Introduction

Opera, Staging, Technologies

New York, 2010. Like many opera houses around the world, the Metropolitan Opera prepares for the 2013 bicentenary of Richard Wagner by launching a new production of *Der Ring des Nibelungen*. Boasts the Met's general manager, Peter Gelb, "Since Wagner was way ahead of his time, I believe he would be pleased by what we are attempting."[1] Indeed, according to the season book, "this new *Ring* is faithful to the libretto and to Wagner's vision. . . . Yet it is also strikingly contemporary. The production uses modern stage techniques and state-of-the-art technology."[2] In a truly Wagnerian paradox, the new *Ring* cycle is being heralded as both inviolate and innovative, as completing an "authentic" vision with hypermodern means. The gist is clear: the Met purports to show "the *Ring* that Wagner would have wanted all along" if only he had known the latest technologies that director Robert Lepage now introduces.[3] Here, in twenty-first-century New York, not in Wagner's own theater in nineteenth-century Bayreuth, we are to experience the fullest realization of Wagner's complex illusionist music drama.

To be sure, much of this rhetoric may be attributable to marketing tactics. Given today's increasingly Wagner-saturated operascape, Gelb needed to emphasize something novel about his production, but he wanted to avoid radical innovation on the level of direction. For years, Gelb had been trying to placate fears among more conservative opera patrons that his company might be invaded by what has become known as *Regietheater*, or director's opera—stagings with a strong interpretive concept that are often slanted toward updated sociopolitical or psychological readings and therefore frequently depart from the scenery and settings described in the score. Regarding the *Ring*, Gelb instead appealed to an "audience that is more visually astute than ever before, thanks to its exposure to a

widening range of media":[4] he shifted the terms of innovation from conceptual revisionism to the staging's optical surface and its pioneering technology. Even so, he faced opposition for discontinuing the Met's previous *Ring* in the first place, a purposely "Romantic," traditionalist staging created in 1986–88 by Otto Schenk that was partly based on Wagner's original designs. Amid such conflicting demands, Gelb opted to veil the modern—the mere shock of a new production, or of up-to-the-minute stage devices—with a veneer of fidelity, selling his expensive technological enterprise and artistic compromise as the real(ist) deal.

Such a chameleon-like PR campaign was understandable in the post-2008 economy, not least for such a costly work as Wagner's *Ring* cycle. But Gelb's particular recourse to authenticity in his sales pitch could seem surprising. For musicologists, *any* claim to an authentic production might appear both stale and problematic following the heated discussions of the 1980s and 1990s over historically informed performance practice (dubbed "HIP") in the early music scene. As several scholars have argued, HIP is based on questionable claims about our knowledge (and the knowability) of composers' intentions and "original" yet irrevocably lost sound worlds, performance traditions, and listening habits. Instead, in Richard Taruskin's oft-cited analysis, it is driven by a very contemporary quest for the always new under a banner of authenticity that is merely "commercial propaganda," and thus HIP stands as the truly modern performance style of today.[5]

Beyond such general skepticism, the Met's rhetorical coupling of authenticity with technology raises a more specific set of issues. Unlike HIP or those historicist opera stagings of recent decades that employ "original" (often reconstructed) hardware—whether Baroque instruments, "period" costumes, or eighteenth-century stage machines—in a claim to historical accuracy, Lepage displays ultra-modern gadgets, including such novel features as interactive videos and 3D projections. Ironically, his means are entirely of our time—which is also to say that they are decidedly not authentic. It is their *end* that is supposedly HIP. The Met's reasoning is that Wagner himself was dissatisfied with his original production since his demands far exceeded the possibilities of even the most advanced nineteenth-century stages. But in the early twenty-first century, technology has at long last caught up with Wagner, and Lepage professes to be realizing the composer's utopian vision.[6] In so doing, however, he highlights precisely the element of operatic production—its mechanical conditioning—that Wagner had been most eager to downplay in both theory and practice. Furthermore, Lepage's equipment partially malfunctioned and (arguably worse for his cause) partly developed further even during the initial run of his production. The latter's asserted authenticity proved tenuous at best, its finality fleeting.

Although I leave a more detailed discussion of Lepage's endeavor for the epilogue, its focus on enabling technologies and their historicity provides a useful starting point for my book. In the most general terms, *Curtain, Gong, Steam* exam-

ines the relationship between opera and technology from the dual yet entwined perspectives of production and preservation. Its conceptual frame is the question of how composers since the late eighteenth century increasingly embraced select audiovisual details as integral to their creative efforts, inscribing certain facets of staging into their operas and thus expanding the notion of what constitutes the operatic work. These attempts involved technics both in their inclusion of evermore-specific stage technologies to facilitate the envisioned effects and in their quest to "fix" the latter for future productions. I suggest that it is precisely at the intersections of both technological processes—at operatic moments when composers required idiosyncratic mechanical procedures or audiovisual results—that we can clearly observe the importance of technology for the overall conception and efficacy of opera onstage. *Curtain, Gong, Steam*, then, explores select composer-prescribed stage technologies in view of their dramatic, musical, aesthetic, and cultural meanings; their material functioning and sensorial effects; their absorption (at least temporarily) into a widely shared vision of the respective operas; and the gradual transformation of all these aspects in later productions or works.

Although the study of opera has traditionally focused on text and music while committing the history of stage technology to specialist treatises, scholars over the last several decades have moved decidedly toward a concept of opera as existing on three signifying levels, frequently summarized as verbal, musical, and visual.[7] Such a triangulation, however, risks obscuring the microcosm of agents and media involved in each of these levels. In particular, the visual component does not simply provide music and text with a pictorial surface or directorial playground: it comprises a host of media and materialities. Not all of these operate purely on the optical level, and each carries its own tradition, resilience, and interpretive potential. Indeed, the "performative turn" across the humanities has notably shifted attention to corporal aspects of performance, such as singers' bodies or the physicality of voices.[8] And still more recent investigations have begun to address the significance of specific mechanical procedures (and of technology as such) for staged opera and, consequently, for opera studies, usually in view of individual composers, works, or institutions.[9] Even beyond opera, interest in the technicity of musical cultures—indeed, of all human expression—and in music's medial qualities has begun to flourish, informed by recent media studies, a renewed fascination with the histories of science and technology, and the advent of what has been dubbed "new materialism." Partaking in all these trends, my book aims to deepen our understanding of the material and mechanical conditions of both historical operatic practice and individual works by exploring select technologies across a wide geographic and chronological spectrum and by showing how their implications often reach to the present day.

Technology, of course, can mean many things, including the compositional techniques, orchestral instruments, or theatrical architecture required for the

production of opera. In 1817 Stendhal described the reopened Teatro San Carlo in Naples wholesale as a "machine for music."[10] Lurking behind such a general notion of technology is the Aristotelian division between *physis* and *technē*, between nature and the human "bringing-forth" or making of something that, unlike nature, does not generate itself.[11] According to Aristotle, all *technē* imitates nature. Yet it does so in two different modes: "On the one hand," according to the exegesis of philosopher Philippe Lacoue-Labarthe, "*techne* carries to its end [accomplishes, perfects, *epitelei*] what *phusis* is incapable of effecting . . . ; on the other hand, it imitates." From the latter sense was derived the classic construal of art in terms of mimesis; from the former emerged *technē* in its modern, narrow conception: the generation of something that was not previously in existence "but which *supplements* a certain deficiency in nature, its incapacity to do everything, organize everything, make everything its work—*produce* everything."[12] With regard to this notion of useful, manmade artifacts, in the late eighteenth century the neologism *technology* began to be cultivated, referring to the "branch of knowledge dealing with the mechanical arts and applied sciences." As such, technology became increasingly associated with the practical and economic spheres of manufacture and industry as well as with specific equipment (or technics), in contradistinction to the arts.[13] From this split emerged a somewhat dismissive perception of technology as a means to an end, a mere aid that was subordinate both to the vitality of nature and to what was now taken as the self-contained purpose of art. In turn, this condescension lies at the root of the trend to distinguish within operatic culture between the "artistic" (music, text, set designs, or staging concepts proper) and the mechanical—all those structures and devices that are necessary for the former's "bringing-forth" onstage but that, as seemingly auxiliary appendages, have often been deemed irrelevant for hermeneutic exegesis. It is technology in this practical, mechanical sense that this book addresses.

