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### **Ethereal Timbres**

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The Oxford Handbook of Timbre

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### **Abstract and Keywords**

The notion of the “ethereal” has a long and surprisingly continuous history in Western art music. From the Aeolian harp to early electronic music, listeners have identified certain instruments as producing otherworldly and supernatural sounds. This essay considers the diverse range of technologies that have been frequently identified as “ethereal,” while also delving into the use of the idea of the ethereal within writing about music. This phenomenon is found to be unsurprisingly elusive, in some cases seeming to correlate to certain timbral qualities, such as sustained tones with shimmering upper harmonics or slowly fading envelopes, while in other instances relating instead to circumstances of audition, most famously in the case of the unseen sound sources of “acousmatic” listening. The study of ethereal timbres thus occupies a nexus between the topics of sound technology, listening practices, musical aesthetics, and experimental art.

Keywords: timbre, aeolian harp, glass harmonica, acousmatic sound, black box, nature, electronic music, sound art

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Through all the sounds / In the motley dream of earthly life / There sounds a soft,  
long drawn-out sound / For the one who overhears in secret.

—Friedrich Schlegel, “The Bushes”<sup>1</sup>

Anomalous timbres imply a world where they are not anomalous.

—Cornelia Fales, “Playing with Timbre”<sup>2</sup>

# Introduction

Music and music's medium of sound have, for many listeners, intimated aspects of reality beyond that disclosed by everyday, rational thought. This quality, often associated with terms such as the uncanny, the otherworldly, and the supernatural, encompasses a complex constellation of aesthetic responses that we collectively call the *ethereal*.<sup>3</sup> This essay explores the various historical characterizations of ethereal sounds and the technologies that have been used to produce them, both within the instrumentarium of music and in listeners' imaginations.

Ethereal timbres have been produced by a wide range of instruments, from the Aeolian harp to the theremin, yet throughout history there is a striking consistency in descriptions of these sounds. Ethereal timbres are "silvery" and "crystalline"; they often have masked attacks and decays; sometimes they lack overtones, producing a kind of tonal purity; and in other cases they are marked by the presence of inharmonic noise. They often tend towards the static, either through their duration—their ability to be sustained—or through repetition. In timbral terms they are often compared to a string instrument, a bell, or a voice—three very different instruments that share a capacity for subtle timbral modulation: strings through the pressure applied by the bow, bells through their inharmonic partials excited by striking different parts with varying velocity, and the voice through the plasticity of the oral cavity and its timbre-shaping formants. Another common aspect of ethereal timbres is what might be called the "Aeolian envelope": a gradually swelling onset, a fluctuating steady state, and a long decay, all typical of the tones generated by the ethereal ur-instrument, the Aeolian harp.

These sounds present us with a paradoxical opportunity. On the one hand, they intimately tie us to a particular time period: the late eighteenth and early nineteenth century, which saw the birth of both a robust rhetoric surrounding ethereal sounds and the frenzied invention of instruments that could produce such sounds. The emergence of the ethereal in this period reflects the broader development of timbre as a concept and the descriptive language around it during the eighteenth century.<sup>4</sup> Ethereal sounds were entwined with the idea of romanticism: Jean Paul went so far as to define romanticism itself as "the wavelike ringing of a string or bell," which fades away but remains audible in the listening subject, and compared it to "an Aeolian harp through which the tempest of reality sweeps in melodies."<sup>5</sup> The short stories of E. T. A. Hoffmann are likewise littered with "crystal tones" that help to mark special moments of heightened spiritual or emotional tension: to borrow R. Murray Schafer's term, these timbres are keynote sounds in Hoffmann's literary imagination. To study these timbres and their production, then, is to gain insight into the sound world of early romanticism.

On the other hand, ethereal sounds can be found across history; they therefore invite—indeed demand—trans-historical thinking that can attend to the things that persist with remarkable consistency across time. In the chapter "Sounds" in Thoreau's *Walden*, he describes a "vibratory hum" in the wilderness as the local bells rang "as if the pine

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needles in the horizon were the strings of a harp which it swept.”<sup>6</sup> The experimental instrument maker François Baschet (1920–2014) said that his instrument, the Cristal Baschet, was so named because “a crystal is something rather perfect and we have been looking for sound giving the impression of perfection: sounds with no aggressivity and sounds that can give the idea of another world.”<sup>7</sup> Ethereal tones helped to define the soundscape of the romantic imagination; once established, however, they have continued to shape habits of listening and aesthetic judgment.

This essay moves freely from the seventeenth century to the present, though we do not seek to put forth a schematic chronology of the ethereal. Rather, we are interested in the provocative continuities that emerge from this broader viewpoint. In thinking transversally across history, we take inspiration from Roger Moseley’s recent work on the keyboard, which traces the kinds of musical thinking and practices that adhere to the persistent interface of that device.<sup>8</sup> Our methodology, however, is the inverse of Moseley’s: rather than following a long-lived interface, we pursue sound itself. A study of ethereal sonorities can suggest the ways in which timbre shapes our understanding of musical instruments. And just as our purpose is not to tell the history of ethereal timbres, we also do not aim to provide an exhaustive catalogue of these sounds through our examples. We are engaged in what might be called musical forensics, tracing how these responses have been provoked throughout history by certain instruments, sounds, and situations. To this end, this essay considers a cluster of related themes: the relationship between ethereal timbres and ideas of nature, the complex ways in which these sounds both obfuscate and celebrate their material sources, and the varied attempts to bring the sonic domain under complete human control. In treating the ethereal as an enduring phenomenon that spans long historical distances, we hope to reveal some unexpected through-lines in the history of music. From this vantage point, the relatively recent developments of electronic music and sound art, which we discuss at the end of the essay, appear in a new light. Rather than offshoots or deviations from the lineage of past centuries, these unprecedented forms of music are quite firmly grounded in a number of traditions—of instrument building, speculative musicology, and listening practices—whose common threads we trace in this essay. Our transversal exploration thus moves in two directions: both sketching the deep genealogy of current sound work and suggesting the striking modernity of earlier manifestations of the ethereal—a feeling of contemporaneity that is perhaps grounded only in the fascination these phenomena still command.

