Power–lines: Electricity, Landscape, and the American Mind

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Abstract

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Abstract:

Power–lines examines the intersections between electricity (power-) and landscape (-lines) as they were manifest in American art, literature, science, technology, religion, and philosophy throughout the nineteenth century and into the first part of the twentieth. It alternates between two parallel trajectories. The first line follows "electricity" and "landscape" as defined and circulated by writers such as Samuel Morse, Ralph Waldo Emerson, William James, and Nikola Tesla. I argue that the science of electricity, the aesthetics of the electric, and the understanding of electric technologies provided models for thinking about the perception of nature and landscape. The telegraph particularly influenced popular ideas about communication and the environment, and what I call "the Line" became a popular way to think about, and with, electricity. The telegraph was not only a metaphor but a physical artifact inserted into the environment. Thus, the second trajectory traces poles and wires as described in American fiction, poetry, landscape painting, and film. Overhead grids were crucial to the development of industries and politics that spanned the nation. The Line framed the way Americans looked at themselves and their environment. For example, Henry David Thoreau, who famously rebuked the need for a telegraph line between Maine and Texas, sat beneath the wires and documented the sounds emitted by what he called "the telegraph harp." The wire's sounds were a sign of a supernatural infrastructure that could offer its listeners

access to a higher plane of existence. Later in the nineteenth century, the wires stemming from Niagara Falls' power plant seemed to provide a substitute for the frontier lines which historian Frederick Jackson Turner said had disappeared from the American landscape. Such coincidences suggest that the theories and language of electricity—especially terms like *shocks*, *waves*, and *currents*—and electrical infrastructures had a collective influence on popular attitudes about politics, communication, progress, and technology. Although new grids and nation-spanning networks seemed to unite landscape and electricity in a pastoral equipoise, *power–lines* have signified the increasingly potent and ambiguous effects of lining our environment (and minds) with wires.

Acknowledgements

The first whispers of this dissertation were uttered somewhere in Omaha and dissipated through those endless and empty landscapes where I watched transmission lines rise and dip beyond the windows of our family station wagon. Around the age of six, I began to play an imaginary video game with the wires and poles on the roadside, hopping and leaping with an invisible "guy" through the towering peaks and low swinging curves. This childhood habit came flooding back in 2005 during Joan Richardson's graduate seminar titled, "American Aesthetics: The Fact of Feeling." We were reading Jonathan Edwards's 1723 "Spider Letter," which includes hand-drawn diagrams and religiously-inflected descriptions of how spiders fly between tree branches in the forest. At one point, Edwards expresses the joy of beholding, "Vast multitudes of little shining webs and glistening strings, brightly reflecting the sunbeams, and some of them of a great length, and at such a height that one would think that they were tacked to the vault of the heavens." Reading this passage struck me deeply as if the angle of a light beam in my mind had been slightly tweaked. Suddenly the sinews of the distant American past and my own childhood fantasy became part of a single network of "shining webs and glistening strings" projected as far as the eye could see.

In the months and years that followed, I made many clumsy attempts to both verbalize and further explore this vision. Joan offered support and advice that both kept me on track and gave me the freedom to forge my own paths. Her seminars and our face-to-face meetings changed the way I approach thinking and language, and for this I am extremely grateful. I have also been fortunate to receive guidance and advice from the other members of my committee, David Reynolds and Edmund Epstein. David gave me important leads concerning Samuel Morse, Walt Whitman, and the rare 1830 publication, *The American Landscape*. He has been, and will continue to be, an inspiration for me both as an American Studies teacher and scholar. Epstein unlocked for me the joys of *Ulysses* and *Finnegans Wake* and showed me that Joyce could do almost anything with language. While my dissertation does not include Joyce's work, Epstein led me to question the very notion of "stream of consciousness" as a description for literature and inspired me to blend the satisfaction of analyzing seemingly incomprehensible texts with the pleasure of bearing witness to the beautiful evolution of the spoken and written word.

Much of the research and writing for this dissertation was completed in the Wurtheim Room of the New York Public Library, and I would like to thank the NYPL and Jay Barksdale for extending their support and resources to students at the Graduate Center. In 2010, Jay recommended me to the directors of the Library's Lecture Series. Sharing my ideas with an overwhelmingly large audience inside one of the world's most prestigious institutions was a highlight of this entire process.