The relative neglect of the technical sphere thus circumscribed in favor of the artistic (or scientific) has a long tradition in academia. According to literary scholar Mark Hansen, that disregard results from a penchant for what he calls "*technesis*, or the putting-into-discourse of technology"—a tendency he believes to have persisted even among modern philosophers of technology, with their inclination to bracket out the material reality of technology in order to focus on what Heidegger famously postulated as its nontechnological essence. In Hansen's analysis, this assimilation of the technical with thought perpetuated the priority accorded mind over matter.[14] Indeed, even in early media studies (just as in opera studies) the focus was often on the end product, on shiny screens and their interactions with audiences and users, rather than on the nuts and bolts of their facilitating operations. Such medial myopia has epistemological consequences. First, it sidelines the often-troublesome details and unwieldy materialities that afford and effect those sensory interfaces to arrive instead at an essentially immaterialized and idealized notion of media (or

opera). Second, it disregards the ways in which these media are conditioned by, and in turn condition, technological developments that are themselves bound up with societal changes, thus limiting the site of critical engagement with cultural meaning.[15] For opera scholars, such cultural half-heartedness with regard to technologies has created practical hurdles as well: unlike "artistic" sources, documents relating to mechanical aspects of historical productions tend to be scattered across administrative and musical archives or to have been discarded altogether.[16] And yet, as Bruno Latour has observed, humanists will find that "if they add interpretation of machines to interpretation of texts, their culture will not fall to pieces; instead, it will take on added density."[17] More recently, media scholar Wolfgang Ernst has asserted that "media archaeology exposes the technicality of media, not to reduce culture to technology but to reveal the technoepistemological momentum in culture itself."[18] *Curtain, Gong, Steam* pursues precisely such material and conceptual enrichment, specifically for our idea of opera and historical operatic culture.

In a way, then, this book could be described in Latourian terms as an effort to partially reverse the "blackboxing" of the operatic event—to unpack the carefully concealed machineries behind those illusionist stagings nineteenth-century composers desired.[19] Put differently, it seeks to disclose the technological grounding of an opera's staging as nontransparent and nonliteral—as not simply ready and available to "translate" a given work onto stage, but instead as contributing, significantly and idiosyncratically, to the overall effect, material reality, and hermeneutic potential of a work as both conceived and staged. Although striving to illuminate the nuances with which opera's many technologies engage in specific works or moments thereof, however, I do not pursue an actor-network theory approach: I am less concerned with questions of agency or the collaboration between humans and nonhumans in the creation of staged opera than I am with composers' visions and the technologies applied toward their realization. My focus is the historical context and hermeneutic potential of specific technologies in (operatic) action rather than their genesis or functionality per se.

Ironically, though, my book embraces mechanical conditions of historical productions even as it simultaneously confirms the details of these conditions to be historiographically ephemeral. Uncovering the technological thus also sheds light on the historicity of production: it highlights staged opera's fundamental instability from a perspective that is both practical and historical. After all, what David J. Levin has called opera's "unsettledness" is not only synchronic, due to contingencies inherent in every performing art, but also diachronic.[20] Despite their hardware materiality, what we might dub "special-effects technologies" tend to be fast-changing features of both operas and the modern world in general, caught as they are in a constant—and constantly accelerating—cycle of innovation and obsolescence; by contrast, other operatic elements (such as the proscenium stage or orchestral instruments), cultural artifacts, and societal structures have

proven relatively durable.[21] In focusing on the technologies of staged opera, *Curtain, Gong, Steam* implicitly offers a historically anchored backdrop to the oft-posed question of why, in today's operatic world, the ever-same scores are treated to always-new productions; why *Werktreue* at the level of music and text is frequently counterpointed with (often self-proclaimed) innovation in the realm of production; in short, why preservationist efforts for particular moments of staging are largely doomed to fail, whether in the Met's new *Ring* cycle or elsewhere.

STAGING IN HISTORY

It is no coincidence that the Met pushed its authenticity-via-technology campaign for none other than Wagner. After all, no canonic composer tried to control and prescribe productions more energetically than did he. In this regard, my book's focus on some of Wagner's ideas and practices of staging—on Wagner's technologies—makes good historical sense. Yet I do not want to imply that he was the first or only composer to care about the details of his operas' physical manifestations. Wagner absorbed and pushed further a common aspiration among composers and institutions since the late eighteenth century to integrate certain facets of staging into operatic works alongside text and music. By the same token, he adopted and adjusted (rather than invented) the technologies involved in realizing this desire: hence Wagner*ian* technologies. *Curtain, Gong, Steam* is therefore about Wagner as much as it is about a larger cultural concern among nineteenth-century composers with the multimediality of their works and its practical and hermeneutic implications. In this sense, Wagner provides merely a useful focal point for this book. His voluminous (if often inflated, self-aggrandizing, or outright ideological) writings; his zealous pursuit of his ideals; the construction of his own theater; the copious commentary his works have garnered; and an uninterrupted performance history: all these factors make Wagner a suitable gateway—or paradigmatic technology—for delving into expanding nineteenth-century notions of the operatic work as implying its onstage realization.

Admittedly, Wagner's central position might seem rather conventional, for at least two reasons. First, it privileges a composer's visions over collaborative or institutional efforts toward an opera's staging. Such efforts could involve any number of people (and their respective artistic traditions), including librettists, stage directors, designers, and theatrical agents. But the paper trails that reveal exactly who made which decision are fragmentary at best, and finding even those remnants requires extensive archival digging. For the purposes of *Curtain, Gong, Steam*, composers' names—including Wagner's—must therefore sometimes stand in as shorthand for the creative team that might collectively have shaped a staged operatic moment. Beyond such practicalities, however, Wagner was not alone in advocating the composer as ultimate authority on all matters of production. The

career of his exact contemporary Verdi reflects a similar shift of control away from impresarios and institutions (in Verdi's case with the support not of his own theater but of his publisher). And both Verdi and Wagner took their cue from Meyerbeer and other composers of French operas who increasingly dominated the famously complex artistic and administrative apparatus of the Paris Opéra, that hotbed of lavish illusionist stagings.

Second, my paradigmatic use of Wagner seems to echo the well-worn narrative that has him as a turning point in—even the pinnacle of—the history of opera. Wagner laid the foundation for this idealizing account when, in his seminal treatises around midcentury, he rejected the genre of opera (along with its generic label) wholesale; instead, he claimed to reinvent musical drama by going back to Greek tragedy. Despite such hyperbole, the notion of a victory of German music drama over French and Italian opera struck a chord with many (particularly Austro-German) music historians who were eager to perpetuate the ideology of Germanic dominance and superiority in the musical realm since Beethoven. In 1860, for instance, the influential music writer Franz Brendel declared, "Wagner above all could dare to break with everything existing, since he had the power to replace it with something greater."[22] From here, the notion of Wagner transcending the generic development of opera and literally forming a separate chapter in the history of music entered mainstream historiography; that perception largely persisted until both the underlying nationalism and the tendency to view all of nineteenth-century opera (and its successors) through the lens of Wagner's theories were questioned in the twentieth century.[23]

Although my book is organized around what I call "Wagnerian technologies," it does not perpetuate this outdated and ideologically suspect narrative. Instead, it seeks to problematize the idea of Wagner as operatic redeemer. For one, I examine something Wagner himself vehemently sought to deny—namely, his vital dependence on technology. Not only does this reliance put him on a par with his peers, but by looking at Austro-German, French, Italian, and some British developments before and around Wagner, my book shows just how much he took in this regard from his contemporaries, particularly from the French models he so denounced. A product of his time, he participated in, rather than broke with, important pan-European strivings in opera. What is more, both my examination of select material realities behind Wagner's claims to innovation and my longer-term perspective, reaching beyond his lifetime, challenge the idea that he successfully achieved his artistic agenda. What will emerge, alongside a rich contextualization of specific stage technologies, is a more complex historical embedding of a composer more ambiguous than he is frequently portrayed.[24]

