https://siris-libraries.si.edu/ipac20/ipac.jsp?index=BIB&term=135810>. Permission: CC 0 Public Domain

By the end of the Renaissance, physical theory sought to bridge sublunar and superlunar realms, an ambition which would have seemed ludicrous, even paradoxical at its beginning. It is harmony, in the intellectual tradition of Boethius, that likens the realms. To this end there were three separate kinds of harmony: *Musica Mundana* (of the spheres), *Musica Humana* (of the human body) and *Musica Instrumentalis* (audible music).<sup>81</sup> For most of the period—even as things begin to change—music had permeated the universe on multiple scales, through multiple modes of perception and conception. It

<sup>78</sup> Czesław Miłosz, *The History of Polish Literature*, second ed. (Berkeley: University of California Press, 1969), 38; That Melanchthon (1497 - 1560) should choose the term “light-mindedness” becomes a such a delightful irony of hindsight; he might as well have said “relativity”, for it was precisely Albert Einstein’s readiness to imagine different inertial reference frames—including that of *light* itself—that would lead to the Theory of Special Relativity nearly 400 years later.

<sup>79</sup> Planetary harmony, for Kepler, endows the earth with *anima* (soul), which is the cause of planetary properties or temperaments. “Ultimately these harmonies became Kepler’s Third Law, describing the distance relationship between the planets’s respective orbital periods and their distance from the Sun... and helped Isaac Newton and Edmund Halley demonstrate the inverse square law of gravitational attraction between the Sun and its planets,” David Voss, et al. “This Month in Physics History, May 1618: Kepler’s Discovery of Solar System Harmonics,” *American Physical Society: News*, May 2019 (Volume 28, Number 5).

<sup>80</sup> David R. Williams, “Venus Fact Sheet,” NASA Goddard Space Flight Center, Accessed 15 April 2024 <https://nssdc.gsfc.nasa.gov/planetary/factsheet/venusfact.html>

<sup>81</sup> Boëthius, *De Institutione Musica*, I. 2. / *Fundamentals of Music*, (6th century AD), book I 188. transl. Calvin M. Bower, ed. Claude V. Palisca, (New Haven and London: Yale University Press, 1989), 9. This is similar to the doctrine of *Musica Universalis*—as previously mentioned—from Plato’s *Timaeus*.

could reveal hidden connections and it had explanatory power. It was number in time.

### Music as Graph.

When addressing music's relationship to motion it is tempting to look directly to the notational staff itself, with its axial representation of time and tone. Like cartography, which positions objects in space, musical notation positions events in time and pitch-space. Musical phrases also make an attractive metaphor for physical motion and acceleration; for Kepler and others this even takes the form of a data sonification (see Figure 10).<sup>82</sup> Qualitative values also find representation in intervallic form, by the use of perfect and imperfect proportions: an observation that goes all the way back to Pythagoras.<sup>83</sup>

For several centuries already, rhythmic notation, or *Musica Mensurata*, had enabled the accurate representation of duration, a necessity in creating elaborate polyphonic architectures.<sup>84</sup> Rectangular coordinate systems (*latitudo* and *longitudo*) were technically available—but not yet employed—to the scholarly world from 1353, having been introduced by Nicolas Oresme in his “*Tractatus de Configurationibus Qualitatum et Motuum* / A treatise on the Uniformity and Deformity of Intensities.”<sup>85</sup> In the course of time, these empty graphs are given substance by a series of artist-engineers. In 1435 Leon Battista Alberti invents a grid—a veil of loosely woven thread—for teaching painters to accurately transfer real-world features, point for point, to analogous positions on a canvas.<sup>86</sup> In 1515 Albrecht Dürer and Johannes Stabius print an early data visualization, recording the positions of the fixed stars in relation to both the hour of night and to the 12 signs of the zodiac.<sup>87</sup> The following century sees this trend redoubled. Given the use of visualization in the development of empirical science, and music's already-attested connection to other realms—the macrocosm for example—there is ample cause here to read between the lines.<sup>88</sup> The pseudo-Aristotelian *Problemata* even compares the behavior of notes to projectiles:

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<sup>82</sup> Sonification is “a mapping of numerically represented relations in some domain under study to relations in an acoustic domain for the purposes of interpreting, understanding, or communicating relations in the domain under study.” Carla Scaletti, “Sound Synthesis Algorithms for Auditory Data Representations,” in *Auditory Display: Sonification, Audification, and Auditory Interfaces*, ed. G. Kramer, (Boston, MA: Addison-Wesley, 1994), 224.

<sup>83</sup> Anicius Manlius Torquatus Severinus Boëthius, *De Institutione Musica*, I. 2. / Fundamentals of Music, (6th century AD), book I 196-7. transl. Calvin M. Bower, ed. Claude V. Palisca, (New Haven and London: Yale University Press, 1989), 17-18.

<sup>84</sup> James Vincent, *Beyond Measure: The Hidden History of Measurement*. (London: Faber and Faber, 2022), 102.

<sup>85</sup> A.C. Crombie, *Augustine to Galileo*, Vol. 2, (1922), 114. Nicholas Oresme, *Tractatus de Configurationibus Qualitatum et Motuum* / A treatise on the Uniformity and Deformity of Intensities (mid 14th c.), transl. Marshall Claggett, (Madison: University of Wisconsin Press, 1971). 165.

<sup>86</sup> James Vincent, *Beyond Measure*, 100.

<sup>87</sup> Woodcut with the purpose of calculating the hour of night using the stars. Reused by Joseph von Kurzböck, in his book *Culminatorium Fixarum*, (Vienna, 1781) pp. M.DCC.LXXXI. Referenced in Alexander Marr, “Ingenuity in Nuremberg: Dürer and Stabius's Instrument Prints.” *The Art Bulletin* 100, no. 3 (2018): 48-79.

<sup>88</sup> Björn Schmelzer and Margarida Garcia also explore the diagrammatic qualities of “Musica Mensurata.” Björn Schmelzer and Margarida Garcia, *Time Regained: A Warburg Atlas for Early Music*. (Gent: MER Paper Kunsthalle, 2018), 89-94.

That is why sound is continuous, motive power continually succeeding to motive power, until the force is spent, which results in falling in the case of bodies, when the air can no longer impel the missile, while in the case of sound the air can no longer impel other air. Continuous sound is produced when air is impelled by air, while the missile continues its progress as long as there is air to keep a body in motion.<sup>89</sup>

Musicologist Simon Van Damme has extended this analogy even to polyphonic relationships:

They may have reasoned in a similar way with regard to singing a long note: beginning with an instance of motion (“percussio”) and subsequently letting it go to travel through the air for a certain timespan. The absence of a perceptual force in the further course of the note then results in its failure to remain audible in a suspension, to play a role in disconcerting and delighting the listener or to act upon other notes, “pushing” them to consonant resolutions.<sup>90</sup>

### The Notation of Relationships.

The art of *Punctus Contra Punctum* (counterpoint) is the management of multiple moving lines of polyphony. Like physical objects moving in space, they are causally linked. Various constraints on the use of dissonance mean that those lines are not truly independent: they interact with each other. *Klangschrittlehren* (literally “sound step teachings”), which appear throughout the didactic literature, are essentially collections of if-then statements, providing a roadmap for almost every conceivable intervallic situation. In 1477, theorist and composer Johannes Tinctoris goes to great length in suggesting the appropriate responses to various moves in the tenor line, for example:

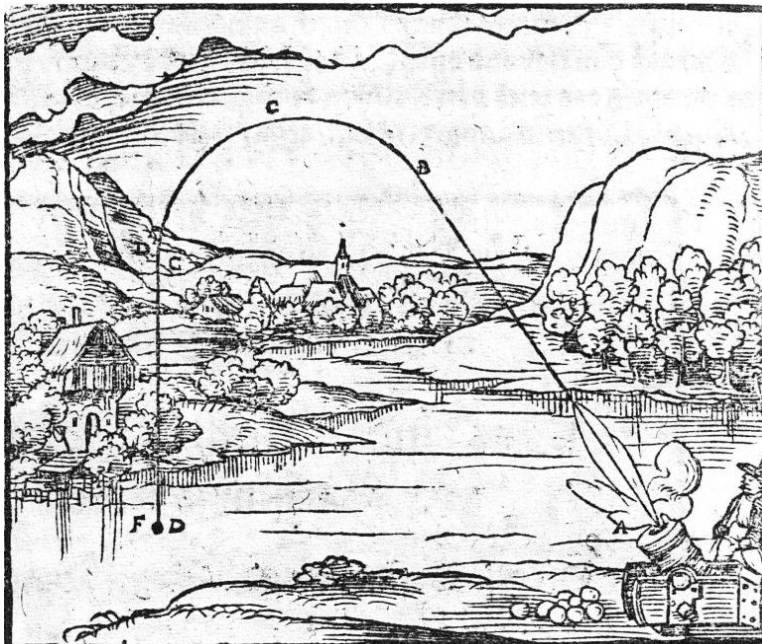
And it (the 5th) is a most melodious concord, applicable most delightfully either to middle notes or to extreme ones, unless the tenor ascends or descends one step to any completion. Indeed then (that is, with the tenor ascending one step to any completion) the preceding note never seeks a lower fifth against it. And if the tenor likewise will descend one step to any completion, an upper fifth will never be able to be located against the preceding note.<sup>91</sup>

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<sup>89</sup> Aristotle of Stagira, “Problemata, 899 a37-b5”; transl. E. S. Forster, *The Complete Works of Aristotle: the Revised Oxford Translation*, (Princeton, 1984), 1394.

<sup>90</sup> Simon Van Damme, “Quasi una Taciturnità: the Silence and Salience of Dissonance According to 16th-Century Theorists,” *Early Music*, Vol. 38, No. 2, *Performing Bach* (May 2010): 237-247.

<sup>91</sup> Johannes Tinctoris, *De arte contrapuncti. Book 1*. Transl. Ronald Woodley, “The Complete Theoretical Works of Johannes Tinctoris” (2013), *Early Music Theory*, <https://earlymusictheory.org/> accessed May 3rd, 2024.



**Figure 13:** A diagram from the 1582 edition of *Bawkunst Oder Architectur aller fürnemstenthwendigsten, Angehörigen Mathematischen und Mechanischen Künsten* by Walther Hermann Ryff, (1500-1548) showing projectile motion under the Impetus Theory.<sup>92</sup> A: The cannon provides impetus to the ball, which B: initially travels in a straight line. As this impetus runs out, C: the ball begins to take a curved path. Once all of the impetus from the cannon is gone, D: the ball begins to fall straight back down to the earth. This was later replaced by Galileo’s Theory of Parabolic Trajectories (originally called Projectile Motion).<sup>93</sup> Digitization by the Bavarian State Library, non-commercial use. Source: Digital Mechanism and Gear Library. [https://www.europeana.eu/item/2020801/dmglib\\_handler\\_docum\\_2269009](https://www.europeana.eu/item/2020801/dmglib_handler_docum_2269009). Permissions: CC BY-NC-ND 3.0 DEED.

Tinctoris could simply have said “avoid parallel fifths,” and yet the choice to describe this as a scenario, an unfolding of action and reaction, is revealing: both in its suggestion of a real-time improvised practice, and in its reification of the musical line. This horizontal conceptualization is also reflected in the practice of a repertoire performed from parts notated separately, either over a choirbook’s opening or in discrete partbooks. The polyphonic lines encounter one another only in the air; their sonic rendering is thus a performance of interaction. Such framings further strengthen the link between polyphony and causality. Music’s ability to reflect physical theory makes space for the musician’s experience of physical theory.

<sup>92</sup> This is physics which applies only to the area between the earth and the moon—the sub-lunar sphere; Edward Grant, *Physical Science in the Middle Ages*, (Cambridge University Press, 1977), 78.

<sup>93</sup> Emily Sanford and Justin Halberda, “A Shared Intuitive (Mis)understanding of Psychophysical Law Leads Both Novices and Educated Students to Believe in a Just Noticeable Difference (JND),” *Open Mind* (2023).

### Narrative Mode.<sup>94</sup>

As modern performers we speak about phrase shape and trajectory, and rationalize pitch space as up and down. Musical lines seem almost gravitationally bound, requiring an expenditure of energy on ascent, as though they represent physical objects moving through space. Multiple lines work together like characters in a story, acting in relation to each other, responding, varying together in texture and intensity. Modern performers are often encouraged to narrativize their musical roles: “I am the third in this sonority, I move against the tenor, and I imbue the musical gestures with character and intent.” Polyphonic compositions also have a kind of grammar and syntax; cadential moments, for example, punctuate an ever-unfolding texture, marking out moments of greater and lesser finality. In a pre-tonal world, voice-leading becomes the driving force.<sup>95</sup> In his 1586 treatise on the art of counterpoint, Giovanni Maria Artusi describes a contrapuntal suspension in terms of “agent” and “patient” to differentiate between the voice that initiates dissonance, and the voice that reciprocates by resolving downward.<sup>96</sup> In his treatise on the art of counterpoint, Tinctoris—who was a major skeptic of extra-musical correspondences—says without any trace of flippancy:

Just as a sweet friendship is brought about by the conjunction of two hearts mutually agreeing with one another, so a pleasant concord is constituted out of the mixture of two pitches combining between each other.... just as the bitterness of enmity arises from the separation of two hearts from the uniformity of mutual agreement, so the harshness of discords is produced from two pitches not agreeing with one another.<sup>97</sup>

### Cosmic Drama.

Music unfolds in time just as nature unfolds in time, and earthly music tells the story of an animated cosmos. *Anima* (soul) in the Aristotelian sense is the cause of planetary motion.<sup>98</sup> For Ficino, the subtle element of *Spiritus* (spirit) circulates “between and within the heavenly and sublunary bodies.”<sup>99</sup> Earlier natural philosophers had embraced a vision of nature that explained phenomena not

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<sup>94</sup> The “Narrative Mode” is a concept proposed by Jerome Bruner as part of a larger theory of cognition. It addresses the stories we tell ourselves to create cohesive historical accounts and put “timeless miracles into the particulars of experience.” Jerome Bruner, in *Actual Minds, Possible Worlds*. (Cambridge, MA: Harvard University Press, 1986), 13.

<sup>95</sup> See Margaret Bent, “The Grammar of Early Music: Preconditions for Analysis,” in *Tonal Structures in Early Music* ed. Cristle Collins Judd, (London: Routledge, 1998). 40-43.

<sup>96</sup> Originally “Agenti” and “Patienti” Artusi’s *L’arte del contraponto ridotta in tavole*, 1586; referenced by Peter Schubert, *Modal Counterpoint, Renaissance Style*. (New York and Oxford, 1999), 73.

<sup>97</sup> Johannes Tinctoris, *De arte contrapuncti*. Book 1 and 2. Transl. Ronald Woodley, “The Complete Theoretical Works of Johannes Tinctoris” (2013), *Early Music Theory*, <https://earlymusictheory.org/> accessed May 3rd, 2024.

<sup>98</sup> Grant, “Physical Science in the Middle Ages,” 37.

<sup>99</sup> McDonald, “The Reception of Ficino’s Theory of World Harmony in Germany,” 162.

by actively measuring them but by reasoning about their underlying causes.<sup>100</sup> Steven Brown and Ellen Dissanayake note that:

In the absence of physical theories to explain natural phenomena, people “narrativize” these natural events in terms of the intentionality of a supernatural being, with the implication being that these phenomena happen “for a reason,” in the same way that human behavior is believed to happen.<sup>101</sup>

As previously detailed, the Neoplatonic doctrine of *Musica Universalis* and Boethius’s *Mundana/Humana/Instrumentalis* framework implicate musicians in this activity. Perfect ratios ordered the heavens and sweetened earthly music. Expanding on the analogy: the motions and interactions of celestial bodies and the agenda-d forces that govern them find an expected kinship in the animated polyphonic texture. From Kepler:

Accordingly you won't wonder any more that a very excellent order of sounds or pitches in a musical system or scale has been set up by men, since you see that they are doing nothing else in this business except to play the apes of God the Creator and to act out, as it were, a certain drama of the ordination of the celestial movements.<sup>102</sup>

Though Kepler rejects many of the earlier astrological claims about musical consonance, he still seeks perfection in his astronomy.<sup>103</sup> Furthermore, upon encountering imperfect ratios, they too become evidence of the “creator’s hand” which “delights in variety.”<sup>104</sup> In this way, even contrapuntal intrigue is read as a reflection of macrocosmic happenings: a simian similitude (to acknowledge the speciesism). In Kepler’s hands, *Musica Universalis* seems as persistent as it is inevitable.