Dozens of friends and colleagues have provided me with casual conversations, landscape consultations, and general editing advice related to *Power–lines*. It has been exciting to share my ideas at conferences, but possibly more rewarding has been the spontaneous, late night talks and long road trips during which I felt the spark of these ideas and saw them come to life through others' eyes. I am blessed to know so many lovers, fighters, poets, and artists.

I would like to extend my deepest gratitude to my family. My brother, my four sisters, and fourteen other Haller cousins offered me one of those alternatively idyllic and painfully pragmatic upbringings that are most readily accessed through Willa Cather's novels. My parents, Ted and Colleen, are responsible for whatever creative, spiritual, and entrepreneurial achievements are reflected in this dissertation. I would like to dedicate this dissertation to my grandparents, Phyllis and Joe Haller and Elfreda and Lewis Wuebben. My grandmothers have displayed fearlessness and grace as the matriarchs of energetic and diverse families. They have given me the courage to always be myself and question "Why not?" My grandfathers reflected some of the dichotomies that I have wrestled with over the past few years. Grandpa Wuebben worked in various machine shops, garages, and racetracks in Dayton, Ohio. He is remembered for inventing and improving various household devices and for his ability to build motors and dies with high levels of precision. Papa Joe flew planes for the United States Military before helping to finance the transformation of farmlands into the Omaha suburbs. Together, these two couples and, by extension, my own parents, have provided me with excellent models for how to live, work, and raise a family—I am forever thankful for their love and support.

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Introduction

Tapping Power–Lines

> *Electricity*, n. 1. The physical phenomena arising from the behavior of electrons and protons that is caused by the attraction of particles with opposite charges and the repulsion of particles with the same charge. 2. Electric current used or regarded as a source of power. 3. Intense, contagious emotional excitement.
>
> *Landscape*, n. 1. An expanse of scenery that can be seen in a single view. 2. A picture depicting an expanse of scenery. 3. The aspect of the land characteristic of a particular region. 4. An extensive mental view; an interior prospect.

This dissertation examines the development of electricity (power-) and landscape (-lines) in the United States. Inspired by systems of electrified wires that stretch across the earth's surface, my study has bloomed into an investigation of how forms and ideas of electricity have circulated through the American mind and have been applied to the American landscape. More specifically, I argue that between the antebellum period of the nineteenth century and the Progressive era of the early twentieth, an array of canonical texts and sometimes marginalized media showed that ideas about electricity and real electric lines *created* landscapes.

One of the central assumptions is that electricity and landscape have an inherent agency, uncertainty, and subjectivity. Language and popular attitudes shape landscapes as much as the electric currents in our brains create thoughts, which are in turn accessed through words. The process of "landscape"—which includes written, pictorial, and conceptual projections—is similar to the figurative and physical transmission of "electricity"—which includes transmissions of currents, language, and affect. The overlap is made clearer when one recognizes the common cluster of terms between electricity and landscape such as fields, currents, waves, and radiation.

My project uses the history of science, literature, and technology in order to draw out new combinations of electricity and landscape, which are potent and yet slippery subjects. *Electricity* commonly refers to the energy created by charged particles. Most Americans encounter it as the power that flows through the grid and enters into our homes. Electricity also refers to a vague affect laced with tension and keen excitement. During the eighteenth and nineteenth centuries, electricity-as-energy and electricity-as-affect were harder to separate than they are today. Electricity's associations with the wrath of gods, its fine presence in the body, and its underpinning of the cosmos placed electricity beyond the limits of rational understanding. A discovery of electricity's effects was often accompanied by a startling affect. Thus, James Delbourgo argues that through the efforts of Benjamin Franklin and other early pioneers of electrical science such as Luigi Galvani and Alessandro Volta, electricity became familiar enough to engage "the full range of human concerns—social, political, philosophical, and religious."[1] Electricity was ambiguous yet powerful. When individuals came into direct contact with the "electric fluid," they found themselves within what Delbourgo calls a "shadowy epistemological landscape" and, standing in these shadows, Franklin and his contemporaries felt skeptical about "utility of electricity."[2] They knew that the currents and charges produced in Leyden jars and Voltaic piles were important to understanding the universe, but Franklin and others doubted harnessing electricity would ever serve a practical purpose.