My chronological purview, then, extends out from Wagner both ways into the "long" nineteenth century. This historiographical frame warrants further explanation. For just as Wagner was not the only composer to put a premium on opera's

multimediality, the nineteenth century was by no means the first era during which such a focus developed. Definitions of opera during its first century regularly referenced machines as seminal for the genre's appeal. To cite just one instance: in 1648 Englishman John Raymond reported that during his recent grand tour to Italy he had seen "an *Opera* represented . . . with severall changes of Sceanes, . . . and other Machines, at which the *Italians* are spoke to be excellent."[25] The tradition of mechanic effects dated back even further, to the elaborate Renaissance spectacles and their predecessors out of which opera had emerged, and whose fabled stage tricks—monsters, chariots, and all—were proudly described in contemporary treatises on theatrical architecture and staging.[26]

Yet there were crucial differences between these early manifestations and nineteenth-century opera in the use and status of technology, both onstage and off. To mention just an illustrative few (and at the risk of oversimplification), Baroque opera was a decidedly collaborative venture in which staging "meant not only creating a show but also shaping the opera itself."[27] An opera's conception and critical success depended generally more on librettists, machinists, and stage designers than on composers; already the storylines tended to be conceived so as to display a variety of magnificent scenic effects and devices specially constructed in line with the available budget.[28] In summarizing the aesthetics of seventeenth-century opera, Massimo Ossi has proposed its centerpiece "was a kind of competition between the audience and the architect in which the former tried to figure out the means by which the stage effects were carried out, while the latter endeavored to hide them."[29] The overall intent was to impress spectators with the quantity and quality of means (among which mechanics reigned supreme), which did not, though, necessarily cohere as integrated, illusionist musical multimedia. This wholehearted embrace of technology was furthered by the favored mythological subject matter and its dependence on supernatural interventions, sudden apparitions, and magical transformations: thus the inevitable deus ex machina arose as the quintessence of Baroque opera. So close did the association between fantastical plots and wondrous machines become that both were implied in the concept of the *merveilleux*, the marvelous.[30] Technology, then, was not only a driving force for multimedia performance but also an artistic miracle in and of itself. It encompassed both "function and illusion, goal and play, math and magic": hence the display of machines alongside classical art and natural objects in early modern *Kunstkammern* (or "cabinets of arts and curiosities") and the widespread cultural fascination with automata and clockworks, mechanisms seen to mirror and, therefore, to reveal the hidden order of the world.[31]

However, early opera's aesthetics of the marvelous and its attendant celebration of machines already displeased some seventeenth-century commentators. An influential critique came from the essayist Charles de Saint-Évremond, regarding Italian operas performed in Paris around 1660:

Machines may satisfy the curiosity of ingenious Men, who love Mathematical Inventions, but they'll hardly please persons of good judgment in the Theatre: the more they surprize, the more they divert the mind from attending to the Discourse; and the more admirable they are, the less Tenderness and exquisite Sense they leave in us, to be touch'd and charm'd with the Music. The Antients made no use of Machines, but when there was a necessity of bringing in some God; nay, the Poets themselves were generally laughed at for suffering themselves to be reduc'd to that necessity. If men love to be at expences, let them lay out their Money upon fine Scenes, the use whereof is more natural and more agreeable than that of Machines.[32]

This multilayered rebuttal of stunning machinery in opera prefigured many arguments that would become commonplace in eighteenth-century discourse leading up to the Enlightenment. At its core lay the emerging split between science and art, or a mutually exclusive separation of *technē* into technics and aesthetics, a division that was fundamental to the changing status of the mechanical in society at large. According to art historian Horst Bredekamp's engaging account of the *Kunstkammer* and its demise, mechanics in the sixteenth century was considered a means of perfecting nature. Since it was the purpose of all art to imitate nature, animated mechanical devices surpassed even the revered classical arts, especially sculpture; moreover, such dynamic contraptions contained both godlike and playful qualities (which were summoned so resonantly in the dei ex machina). But with the growing—and reductive—spread in the later seventeenth and eighteenth centuries of rationalism and the mechanistic worldview associated with Descartes, machines increasingly became codified as objects of scientific study and human progress. The rise of mercantilism and utilitarianism furthered the focus on the practical applicability of technology. Conversely (as evinced in Saint-Évremond's reasoning), artists began to associate themselves with the intellectual realm, that other side of the Cartesian body-mind dualism. Eventually, idealist thinkers conceptualized the arts as superior to other forms of human activity and episteme, owing to their ideal grasp (rather than mere imitation) of nature, their metaphysical transcendence of materiality and functionality, and their access to the spiritual world beyond appearances.[33] Add to this the unsettling changes to traditional lifestyles and environments engendered by the ever-faster pace of technological innovation and industrialization, and it becomes clearer why composers increasingly sought to cut themselves free of everything that smacked of mechanical forces, by now—in Bredekamp's words—tokens of "lifelessness as well as stylistic aberration."[34]

Bredekamp carves out one important trajectory that helps explain why the use of machines onstage, and the general dependence of theatrical success on technical effects, would appear infinitely more problematic during the later seventeenth and eighteenth centuries. In Italy, fostered by the ascent of comic opera and a shift in serious opera toward historical subject matter, machines and anything supernatural (along with large casts and sensationally sprawling plots) became

secondary. From at least the mid-eighteenth century through to early Rossini, Italian operas tended to come with minimal stage directions and to require few extravagant machines. Instead of stunning audiences (audio)visually, they sought to move them musically and morally.[35] It was on the always more sumptuous French stages that the *merveilleux* lingered as a residue of mechanical magic. Yet even here, its metaphysical presence was sublimated into plots less dependent on physical spectacle, while its mechanical artifice began to be concealed, given the increasing demand by audiences for illusionist immersion, lifelike representation, and lyrical sensitivity—the "natural" and "agreeable" performance evoked by Saint-Évremond.[36] An unencumbered embrace of modern technologies and spectacular effects would instead reemerge in popular entertainments of the later eighteenth and nineteenth centuries—a new cultural middle ground between the now-divorced realms of technology and mass fabrication on the one hand and high art, with its cult of originality, on the other.

So why did the stage-practical dimension eventually gain renewed importance in serious opera during the long nineteenth century, and why did composers themselves now address specifics of stage effects and their enabling machineries? Even in a nutshell, several factors contributed to what we might call the expansion of these composers' creative visions. As Lydia Goehr has argued, around 1800 the "regulative concept" of the musical work began to influence compositional practice.[37] This work-character was primarily associated with "absolute" instrumental music rather than with collaborative, heterogeneous, and occasion-driven opera, whose products were also highly amenable to changes in future productions on different stages. Nevertheless, a repertory began to emerge also in opera, implying a longer stage life and wider dissemination of successful operas—an extension that spatially and temporally transcended the composers' direct sphere of influence on productions (as well as on casting and musical execution). It was to ensure their works' optimal appearance and, with it, utmost economic profit that composers increasingly tried to prescribe the scenic realization as well.[38] What is more, the Romantic movement fostered an appetite for descriptive detail and accuracy of representation across the arts, while the invention of photomechanical reproduction technologies, the concomitant flood of images, and the advent of optically focused mass entertainments such as panoramas, cycloramas, and dioramas resulted in what Jonathan Crary has described as a "new valuation of visual experience" during the long nineteenth century.[39]

Small wonder, then, that questions of staging and design became more urgent in operatic culture and for individual works, and that composers started to raise their voices in these debates. Between 1817 and his untimely death in 1826, for instance, Carl Maria von Weber overturned traditional rehearsal practices at the Dresden Court Opera when, as kapellmeister, he addressed not just the music but also the overall production. As his letters reveal, he even concerned himself with

the mechanics of desired stage effects.[40] And in the famous Wolf's Glen scene of his romantic opera *Der Freischütz* (Berlin, 1821), he set new standards regarding the quantity and quality of audiovisual stage directions and their integration into the musical drama, providing a model for the next generation of German composers.