## Listening to the Album of Nature

Schläft ein Lied in allen Dingen

There sleeps a song within all things

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Die da träumen fort und fort.	Dreaming there and never heard.
Und die Welt hebt an zu singen	And the world shall start to sing
Triffst du nur das Zauberwort.	If you but speak the magic word.

—Eichendorff, “Wünschelrute” (1835)<sup>9</sup>

Ethereal sounds have often been bound up with the idea of nature. But what kind of nature? Borrowing a distinction R. G. Collingwood traced in ancient Greek thought, we can distinguish between two main meanings of nature: first, the entirety of what exists (*cosmos*), and second, the underlying law or principle of what exists (*physis*).<sup>10</sup> The nature invoked in older traditions of thinking about ethereal sounds belonged to the second type: it is not the collective soundscape of animals or insects; rather, it has its roots in the ancient idea of cosmic harmony that was the original subject of the study of music theory. *Musica universalis*, in its original conception, concerned abstract mathematical relationships and proportions, not a sonic reality: cosmic harmony had no timbre.

This notion of the tuning of the universe found one of its most enduring representations in Robert Fludd’s image of the celestial monochord, which depicts the hand of God adjusting the tuning that binds the proportional relationships between the earth, the elements, the sun, and other celestial bodies. A similarly musical cosmic grounding undergirds the work of Kepler, despite the stark intellectual divide between the two thinkers. In his *Harmonices Mundi* (1619), Kepler drew on the idea of celestial harmony to represent different planetary orbits in relation to the sun; in his cosmology, each planet sings, and the pitch produced depends upon the distance from the sun (this implies that the more elliptical the orbit, the more possible variation in pitch). As shown in Figure 1, each planet therefore produces a song over the course of its orbit. For Kepler, nature is not (or not only) a book to be read but an album to be heard.<sup>11</sup>



Figure 1. Johannes Kepler, *Harmonices mundi* (Linz: Johann Planck, 1619), p. 207

By the end of the eighteenth century, celestial harmony had found terrestrial manifestations—the music of the spheres was brought down to earth. This involved two shifts: first, reconciling the notion of celestial music with the idea that earthly nature—which was often cast as

something primordial and moribund—contained a kind of fundamental harmony or

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musicality; and second, conceiving this harmony as something that could be experienced and heard by human ears. Much of this transformation is bound up with the complicated mechanisms of romanticism and romantic science, which recast ideas of the sacred, and older cosmologies, in secular and natural terms.<sup>12</sup> On the musical side, however, part of this shift can be attributed to musical technologies that seemingly gave voice to nature and the supernatural—and in particular, to the Aeolian harp, as shown in Figure 2.

The Aeolian harp has been a perpetual musicological novelty, forever lurking on the margins of music history and enjoying occasional mainstream invocations. Hector Berlioz, for example, famously imitated its sound in the fifth movement of his *Lélio, ou Le retour à la vie*, composed in 1831. From the perspective of the history of listening and sound studies, however, the instrument is far from a mere technological quirk. The Aeolian harp creates a plentitude of sounds from an extremely simple mechanism: a resonating box with a number of strings, most often tuned in unison. As we hear in Sound example 1, however, these strings give forth multiple different pitches. As the wind blows over the strings, it produces a series of vortices; when these vortices form near the strings' harmonics, the strings move and a process (now called "vortex shedding") occurs, whereby a feedback loop magnifies the shedding effect and causes the string to sound. Although the Aeolian harp was understood in basic functional terms (such as allowed it to be constructed the world over) for centuries, an acoustic explanation of its peculiar timbre, rich in dissonant, non-harmonic overtones, was reached only in the late nineteenth century.<sup>13</sup>

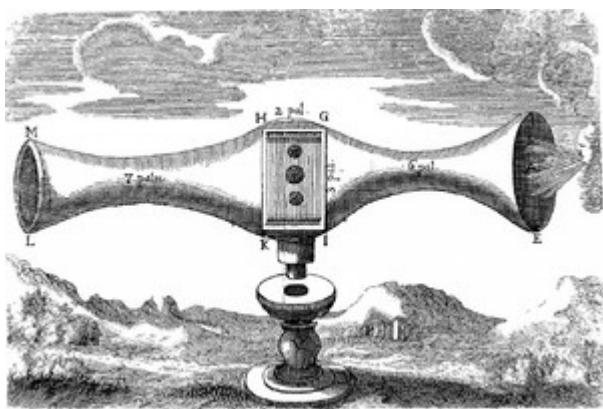


Figure 2. Aeolian harp, Athanasius Kircher, *Phonurgia nova* (Campidon: Rudolphum Dreherr, 1673), p. 144

The history of wind-activated music stretches back to antiquity, when stringed instruments—including, according to legend, King David's harp—were made to sound by passing breezes.<sup>14</sup> Among the earliest deliberately constructed Aeolian harps were those described in the work of the seventeenth-century polymath Athanasius

Kircher. In his *Musurgia universalis* (1650), he described the instrument's remarkable effect:

In my museum, it is listened to with great amazement ... No one will ever suspect what kind of instrument it is, or by what hand or pump or artifice it creates its

melodious sound. This instrument will be so much the more *recherché* and worthy of wonder to the extent that it is more hidden and concealed.<sup>15</sup>

As we will see, this pairing of instrumental obfuscation and aesthetic pleasure is one of the touchstones of ethereal sounds: the less we know about where these tones are coming from and how they are made, the stronger the spell they cast.



Sound example 1. “South Wind,” from Roger Winfield, *Windsongs* (Saydisc CD-SDL 394). Recorded in La Manga and Sierra Nevada, Spain, winter and spring 1989.

By the mid-eighteenth century, and particularly in Britain, the Aeolian harp began to enter into the broader sonic imagination. The very idea of an instrument played by the wind found its way into early romantic poetry, later becoming a powerful metaphor for the human mind. Indeed, the Aeolian harp’s poetic use as a metaphor for the structures of interiority can overshadow the ways in which it altered the sonic understanding of nature. By skirting human agency, the instrument produces new agents: the sounds it makes, though highly mediated, create the illusion of an unmediated access to the voice of nature. The Aeolian harp is a meeting place for man-made technology and the primordial expressions of the inanimate world; it renders nature as something to which human ears can attend.