After the American Revolution, our nation's atmosphere swelled with the desire for electric sensations and the display of electric spectacles. The language of electricity—

which is, in my opinion, part of its "utility"—surged from Franklin's writings and experiments, radiated through the fields of science and politics, and then drifted like a lost kite into the charged and cloudy realms of art, metaphysics, spirituality, and literature.[3] In 1844, Samuel Morse's inauguration of his electromagnetic telegraph revealed electricity's ability to empower a widespread communication system. Controlled currents began coursing through the physical landscape, but the mysterious nature of electricity continued to present thinkers and writers with a special rhetorical tool. Similar to the way modern humanities scholars attempt to situate their arguments in the breakthroughs of our day—such as social networking and neuroscience—individuals aligned with the movements of Romanticism used electricity as a way to think about nature, religion, and nation.

In the nineteenth century, inventors and engineers began to harness electric forces and the shroud covering electricity's role in the universe began to lift. Around the turn of the twentieth century, the forms and functions of electricity in the environment became so strong that "electric" language (and affects) began to disconnect from a world abounding in electrical devices. Material electrification weakened the connections between electricity coursing through the wires placed in the environment and the ability to use "electric" as an adjective for emotions one felt during rare and fleeting moments of excitement. Today, rhetorical uses of electricity often seem cliché.

Electricity is neither a stable force nor space, making it difficult to define it and to splice the causes, effects, and affects that it displays. When we see transmission lines marching across a cornfield, we do not often think of coal, dead bones being scraped at mines and burned at power plants in the distance. When we feel a tingling sense of excitement and say “There is electricity in the air,” it is not always certain where and how the charge began: The music? The crowd? The light in a lover’s eyes? Instead of finding an answer, we are often content to think of electricity in terms of tools and moments that have already been electrified.

Electricity’s pervasive nature and myriad applications are countered with the plurality of ways we use and experience landscape. Landscape and electricity have been fleeting, subjective, metaphorical containers for lofty ideas and strong beliefs. The word *landscape* often denotes a piece of natural scenery, a snapshot of a place, or an overview of a popular activity (such as the “media landscape”). The etymology of *landscape*—which comes from the Dutch word *landscap* and combines a noun, *land*, with a verb *schap*, “to create”—implies a certain creativity and agency. Streams passing through valleys, dark clouds posed over the plains, and a diverse set of opinions can be respectively labeled a “pastoral,” “stormy,” and “political” landscape, but to name something *landscape* implies the act of *scaping*. Every landscape is made through subjective views, inherently limited, posited in time and space. Landscapes are physical and conceptual frameworks that an individual can use to gauge his or her surroundings. Landscapes are constantly changing. A shovel or a plow as well as a rainstorm or a strong wind may shape a landscape and its moment as well as a shift in power or an alternative language, lens, or metaphor. The cultivation of landscape may include scooping, harvesting, or highlighting the objects or actions that define a situation (such as the “religious” or “revolutionary” landscape).

For a broad cross section of the American public, the Grand Canyon, the Appalachian Trail, or Niagara Falls are valuable because their landscapes serve as what

W. J. T. Mitchell calls "instrument[s] of cultural power."[4] I believe that forms of *electric* power have often inspired such thoughts of the American landscape. Indeed, some of our nation's most influential and lasting landscapes have been created by painters looking at mountains or waterfalls and highlighting their *attractive* qualities, by scientists seeing endless fields and feeling *charged* by unseen energies, and by philosophers walking through meadows and feeling transcendent, universal *currents* coursing through the Universal Being.

The usefulness of electricity to shaping thoughts about landscape accounts for what I call "metaphorical utility." As a noun, *metaphorical utility* refers to an idea that can be condensed into a single metaphorical word or phrase and then opened for interpretation. The act of interpreting and contextualizing the metaphor is not just an exercise in wild imagination, but a tool for critical thinking. Thus, thinking about the different forms and meanings of something like "freedom" or "electricity" enhances the term's cash value. As an adjective, *metaphorical utility* refers to the usefulness of certain words and ideas to act as flexible paradigms. For example, the title of this dissertation, *Power–lines*, is meant to convey metaphorical utility. In common use, the terms are separated so that the word *power* modifies *lines*. Technically, the "power line" is a "transmission line." I have placed a dash between power–lines to suggest a broader connotation. The term *power–lines* proposes two coequal nouns and implies that modes of *power* are intimately related to their *lines* (or means) of transmission. Adding a dash shows that *power* is both a noun and an adjective, gesturing toward what the lines transmit as well as how they perform the transmission.