For his part, Weber had been influenced by French opera. The nexus between a growing attention to audiovisual detail in opera—traditionally the most complex of the performing arts—and the rise of new media was particularly evident in Paris, one of the nineteenth-century capitals of multimedia stimulation and technical invention. As the cultural flagship of the French nation, the Opéra, Paris's primary opera house, had long lavished the largest sums of money on the *mise-en-scène* and boasted the most luxurious productions in Europe. Reflecting the splendor of the Napoleonic Empire, for example, Spontini's historical operas of the early 1800s were of unprecedented scale and pomp. During the Restoration, serious opera declined in popularity; in response, the Opéra in 1827 formed a Staging Committee specifically to set higher standards of design and production, and by the early 1830s, the Opéra's short-term yet influential director Louis Véron was encouraging the introduction of enticing methods of décor and dazzling optical effects found in boulevard theaters to modernize opera and attract a wider, more bourgeois audience.[41] Thus emerged the spectacular genre of *grand opéra*, "a product of technology" (in Hervé Lacombe's words) whose historical subject matters and often-gruesome denouements offered additional opportunities for immersive pictorial display and jaw-dropping shock effects.[42] The arrival of production books—the so-called *livrets de mise en scène*—from 1828 on palpably manifested this recent concern with the "how-to" of stagings and their detailed relation to both music and drama, whether these manuals were primarily meant to preserve productions for posterity, to supply practical guidelines for other theaters of the time, or merely to offer a mnemonic aid for future performances at the original theater.[43]

Among composers, above all Meyerbeer came to personify *grand opéra*'s emphasis on extravagant showiness and audiovisual synthesis. Although he was far from the only composer for the French stage interested in details of production, his published diaries and correspondence testify to the remarkable power he achieved in this regard, as he obsessively commanded, rehearsed, and commented on each and every feature of his operas onstage. Moreover, after the 1849 premiere of *Le prophète* (his last *grand opéra* he saw into production), Meyerbeer was also involved in the creation of its stage manual. Along with other additions, he explicitly requested more detailed technical descriptions of this opera's most innovative special effects as well as the inclusion of contact details for the Parisian distributor of the necessary mechanical contrivances. And he urged the *livret*'s author to make haste with its publication for the benefit of both provincial and Germanic theaters. As Arnold Jacobshagen has argued, the resulting and unprecedentedly extensive production book is "the first comprehensively documented evidence to

date of a composer claiming for himself the ultimate control over the various aspects of both the musical and the scenic realization of his work, and not only for the premiere but as far as possible also for future stagings and performances elsewhere."[44] Toward the mid-nineteenth century, then, several composers began to expand their reign beyond music and text, developing a vision of opera as what we today would call immersive musical multimedia.

GESAMTKUNSTWERK

Wagner significantly borrowed from and built on these holistic approaches to opera when he formulated his concept of the *Gesamtkunstwerk*, or "total work of art," around midcentury. True, he was not the first to employ this term, nor did he use it consistently.[45] Furthermore, his treatises are fraught with contradictions and sociopolitical ideologies, and he would later adjust his ideas in both writing and practice. Nonetheless, his theory was then the most sustained argument in favor of a centrally regulated unification of the theatrical arts. As such, it has recently garnered renewed attention in interdisciplinary scholarship on common tendencies across artistic modernisms.[46] Wagner's 1849 essay "The Art-Work of the Future" (which has tended to be eclipsed by the more music-focused *Opera and Drama* of 1850–51) is particularly worth revisiting from the perspective of staged multimedia, as it cuts to the core of his envisioned interrelationship of the various arts in performance. In turn, my book's examination of stage-technological realities both recontextualizes and challenges his theoretical approach as well as its ties with general theatrical practices of his time.

According to Wagner's original articulation, "opera" had mistakenly made music dominant and thereby neglected both drama and stage representation. By contrast, the seed, unifying factor, and ultimate goal of their union "for the *collective* Artwork" (*zum* gemeinsamen *Kunstwerke*) was to be Drama writ large, that is, "the *dramatic Action*" (*die* dramatische Handlung) emerging from Life itself.[47] Wagner consequently conceived this "true artwork" as "an immediate vital act" (*als unmittelbarer Lebensakt*) to be achieved only in its "*immediate physical portrayal, in the moment of its liveliest embodiment*": short-circuiting intellectual mediation, it would come into full existence only when sensually experienced as materially staged.[48] To this end, all means of human expression were needed: the individual arts were to unite and collaborate, each surrendering its separate identity and thus (paradoxically) fulfilling its true potential under the inspired stimulus and authorship of the poet-performer. To wit, Wagner cast himself as the all-encompassing "artist of the future" whose creations, once realized, would be served by and consummate all the arts, including all prior operatic achievements.[49]

This early theoretical framework helps explain why Wagner was obsessed not just with writing his own libretti, but also with providing details for and overseeing

the stagings themselves. As early as his first public performance, the Dresden premiere of *Rienzi* in 1842, the then entirely unknown composer apparently surprised the Court Opera's conductor and manager rather unpleasantly when he showed up to intervene at the rehearsals.[50] And throughout his career, he would seek to coach performers personally in both singing and acting. Admittedly, it was common for nineteenth-century composers (even typically part of their *scritture* with Italian opera houses) to oversee the rehearsals and first few performances of new works. Moreover, we have seen how Weber and Meyerbeer had already expanded this involvement to embrace direction and design. By the same token, from the 1840s on Verdi would gradually extend the composer's authority in Italian opera, insisting on the integrity of his scores in performance as well as his influence over stagings.[51] But Wagner increasingly focused not just on the presentation but also on the perception of his works, to a point where everything—gestures, blocking, lighting, design, costumes, scene changes, even acoustics and architecture—became essential for the *Gesamtkunstwerk*'s desired multisensorial experience. This concern with the physical manifestation continued even after 1854, when his beginning encounter with Schopenhauer's philosophy led to a shift in emphasis from drama to music as the *Gesamtkunstwerk*'s chief motivator. Thus, in 1872 Wagner pondered as a generic label for his works "*deeds of music made visible*" (*ersichtlich gewordene Thaten der Musik*)—a dictum he claimed he dropped only because post-*Tristan* he feared that his dramas no longer offered sufficient spectacle to warrant a moniker of such audiovisual synthesis.[52]

Yet this declaration was clearly coquetry, or a clever ploy to avert criticism of his hyper-Meyerbeerian show in the making. After all, it was precisely in 1872 that Wagner laid the foundation stone for his festival theater, the Bayreuth Festspielhaus, whose primary purpose it was to enable the long-delayed complete premiere of the *Ring* cycle under his own direction. On the grounds of its libretto alone (which, unusually, Wagner had published, to raise money for the project, before even starting the composition), this work had become notorious for its extraordinary demands on stage technology, given its underwater seduction scenes, cosmic peregrinations, and other seemingly impossible episodes. At the cusp of the era of illusionist theater, with its proscenium stage and its quest for visual verisimilitude, these scenic fancies required the aid not only of those architects and painters Wagner had called forth in "The Art-Work of the Future," but also of the most skilled engineers and their contraptions. Accordingly, Wagner had his theater equipped with cutting-edge machinery designed by Carl Brandt, the foremost German authority on the modernization of stage technology. In addition, the Festspielhaus's amphitheatrical auditorium, unobstructed sightlines, and entirely sunken orchestra pit provided a unique immersive environment that was quickly considered revolutionary in Europe's theatrical world, outshining in this regard even the Palais Garnier, the new home of the Paris Opéra, which had opened only one year

earlier.[53] And even apart from this architectural and technological finesse, a composer's having a theater purpose-built for his own works and placed under his sole direction was unprecedented. With the premieres in Bayreuth of his last works—the *Ring* cycle (1876) and *Parsifal* (1882)—Wagner's control over each and every aspect of production reached a new level indeed.[54]