The earthly performance of polyphony, though it may be scripted, can be nevertheless as gripping as any character-driven story. “Narrative immersion,” is a term used by literary theorist Rutger J. Allan to explain the experience of being mentally drawn into the storyworld. He continues:

The more a text enables the reader to construct an embodied simulation of the described

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<sup>100</sup> James Vincent, *Beyond Measure: The Hidden History of Measurement*. (London: Faber and Faber, 2022), 86.

<sup>101</sup> Here Brown and Dissanayake are building on Bruner’s “Narrative Mode of Cognition.” They go on to suggest that the arts, especially those occurring in time, have in the course of human cultural evolution, served to link ceremonial practices with belief in supernatural agents. This is done through the mechanism of “artification”—or “making special”—in order to signal extreme commitment to the activity and endow it with meaning. Steven Brown and Ellen Dissanayake, “The Synthesis of the Arts: From Ceremonial Ritual to ‘Total Work of Art,’” *Frontiers in Sociology*, (2018), 6-7.

<sup>102</sup> In his evocation of “apes” Kepler is referencing astronomer Robert Fludd (1574-1637) who had earlier applied the term to all the arts. Kepler, *Harmonices Mundi / The Harmony of the World*. (1619) *libri V*. transl. E. J. Aiton, A. M. Duncan, and J. V. Field, (Philadelphia, Pennsylvania: American Philosophical Society, 1997), 504.

<sup>103</sup> J. V. Field, “A Lutheran astrologer: Johannes Kepler,” *History of Exact Sciences*, vol. 31, no. 3, (1984): 225, 265.

<sup>104</sup> Field, “A Lutheran astrologer,” 221. See also Di Liscia, “Johannes Kepler.” Kepler’s choice to relocate the significance of music rather than remove it from his astronomy show the continuing Neoplatonist influence on early seventeenth-century astronomical thinking.



situation, the more intense the immersive experience will be... Narrative techniques contributing to immersion include descriptions rich in sensorimotor information, scenic spatial and temporal organization, character focalization, narratorial covertness, and the creation of empathy and suspense.<sup>105</sup>

In a state of narrative immersion it is easy to lose track of time, disconnect from the environment around us, and become so completely wrapped up in a character's predicament that we behave as if it was actually happening to us.<sup>106</sup> This shares something with the flow state, as elaborated earlier, but additionally—and importantly where perspective is concerned—it also describes a projection of one's own identity into the subject matter: acting as, viewing as. A shift into narrative immersion is a shift of awareness, agency and identity.<sup>107</sup>

In the musical microcosm then, it would not be unreasonable to view the characterfully embodied musical line as a reflection of that same intentional stance which animated the cosmos.<sup>108</sup> What might have been only a sonification of trajectory data to the disenchanted practitioner becomes spirited with a kind of performed intentionality. In the heart of that similitude toils the artist, immersed in the complexities of a cosmic drama.

### **Worlds all the way down.**

Increasingly accurate astronomical observations, and the translation of Arabic sources added a new layer of complexity to that cosmic drama. The potential for a kind of multiverse, commonly dubbed “Cosmic Pluralism,” became an empirical affair in the sixteenth century. In 1584, astronomer Giordano Bruno, proclaimed that the Creator is glorified

... not in one, but in countless suns; not in a single earth, a single world, but in a thousand thousand, I say in an infinity of worlds.<sup>109</sup>

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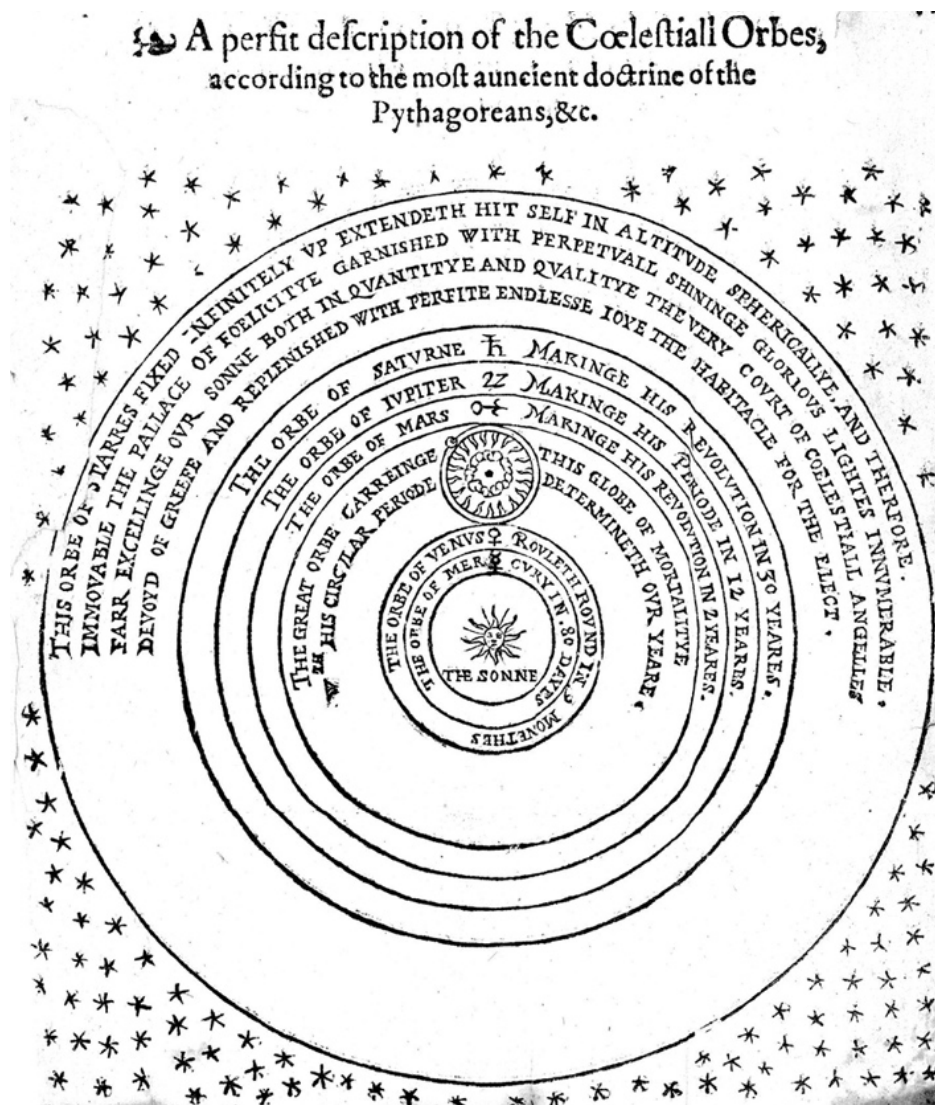
<sup>105</sup> Rutger J. Allan, “Narrative Immersion: Some Linguistic and Narratological Aspects”, in *Experience, Narrative, and Criticism in Ancient Greece: Under the Spell of Stories*, eds. Jonas Grethlein, Luuk Huitink, and Aldo Tagliabue, (Oxford University Press, 2020), 15.

<sup>106</sup> This is referred to as “the literary illusion” in J. Thompson et al. “Does Believing Something to be Fiction Allow a Form of Moral Licensing or a ‘Fictive Pass’ in Understanding Others’ Actions?” *Front Psychol* (May 15, 2023): 2.

<sup>107</sup> The idea of a “narrative mode” of cognition is one that addresses “the vicissitudes of human intentions.” Bruner, *Actual Minds, Possible Worlds*, Jerome Bruner, *Actual Minds, Possible Worlds*, 103.

<sup>108</sup> “Intentional Stance” is a term coined by philosopher Daniel Dennett to describe the attribution of mental qualities in the prediction of complex systems. Daniel Dennett, “The Intentional Stance,” *Mind Design II*. ed. John Haugeland, (MIT Press, 1997), 57-79.