Transmission lines are architectural common denominators. Galvanized steel towers and low-swinging cables are fixtures in landscapes around the world. Power–lines is more metaphorical, a conceptual tool that can unearth the connections between electricity and landscape. In other words, the infrastructure we see rising and falling outside our car windows is only a starting point for thinking about how technology has framed and in many cases digitized our space. We find these lines drawn in various media—paintings, sentences, wires. Therefore, the study of power–lines blends together internal and external landscapes and thinks of the landscape as both a written and writerly text.

The historical and conceptual hinge of my narrative is the Chicago World's Fair and Columbian Exposition of 1893. Historians and cultural critics have written of this event as a turning point in American history. As of 2011, it has been just more than 117 years since the fair closed in Chicago and approximately 117 more since the American Revolution of 1776—the event which the active participant Thomas Jefferson later recalled being "like a shock of electricity arousing every man and placing him erect and solidly on his centre."[5] More than providing a halfway point between the present day and the birth of the nation, the Columbian Exposition was one of the greatest peacetime events in American history and featured some of the nation's glaring dialectics: Old World and New World, the Eastern metropolis and the Midwest boomtown, race and class, labor and capital, engineering and financing, aesthetics and entertainment. Historical, anthropological, and literary scholars have examined the presence of such conflicts in Chicago, but I focus on an often-overlooked juxtaposition that reflects a shift in thinking about landscape and electricity.

During a special meeting of the American Historical Society at the World's Fair, an assistant professor from the University of Wisconsin read an essay explaining the significance of the "frontier" to America's past. Around the same time and in the same place, a group of inventors, electricians, and engineers unleashed groundbreaking technologies that offered visions of the nation's future. Frederick Jackson Turner's speech reportedly received a lukewarm reception in Chicago on July 12, 1893, but the "Turner thesis" was published soon afterward, grew in fame, and has since become one of the most important arguments in the history of American historiography. In the months before and after Turner's address, thousands of displays in the fair's Electricity Building and millions of bulbs illuminating the "City of Light" sparked the imaginations of almost 27 million visitors—or about half of the American population. Thus, we might imagine a startling scene from this famous exposition. On the evening of his address, Turner asked his audience to picture the frontier line flowing across the nation:

> Stand at Cumberland Gap and watch the procession of civilization, marching single file—the buffalo following the trail to the salt springs, the Indian, the fur-trader and hunter, the cattle-raiser, the pioneer farmer—and the frontier has passed by. Stand at South Pass in the Rockies a century later and see the same procession with wider intervals between.[6]

In the hour it took Turner to read his entire essay before the gathering of historians, approximately one thousand Americans had looked out from the cars attached to George Washington Gale Ferris's 264-foot-tall wheel on the Midway Palisade. As Turner asked his audience to imagine standing at South Pass in the Rockies, the rotating Ferris wheel paused, and the riders beheld one of the most spectacular scenes to ever grace the nation: peoples from around the world, lights stretched up and down the coast of Lake Michigan, and the most voluminous buildings ever constructed on American soil.

Turner's thesis evaluated (and often romanticized) the causes and effects of the frontier faced by Columbus and other early explorers as well as the "frontier line" that advanced across the continent. Between the sixteenth and nineteenth centuries, explorers, pioneers, and immigrants came to the landmass now called the United States, gained footing, and then began to move west. The flexible, unknown space beyond the frontier line attracted traders and settlers and created what Turner called "the new product that is American."[7] Turner offered a broad way to understand how and why the great abundance of land and resources in the New World was quickly settled and reshaped into something bearing a distinctly American stamp. This product emerged from the paradoxical urge to separate and conquer, expand and unify, unleash new technologies and celebrate pristine nature.

For instance, the pastoral was an established European tradition, but in America it became a "new product" that emerged alongside depictions of the wild and howling wilderness. An almost visceral attraction to the frontier, Turner argued, guided the exploration, colonization, and commercial development of the United States and many of its cultural and political institutions. By the 1890s, the line of the frontier had vanished, but the attractive force of a frontier waiting to be overcome had become engrained in American culture. After the "official" frontier closed, the habit of extending into the relative unknown continued to be an important part of American identity. The need for fluidity and expansion—also key components to the doctrine of Manifest Destiny—would not wane. "The American energy," Turner predicted, "will continually demand a wider field for its existence."[8]

Chicago's demonstration of amusement rides, streetlights, illuminated fountains, and electric transportation systems offered a preview of the industrial landscapes that would proliferate and continue to meet the popular demands for expressing what Turner called "American energy." Past generations overcame the people and places they saw as savage and transformed them into what they considered civilization. Future generations would take that civilization and try to create new American products, many of them powered by electricity. The forces that had driven the frontier toward the Pacific were similar to those underlying the upcoming age of electrification.