Understandably, media and performance scholars have therefore tended to place Wagner at the beginning of a growing intersection of theatrical and technological modes of representation. In their view, Wagner spearheaded an emerging alliance of aural and visual media that ultimately led to their convergence in our virtual age. For instance, Wagner looms large in the work of German media theorist Friedrich Kittler, who regularly referenced the *Gesamtkunstwerk* as a "monomaniacal anticipation of the gramophone and the movies."[55] Multimedia artists and theorists have likewise dated the emergence of contemporary media performance with Wagner. Chris Salter starts his survey of the modern "entanglements" of mechanical (or computational) technologies and performance with Bayreuth, while Randall Packer and Ken Jordan prominently discuss Wagner as having made "one of the first attempts in modern art to establish a practical, theoretical system for the comprehensive integration of the arts."[56] His struggle for "aesthetic totality" as well as the *Gesamtkunstwerk*'s dialectically related reliance on mechanization is the connective tissue that allows literary scholar Matthew Wilson Smith to link Wagner to film, Disneyland, and virtual performance.[57] And according to historian of modern art and media Noam Elcott, Wagner's Bayreuth theater was unique among audiovisual devices of its time because it alone "could accommodate countless types of performances and images," with its "most significant legacy . . . its adoption by cinemas."[58] In short, Wagner is frequently equated with his Bayreuth theater, which in turn tends to be construed as a historically new amalgamation of arts and modern technologies. His artistic vision has become a convenient reference point for bestowing both historical roots and a weighty artistic heritage on the development of cumulative, multisensory, integrative multimedia.

In contrast to such general claims about the media-historical significance of Wagner's ideals and their manifestation in the form of Bayreuth's Festspielhaus, I pursue a rich historical embedding of a number of specific yet oft-overlooked technologies. By opening out to a chronologically and geographically wider field of composers, locales, and traditions, these case studies show how Wagner based not only his theories but also his *Gesamtkunstwerk*'s staged realizations squarely on contemporary practices, and in this sense formed but a step in opera's development toward medial integration. *Curtain, Gong, Steam* thus counteracts Wagner's dominant position in media studies, while my focus on stage practice also serves as a corrective to the almost exclusive reliance of Kittler (and others) on Wagner's idealized artistic claims. This reliance amounts to nothing less than a romanticized continuation of Wagner's messianic self-stylization that is weirdly at odds with the

otherwise blatant techno-determinism and anthropological skepticism permeating Kittler's writings.[59] After all, the incorporation of *technē* into Wagner's *Gesamtkunstwerk* was not without its drawbacks, even on the theoretical plane. One indication of this downside is that Wagner remained conspicuously silent about what we might call the mechanical underbelly of his envisioned music drama. Just as he originally charged opera's music to have oppressed drama, so the three "material" arts that he invited into his drama (though architecture and painting more so than sculpture) now eclipsed the manifold technological underpinnings required to realize his vision onstage. In other words, Wagner's theoretical recourse to the traditional arts veiled his concrete reliance on mundane theatrical mechanics.

Far from being a high-flying theorist's oversight, this diversion was precisely what Wagner—more adamantly than other composers—required in practice as well. In his 1862 Preface to the *Ring* poem, for instance, he expressly demanded that, if the tetralogy was ever to materialize onstage, "the cords, ropes, laths and scaffoldings of the stage decorations" should be carefully hidden from the audience.[60] That is, the mechanisms facilitating the visual scenery qua art were at the same time to be cloaked (or what we might call "artified") by it. In Adorno's famously critical Marxist analysis, Wagner concealed his means of production by the "outward appearance of the product": through simulating a fictional world as seemingly natural reality, Wagner glossed over both human labor and material machinations involved in its creation. Adorno likened the result to that of the phantasmagoria, a popular optical entertainment of the late eighteenth and early nineteenth centuries in which, for the first time, the supporting devices (a *laterna magica* and screens) were masked by total darkness, thus letting projections appear "real."[61] By similarly camouflaging the technological origins of his multisensorial spectacle, Wagner sought to render it autopoietic, self-animated, and—ultimately—natural. The intended seamless, and seemingly effortless, façade identified by Adorno's metaphor of the phantasmagoria is yet another link to the surface-oriented aesthetics of both film and new media (and, for Adorno, evidence of the commodity character of Wagner's works).

Wagner's apparent discomfort with the perceptibility of his enabling technologies had deep roots in his fundamentally skeptical outlook on both the arts and the world. Regarding the former, he pitted himself above all against *grand opéra* and what historian of science John Tresch has dubbed its "ever-escalating arms race for spectacular effects," as epitomized by the so-called prophet sun—the first use of electric light in opera.[62] Introduced at the Opéra in 1849 for the sunrise in act 3 of Meyerbeer's *Le prophète*, this self-regulating electric arc apparatus was one of those technologies advertised at the composer's behest in the production book. And it became Wagner's bête noire of an "*effect without a cause*" (*Wirkung ohne Ursache*), a musical or scenic coup unmotivated by the drama and therefore apparently an end in itself. For Wagner, such a "master-stroke of mechanism" dissolved "the whole

of Art into its mechanical components."[63] Freewheeling technological gadgetry would not only violate Wagner's overall artistic ideal but also degrade each of opera's other signifying components from art into technology. As such, opera's multiple media would become mere tools for a purpose no longer achieved, and—hence—pointless technics. To the end of his life, Wagner dreaded that his own works might fall prey to such mechanistic procedures of production and perception, to which, he felt, regular operatic business was prone. Hence his frustration after the *Ring* premiere that many critics had focused mostly on the functioning (or failure) of his stage technologies, and his irritation that, owing to a miscalculation by his machinist, he had to deliver extra music for the overlong moving canvas of *Parsifal*'s first-act transformation, which thus exceeded mere dramatic necessity to become an explicitly "decorative-painterly effect."[64] Technology, Wagner continued to insist, was to be doubly concealed: by its dramatic cause as well as its artistic appearance.

A similarly troubled stance emerges in the composer's more general utterances against industrialization. Lamenting the negative repercussions of industrial development on nature, culture, and society was common coin in nineteenth-century Europe, and went hand-in-hand (among other tendencies) with the Romantic idealization of subjectivity, a preindustrial past, and the natural world.[65] Indeed, Wagner argued in his 1849 essay "Art and Revolution" that industry, that real-life embodiment of everything mechanical, threatened both art and life in contemporary society: it turned the former into empty, commercial entertainment, while the latter was now the lot of denigrated humans who had become factory workers (or multimedia components), their labor bereft of purpose. Salvation of this debased civilization was to come only from a revolution, followed by a return to nature.[66] And this redemption would be achieved precisely through art writ large—art freed from the shackles of the mechanical that had crystallized in modern consumerism, artificial abstractions, and fashions. As Wagner explained the distinction between the technological realm and "real" art:

> the mechanical moves from derivative to derivative, from means to means, to finally bring forth but one more mean, the *Machine*. Whereas the artistic strikes the very opposite path: it throws means on means behind it, abandons derivative after derivative, to arrive at last at the source of every derivation, of every means, in *Nature*, with full satisfaction of its need.
>
> Thus the machine is the cold and heartless benefactor of luxury-craving mankind.[67]

Art, then, would lead humanity back from industrial society's profit-oriented lifestyle into wholesome attunement with the natural world, the ultimate end of creation. And this could be accomplished all the more easily if the *Gesamtkunstwerk* represented the vitality of nature itself: "The Scene which is to mount for the spectator the picture of human life must, for a thorough understanding of this life,

also be able to depict the living image of nature, in which alone artistic man can fully render a speaking likeness of himself."[68] In other words, beyond the then-dominant credo of scenic realism, the onstage rendition of an *idealized* nature was crucial for the transformative effect of music drama. By the same token, Wagner's *Ring* cycle was to be performed "in some beautiful solitude, far away from the fumes and industrial stench of our urban civilization."[69]

Technological progress, in short, had crippled both society and art; and Wagner would remain doubtful of it to the end of his days, preferring nature and a sunny climate to the luxuries afforded by electricity. Small wonder that he was eager to mask the dependence of his stage creations on mechanical production—ironically precisely the cause of modern society's ills that his total work of art was supposed to relieve.[70] Given these close interconnections of industrial progress, artistic ideals, and their practical realization, it is time to wrest technology from Wagner's ideology of concealment and to acknowledge its central role in nineteenth-century opera, whether by Wagner or anyone else. *Curtain, Gong, Steam* can thus be read as an attempt to approach the *Gesamtkunstwerk* less philosophically than materially: as a product of technological modernity.