<sup>109</sup> Giordano Bruno, *De l'Infinito Universo et Mondi / On the Infinite Universe and Worlds* (1584) “Introductory Epistle” 1584. transl. Scott Gosnell, (CreateSpace Independent Publishing Platform, 2014).



**Figure 14:** Thomas Digges's 1576 diagram of the universe, showing the dissolution of the sphere of fixed stars. London : F. Kyngstone, 1605. Luborsky & Ingram. Engl. illustrated books, 1536-1603, 435.41. Wellcome Images, <https://wellcomecollection.org/works/pwneanbw>. Permissions: CC BY 4.0 DEED.

For Bruno, the stars are no longer fixed to the surface of a single crystalline orb, as in the Ptolemaic model, but extend endlessly into the space beyond. Copernicus's decentering of our earthly home some 50 years prior had, like a line of dominos, toppled the whole solar system from centrality. Bruno's multiverse—also proposed by his contemporary Thomas Digges—ends up being nothing more than the universe that we know today: a multifarious collection of material objects. However the distinction between an exoplanet and an earth hangs purely on the observer's position, a simple matter of perspective. The earth had for centuries been so much more than a generic rock; it had been the anchor of humanity's identity. This is personal. When Copernicus, and later Kepler discard the "mean sun" (a theoretical point of reference) in favor of the actual sun (a celestial body with its own properties and

governance), they also reify it as a potential subject.<sup>110</sup> These multiple yieldings of place testify to a different kind of subjectivity: a pluralized subjectivity. The propositions of Digges and Bruno had favored multiple centers of importance, and the criticism launched at them is not about the discovery of anomalous, insignificant objects, but about heretical replications of earth-ness and the dilution of privilege. If we are to take cosmic pluralism seriously, then it is then also a proposition about multiple subjects.

An aphorism which had gained wide currency in the late middle ages, seems to speak to the idea of multiplicity:

God / Nature is a sphere with center everywhere and circumference nowhere.<sup>111</sup>

Shared for centuries among intellectuals, this phrase has a colorful pedigree, popping up at various times and places as a well-rounded, infinite, growing, intelligible, intellectual, and immobile sphere, prompting even Jorge Luis Borges—scholar and early popularizer of 20th century multiverse fiction—to speculate that “perhaps universal history is the history of a few metaphors.”<sup>112</sup> For early astronomers, that metaphor seemingly feeds the artistic and cartographic intuition that perspective truly is—to restate Cosgrove—“the inherent constructional principle of space itself.”<sup>113</sup>

### **The Art and Science of Plurality.**

Multiverses were not new to the sixteenth century, either. In the 15th century Oresme and Cusanus had pondered the potentials for all manner of cosmological infinities and pluralities, in an attempt to imagine the vision and reach of a divine creator.<sup>114</sup> Many early multiverses were a mixture of the literary, philosophical, and theoretical. These admittedly speculative fictions made space for later empirical developments, without themselves reflecting any measurement or observation. They seem to inhabit a space somewhere between art and science.

The idea of pluralism is also echoed in sixteenth-century literature. Here is the full quotation, detailed earlier from Shakespeare’s *King Richard II*, which references plurality in the form of teared

<sup>110</sup> Copernicus had previously employed the use of a “mean sun”, but in a purely geometric sense; it was Kepler who endowed the sun with actual properties. William Anthony Robert Dorsey, “Kepler’s ‘War on Mars’ and the Usurpation of Seventeenth-Century Astronomy.” (PhD thesis, James Cook University, 2012), 75-78.

<sup>111</sup> Traditionally attributed to “The Book of the Twenty-Four Philosophers,” a philosophical and theological medieval text of uncertain authorship. Paolo Lucentini, “Il Liber Viginti Quattvor Philosophorum nei Poemi Medievali,” in *Poetry and Philosophy in the Middle Ages: A Festschrift for Peter Dronke*, ed. John Marenbon, (Leiden: Brill, 2001).

<sup>112</sup> Jorge Luis Borges, “Pascal’s Sphere,” in *Labyrinths Selected Stories & Other Writings*, transl. Anthony Kerrigan, (New York: New Directions, 1962), 238.

<sup>113</sup> Cosgrove, *Geography and Vision*, 25.

<sup>114</sup> “A... plurality (which) borders on science fiction and was probably viewed as little more than a mental exercise, hardly to be taken seriously,” Grant, *Physical Science in the Middle Ages*, 75.

refractions on the surface of a grieving eye:

Each substance of a grief hath twenty shadows,  
Which shows like grief itself, but is not so;  
For sorrow's eye, glazed with blinding tears,  
Divides one thing entire to many objects;  
Like perspectives, which rightly gazed upon  
Show nothing but confusion, eyed awry  
Distinguish form.<sup>115</sup>

Clearly this multifaceted gaze, in the Renaissance mind, links perspective with the potential for plurality. This same sentiment is echoed centuries later by Borges who writes that “each thing (the glass of a mirror, let us say) was infinite things, because I could clearly see it from every point in the cosmos.”<sup>116</sup> Shakespeare and Borges describe a multiverse populated by our multifaceted experience of complex objects, feelings, situations and emotions. The narrative implications of theoretical multiverses seem also to occupy the 21st century imagination, perhaps to lend a personal touch to the purely theoretical.<sup>117</sup> There has been a demonstrable exchange in concepts and terminology throughout their coexistence.<sup>118</sup> In an article ominously titled “The Power of Regret Fuels our Love of the Multiverse,” theoretical physicist Sean Carroll remarks:

Whether or not other possible worlds exist in reality, they certainly exist in our imaginations. Every time we wistfully contemplate the past, or dream of the future to come, we cannot help but compare actuality to alternative possibilities. Each of us carries our own version of the Multiverse in our heads. Hollywood has latched onto a way to make this space of possibilities tangible and employ fantasy as a way of making us think about the reality of our lives in a new way.<sup>119</sup>

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<sup>115</sup> William Shakespeare, *King Richard II*, 1595, ed. Roma Gill (Oxford University Press, 1998) act 2, scene 2.

<sup>116</sup> Jorge Luis Borges. “El Aleph.” 1945, ed. Norman Thomas di Giovanni, *Jorge Luis Borges*. (Boston: E. P. Dutton, 1970).

<sup>117</sup> Andrew Hallock, “A Multiverse Between Us: Unpacking the Art and Science of Plurality in the Renaissance,” Presented at *Renaissance Resonances: A Transdisciplinary Conference*, (London, 21.4.2024), accessed 24.4.2024. <https://www.youtube.com/watch?v=HIMQjwzHCag>

<sup>118</sup> Angélica Cabrera-Torrecilla, “The Labyrinthine Multiverse in Three Short-Stories by Jorge Luis Borges,” (Conference: International Congress ALEPHA: University of Barcelona, Barcelona, Spain 2017); In this presentation, Cabrera-Torrecilla explores the reciprocal relationship between modern fictional multiverses and the various multiverse theories from quantum physics and cosmology. accessed 24.4.2024

[https://www.researchgate.net/publication/325273388\\_The\\_Labyrinthine\\_Multiverse\\_in\\_three\\_Short-Stories\\_by\\_Jorge\\_Luis\\_Borges\\_-in\\_Spanish-](https://www.researchgate.net/publication/325273388_The_Labyrinthine_Multiverse_in_three_Short-Stories_by_Jorge_Luis_Borges_-in_Spanish-)

<sup>119</sup> Sean Carroll, “The Power of Regret Fuels our Love of the Multiverse,” *Big Think*, September 9, 2022, <https://bigthink.com/high-culture/regret-multiverse/>

### Musical Forking Paths.<sup>120</sup>

In coordinating many—often imitative—musical lines, polyphonic practice also has the potential to tell a similar kind of story. Characters are represented in the polyphonic practice, which offers them each a reference frame through which to experience the others—as previously argued. Like the scripted performance of a dramatic actor, the decisions of the musical actor are expressed on the leading edge of that line. Polyphony is the personalization of event and eventuality. Cusanus, in an assertion that seems equally cosmic and canonic, remarks that only the present “is”, enfolding all time into the “now”; the past and the future are simply the unfolding of the present.<sup>121</sup> Past and future moments are thus experienced in pluralized form, through the present moment. The nature of now has long been debated, but for Cusanus it is clearly the place to be, to experience, and to do.