Perhaps the most famous literary appearance of the Aeolian harp as a vehicle of “nature music” is found in E. T. A. Hoffmann’s celebrated short story “Die Automate.” In the course of the story, the two protagonists, Ludwig and Ferdinand, discuss these “tones of nature,” the melancholy they induce, and the attempts by contemporary instrument builders to capture these sounds in a wide range of musical instruments. When Ferdinand asks his companion what he thinks of the Aeolian harp, Ludwig responds:

Every effort ... to tempt Nature to give forth her tones is glorious, and highly worthy of attention. Only, it seems to me that as yet we have only offered her trifling toys, which she has often shattered to pieces in her indignation. A much grander idea than all those playthings (like Aeolian harps), was the “storm harp” which I have read of. It was made of thick cords of wire, which were stretched out at considerable distances apart, in the open country, and gave form to great, powerful chords when the wind smote them.<sup>16</sup>

Striking here is that Ludwig’s proposed solution was not an entirely different technological configuration, but rather simply a larger version of the Aeolian harp. The instrument bound together several concepts under a single acoustic sign: the idea that nature has a voice, that we can hear that voice, and that it is something sustained in time. Hoffmann’s elusive idea of nature music was influenced by the writings of the naturalist Gotthilf Heinrich Schubert (1780–1860), whose influential book *Ansichten von der Nachtseite der Naturwissenschaft* (Perspectives on the Dark Side of the Natural Sciences,

1808) offered an empirical explanation for naturally occurring tones even as he acknowledged the enduring mystery of their psychological effects:

We still know of certain peculiar natural phenomena in which the movement of the air is accompanied by a genuine, virtually articulate tone.... This natural voice [*Naturstimme*] is best heard on still, hot nights.... It most resembles a low, mournful human voice, yet it exerted, like all natural sounds, such a powerful impact upon human emotions that even the calmest and most reasonable observers, who well understood the natural origins of this phenomenon, could not avoid feeling a profound horror, a shearing pity for those nature tones that so chillingly mimicked human lamentations.... Back then the atmosphere must have had a much greater capacity for such audible manifestations of the air.<sup>17</sup>

Here the elusive quality of ethereal tones is explained in terms of natural history: while these sounds once flowed freely, in modern times instruments such as the Aeolian harp are needed to wrest them from an increasingly muted natural environment. The Aeolian harp thus embodies a dialectical (and perhaps uniquely modern) relationship between the natural and human-built worlds, in which ever greater degrees of technological intervention are needed to capture phenomena of an ostensibly natural origin.

## Crystal Boxing

He walked up and down the central path, with slow and measured steps; and, as he passed along, everything around him seemed to waken into life and movement. In every direction crystal tones came scintillating out of the dark bushes and trees, and, streaming through the air like flame, united in a wondrous concert, penetrating the inmost heart, and waking in the soul the most rapturous emotions of a higher world.

—E. T. A. Hoffmann, “Die Automate”<sup>18</sup>

The dual invocation and repression of agents and agency by the Aeolian harp highlights a more general characteristic of ethereal instruments: they draw attention to their technological source while simultaneously subverting our ability to understand that source. The most influential theorization of this situation is encompassed in the notion of the *acousmatic*, developed in the mid-twentieth century by Pierre Schaeffer. For Schaeffer, the acousmatic attitude, enabled by the advent of audio recording, creates a new relationship between listeners and sounds. In being isolated from the physical cause of the sound, the argument goes, the listener can better focus on the sound in a purely phenomenological sense, paying attention “not [to] the external references of the sound ... but [to] the perception itself.”<sup>19</sup>

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Here it is perhaps useful to invoke the technological object known by electrical engineers as a “black box,” a system in which inputs and outputs are known, but what happens inside the box is obscured. Instruments can be perceived as black boxes, particularly in electronic sound technologies developed since the turn of the twentieth century: we see the inputs—the gestures of the theremin player, the knob-twiddling of the synthesist, or the code of the computer musician—and we hear the outputs—the sound the instrument makes—but who knows what happens in between?<sup>20</sup> But Kircher’s confounding Aeolian harp also participates in the long history of objects that mask their function: we might describe it as a black box as well.

In his book *Sound Unseen*, Brian Kane calls attention to the ways in which musical culture writ large has long drawn on the power of the acousmatic. His focus is directed toward the conditions of listening, both philosophical and technological; he explores the architectural interventions—the veiled staged and hidden orchestras—that made possible certain forms of the “acousmatic phantasmagoria.” Many of Kane’s examples—starting with the striking Moodus tones with which he opens the book—intersect with what we call ethereal timbres and mysterious sounds tied to natural landscapes. That Kane can so effectively introduce his topic through these landscapes shows how the concept of the acousmatic is bound up with particular timbres: timbre sometimes can, in and of itself, invoke the kinds of “reduced listening” (Schaeffer’s term) that we might assume is tied to the conditions of listening. Timbre, put another way, is also a condition of listening.

Indeed, the Aeolian harp complicates the implicit audio-visual relationship implied by the acousmatic and by the concept of the black box. Kircher argued that the wondrous effects of the harp could be augmented by hiding the instrument, but he ignored part of the paradoxical power of these instruments: their ability to induce marvel is not necessarily dependent on their being obscured. The sound-producing body may be in plain sight, its workings laid bare, and yet remain shrouded in mystery. Even as it is unveiled, even as it calls attention to itself, the object can nevertheless remain a source of acousmatic wonder. This paradoxical configuration of sound, visual source, and listening attitude invites a variation of our familiar terminology: we might describe such technologies as *crystal boxes*.