TECHNOLOGY VERSUS MEDIA

Wagner was obviously not alone in his deep ambivalence toward the technological sphere, whether in society or onstage. In fact, it was precisely the pervasiveness of this attitude that gave rise to the long-lasting theoretical neglect of technics we have observed. Over the last several decades, however, poststructuralist thinkers have expanded the originally pejorative notion of technology as "mere" supplement into an affirmative stance toward humans as essentially "prosthetic" beings—as creatures whose survival, communication, and cultural development are inevitably bound up with technics exterior to themselves. As the pioneer of media studies, Marshall McLuhan, famously proposed, technologies are "extensions of man":[71] they appear to be as indispensable (and thus, paradoxically, as natural) to human life as nature itself.

Regarding Wagner, this approach proves fruitful. On the one hand, his conceptual neglect of stage machinery, the most obviously "technical" contributor to his *Gesamtkunstwerk,* can be pinpointed as dismissing the ancillary essence of technology. Hence Wagner's condemnation to invisibility of ropes and pulleys, such annoyingly necessary mechanical aids. Yet, on the other hand, it was in part precisely this urge to conceal that confirmed their status as "mere" technology rather than an artistic medium. To explicate this difference, we can understand media with Kittler (following McLuhan) as "intersecting points (*Schnittstellen*) or interfaces between technologies, on the one hand, and bodies, on the other."[72] Qua interfaces, media offer "surface effects," or what Alexander R. Galloway has

evocatively called "those mysterious zones of interaction that mediate between different realities."[73] In other words, technical devices that appeal directly to our sensory organs (and thus simultaneously provide both means and end) may be considered media—or, in Wagner's terms, fully legitimate constituents of the total artwork. By contrast, we can describe those devices operating in the background as a means to an end and, therefore, as remaining in the realm of technics: Wagner's detested technologies. To be sure, this is a pragmatic distinction of degree, not of kind, as the common expressions "technical media" or "media technologies" imply: whether or not a contraption tends toward the technology or the medium end of my spectrum depends on its contextual use and (often subjective) reception. Nonetheless, my terminological differentiation between technology and medium offers a helpful heuristic that captures both the conceptual understanding and the concrete tools embraced by Wagner and other nineteenth-century composers in their efforts to generate and control their operas' illusionist effects.

That Wagner practiced such a hierarchical division into perceptible creative media and merely facilitating technologies is evident in his notion of the opera orchestra as a "mechanism for tone-production." As he explained in the 1862 *Ring* Preface, this apparatus (like those ropes) should be veiled, lest the spectator, "through the inevitable sight of the mechanical *auxiliary* movements during the performance of the musicians and their conductor, is made an unwilling witness to technical evolutions which should really remain concealed from him."[74] Music, of course, was one of the key arts in Wagner's music drama. But the orchestra amounted to a sheer "technical source" (*den technischen Herd*) of this acoustical art.[75] As such, it was to stay hidden in order not to disrupt—and distract from—the multimedial illusion onstage. In other words, Wagner severed the orchestra's optical and acoustic interactions with the audience, thereby turning the orchestra from embodied audiovisual medium into disembodied technology *behind* an acoustic medium. In the context of the *Gesamtkunstwerk*, the orchestra was no less technological than the stage's ancillary ropes—a mere mechanical implement for the generation of one of his music drama's constitutive media.

And yet, the view of technology as human appendage highlights that Wagner the artist was himself in need of such accessories. After all, his unease with technology had very practical reasons as well. As the poet-performer he had envisioned in "The Art-Work," Wagner was fully capable of writing his own libretti and music, of coaching singers and musicians, and of directing gestures and blocking: legends of him bounding onto stage during rehearsals and demonstrating the movements and expressions of his characters are legion. All he needed in this regard—as did all composers—were singers capable of personifying these roles: in this sense, singing bodies became extensions of Wagner. But he had much less command over the scenic, lacking as he did both painterly skill and technical acumen. As Patrick Carnegy has argued, Wagner's inability to concretize his interior

visions created serious hurdles en route to his stage productions: he had to find painters and costume designers able to realize his visual conceptions—mediators in the flesh who were not only receptive to Wagner's inspirations but also amenable to having their sketches critiqued until they sufficiently approximated the composer's ideas to be submitted to a studio for material execution.[76]

With regard to stage technology, Wagner's need for support was even greater. This want was felt acutely by Brandt, Wagner's chief machinist for Bayreuth. During the early stages of planning the theater's equipment, Brandt observed that "Wagner rhapsodizes in the ideal. Everything real is too foreign to his nature."[77] Insofar as Wagner mentioned the machinist in his more practice-oriented writings (particularly those that advocated stagings of his works), he did so always in tandem with the painter; together, painter and machinist created a singular scenic art (rather than separate painterly and technological arts).[78] In reality, though, Brandt became the right hand not of the painter but of Wagner himself: he was Wagner's "most important helper" and the only person other than the composer without whom, as Wagner frankly confessed, producing the *Ring* would have been impossible.[79] Brandt, then, functioned as technological supplement to Wagner and his artistic ideals. Again, such collaboration was typical for opera composers. But for a *Gesamtkunstwerk* artist set on total control—one who had even managed to establish his own theater—having to count on someone else's ingenuity and on machines can hardly have been comfortable. His scant technological savvy and resulting dependency offer yet another reason why Wagner was so eager to obscure his productions' reliance upon technics.

From a wider perspective, this covering-up of dependence on others included also the inherited musical, dramaturgical, and stage-practical techniques on which Wagner built his *Gesamtkunstwerk*. The extent to which he used his contemporaries' operatic models as multimedia quarries is perhaps most obvious with *Rienzi*, the work Wagner consciously designed in the late 1830s to make a name for himself. As he retrospectively admitted, he sought to achieve this repute by outdoing "in reckless extravagance" every aspect of *grand opéra*, "with all its scenic and musical splendor, its spectacular and musically amassing fervor."[80] Not only was *Rienzi* longer and arguably louder than any previous opera, but it also blatantly showcased many audiovisual effects borrowed from French works. For example, Wagner adopted interactive on- and offstage choirs, organ, and bells from Meyerbeer and from Halévy, whose 1835 *La juive* had left a striking impression on the composer. Processions, religious and military ceremonies, and (yes) sunrises had long been operatic staples, while conflagrations had more recently become fashionable: Wagner's grim denouement expanded on Rossini's *Le siège de Corinthe* (1826) and the eruption of Vesuvius in Auber's *La muette de Portici* (1828), one of the few French works Wagner admitted to admiring. And, as we shall see, he prescribed curtains and signaled with a tam-tam not one but two dramatic peripeties. Contemporary

critic Ludwig Rellstab surely had grounds to decry *Rienzi* for an abundance of sce-
nic "facts" without dramatic motivation—for providing "a number of *effects* with-
out the *cause*."[81] Just how much this parade of mechanical wonders must have
embarrassed the later Wagner of *Opera and Drama* is clear from the fact that he
adopted Rellstab's diatribe against himself in order to hurl it in turn at Meyerbeer,
thereby allegedly stigmatizing the cause of all opera-technological evil. But this rhe-
torical deflection was not enough to cover over Wagner's own earlier exuberant
exposure of his music-dramaturgical armory. Instead, he also glossed over *Rienzi*
itself: the mature Wagner disavowed his early opera as a "convolute of monstrosi-
ties" that had little to do with his later *Gesamtkunstwerk*. (And yet, as with his stage
technologies, he continued to depend on the successful *Rienzi*—in this case for
income.[82]) Wagner thus reduced this opera from medium to technology no less
than he did his veiled orchestra.