Upon performing a canon, one character is fractured into multiple lines; the notion of “now” appears in multiple places on the page. Cusanus goes on to say: “The present is the enfolding of all present times; and the present times are the unfolding, serially, of the present.”<sup>122</sup> Although he is writing from a metaphysical standpoint, this recognition of multiple “present times,” in contrast with a true present, perfectly captures the canonic gap between the auditory now and the notational now.<sup>123</sup> To say it another way, canons seem to illustrate something of Cusanus’s temporal metaphysics.

Canons narrativize the “what if,” a kind of contrafactual space which according to Sean Carroll “lies at the heart of our capacity to imagine possible futures and work to bring them about.”<sup>124</sup> What normal polyphony had dramatized, canons personalize. At every moment in the generation of a canon, the “leader” is hyperfocused on their choices as protagonist, immersed in the consequences and potentialities of those decisions played out by the “follower,” a kind of alter ego.<sup>125</sup> The protagonist of a canon gets to meet themselves in other circumstances, and is engulfed in their own personalized option-space. A canon thus depicts the intersection of the deciding self and the experiencing self, and—to borrow again from Cusanus—it is this “enfolding of all present times” that narrativizes that encounter.<sup>126</sup> Every moment is an enfolded composite of nows and selves.

At first glance it would seem that humans are not built for this kind of reality. The idea of forking selves and multiple nows splayed across the page is a contra-natural kind of storytelling, and makes

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<sup>120</sup> A reference to Borges’s 1941 work, “The Garden of Forking Paths,” which employs a kind of multiverse.

<sup>121</sup> Paraphrase, Cusa, *De Docta Ignorantia II*, 2 - 3, 106. (65 in translation); Marta Faust has also compared Cusanus’s assertion to representations of layered time in early modern visual culture, especially concerning memorials. Marta Faust, “Eyed Awry,” Note 48.

<sup>122</sup> Cusa, *De Docta Ignorantia II*, 2 - 3, 106 in original

<sup>123</sup> A gap which tends not—to restate an earlier critique—to be represented in modern editorial practice.

<sup>124</sup> Marta Faust, “Eyed Awry,” note 48.

<sup>125</sup> There are notable similarities here with the flow state, which can incite intense and focused concentration on the present moment, a merging of action and awareness, a sense of personal control or agency, and distortion of temporal experience. Nakamura and Csikszentmihalyi, “The Concept of Flow.” 90.

<sup>126</sup> Cusa, *De Docta Ignorantia II*, 2 - 3, 106. (65 in translation).

difficult reading to say the least. If there is any doubt about the market for parallel universes, one need only ask the likes of H. G. Wells, Jorge Luis Borges, Douglas Adams, Terry Prachett, and the current crop of Hollywood blockbusters. Fantastical “elsewheres” have always found a home in genres that seek to hold a mirror up to the reader’s world. In multiverse fantasy that mirror is concave, magnifying every miniscule facet of the gazing visage. Often the protagonists of these works are heroes precisely because they have access to this what-if space, to interact with their own alter egos. That is their superpower: a privileged insight into identity.

Here we have attempted to show how canon practice might be construed as a similar kind of storytelling, illustrating the multiverse in musical form and producing various scripts for navigating as a pluralized subject. This is the human-scale correlate of cosmic pluralism, and similarly aims to chart the intersection of plurality with identity.



**Figure 15:** Objects used by Dee in his magic: a wax disc, engraved with magical figures and names, used for reference when consulting "shew stone" (black), or the magic mirror (gold). Source: The Trustees of the British Museum, Asset number 37447001. <https://www.britishmuseum.org/collection/image/37447001>. Permissions: CC BY-NC-SA 4.0

### *Visibilium Omnium et Invisibilium*<sup>127</sup>

While literature—highbrow and lowbrow alike—can serve to illuminate unseen realities, such things remain mostly invisible from within the matrix of everyday life. As a viewing aid and an optical cipher for anamorphic puzzles, lenses of all types also have pride of place in the early modern imagination. Some are optical and some, mystical. Seventeenth-century writer and philosopher Joseph Glanvill said of Adam—the first man according to the Abrahamic religions—that he was the “medallion

<sup>127</sup> “Visibilium omnium et invisibilium / of all things visible and invisible” is part of the Nicene Creed, dating back to the First Council of Nicaea in 325 AD, Philip Schaff, *The Creeds of Christendom, with a History and Critical Notes*. Vol. i. (New York: Harper & Brothers, 1877), 28–29.

of God,” possessing both telescopic and microscopic vision.<sup>128</sup> Objects such as the “shew stone,” which alchemist John Dee (1527–1608/9) used for scrying, the “columnarie glass”<sup>129</sup> mentioned in Shakespeare’s *Twelfth Night*, various reading lenses, and so-called anamorphoscopes evidence a clear infatuation with the magical gaze. In his epistemological treatise “*De Beryllo / On Eyeglasses*” (1458), Cusanus speaks of a kind of intellectual lens:

Beryl stones are bright, white and clear. To them are given both concave and convex forms. And someone who looks out through them apprehends that which previously was invisible. If an intellectual beryl that had both a maximum and a minimum form were fitted to our intellectual eyes, then through the immediateness of this beryl the indivisible beginning of all things would be attained.<sup>130</sup>

Intriguingly Cusanus’s “indivisible beginning” hints at a certain primordial singularity in space and time, visible through the Beryl: a “Big Bang Theory” for the fifteenth century.<sup>131</sup> “Attainment” for him seems to represent the ability to see a composite of all scales, simultaneously. In “*De Visione Dei / On the Vision of God*,” Cusanus describes *omnivoyance*—the all-seeing perspective—in the form of a painting whose eyes follow the viewer. This, once again, is parallax.<sup>132</sup> Cusanus goes on to speculate that each viewer is aware of being observed, and simultaneously aware that they share this experience with all other viewers, who stand in other positions.<sup>133</sup> For him, this perspectival short-circuit develops into a meditation on the changeable yet unchanging creator; for us it is another illustration of the multifaceted gaze—one that makes room for additional subjects. In an earlier work, *De Docta Ignorantia*, Cusanus speculates on the nature of infinity, allowing for the possibility of many worlds, and alien species. There is no circumference to speak of. For Cusanus, the earth is not the center of the universe because the perspectival center is quite literally everywhere.

With the translation and proliferation of Ibn-al-Haytham’s optics, and later developments by Christiaan Huygens and Galileo Galilei, technology enters the scene that enables practitioners literally to see past what nature would normally allow. Visually impaired practitioners might more easily read a

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<sup>128</sup> Borges, “Pascal’s Sphere,” 241.

<sup>129</sup> V.F. Petronella, “Anamorphic Naming in Shakespeare’s *Twelfth Night*,” *Names: A Journal of Onomastics*, (1987): 144.

<sup>130</sup> Nicholas of Cusa. “*De Beryllo / On Eyeglasses*,” 3. transl. Jasper Hopkins, (Minneapolis: The Arthur J. Banning Press, 1998), 793.