Between the change in thinking about the past American landscape as a series of frontier lines and the new expressions of electric technologies, the Columbian Exposition created a fulcrum[9] through which the concepts of landscape and electricity were exchanged and amplified. The new and various outlets for electrical energy initiated a transfer of cultural capital that in turn helped the United States become a world power and widen the fields of human existence. Of course, the transfer was not always smooth and by no means continuous. The export and implementation of "American energy" was not always received with open arms. Individual scientists and engineers often explored the twentieth century's technological frontiers, but the landscape was often staked and claimed by powerful corporations such as Western Union, American Telephone and Telegraph, and General Electric. The electrical systems that emerged bore the imprint of capitalism. Although advertisements and media painted pictures of an electric powered landscape of comfort and leisure, electrification also helped to create urban wildernesses dense with smoke, noise, and wires.

Until now, wires have been marginalized in academic discourse. I argue that the physical telegraph, telephone, and transmission lines—cables, conductors, poles, towers, and the other devices that complete the circuit—influenced the way our ancestors defined and interpreted the world. By the end of the nineteenth century, wire infrastructures connected most parts of the planet. Wires were sites where electricity and landscape collided and entwined. In the spring of 1893, just before the opening of Chicago Fair, George Westinghouse (with the help of the patents he had purchased from Tesla) signed a contract to build the generators and transformers for the nation's first hydroelectric power plant on the shores of Niagara Falls. By 1896, General Electric had built transmission lines between the Niagara Falls power station and the city of Buffalo. The structures signaled the emergence of a commanding new frontier driven by lines of electric power. Overhead electric wires were nothing new to the nineteenth century. Beginning in 1844, telegraph lines and poles spread up and down the Eastern seaboard and then pushed westward, often advancing through areas well beyond the settled frontier lines. In 1880 there were 291,213 miles of telegraph wire and 34,305 miles of telephone wire. By 1902, there were 1,318,350 miles of telegraph wire and 4,850,486 miles of telephone wire operating in the United States.[10] The approximately six million miles of wires served only a portion of the eighty million Americans. The new high-voltage transmission lines added to the patterns that the telegraph and telephone had already woven across the continent.

Between 1844 and 1912, various wire infrastructures made a collective impact on the landscape. Electric wires and lines of various currents and voltages proliferated from city to city, across states, and between continents. Telegraph wires often constituted the boundaries of civilization and changed the fabric of the rural landscape. They were followed by telephone wires, which traversed the outskirts of towns and added to the webs streaming through the sky. Finally, lines for the transmission of electric power entered the American scene. Telegraph wires are no longer in use, but power lines remain one of the most pervasive and most easily recognized structures in the modern environment.

The material development of wire systems in the American landscape has no exact center or turning point; it is indeed more like a grid. Therefore, I capitalize the word *Line* to refer to all wire infrastructures and circuits built to transmit electric currents—from the slightest electromagnetic pulses of Morse's telegraph to high-voltage alternating current that spread from places like the Niagara Falls Power plant. As the Line spread through the American landscape, it changed the way Americans thought about and used electricity as well as how they experienced this newly framed, charged environment. Although telegraph keys and telephones were the tools of electric communication, putting wires through the landscape, between buildings, and through streets made electricity and electric machines more noticeable. This visibility helped them to become commonplace frames (that is, ways to see the landscape) and also widespread metaphors (ways to understand the transmission of information and power in time and space).

Scholars such as Wolfgang Schivelbush, David Nye, Leo Marx, and Thomas Hughes have shown how the axe, the plow, the mill, and various electric technologies—especially those that artificially illuminate urban space—influenced American culture, but there has not yet been a study of wires and how they affected the meaning and perception of technology. Certainly, the Line is not as loud, noisy, or dramatic as other machines. Its height and distance from normal activity seems to conceal the electric power generated and consumed on either end.