The example of *Rienzi* discloses the extremes to which Wagner would go to
camouflage his—and his works'—historical, practical, and technological roots.
Throughout his career, Wagner aspired to transform and conceal acquired tech-
niques and gadgets through their specific multimedial integration within his music
dramas. The resulting high demands on these technologies in turn fostered their
further innovation. In this sense, the staged *Gesamtkunstwerk* functioned like a
new medium whose content, according to McLuhan, "is always another medium":
the "total work of art" is opera and all its technologies remediated.[83] Just as the out-
side of his brick-and-timber Festspielhaus, to the amazement of many contempo-
raries, resembled an industrial plant, so Wagner himself emerges as a transformer
and merger of media.

Finally, if Wagner so finely calibrated various stage effects for his works but
depended on a congenial machinist for their realization, how could he reliably
communicate the precariously balanced multimedia end-products to his contem-
poraries, let alone posterity? Here we come full circle to Lepage and the question of
preservation. According to Kittler, both linguistic writing and musical notation are
symbolic technologies of inscription, recording, and dissemination, and we can
easily expand this notion to production books, with their abstract sketches of
blocking and stage layout. Yet Wagner increasingly searched for nonsymbolic "real"
means of conveying his multimedia ideas—for technologies in the sense of what
Jonathan Sterne has called "repeatable social, cultural, and material processes crys-
tallized into mechanisms" that mediated his *Gesamtkunstwerk* as multimedia per-
formance.[84] Put differently, Wagner pursued an exteriorization of individual and
collective memories so as to store and communicate a performative event and its
experience.[85] Although neither the idea of an artist's own theater nor that theater's
architecture was widely imitated at the time, Bayreuth did mobilize contemporary
desires, not only for multimedial integration, but also for its conservation—
strivings that would ultimately manifest in a range of twentieth-century media.

Wagner has therefore been singled out in recent media studies as a conceptual step-pingstone largely in view of relations between opera and newer media, rather than in light of his position within operatic history.

WAGNERIAN TECHNOLOGIES

Using the ideals and realities of Wagner's *Gesamtkunstwerk* as an important lens, *Curtain, Gong, Steam* explores in detail three audiovisual technologies that proved vital to a range of nineteenth-century operas. These technologies were not neces-sarily newly discovered; but they came into vogue because of their potential to veil both other appliances and their own mechanical nature—in other words, because of the ease with which they could be pushed toward the media end of the spec-trum. Their effects leaned toward the ephemeral, making them conducive to being reserved for important moments and, as such, to being requested in the score. At the same time, these devices could appeal to more than one sensory organ, some-thing that rendered them particularly useful for glossing over the interstices between opera's various media. I call them "Wagnerian technologies," then, to emphasize both their mechanical essence and their propensity to be perceived—or conceived—as seemingly natural media.

As a second introduction of sorts, chapter 1 fleshes out Wagner's notion of the *Gesamtkunstwerk*-as-staged beyond the thumbnail sketch of his key treatises found in this introduction. In order to take a fresh look at both his desire to mastermind productions and his concomitant dependence on technologies, I open up a third space between Wagner's theoretical writings and his practical stagings by reading the Venusberg scenes of *Tannhäuser*, act 1 (1842–75) as an allegory of the *Gesamt-kunstwerk* and its realization. These scenes, I suggest, provide a conceptual labora-tory in which we can gain insight into Wagner's inner vision of his operas' staged appearances and the ways in which he sought to bring them about onstage. For instance, the Venusberg boasts lifelike simulations of nature and visual effects—red lights, veiling mists, sudden transformations—that Wagner would continue to evoke through *Parsifal*. Moreover, Venus seeks to overwhelm Tannhäuser, her audi-ence, by micromanaging every aspect of her grotto's multimedia appearance; and her realm is hermetically closed, artificially lit, removed from civilization, elevated on a mountain, and accessible only to the initiate—in a word, a proto-Bayreuth. From this perspective, it is no coincidence that Wagner abandoned his revisions of *Tannhäuser* a year before the opening of Bayreuth proper, where his conceptual grotto materialized as real theater: Wagner could henceforth act like Venus herself.

And yet, even in his own theater Wagner would lack the goddess's magical pow-ers, necessitating auxiliary technologies instead. Indeed, *Tannhäuser* prefigures the practical breakdown of Wagner's ideal. On the one hand, it is the opera that particu-larly incited his search for prescriptive and executive technologies, and on whose

staging he spilled the most ink. On the other hand, Venus—the total director—fails to win over her audience by completely dominating its sensory experience. "Too much," Tannhäuser moans before fleeing from her. Anticipating Nietzschean anti-Wagnerism, the Venusberg scenes thus cast doubt on the attainability of total control—something that, as chapter 4 will show, was ultimately borne out in Bayreuth itself. When, shortly before his death, Wagner pronounced that he still owed the world his *Tannhäuser*,[86] he may have been referring not only to a final revision of the score but also to his overall artistic ideal and its facilitating technologies.

Notwithstanding this failure of Venus, Wagner would pay ever-greater attention to production details throughout his career. And these features included not just attention-grabbing stage-technical challenges such as swimming nixies or singing dragons, but also those less obvious—and, hence, less frequently discussed—Wagnerian technologies that helped smooth over opera's multimedia surface. Chapters 2 ("Curtain"), 3 ("Gong"), and 4 ("Steam") each focus on one such technology and its historical, cultural, theatrical, and hermeneutic resonances before, within, and beyond Wagner's works. Moving from the oldest contrivance to the newest and from an omnipresent machinery to a device expressly associated with Wagner, I combine analyses of technology-rich moments in both canonic and lesser-known scores by Wagner and the generations of opera composers around him with readings of historical materials on productions and technologies (both published and unpublished), theatrical treatises, and reception documents. In tracing these technologies and their effects into the twentieth century, I register the ultimate impossibility of inscribing technology-driven audiovisual effects into works to the same degree, and with the same historical durability, as text and music. In a sense, then, *Curtain, Gong, Steam* is about failure as much as it is about transformation: it shows how each Wagnerian technology continually morphs, reappearing over time in productions of the same and other pieces—even in new types of media—in different forms and shapes. The emphasis on technology in the Met's new *Ring* is but one example.

Raising the curtain on my discussion of Wagnerian technologies proper, chapter 2 addresses the curtain itself, that time-honored frame of the illusionist stage and paradigmatic cipher of theater per se. Particularly French composers of the late eighteenth though the mid-nineteenth centuries paid increasing attention to its movements, thus liberating the curtain from being merely a universal temporal frame of spectacles as a whole. Operating in a liminal space between stage and auditorium, architecture and performance, machinery and effect, the curtain became a commentator on the staged action. Its deliberate use allowed for the temporary dissociation of sound and vision and, thus, a newly expressive relation between auditory and visual media. In addition, the curtain's functions and shapes became diversified with the rise of idiosyncratic procedures to mask mid-act scene changes. Wagner, then, built on contemporary practices when he began to pre-

scribe tempi for curtains, although he did so more frequently than other composers, and his curtains became crucial atmospheric indicators. This heightened demand for flexibility stimulated a new mechanical curtain technology. First installed in the Bayreuth Festspielhaus, the diagonally pulled "Wagner curtain" both set the scene for and sealed the intended final impression of an opera, its newly variable gestures embodying Wagner's wish to govern both stage and audience. So ubiquitous did Wagner's agogic curtain become that few composers after him could ignore it. Small wonder that Brecht looked above all to the curtain when he sought to herald onstage his break with Wagnerian illusionism.