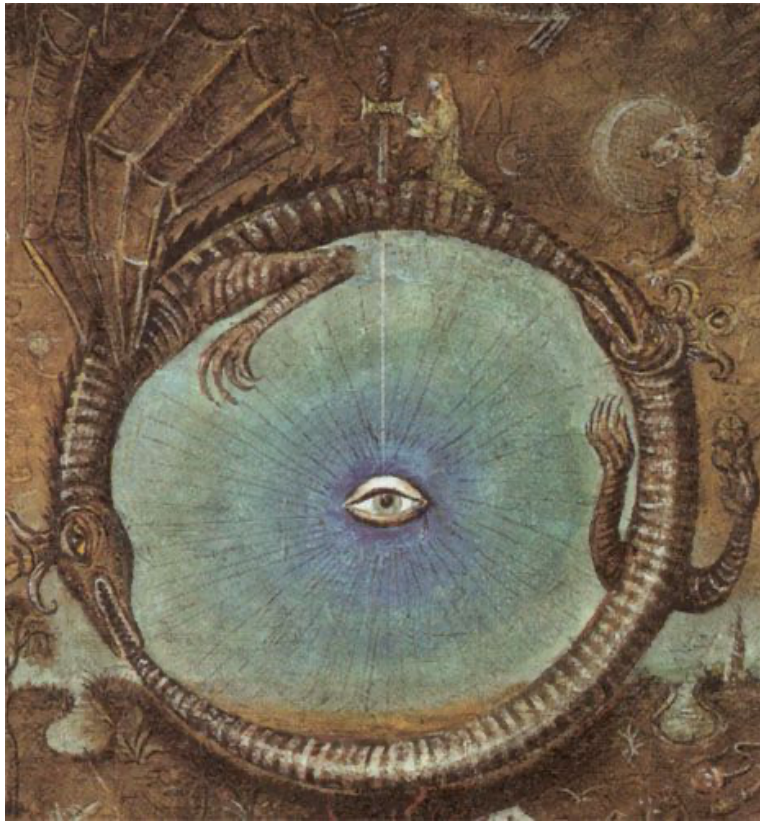
<sup>131</sup> The Big Bang Theory, proposed in 1927 by physicist Georges Lemaître, was “attained” by visualizing the idea of an expanding universe in reverse—in a sense “rewinding” it. Coincidentally it also posits that the center of that expansion was—and is—everywhere in the universe, due to the expansion of space itself; Britannica, T. Editors of Encyclopaedia. “Big-Bang Model.” *Encyclopedia Britannica*, March 1, 2024. <https://www.britannica.com/science/big-bang-model>.

<sup>132</sup> Marta Faust has also made the connection between anamorphic illusionism and Cusanus’s metaphysics.

<sup>133</sup> Cusanus’s work *De Visione Dei / On the Vision of God*, was written in 1453 at the behest of the monks of the Benedictine abbey at Tegernsee; Lasse Hodne, “Omnivoyance and Omnipresence. Word and Vision According to Nicholas of Cusa and Jan van Eyck,” (2013)

[https://www.researchgate.net/publication/285173722-Omnivoyance\\_and\\_Omnipresence\\_Word\\_and\\_Vision\\_According\\_to\\_Nicholas\\_of\\_Cusa\\_and\\_Jan\\_van\\_Eyck](https://www.researchgate.net/publication/285173722-Omnivoyance_and_Omnipresence_Word_and_Vision_According_to_Nicholas_of_Cusa_and_Jan_van_Eyck)

miniature devotional, and astronomers might better reconcile theory with empirical observation. In bridging the gap between the macroscopic and microscopic the potential of optical lenses to take on a symbolic dimension is clear, bringing the numinous within reach.<sup>134</sup>



**Figure 16:** Ouroboros with Eye from “The Fouquet Missal.” Bourges, c.1470-1475. Source: Yale, Beinecke Rare Book and Manuscript Library, MS 425, detail of f. 305v. <https://collections.library.yale.edu/catalog/32465651>. Permissions: CCO.

### The experience of interiority.

In casting the gaze around our milieu, revealed amidst the microbes and macrobes is a certain quality of surroundedness; a kind of immersive topology is uncovered—viewing from within, as a part of. In sociological terms, surroundedness often signifies the potential for change, particularly in—but not limited to—rites of passage. During Baptism, for example, an initiate is often submerged in water.<sup>135</sup> Students of a foreign language might choose to embed themselves amidst the geographical body of native

<sup>134</sup> Scholten, “Immersive Play,” 162.

<sup>135</sup> New Testament scholars generally agree that the early church baptized initiates by immersion. See: Warren W. Wiersbe, *Wiersbe's Expository Outlines on the New Testament*, (Colorado Springs: David C. Cook, 1991), 466–67.



speakers.<sup>136</sup> Children at play will find themselves operating inside a “magic circle” with its own boundaries of space and time,<sup>137</sup> and artists in flow states will find themselves in a world comprised of a singular activity.<sup>138</sup> To be immersed is to stand not beside, around, or on top of, but inside and surrounded by. The terms of this relationship are clear: the baptized is initiated, the speaker made fluent, the child transported, and the artist flowing. The experience of interiority predicates a specific kind of reciprocity with a surrounding medium, and it is that peculiar mix of particularity and absorption that characterizes the experience.

Cusanus’s attempt to describe the vision of God is however an inversion of this; it is a description of all-embracing totality.<sup>139</sup> There is simply nothing left for this deity to be, or feel immersed in. Rather than a singular perspective, Cusanus imagines the perspective of the entire area of the sphere, observing itself through infinite centers. From this radical consolidation of the cartographer’s gaze, all perspectives, relationships, and interactions are revealed, held at once together in a superposition of omniscient awareness: an emergent composite of all particulars. The antonym of “to immerse” is after all, “to emerge.” Contained in the long project of perspectives is the religiously-motivated attempt to re-imagine the immersive object as an emergent subject. Cusanus maintains that this complete *omnivoyance* is impossible to grasp, and yet the attempts to do so extend well into the following centuries.<sup>140</sup> In 1750, the astronomer Thomas Wright waxed eloquent:

In an Eternity, what Scenes shall strike?  
Adventures thicken? Novelties surprise?  
What Webs of Wonder shall unravel there?<sup>141</sup>

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<sup>136</sup> The first programs that use this phrase in language education are in Canada in the 1960s, see: J. Zuidema, “French-Speaking Protestants in Canada: Historical Essays,” (Leiden: Brill NV. 2011).

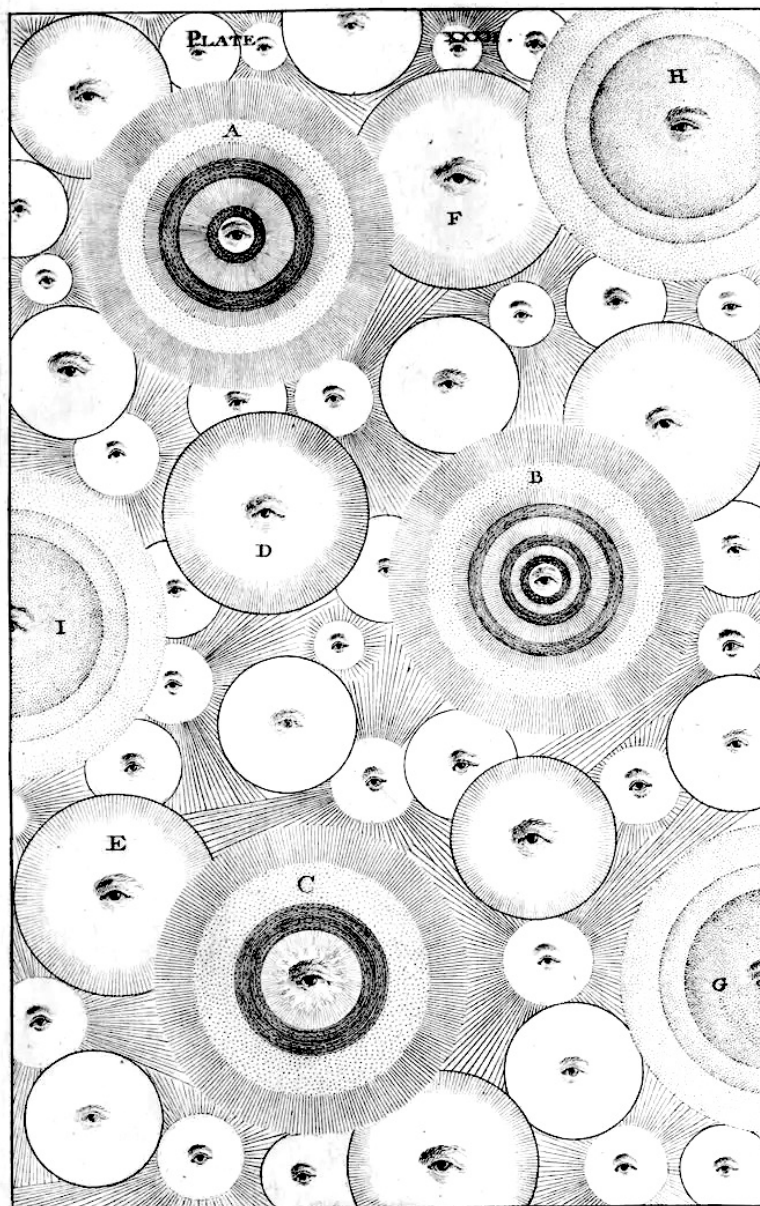
<sup>137</sup> Johan Huizinga, *Homo Ludens. Proeve eener Bepaling van het Spel-Element der Cultuur.* (Amsterdam: Amsterdam University Press, 2008), 37, 38.