Crystal boxes abound in the history of music. Take for example, the musical glasses—goblets tuned with water and played by rubbing the rims—another source of ethereal tones par excellence. Their distinctive timbre, whose diffuse spatialization confounds the listener’s ability to pinpoint the source of the sound, played a role equal to the Aeolian harp in shaping the idea of ethereal tone. In 1761, Benjamin Franklin transformed the glasses into the armonica, or glass harmonica, in which a series of tuned glass bowls are threaded on a center spindle, which the player then rotates using a treadle. The composer Karl Leopold Röllig, in his 1787 treatise *Über die Harmonika, ein Fragment*, described the ideal method of playing the instrument: “The fingers must lie lightly and without lingering over the glass disks, which produce the desired tone not through pressure and effort, but rather through feeling, which is so indispensable to all art.”<sup>21</sup> The instrument’s emphasis on feeling over physical effort and its angelic tone quickly led it to



be gendered feminine, a glassy counterpart to the keyboard instruments women traditionally played.<sup>22</sup> But even as it seemed to minimize the physicality of the player, directing the audiences' ears away from its source and toward its remarkable sonority, works written for the armonica could explicitly draw attention to the instrument. Take, for example, Johann Adolph Hasse's cantata *L'armonica* (1769), for soprano, glass harmonica, and chamber orchestra. In Metastasio's text, the soprano addresses the player of the glass harmonica: "Be bold sister: apply your skilled hand to your resonant, ever-changing crystals, and wake the rare, enchanting strains. I also will try to imitate their amorous tone with my singing [Ardir, germana: à tuoi sonori adatta/volubili cristalli l'esperta mano; e ne risveglia il raro / Concerto seduttur. Col canto ach'io / Tenterò d'imitarne/L'amoroso tenor]." This music points to its means of production, and in so doing enhances the power of the ethereal sounds.



Sound example 2. Recitativo from Johann Adolph Hasse, *L'Armonica* (1769), from *Cristal: Glass Music Through the Ages*, with Dennis James, Glass Harmonica; Véronique Dietschy, Soprano (Sony Classical SK 89047)

This gesture—the drawing of attention to remarkable new technology through composition—has had staying power. The Magnetic Resonator Piano (MRP), created by composer and technologist Andrew McPherson, can be folded into the long history of ethereal tones. The instrument comprises 88 electromagnets that can induce strings to vibrate indefinitely, producing sounds that can invoke anything from an Aeolian harp to a synthesizer. Part of the magic of the instrument is that, for an audience, it looks at first glance like a regular grand piano; the wild range of sounds that it produces is therefore even more dazzling. McPherson's and other composers' compositions for the MRP deliberately draw attention to the instrument itself: McPherson's *The Secrets of Antikythera* (2009), used the mysterious qualities of the MRP as a mirror for the ancient Antikythera Mechanism (enigmatic fragments of an early analog computer); Alexander Elliot Miller composed *88 MPH* (2015) for the MRP, which playfully references *Back to the Future* (88 miles per hour is the speed necessary to activate the DeLorean's flux capacitor); and Julia Adolphe composed her three-movement *Magnetic Etudes* (2015). These are works not just about technology, but about the mystery and wonder that technology can evoke.

The crystal box and its attendant effects of wonder, marvel, and mystery call to mind literary theorist Tzvetan Todorov's notion of the *fantastic*, which is characterized by the reader's uncertainty about whether the events depicted in a narrative are real or not—that is, whether the story takes place in a world basically the same as the one inhabited by the reader. For Todorov, the fantastic is an inherently transitory feeling of suspension that is ultimately resolved into an interpretation either of the uncanny (the events of the story were strange, but not supernatural) or the marvelous (the events of the story can be explained only by means of "new laws of nature").<sup>23</sup> Listeners of ethereal-acousmatic sounds are similarly suspended between two interpretations of what they are hearing: on

the one hand, as a known instrument whose identity was somehow masked (“Ah, it was but a muffled flute!”), and on the other hand, as an encounter with a hitherto unknown means of sound production that requires a new category to explain it.

## Nature Instrumentalized

Starting in the late Enlightenment and extending well into the nineteenth century, a barrage of newly invented instruments burst onto the European musical scene. Many of these appear, at least at first blush, to be attempts to capture “ethereal” timbres in easily controllable instruments, often with keyboard interfaces. Indeed, once attuned to the centrality of the ethereal sounds, the history of experimental instrument building (distinguished from the tweaking and “perfecting” of existing instruments) begins to look like a series of variations on the Aeolian harp. But while many of these technologies were explicitly motivated by the goal of instrumentalizing the ethereal, we must also recognize that the concept of the ethereal also controlled experiences of new instruments.

Wind-driven instruments were one class of instruments that quite explicitly courted the ethereal. These range from Johann Jakob Schnell’s *Anémocorde* (1789), which used air to set strings in motion (the exact nature of the mechanism he kept secret) to the vast proliferation of free-reed instruments in the nineteenth century, which most often used a variation of Aeolis in their names. These pointed to the mechanical breath that animated them and tied them, genealogically, to the Aeolian harp. These were made by inventors and builders across Europe, with names such as the aeolodican, the aeoline, the aeolsklavier, the aeolomelodikon, and the aeolopantalon. These instruments point to another way in which sound invites the language of the ethereal and the celestial. In 1824, when J. F. Lange from Kassel performed on the aeolodikon in Vienna, it was reported that his improvised fantasia was of “great power, beauty, and delicacy of expression.” The reviewer continued:

The aeolodikon, which is still little known, found general approbation and is undoubtedly the most perfect of all newly invented instruments ... For those who have never before heard the instrument, the first chords arouse the idea of the music of the spheres and one believes one hears a complete orchestra.<sup>24</sup>

There are many ways of understanding this reviewer’s experience of the aeolodikon: it is, of course, possible that the instrument did indeed produce tones of such delicacy and dynamic nuance as to demand this lofty language of perfection; more likely, however, is that this description signals that the reviewer was grappling with the challenges presented by novel tones. The rhetoric of the ethereal was ready at hand to describe the indescribable. To say that the instrument suggests “the music of the spheres” is another way of articulating astonishment: an emotional reaction transformed into a timbral description. Ethereality, we might say, is both tied to specific soundworlds and reveals

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something about the relationship between listener and instrument: the instrument's power to astonish is partially a result of its unfamiliarity.