Where chapter 2 traces the artistic transformation, during the long nineteenth century, of an old stage technology into an artistic medium, chapter 3 describes a more complex trajectory as it follows the ambivalent migration of a new sonic device—the gong or tam-tam—between the musical and the mechanical. As foreign import and curiosity, gongs initially wandered in Western Europe between science labs, collectors, and popular shows. But with their (partial) cachet as musical instruments rather than "mere" technologies, they left more substantial paper trails than did curtains, deemed simply material objects. (Likely for the same reason, the gong is also the only technology featured in this book on which Wagner himself commented.) Composers in the mercantile metropolis of London and in post-Revolutionary Paris promoted the instrument's soon-to-be ubiquitous theatrical roles as exotic signifier and acoustic signal. Looking at its operatic employment through the 1830s, I lay out a gamut of semantic "gong topoi" that permeated operas and, later, symphonic music well into the twentieth century. By midcentury the loud tam-tam strike was so customary a sound effect that even Wagner added it to his 1861 Paris *Tannhäuser*, to mark the Venusberg's disappearance. Yet his mature operas would utilize it more sparingly. Instead, he cultivated subtle sounds and playing techniques designed to mask the prototypical gong strike's metallic essence. This musically tamed tam-tam added significant color to Wagner's increasingly rich timbre and thus aided the dematerialization of his orchestra's synthetic sound: it was a technology in the service of heightened sonic mediality.

At the same time, production books and performance materials reveal an alternative to Wagner's acoustic veiling: loud gong strokes helped coordinate backstage technologies or cover the sound of noisy machines. As such, theaters treated the tam-tam as a gratuitous accessory for earlier operas as well, which left it fluctuating between orchestra pit and backstage, music and machinery, intended artistic medium and technological supplement. By exploring this porous acoustic space, chapter 3 challenges the common equations of stage technology with optical effects and of stagings with opera's "visual" side. Indeed, the piercing tam-tam strike might be perceived as epitomizing the *Gesamtkunstwerk* acoustically as much as the curtain typifies the *Gesamtkunstwerk* optically: it consummates the collaboration of all participating art forms in one orgiastic climax. When Puccini elevated

the tam-tam to central stage prop in *Turandot* (1926), he ultimately staged its role as central dramatic agent.

Chapter 4 turns to the most multisensorial and innovative technology directly linked to Wagner: the onstage use of steam. Although French operas had occasionally utilized vapor to enhance their beloved conflagrations, Wagner's foggy *Ring* libretto summoned it excessively. By invoking mists to suggest both unspoiled nature and Nordic mythology, Wagner allowed actual steam to become the most "real" element of his scenic make-believe—a feature that embodied his desire to render art as nature. As such, it came to serve further theatrical functions as well, shrouding and simultaneously enlivening open transformations or simulating changes in the corporality of protagonists. Its amorphous physicality also superbly mediated between the scenery's two- or three-dimensional contrivances and the singers' bodies, thus providing a multivalent medial glue to connect opera's various materialities into one multimedia interface. Steam was a real-life equivalent of Venus's magic—the ultimate expression of the *Gesamtkunstwerk*-as-staged. Accordingly, it was quickly (and closely) associated with Wagner. Employed for *Ring* productions around the world, it is perhaps the clearest example of a technology becoming part of the popular idea of a work itself.

Like no other stage effect, however, onstage steam also pinpoints the friction inherent in Wagner's conceptions and uses of technologies. Although intended to simulate nature, steam relied on Bayreuth's most plainly industrial exploit: two huge locomotive boilers and a complex system of pipes and valves. Even as it boosted Wagner's theatrical illusion, moreover, steam exposed this total—and totally controlled—artistic experience as a mirage: its smell transported spectators into the laundry room, its noise evoked the railway station. The new theatrical medium could not conceal its mechanical essence; unwittingly, Wagner staged the latter's corruption of (idealized) nature. This paradox was prefigured in the *Ring*'s dramatic trajectory itself, where the smoke of artificial fires (according to Greek mythology, the oldest human technology) gradually replaces the fogs of mythical nature. Indeed, Wagner turned *grand opéra*'s ubiquitous stage fires from an isolated special effect into a quasi-natural ambient signifier. Unsurprisingly, Bayreuth used steam to simulate these extended blazes as well, seemingly merging nature and technology into a single vaporous medium. Steam might thus symbolize the illusory redemption of technology through art that Wagner had hoped to achieve through his *Gesamtkunstwerk* overall. And yet, precisely because of the tensions it inherently signaled—between medium and technology, nature and artifice, archaic myth and hypermodern progress, stage and life, and so on—steam was able to outlast the nineteenth-century illusionist theater, having long since become a fixed feature of light engineering across the performing arts. Ultimately, we can read steam as a cipher for the ephemerality and contingency of staged opera at large:

the epitome of theatricality and a token of the rapidly changing meanings and uses of Wagnerian technologies.

This longer-term perspective reveals that the incorporation of special technologies and audiovisual effects into the common idea of particular works was both volatile and transitory. Wagner was left notoriously disappointed by the premiere of the *Ring* but nevertheless continued to promote his staging as a "model performance" for other theaters. The epilogue addresses the resulting fissures between these preservationist efforts on the one hand and the short life cycle and limited transparency of stage technologies on the other by describing Wagner's Bayreuth theater—along with its touring derivative—as a kind of recording mechanism: a technology of inscription and dissemination that advocated an unprecedented fixity of staged opera while eschewing the mediation of symbolic storage media. Yet precisely because of its material hybridity, this storage technology, too, disintegrated quickly.

This observation will bring us back to the present day and to the Metropolitan Opera's 2010–12 *Ring* cycle. Examining Lepage's production in more detail, I suggest that its most authentic trait was neither its emphasis on pioneering technology nor its re-creation of some aspects of the 1876 design: it was the failure of Adorno's phantasmagoric illusion. With the introduction of digital 3D projections onto a fully kinetic stage "machine," Lepage foregrounded matters of materiality, agency, and the interstices of opera's contributing media. Yet his multimedia conception broke down along the same lines Wagner's had, with mechanical glitches and misguided attempts at literal presentations of mythical magic. The creaks of Lepage's hardware thus disclose that no technology can ever fully bridge the divide between singers and scenery, real bodies and artificial simulation, man and machine.

Comparing both Wagner's *Gesamtkunstwerk* ideal and Lepage's practical realization to a recent postdramatic opera that explicitly foregrounds the relationship between humans and technology, I end with a question, wondering whether unified operatic illusionism and "transparent" technological remediation are goals worth pursuing onstage in today's world of virtual realities and ubiquitous shiny interfaces. If there is a glimmer of promise in Lepage's approach, it seems to lie in its self-consciously "hypermedial" features, emphasizing as they do the fundamental unsettledness of opera's multiple media.[87] A brief look at one further technology-savvy recent *Ring* production, by the theater group La Fura dels Baus, fosters this suggestion. Their 2007–9 staging revels in the display of Wagner's characters as cyborgs that—like their *mise-en-scène* proper—enthusiastically wield both analog and digital gadgets. Thus defying any linear teleology of technological development, La Fura dels Baus enacts opera's inherent reliance on the live interaction between humans and machines. As such, their production engages an ongoing cultural nostalgia for embodied technologies, corporeal media, and the machine age. By the same token, it may be precisely opera's inherent material and medial

hybridity that feeds a renewed fascination with this genre. Opera's unapologetic embrace of mixed media, of singing bodies and reeling technologies, and its presupposition of a blatantly suspended disbelief in the reality of the audiovisual performance may in the end prove more forward-looking—or current, at least—than Wagner imagined. All the more reason, then, to give opera's Wagnerian technologies their historic and conceptual due.