<sup>138</sup> Paraphrased description from Nakamura and Csikszentmihalyi. “The concept of Flow,” 89.

<sup>139</sup> Nicholas of Cusa, *De Visione Dei* 1453, translation by Jasper Hopkins by The Arthur J. Banning Press, Minneapolis.

<sup>140</sup> This is one of the assertions in Cusanus’s “*De Docta Ignorantia / On Learned Ignorance.*”

<sup>141</sup> Thomas Wright, *Original Theory or New Hypothesis of the Universe*, (London: 1750), 83.

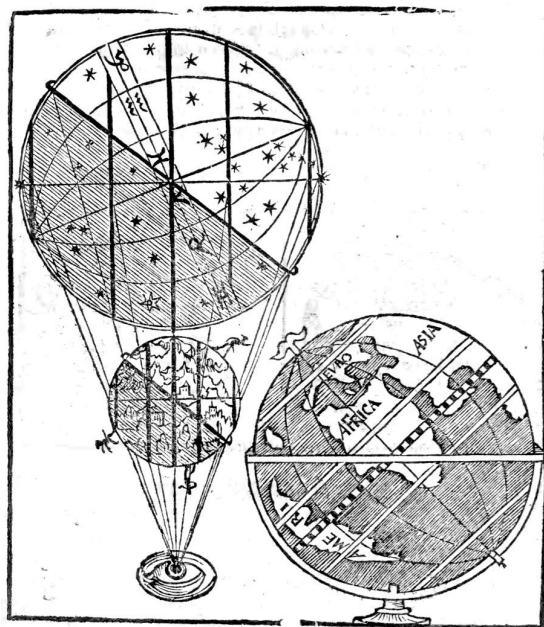


**Figure 17:** The final plate in Thomas Wright's *Original Theory or New Hypothesis of the Universe*, depicting a multitude of overlapping star systems, each with its own eye. There are earlier examples that equate observation with worlds; in fact the closing image of Wright's "Original Theory" represents the culmination of a tradition rather than a new hypothesis. Source: BEIC digital library. [https://preserver.beic.it/delivery/DeliveryManagerServlet?dps\\_pid=IE8033802](https://preserver.beic.it/delivery/DeliveryManagerServlet?dps_pid=IE8033802). Permissions: CCO.

Wright's admittedly psychedelic image answers not what shall "strike," "surprise," and "unravel," but how all these things shall be seen: by infinite eyes, distributed through space and time. Unlike an Argos, or any other singular demigod, this depiction of all-seeing providence clearly acknowledges dimensionality as the means by which the all-seeing is accomplished. Wright was a

strongly religious man and his *Original Theory or new Hypothesis of the Universe*, is at least partly his attempt to reconcile astronomical observation with Christian doctrine. The subject of study, “the great author of nature” in Wright’s words, is splayed across reality and temporality; He is the experience of time and space, thoroughly saturating it with “incomprehensible being, which alone and in himself comprehends and constitutes supreme perfection.”<sup>142</sup> If this is Wright’s creator, then these are certainly the multitude of unbounded centers that comprise Him; and if this is his depiction of nature, then that nature is clearly made of perspectives.

For Cusanus and Wright, the flipside of a particular perspective is an all-embracing perspective. While their motivations are religious, the connection between perspective and space owes as much to the Renaissance visual revolution as to the supposed relationship between creator and creation. Because the topology of immersion speaks to an incomplete view and a finite self, it stems from human subjectivity and its delimiters. These ingredients hint at the potential for an immersive state which is not an activity or sensory contrivance, but simply a topological awareness—the feeling of embrace—which resonates here in the aesthetic search for an elusive omnivoyant.



**Figure 18:** Cosmographic relations of the spheres viewed from nowhere, from Peter Apian’s *Cosmographicus Liber* (1540). First the sky (the celestial), then the earth. The sky serves as a model for understanding and measuring the earth. Apian explains here how the transfer is done. Apian, *Cosmographicus Liber*, f. III verso. Smithsonian Libraries. <https://library.si.edu/digitalibrary/book/cosmographicusl00apia>. Permissions: CCO.

<sup>142</sup> *ibid.*

### The experience of exteriority.

In contrast to the “view from everywhere”, the natural sciences have frequently attempted a “view from nowhere:” a detached and objective take on reality. Kepler’s view from atop the solar system, which brought so much insight, neglects the earth-centered perspective. That so-called Archimedean point has left its mark on the history of Western science; tension between the objective and subjective weaves its way through centuries of scientific pursuit.<sup>143</sup> The development of Classical geography for example, introduces the notion of strategic overview, and almost as a counterpart, chorography reinserts the subjective view. Copernicanism, which neglects the earth-centered perspective, had met with repeated attempts at compromise—in the form of the Tychonic model.<sup>144</sup> In the hands of Newton and Descartes, space itself—which had been composed of perspectives—becomes nothing more than a stage for action. Later Einstein’s Theory of Special Relativity would introduce the idea of inertial reference frames, making perspective once again crucial in the understanding of space and time.<sup>145</sup> Even now there is a resurgence of geocentrism and an ongoing movement to validate the flat earth: both steeped in paranoia yet indicative nonetheless.<sup>146</sup> Historian and philosopher Hannah Arendt remarks: “The great strides of Galileo proved that both the worst fear of human speculation—that our senses might betray us—and its most presumptuous hope—the Archimedean wish for a point outside from which to unlock universal knowledge—could only come true together.”<sup>147</sup> Her observation reads like a call for reconciliation. In his recent book *On the Origin of Time*, cosmologist Thomas Hertog relays a conversation he had with the late Stephen Hawking:

It is an obvious and seemingly tautological point: cosmological theory must account for the fact that we exist within the universe. “We are not angels who view the universe from the outside,” Hawking told me. “Our theories are never decoupled from us.”<sup>148</sup>

The artist seems uniquely positioned to affirm and articulate the experience of interiority, and through this affirmation draws a line from knowing to feeling; the epistemology of the Renaissance shared this concern. In current times, many of the best science educators draw on the same histories detailed above—on literature, visual culture, and music—in their own writings. “Artistic insight” might as well be the term for this attempted reconciliation of interiority and exteriority: from the artfully

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<sup>143</sup> Carlo Rovelli, *White Holes: Inside the Event Horizon*. (London: Allen Lane, 2023), 50.

<sup>144</sup> The Tychonic system is a model of the universe published by the late 16th century astronomer Tycho Brahe, which attempts to combine the best of the Copernican and Ptolemaic systems. Britannica, T. Editors of Encyclopaedia. “Tychonic system.” *Encyclopedia Britannica*, February 23, 2021. <https://www.britannica.com/science/Tychonic-system>.

<sup>145</sup> The gridlike quality of space, solidified over the course of several centuries by Oresme, Alberti, Dürer, and Descartes—as discussed earlier in this essay—becomes once again pliable. Schmelzer and Garcia apply this to the plastic potentials of 15th and 16th century music, and draw a compelling parallel with the work of the above-mentioned figures. Schmelzer and Garcia, *Time Regained*, 89-94.

<sup>146</sup> Matthew P. Weisner, “Modern Geocentrism: A Case Study of Pseudoscience in Astronomy,” *Skeptical Inquirer*, Volume 39, Issue 1 (2015): 50-53.

<sup>147</sup> Hannah Arendt, *The Human Condition*, (University of Chicago Press, 1958), 274.