We encounter the rhetoric of the ethereal once again when Georges Kastner developed his pyrophone or flame organ in the late nineteenth century. The pyrophone, illustrated in Figure 3, used gas jets inside of glass tubes to create pitched sounds that were controlled from a conventional keyboard. And yet, in spite of its industrial trappings, the instrument was quickly folded into the Romantic quest for ethereal timbres. One observer wrote that

the sound of the pyrophone may truly be said to resemble the sound of a human voice, and the sound of the Aeolian harp; at the same time sweet, powerful, full of taste, and brilliant; with much roundness, accuracy, and fullness; like a human and impassioned whisper, as an echo of the inward vibrations of the soul, something mysterious and indefinable.<sup>25</sup>

(The sound of the pyrophone linked it to another archetypal ethereal instrument: in earlier forms it was occasionally called the “chemical harmonica” in allusion to Franklin’s glass harmonica.) In the case of free-reed instruments, one might argue that the language of their reception was partially determined by the makers, who cannily bestowed their creations with fanciful names; they were marketed for ethereal consumption. The pyrophone, however, reveals how this language more broadly helped listeners navigate, conceptually and linguistically, new technologies and new sounds.

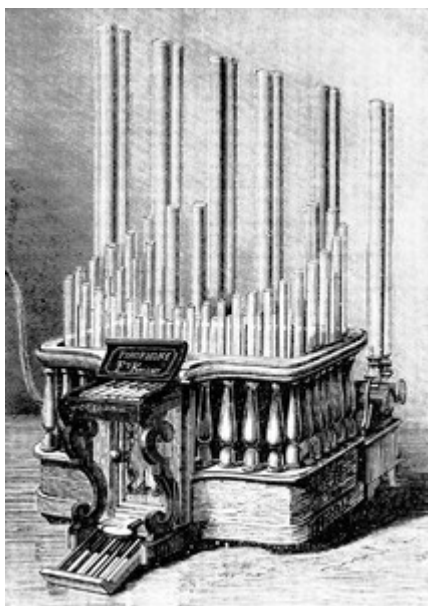


Figure 3. The Pyrophone. *The Popular Science Monthly*, Vol. 7 (August 1875), p. 449

The invocation of the ethereal did not always depend on a new instrument. In the nineteenth century, composers developed what could be called “ethereal instrumentation”: special uses of the orchestra—often at climactic moments—that use glittering high strings and winds to conjure the celestial. These special effects—like the novel sonorities of the aeolodikon and pyrophone—had the power to astonish, and they

remained marked as special effects even as their deployment and meaning became codified. This is the characteristic sound, for example, at the tragic ends of Verdi’s operas, in which the dying heroine sings for the last time (*Aida*, *Rigoletto*, *La Traviata*). Similar music marks the end of Tchaikovsky’s *Romeo and Juliet Overture-Fantasy*, in

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which the love theme returns in an ethereal version. One might add to this the fire music at the end of *Die Walküre*, when Wotan summons Loge to protect Brünnhilde during her magical sleep, and the shimmering music of moonlit transfiguration at the conclusion of Schoenberg's *Verklärte Nacht*. These moments do not directly resemble the sound of either the Aeolian harp or the glass instruments that proliferated in the early nineteenth century. But there are some shared qualities, such as an emphasis on the upper register and a tendency towards the static. Here the soundworld of the Aeolian blends into a more generalized conception of the ethereal encompassing all the varied timbres of the mature nineteenth-century instrumentarium—what the German music critic Paul Bekker called the “cosmic orchestra ... the symbol of the sounding and creating universe.”<sup>26</sup>



Sound example 3. Schoenberg, *Verklärte Nacht*, Op. 4 (1899), m. 407ff. Juilliard String Quartet, with Walter Trampler, Viola and Yo-Yo Ma, Cello (Sony Classical SK 47690)

It is no wonder, then, that this same, ethereally charged language appears far outside concert halls in this period. The “Aeolian tradition,” as we might call it, gave rise to particular relationships between the listener and nature, sound and source, interiority and exteriority: strikingly, even when seemingly key elements of this configuration were altered, the same rhetoric of wonder often remained. Douglas Kahn has explored how late-nineteenth-century thinkers and inventors navigated the field of natural sonic activity that took place not in the medium of air, but through electromagnetism—a phenomenon Kahn punningly dubs the “aelectrosonic.”<sup>27</sup> These signals are part of what Kahn calls “natural radio,” atmospheric electrical fluctuations that are always present but made audible only by modern devices capable of transducing naturally occurring electromagnetic fluctuations into acoustic ones. While the character of these sounds diverges somewhat from the typical Aeolian timbre—two of the most common sounds are described as a snap followed by a decaying grating sound and something like the “chirping of a bird”—they resonate with the ethereal by virtue of the mysterious inner workings of their origin. Thomas Watson, assistant to the inventor Alexander Graham Bell, wrote in his journal of how he sat late at night “listening to the many strange noises in the telephone and speculating as to their causes.” Echoing the Aeolian auditive tradition, Watson heard these sounds as tokens of a chthonic sentience he called “earth’s divinity.”<sup>28</sup> Just as the Aeolian harp allowed listeners to eavesdrop on the wind, it is again precisely through a drastic technological intervention that the listener gains access to the sounds of nature. Both the Aeolian and the aelectrosonic have to do with otherwise imperceptible natural forces revealed by art and artifact, and this exploration of epistemological thresholds is, as we have seen, one of the markers of the ethereal.

# The Electronic Ethereal

At first blush, electronic instruments might seem an unlikely tool in the quest for ethereal timbres. The “dead” or “soulless” tones of electronic sound synthesis have often been heard as the grim products of technology in its inhuman, disenchanting aspect. With the advent of electronics, sound is mastered, denatured, brought to heel. But, as Kahn reminds us, electricity, like sound itself, is a natural phenomenon before it is an object of human ingenuity.<sup>29</sup> Thus, even as electronic instruments figure as fetishes of absolute sonic control, they also resonate with other, older notions of sound as a symbol of cosmic order. The frenzied development of electroacoustics since the turn of the twentieth century was driven in large part by a metaphysical impetus to recreate the bootstrapping cosmic generativity of *natura naturans*, or nature in its creative aspect. The technologies were new, but the purposes to which they were put had been long incubated in the minds of poets, scientists, musicians, and lay listeners alike.