Attention is most often given to the Line when it fails or becomes compromised (by acts such as wiretapping). Otherwise, the Line has looked like a dull steel corridor that denuded nature's aesthetic value. It is ironic that most Americans have been so dismissive and at the same time so reliant on wires. While they may seem like commonplace features in the American environment, poles, towers, conductors, cables and other forms of electrical conduits are relatively new; the world has required wires only in recent centuries. Therefore, after one hundred and sixty years of living inside an increasingly Lined environment, we should turn our attention toward the margins and to the overhead wires radiating from our homes and running alongside train tracks and interstates, connecting and creating electrified landscapes.

The following chapters alternate between focusing on the ideas surrounding electricity and landscape and on the history of wiring the nation. The chapter outlines provide further details, but the general trajectory of my project is as follows. The first chapter explores the prewired, early nineteenth century when electricity and landscape were part of broader projects to translate the invisible into the visible. Morse, the painters of the Hudson River School, and the American transcendentalists developed the genre now referred to as "American landscape." For many of these artists, electric currents and fields were proof of scientific theories and spiritual beliefs, empirical facts and aesthetic moods. Entering the sublime landscape (either painted or viewed first hand) could transmit a "shock" or a "buzz." The second chapter is devoted to depictions of the Line—the poles, wires, and other telegraphic apparatus—that appeared in newspapers, history books, landscape paintings, and fiction. In novels like Herman Melville's *Moby-Dick* (1851) and Nathaniel Hawthorne's *The House of Seven Gables* (1851), the Line represents broader issues concerning communication, social cohesion, and the boundary between human and divine.

The third chapter moves ahead to the late nineteenth century, when electrical terminology such as "currents," "waves," and "circuits" became permanent features in the American mind. The writings of Tesla, Turner, and William James indicate the ways Americans began to employ the metaphorical utility of electricity to understand both the external environment and the internal landscape of the body. Finally, in my fourth chapter, I consider the development of wire infrastructures and responses to the Line during the turn of the twentieth century. I juxtapose the development of electric power in the area referred to as the "Niagara Frontier" with the glut of telegraph and telephone wires that afflicted New York City and were seen by one journalist as a "telegraph forest." These historical stories seem to corroborate the ambivalent symbolism of the Line in popular texts from the early twentieth century. In D. W. Griffith's *The Lonedale Operator* (1911) and *The Girl and Her Trust* (1912), danger strikes and the protagonists telegraph a message. Uncertain if their cry for aid has been received, they must wait for help to arrive and, in the race to the rescue, the viewer sees the lines charging up and down through the Western landscape, reflecting a time in our history when civilization seemed to hang by a thread.

Throughout, I believe that by attuning our eyes and minds to the physical and conceptual lines occupying and thereby defining the margins of our environment, we might calibrate the seemingly disparate forces of electricity and landscape within the spectrum of transmissible frequencies and behold new networks of power–lines.

Chapter Outlines

1. Electric Americans and Pre-Wired, Electrified Landscapes (1826–52)

The first chapter focuses on the expressions and interpretations of electricity and landscape published primarily before Samuel Morse inaugurated his telegraph. During this period, the “American landscape”—the title of a picture book published by Asher B. Durand and the poet William Cullen Bryant in 1830—emerged as a distinct form that blended patriotism, moral instruction, and entertainment. Classical and European models heavily influenced artists and scholars of the American landscape and thus, many colonial and post-revolutionary American landscapes were covered in layers of insulation, as it were. First, landscape was not a primary subject but rather a backdrop for religious allegories or ancient mythology. Secondly, human subjects were considered inherently “more sublime” than landscapes. Thirdly, even after landscape became a primary focus, it seemed proper to paint and design landscapes by “selecting” nature’s most “agreeable parts” rather than recreate a place in all its rugged glory.

During the early nineteenth century, Romanticists began to peel these layers from their transcriptions of the American environment. Many popular metaphors involved contemporaneous ideas about electricity. Landscapists such as Morse, Thomas Cole, and Frederic Edwin Church used the concepts and language of electricity to understand, interpret, and become more intimate with nature. For philosophers of nature like Ralph Waldo Emerson and Henry David Thoreau, concepts of electricity both empowered and disrupted the act of land*scaping*—visually arranging elements like the weather, transcribing a particular plant or process, or hoeing a bean field. Reading the testimonies of British physicist Michael Faraday helped Emerson to create a metaphysical frame for a transcendent, electrified experience in nature. The conceptual currents of electricity and landscape converge in Emerson’s “Nature” (1836). Emerson says that he goes into the woods, becomes a transparent eyeball, and feels the “currents” of the “Universal Being circulate through [him].”[11] It was the circulation of these universal currents that kept the individual in touch with nature.