<sup>148</sup> Thomas Hertog, *On the Origin of Time*, (London: Penguin books, Odile Jacob Publishing, 2023), 172.

rendered pre-modern cosmos, to the animated polyphonic line, to canons and anamorphic illusions which inscribe the participant into the work itself. Such a view is not unlike the “cartographer’s gaze” suggested by chorographic representations, or the “inversions of scale” prompted by the use of devotional miniatures. Even Cusanus’s immersed redeemer contains the artist’s insight, uniting the personal and universal. These are clearly the traces of a long project. Thus in furthering and refining the immersion discourse, the contemporary arts does more than serve itself, it participates in a critical legacy around the topics of identity, positionality, bias, and objectivity.

## Applications

Network Music and Arts, with its pushing of the boundaries of all kinds of experience, now asks itself about igniting the immersive experience. Yet this essay has instead deconstructed that experience and refracted it through a historical prism. It has revealed the following three facets which, though illuminated by the preceding inquiry, reflect on the here and now.

### Shape

In traditional musical performances, it is easy to imagine an entire ensemble as a single point; in the case of networked performances this pretense is harder to maintain. The notion of a “center everywhere” overlays well onto Network Arts, with its multiple centers, a similarity already hinted at by philosopher Marshall McLuhan, who wrote: “Medieval and ancient sensibility now dominates our time as acoustic and multisensory awareness displaces the merely visual.”<sup>149</sup> McLuhan has made frequent reference to a “sphere with center everywhere and margin nowhere,” a configuration that could just as well be applied to cyberspace as acoustic space.<sup>150</sup> To embrace this non-locality, not as a bug but a feature, is to draw inspiration from a time in many ways parallel to our own.

While ideas like the microcosm and games of scale seem to point to a hierarchical relationship, the perspectival cosmos, anamorphosis, and canons open up an additional possibility: suspended between two equal vantages, the practitioner simply is asked to hold both in the mind’s eye—or ear. An experience is revealed in intertextual form. The notion of bifurcated awareness, or even self-bifurcation in the case of canons, becomes part of the conversation. If immersive experience is related to the search for an included middle—which then stretches, blurs, and distorts the self in return—then contemporary projects might do well to investigate novel paths to this target. Network arts, with its valorizing of distance and virtuality, is uniquely disposed to play with notions of identity and representation. Canons already feature in its activities; perhaps this metaphysical repackaging can lend additional meanings to those practices. History makes no clear recommendations here, but it does make the connection between

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<sup>149</sup> Marshall McLuhan, *Laws of Media: The New Science*, (University of Toronto Press, 1988), 225.

<sup>150</sup> Emma Findlay-White and Robert K. Logan, “Acoustic Space, Marshall McLuhan and Links to Medieval Philosophers and Beyond: Center Everywhere and Margin Nowhere,” *Philosophies* 1 (2016): 162–169.

alternative temporalities, non-locality, flow, and self. When those topics are part of the conversation, it may help to join the experiential and technological, in artistically meaningful ways.

## Experience

Immersion predates the present times in the form of *Gesamtkunstwerk*—the total work of art—in the multi-sensory world of opera and the practice of religious ceremonies in large adorned spaces.<sup>151</sup> Though not directly discussed, the immersive experience has left clues throughout the music, arts, and literature of the Renaissance—as argued in this paper. Scarcity of comment however does not indicate scarcity of phenomenon. There would be no basis to presume that artists, viewers, and listeners of the past were empty in this respect; ubiquity could also explain their relative silence.<sup>152</sup> If the potential for immersion was—and perhaps is—everywhere, then the question for Network Arts becomes: how to tap into awareness and flow in a way that emerges uniquely from its platforms and methods.

In our attempts to spark the immersive experience, multisensory and interactive efforts can easily become a goal in themselves, closing the conversation around those parameters. Though the senses would seem a logical place to begin an investigation of this sort, they are too often also the middle and end of the conversation. By definition, the inner world happens behind the senses; multimodality is the facilitator of an experience, not the experience itself. The traditional role of “sense” in Renaissance and late Medieval cognition was to feed the intellect with information about sensible things in order to acquire knowledge of essences.<sup>153</sup> The 21st century immersive experience can be located—as proposed—inside similar epistemic procedures: ones that tap into perspective, projection of self, and a reckoning of realms. It is the quality associated with those procedures.

Believability also seems to be at the heart of many commercial immersive experiences; from THX Spatial Audio to the wraparound screen of an IMAX theater.<sup>154</sup> The audience is invited by these deceptions to step out of the normal world and into an alternative one. Since the contemporary art sphere strives to offer more than simple escapism, believability should be at the service of a larger agenda. The COVID-19 lockdowns present an intriguing example. Networked ensemble music was briefly in the spotlight as

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<sup>151</sup> For a broad use of the term *gesamtkunstwerk* see: Brown and Dissanayake, “The Synthesis of the Arts.”

<sup>152</sup> Amusingly, Thomas Wright highlights a similar sort of obscurity-through-ubiquity. In his words: “The stars are not dispersed and distributed in a promiscuous manner throughout space... (that they appear so is) a certain effect arising from the observer’s situation.” The relative uniformity of the night sky, according to Wright, is merely an optical effect due to our immersion in a flat layer of stars—which he dubbed “the milky way.” Thomas Wright, *Original Theory*, 48.

<sup>153</sup> The complex relationship between sensation, perception, and reason in the Renaissance and late Middle Ages is beyond the scope of this essay. For more information see J. F. Silva, “Introduction: Rationality in Perception in Medieval Philosophy,” in *Investigating Medieval Philosophy*, vol. 18, (Leiden: Brill, 2023), pp. 1-32 . [https://doi.org/10.1163/9789004537712\\_002](https://doi.org/10.1163/9789004537712_002)

<sup>154</sup> THX Spatial Audio is a high-fidelity format used in movie theaters. The audience is seated amidst an array of speakers, giving rise to the expression “surround-sound.” IMAX is a cinema format known for its large screens, tall aspect ratio, and steeply raked seating.

a way for traditional musicians to continue their work together. In terms of believability it served its purpose. Networked music is however uniquely equipped with a large and complex virtual space, with its own unique quirks and potentials. The lifting of lockdowns constitutes a renewed call to address that space on its own terms. As a comparison, the late fifteenth-century development of perspectival technology enabled hyper-realistic representations, but it also gave painters the tools to subvert reality, through anamorphosis. Network music is so much more than a mere stopgap, and the visual arts is so much more than the mere representation of reality. In both cases technology and artistic goals motivate each other.

### **Ambitions.**

The network arts, in joining multiple nodes across space, have great potential for playing with illusions and games of the sort we see in the Renaissance. In looking to the Renaissance we are reminded that those games always served a larger artistic, epistemic, or spiritual agenda. The network arts can take inspiration from the use of glitches and signals, anamorphic rhetoric, and dual perceiving in its endeavor to curate the immersive experience. As we have illustrated through devotionalia and anamorphosis, play of this sort involves a partial dissolution of self, reality, and locality. Furthermore, the participation of practitioners in phenomena beyond their reach is something within our reach today; avatars, videoconferencing, and other extensions of body and presence characterize the gaming and network arts landscape. The projection of self has far surpassed mere visualization and the limited powers of the mind's eye. Uncoupled from the constraints of geography, a networked ensemble can interact across the globe, fostering an active experience of non-locality. The embodied polyphonic line sees many of its own projective ambitions furthered in this form as well: from the microcosm to the multiverse. Representations of presence at a distance are thus linked to the immersive experience in a way that is born out by historical example.

### **Conclusions**

This essay has attempted to tease out an interdisciplinary similitude: to project anamorphic logic and rhetoric up into the stars and down into the arts. It has navigated the paradoxes of scale and contradictions of plurality that saturate the Renaissance episteme in order to illuminate a subtle quality of experience. Each area of inquiry has, in one way or another, invoked a link between a purely physical disposition and a state of mind. Not unlike the etymological path of “immersion” itself—from the literal to the metaphorical—a topology has been translated through the epistemic lens, into a feeling.

Network music and arts, with its multiple modes and nodes of experience, connected in a space apart from space, are a fundamentally metaphysical endeavor. Whether Renaissance music and visual

arts provide comment is a matter of interpretation, and so this wrapping-up can only ever be a starting point. The ideas explored here have already had their day, and though they may resonate with artists in the here and now, their use is inevitably transformed by the intervening centuries—the similitude is at best, dissimilar.

## Acknowledgements.

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