The first large-scale, conventionally playable electronic instrument, Thaddeus Cahill’s Telharmonium, was immediately absorbed into the discourse of the ethereal by the Italian composer Ferruccio Busoni, who lauded the device’s “scientifically perfect, never malfunctioning sound, invisible, effortless, and unremitting.”<sup>30</sup> For Busoni, the charm of electrically generated sound had to do with its apparent independence from human labor—a view that, while neglecting the human and technological work involved in generating electricity in the first place, connects provocatively to the nature music tradition, in which instrumental sound is heard as an echo or imitation of the unceasing and automatic workings of the cosmos. (In keeping with the literary and often purely imaginative valences of ethereal sounds, it is perhaps not surprising that Busoni offered this description of Cahill’s “transcendental tone-generator” on the basis of a magazine article about the instrument, without having heard it himself.)<sup>31</sup> Busoni’s language set the tone for much of the later reception of electronic sound. One of the most famous (though since forgotten) early electrophones, Jörg Mager’s Spherophone, was explicitly motivated by its inventor’s quest for what he called the “ocean of tone,” an ideal of sonic limitlessness made possible by electronics.<sup>32</sup> Likewise, Lev Theremin’s eponymous instrument, developed like Mager’s device in the 1920s, glowed from the outset with metaphysical auras (see Figure 4). Upon hearing the keening tone of an early prototype, Theremin’s colleague Abram Ioffe exclaimed, “That’s an electric Orpheus’ lament!”<sup>33</sup> This instrument—tellingly also known as the Etherphone—cemented an association between electronic sound and the ethereal that survives to this day, and it should be noted that these eerie resonances of electronic sounds long predate their appearance in science fiction films.



Figure 4. Advertisement for the first American demonstration of the theremin. Music Division, The New York Public Library for the Performing Arts, Astor, Lenox and Tilden Foundations

Sound example 4. Percy Grainger, *Free Music No. 1* for four theremins (1936), Lydia Kavina, *Music from the Ether: Original Works for Theremin* (Mode CD 76)

Technology takes on meaning only in contrast to an idea of the natural, whether as negation or extension, and this helps explain the outwardly paradoxical connection between the nature music tradition and the technophilic world of electronic music. In 1930, at the height of the first wave of electronic instrument building, the German writer Eberhard Preussner explicitly linked the advent of electronic sound production to the nature music tradition. He argued that the age-old belief in the “music of the spheres” had prepared the way for the new sound-production techniques of the electronic age.<sup>34</sup> In the same vein, Pierre Schaeffer, writing in the mid-twentieth century, saw the electronic instrumentarium as a roundabout way of channeling a transmundane reality:

The miracle of concrete music ... is that, in the course of experimentation, things begin to speak by themselves, as if they were bringing a message from a world unknown to us and outside us ... If I gather together fragments of noise, animal cries, the modulated sounds of machines, I also am striving to articulate them like the words of a language, which I speak without even understanding it or ever having learned it; I am deciphering hieroglyphics.<sup>35</sup>

By reaching beyond the anthropogenic soundworld, Schaeffer hoped to re-establish contact with nature, and so to confirm a “secret correspondence between man and the world, to which music is one of the keys.” Listeners’ reactions to the first recordings of *musique concrète* corroborated Schaeffer’s hunch that his new music echoed the timeless music of the spheres—admixed, to be sure, with some garden-variety European exoticism: “I thought I had heard a wonderful Balinese music,” wrote one audience member, “music which one could imagine sounding inside an atom, ultrasonic music, that was perhaps

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created by the movement of planets.”<sup>36</sup> The language of the electronic-ethereal thus carried over seamlessly from early electrophones to mid-century magnetic tape, and from the 1960s on, to the synthesizer, arguably the most influential new instrumental paradigm of the twentieth century. (In many cases the link between electronic sound and the ethereal was of course strengthened by the presence of psychedelic drugs.) The Doors’ singer Jim Morrison, attempting to help a technician recreate a sound made on a Moog modular synthesizer during the recording sessions for the band’s 1967 album *Strange Days*, described it as “the sound of broken glass falling from the void into creation. It reminded me of the Kabbalah, *Kether*, the I AM, creating duality out of the one. All crystalline ... and pure. You know, *that* sound.” But, in a twist worthy of a Hoffmann tale, the sound—or rather the settings that made the sound—had vanished into thin air:

[Sound technician] Paul Beaver began to unplug and replugin patch cords, and twist little knobs, and strike the keyboard, which emitted strange and arcane and utterly unearthly tones that sounded nothing like the Kabbalah or *Kether*, the crown of the *Sefiroth*. None of the sounds he was creating was pure and crystalline. And then we realized ... he couldn’t get it back.<sup>37</sup>

Here, as in many earlier accounts of ethereal timbres, the unique nature of the experience is defined by its irretrievability. In the case of the modular synthesizer, the configuration of knobs, switches, and cables that produces a given timbre (the “patch”) is potentially as short-lived as the sound itself. This ephemerality reinforces the sense of mysterious potential surrounding the synthesizer and so challenges the widespread association of electronic instruments with the predictable, mechanical, and unnatural.

While Morrison’s psychedelically tinged language has long since passed into the realm of the cliché, the consistency of discourses around ethereal timbres since the end of the eighteenth century gives reason to suspect deeper correspondences than can be charted in this essay. But we surmise that the sensation of the uncanny provoked by electronic instruments likely stems from a disjunction between the aura of technoscientific mastery exuded by these devices and the nagging mystery surrounding electroacoustic operations that can be understood only in highly abstract terms, as the jostling of invisible particles. Here we might think again of the black box, particularly in light of sociologist Max Weber’s definition of rationalization, which asserts that the “disenchantment” typical of modernity is a product not of actual understanding—after all, electronics remain for most people as inscrutable as any complex phenomenon—but rather of an assumption that all things are *in principle* explicable in terms of natural laws.<sup>38</sup> In short, we don’t know what’s happening in the box, but we default to the belief in a natural, as opposed to supernatural, explanation. We are left suspended between prosaic causal understanding and poetic associations induced by sounds that seem to come from another world.

## Always Already Sound Art

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The artificial can reveal the natural. Technique lets us hear the song of the dolphin and the noise of the city—why not the music of the spheres?

—Mikel Dufrenne<sup>39</sup>

The idea of the ethereal performs a variety of roles within music: it helps circumscribe a particular class of sounds and kinds of relationships between sound and source; it functions as an ideal to which new instruments can aspire; and it serves as ready vocabulary to describe novel and unfamiliar sounds. Throughout our whirlwind of examples, ethereal sounds have again and again manifested as something beyond mere timbres. They have consistently been heard as belonging to a different time-scale—static, concrete, or sculptural—and as transcending the traditional notion of subjective musical expression. This partially explains their ability to lurk continually on the margins of music, forever remaining a special effect.