2. Wires in the Garden (1844–69)

In the years between 1844, when a single wire connected Baltimore to Washington, D.C., and 1861, when the first transcontinental telegraph line connected New York to San Francisco, the telegraph seemingly “annihilated space and time.” It might be more accurate to say that it collapsed the sense of space and sped up the sense of time between points in the telegraph network. Indeed, not every place or sense of pace changed. Much of the population still lived beyond the reach of the Line. This does not mean, however, that they did not see it. This chapter, which takes its title from Leo Marx’s groundbreaking study, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (1967), examines the way telegraph lines created landscapes. References to telegraph wires in Herman Melville’s *Moby-Dick* (1851), Nathaniel Hawthorne’s *The House of Seven Gables* (1851), Alexander Jones’s *Historical Sketch of the Electric Telegraph* (1852), and an anonymous short story titled “An Evening with the Telegraph Wires” (1858) suggest that telegraph wires quickly became an ubiquitous feature of the American environment. At the same time, these texts display ambivalence toward the emerging practice of instant communication and its icons such as the key, the code, and the wires stretching alongside railroads and through town squares.

Electrical telegraphy seemed magical and glorious. In Hawthorne’s *House of Seven Gables*, Clifford Pyncheon looks at a telegraph wire and praises electricity as a “great nerve vibrating thousands of miles in a breathless point of time.”[12] For a moment, the wire is a symbol of brotherly love, an unbreakable bond of man and nature. Clifford's idea of a spiritual network is shattered when a fellow passenger retorts that the telegraph is only good insofar as it aids the "detection of bank robbers and murderers." Clifford is shocked and responds that this "immaterial and miraculous power" should only be used for "high, deep, joyful and holy missions," not as a tool in the "the universal world-hunt."[13] Neither character can read the dots and dashes being sent through the wire, but the sight of the Line in the landscape sends an ambiguous message. Telegraph wires represent an unbreakable bond and a trap, a great nerve uniting all humankind and a sticky web on the horizon waiting to ensnare those, like Clifford, attempting to break free from the shackles of space and time.

3. Wireless Transmissions: Nikola Tesla, Frederick Jackson Turner, and William James (1882–1904)

This chapter analyzes the life and work of the inventor and scientist Nikola Tesla alongside two influential works of American nonfiction: William James's *The Principles of Psychology* (1890) and Frederick Jackson Turner's "The Significance of the Frontier in American History" (1893). In 1890, a public relations struggle coined the "Battle of the Currents" was waged between Thomas Edison's direct-current (DC) system and Tesla's alternating-current (AC) system. That same year, James published *The Principles,* which uses DC circuits to describe sensations in the body. For instance, a pain sensation in the fingers sends a message directly to the brain, which responds by sending a message to the hand muscles to retract. The processes contained *within* the brain are described using a different type of electrical energy. James explains the phenomena he coined as the "stream of consciousness" with references to what he calls "equalizing" currents. Thoughts and moods alternate, and the brain, like a circuit filled with alternating current, achieves balance and equalization. James uses the language of electricity figuratively to rewire the connections between brain and body as well as brain and consciousness.

If James uses the language of electricity to describe the body's interior landscape, Turner uses the language of landscape to describe the frontier's electric spark. Insulated and civilized sites like ports, towns, and forts provided a counterbalance to the shocking, seemingly boundless space beyond. The untrammeled frontier was a vital, magnetic force, drawing settlers west and energizing national ideologies of expansion and exceptionalism. Tesla's writings offer fresh insight into each of these groundbreaking theories: in his attempts to build "automatons," he became convinced of the electrical functions of the mind. In addition, his dreams to tap into renewable energies and to provide wireless power to the entire planet suggest he was one of the first environmentally friendly electrical engineers and viewed the landscape as a place of unlimited potential energy.