As we suggested at the beginning, ethereal timbres have both a long history and a perpetual modernity. Indeed, their perennial novelty sheds light on their frequent deployment in sculptural and installation art that incorporates sound. In recent sound art—especially in pieces installed outdoors that verge on landscape design—the ethereal principles of “nature music” have been developed in new ways that nevertheless draw upon many of the themes we have explored in this essay. We could invoke sculptures designed to work with natural forces, such as Mike Tonkin and Anna Liu’s visually arresting *Singing Ringing Tree* (2006): a tornado of pipes that emits a chorus of ghostly voices into fields of grazing sheep in Lancashire in the UK. But we could also turn to urban landscapes: Max Neuhaus’s installation “Times Square” (first installed 1977), is easily missed by hurried pedestrians; those who stop to listen are drawn by a low, continual drone of ethereal sounds rising up from the street grate. Some of these objects rest at the threshold between instrument and sound art: the Baschet Brothers’ “crystal” instruments, mentioned above and shown in Figure 5, were designed as much as striking visual sculptures as functional musical instruments. In 2013, musical roboticist Andy Cavatorta constructed *The Dervishes*, a series of precisely controlled, spinning corrugated pipes. Its gentle Aeolian envelope gives the impression of a delicate mass of ghostly voices. These works are a powerful reminder that many of the values of what is now called sound art have their origins in the instruments and objects that we have encountered above. After all, one could argue that the first forms of abstract sculptural sound art were objects such as the Aeolian harp.





*Figure 5.* Cristal, Bernard and François Baschet, Paris, 1980, E.983.14.1 Collections Musée de la musique, Photography by Jean-Marc Anglès. Used with kind permission.

Sound example 5. “Pastille Sonore” improvised by Pierre Cuffini on the Cristal Baschet (12 March 2018), used by kind permission of the Structures Sonores Baschet Workshop. Video available at [https://www.youtube.com/watch?v=sqVGFdS2R\\_M&feature=youtu.be](https://www.youtube.com/watch?v=sqVGFdS2R_M&feature=youtu.be)

Christoph Cox, writing on the ontology of sound art, has argued that this work, “at its best ... opens up or calls attention to an auditory unconscious, a transcendental or virtual domain of sound that has steadily come to prominence over the course of the twentieth century.”<sup>40</sup> Cox draws on Leibniz’s definition of the subconscious: a reservoir of memories, past events, and experiences that Leibniz analogizes through idea of constant background sound—mills, waterfalls, the sea—which a listener unconsciously hears. Certain moments, experiences, or triggers can cause us to tune into and become consciously aware of this background, transforming the subconscious into conscious perception. Citing works such as Cage’s *4’33”* (1952) and Alvin Lucier’s *I Am Sitting in a Room* (1970), Cox argues that sound art dramatizes precisely the sudden awareness of what had been ever-present in the background, while music, according to his argument, exists purely in the realm of the already conscious signal. While one could challenge this provocative argument with counterexamples, it is perhaps more productive to acknowledge the role timbre plays here: many of Cox’s examples—long held drones, recordings of wind—belong to the class of ethereal sounds. Perhaps this points to another form of power wielded by ethereal tones: their ability to strike us as a sonification of our subconscious, our dream states, as if the harmony of the spheres had been within us all along. The idea of an ever-present, latent domain of reality that manifests in sound under particular, exceptional circumstances—this is in essence the idea of ethereal timbre.

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Put in less celestial terms, we might also observe that ethereal sounds have often functioned as an invitation to listen more closely to one's environment. They could even be understood to represent the state of being attuned to the landscape. It is precisely this kind of connection that Hoffmann suggests in "Die Automate" when the mysterious Professor X walks through his garden and crystal sounds stream out of the greenery. This image is at once fantastically romantic and a plausible description of possible a sound art installation in the early twenty-first century. Whether as an ideal, perhaps inaudible vibration of the cosmic order, a proto-ecological "nature music," or as electronic music or sound art, the deep history of ethereal timbres has been shaped by the development of technologies that, in various ways, allow access to these sounds, opening apertures between the virtual and the real.

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### Notes:

<sup>(1)</sup> Quoted in Richard Taruskin, *Music in the Nineteenth Century, vol. 3 of The Oxford History of Western Music* (New York: Oxford University Press, 2010), 312.

<sup>(2)</sup> Cornelia Fales, "Playing with Timbre," Keynote lecture delivered at "Timbre is a Many Splendored Thing," McGill University, 7 July 2018.

<sup>(3)</sup> Many of these concepts also fall, of course, under the umbrella of the Gothic, which we do not explore at length in this essay. For more on the connections between sound, media, and ideas of the Gothic, see Isabella van Elferen, *Gothic Music: The Sounds of the Uncanny* (Cardiff: University of Wales Press, 2012).

<sup>(4)</sup> See Emily I. Dolan, *The Orchestral Revolution: Haydn and the Technologies of Timbre* (Cambridge: Cambridge University Press, 2013).

<sup>(5)</sup> Jean Paul, *Elementary Course in Aesthetics*, 2nd ed., 1813; quoted in Oliver Strunk, ed., *Strunk's Source Readings in Music History* (New York: Norton, 1998), 1057, 1060.

<sup>(6)</sup> Henry David Thoreau, *Walden: A Fully Annotated Edition* (Yale University Press, 2004), 119.

<sup>(7)</sup> Eric Marin, *Baschet: The Transfiguration of Daily Life* (Earmark Films, 2003), DVD.

<sup>(8)</sup> Roger Moseley, *Keys to Play: Music as a Ludic Medium from Apollo to Nintendo* (Berkeley and Los Angeles: University of California Press, 2016).

<sup>(9)</sup> Wolfgang Frühwald, Brigitte Schillbach, and Hartwig Schultz, eds., *Joseph von Eichendorff Werke* (Frankfurt am Main: Deutscher Klassiker Verlag, 1987), 1:328. Translation by Thomas Patteson.

<sup>(10)</sup> See R. G. Collingwood, *The Idea of Nature* (London: Oxford University Press, 1960), 43–48.

<sup>(11)</sup> This notion of a musically ordered cosmos has endured to the present: in 2003, NASA announced that Chandra—the x-ray space observatory launched in 1999—had “heard” a black hole in the Perseus Cluster. What its song lacked in variation, it made up for in literal profundity: it emitted, in the form of pressure waves, a low B $\flat$ , 57 octaves below middle C. This discovery, which had potentially great significance for understanding the growth of galaxies, made for an eye-catching lede, with the *New York Times* announcing “Music of the Heavens Turns Out to Sound a Lot Like a B Flat.” See: [http://chandra.harvard.edu/press/03\\_releases/press\\_090903.html](http://chandra.harvard.edu/press/03_releases/press_090903.html) (accessed 13 January 2017), and Dennis Overbye, “Music of the Heavens Turns Out to Sound a Lot Like a B Flat.” *The New York Times*, September 16, 2003. <http://www.nytimes.com/2003/09/16/science/music-of-the-heavens-turns-out-to-sound-a-lot-like-a-b-flat.html>.

<sup>(12)</sup> For two classic texts on this topic, see, for example, Arthur O. Lovejoy, *The Great Chain of Being, a Study of the History of an Idea* (New York: Harper & Row, 1960) and M. H. Abrams, *The Mirror and the Lamp: Romantic Theory and the Critical Tradition* (New York: Norton, 1958). See also: Robert J. Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago: University of Chicago Press, 2002).

<sup>(13)</sup> For a more detailed discussion, see Thomas L. Hankins and Robert J. Silverman, “The Aeolian Harp and the Romantic Quest of Nature,” in *Instruments and the Imagination* (Princeton: Princeton University Press, 1995), 86–112.

<sup>(14)</sup> *Ibid.*, 89.

<sup>(15)</sup> *Musurgia universalis*, 2:353; quoted in Hankins and Silverman, “The Aeolian Harp and the Romantic Quest of Nature,” 89.

<sup>(16)</sup> E. T. A. Hoffmann, *The Best Tales of Hoffmann*, ed. E. F. Bleiler (New York: Dover, 2012), 99.

<sup>(17)</sup> Gotthilf Heinrich Schubert, *Ansichten von der Nachtseite der Naturwissenschaften*, 3rd ed. (1835), 92–93.

<sup>(18)</sup> *Ibid.*, 100.

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<sup>(19)</sup> Pierre Schaeffer, "Acousmatics," in *Audio Cultures*, ed. Christoph Cox and Daniel Warner (New York: Continuum, 2006), 77.

<sup>(20)</sup> See, for example, Brian Kane's discussion of the idea of the black box in relation to Les Paul and the *Les Paulverizer* in *Sound Unseen: Acousmatic Sound in Theory and Practice* (New York: Oxford University Press, 2014), 176.

<sup>(21)</sup> Karl Röllig, *Über die Harmonika, ein Fragment* (Berlin 1787), quoted and translated in Heather Hadlock, "Sonorous Bodies: Women and the Glass Harmonica," *Journal of the American Musicological Society* 53, no. 3 (2000), 511.

<sup>(22)</sup> For an extended discussion, see Hadlock, "Sonorous Bodies."

<sup>(23)</sup> Tzvetan Todorov, *The Fantastic: A Structural Approach to a Literary Genre* (Cleveland, OH: Case Western Reserve University, 1973), 41.

<sup>(24)</sup> "Nachrichten," *Allgemeine musikalische Zeitung* 26 (1824), col. 288.

<sup>(25)</sup> Henri Dunant, "The Pyrophone," *The Popular Science Monthly* 7 (1875–76): 445. Dunant goes on to note that the sound of the pyrophone possesses "a character of melancholy, which seems characteristic of all natural harmonies."

<sup>(26)</sup> Paul Bekker, *The Orchestra* (New York: W. W. Norton & Co., 1963), 180, 198.

<sup>(27)</sup> Douglas Kahn, *Earth Sound Earth Signal: Energies and Earth Magnitudes in the Arts* (Berkeley and Los Angeles: University of California Press, 2013).

<sup>(28)</sup> *Ibid.*, 28, 32.

<sup>(29)</sup> *Ibid.*, 56.

<sup>(30)</sup> Ferruccio Busoni, *Entwurf einer neuen Ästhetik der Tonkunst*, 2nd ed., ed. Martina Weindel (Wilhelmshaven: Noetzel, Heinrichshofen-Bücher, 2001), 65.

<sup>(31)</sup> The similarity to the language of E. T. A. Hoffmann's story "The Automata" is not incidental; Busoni revered Hoffmann and reportedly even believed he was the German author's reincarnation.

<sup>(32)</sup> See Thomas Patteson, *Instruments for New Music* (Berkeley and Los Angeles: University of California Press, 2016), 52–81.

<sup>(33)</sup> Albert Glinsky, *Theremin: Ether Music and Espionage* (Chicago: University of Illinois Press, 2000), 24.

<sup>(34)</sup> Eberhard Preussner, "Musik und Technik in der Geschichte der Musik," in *Kunst und Technik*, ed. Leo Kestenberg (Berlin: Wegweiser Verlag, 1930), 133.

<sup>(35)</sup> Pierre Schaeffer, *In Search of a Concrete Music*, trans. Christine North and John Dack (Berkeley and Los Angeles: University of California Press, 2012), 91–92.

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(<sup>36</sup>) Quoted in Fred Prieberg, *Musica ex machina: Über das Verhältnis von Musik und Technik* (Berlin: Verlag Ullstein, 1960), 86.

(<sup>37</sup>) Quoted in Trevor Pinch and Frank Trocco, *Analog Days: The Invention and Impact of the Moog Synthesizer* (Cambridge, MA: Harvard University Press, 2002), 120–121.

(<sup>38</sup>) See Max Weber, “Science as a Vocation,” in *From Max Weber: Essays in Sociology*, ed. H. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1958), pp. 129–156. First published as *Wissenschaft als Beruf* (Munich: Duncker and Humblot, 1919).

(<sup>39</sup>) Mikel Dufrenne, “Art and Technology: Alienation or Survival?” in *The Myths of Information: Technology and Postindustrial Culture*, ed. Kathleen Woodward (Madison, WI: Coda Press, 1980), 170

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