4. Empowered and Lined Landscapes (1876–1912)

Throughout the last part of the nineteenth century, telegraph lines continued to define, and confine, the American landscape. During the last decades of the century, two new sets of wires also began to sweep across the nation. The first half of this chapter recounts the development of wire systems at Niagara Falls and in New York City. These lines appeared alongside, even intertwined with, preexisting telegraph wires. From a purely visual standpoint, it was difficult to distinguish the various functions being performed by the overhead web. The illumination of streets, buildings, and homes and the raw power of electric motors were responsible for instilling Americans with a sense of the technological sublime, but the Line was increasingly viewed as a public nuisance.

The second half of this chapter provides a close reading of two sensational novels, Arthur Stringer's *The Wire Tappers* (1906) and its sequel, *Phantom Wires* (1907), as well as D. W. Griffith's silent shorts *The Lonedale Operator* (1911) and *The Girl and Her Trust* (1912). The protagonists of Stringer's novels, Jim Durkin and Francis Candler, are both former telegraph operators who become "wire slingers": they splice wires, break codes, and steal messages and money from corrupt gamblers and businessmen. Meanwhile telegraph wires span through the background of Griffith's texts connecting visually the protagonists and their rescuers. The wires evoke the swift and terrifying change of social order and reflect the openness of a frontier that had recently closed.

[1] James Delbourgo, *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America* (Cambridge, Mass.: Harvard University Press, 2006), p. 13.
[2] Ibid., pp. 3–18.
[3] See Delbourgo's chapter, "Electrical Politics and Political Electricity," in *Most Amazing Scene of Wonders*, pp. 129–64.
[4] W. J. T. Mitchell, ed., *Landscape and Power* (Chicago: University of Chicago Press, 2002), p. 2.
[5] Thomas Jefferson, *The Life and Selected Writings of Thomas Jefferson*, ed. Adrienne Koch and William Peden (New York: Random House, 1998), pp. 9–10.
[6] Frederick Jackson Turner, "The Significance of the Frontier in American History" (1893), in *Rereading Frederick Jackson Turner: "The Significance of the Frontier in American History," and Other Essays*, ed. John Mack Faragher (New Haven: Yale University Press, 1998), p. 39.
[7] Ibid., p. 4.
[8] Ibid., p. 37.
[9] *Fulcrum* is defined as "the point or support on which a lever pivots" as well as "an agent through which vital powers are exercised."
[10] U.S. Bureau of the Census, *Telephones and Telegraphs: 1902*, ed. Thomas Commerford Martin, Arthur Vaughan Abbott, and William Mayer (Washington, D.C.: Government Printing Office, 1906), p. 4.
[11] Ralph Waldo Emerson, "Nature" (1836), in *Essays and Poems*, ed. Joel Porte (New York: Literary Classics of the United States, 1983), p. 10.
[12] Nathaniel Hawthorne, *The House of Seven Gables*, ed. Robert S. Levine (1851; repr., New York: W.W. Norton, 2005), p. 264.
[13] Ibid., p. 265.

Chapter One

Electric Americans and Pre-Wired, Electrified Landscapes (1826–52)

We begin by casting a gaze back from 1844 to examine the ways landscape and electricity operated in the "prewired" United States. The representative, transitional figure is Samuel Morse, a gifted painter, promoter of the arts, and professor of design. Morse argued that landscape artists and gardeners should offer disciplined, neoclassical, and *insulated* depictions of nature.[1] His landscape paintings and lectures about the proper cultivation of landscape laid the groundwork for subsequent depictions of the American landscape—both as a genre of painting and a socio-historical view of the nation.

The artistic, political, and system-oriented mindset typified by Morse was eventually overcome by more egalitarian, rugged, and electric experiences of the outdoors. Writers and artists from the Hudson River School and American Transcendentalism celebrated the organic energy of the seemingly untouched and wild parts of the continent. Landscape paintings, prose, and poetry from the period suggest that landscapes (and acts of landscaping) featured spiritual undercurrents that could be readily understood in terms of electric currents. For these artists, the American landscape was not only a blank slate or an abundant paradise; it was also the site of direct, moralizing, and electrifying experiences.

In order to ground these experiences of landscape in empirical fact, the second half of this chapter turns to the study and display of electrical phenomenon in the late eighteenth and early nineteenth centuries. Electricity held a powerful sway on the popular imagination and thus, Morse and other leading cultural figures such as Ralph Waldo Emerson used electricity a metaphor about aesthetics. The language of electricity was also projected into depictions of landscape. Art historian Barbara Novak has shown that American painters viewed nature as a repository of scientific forces as well as a place of powerful, spontaneous creation. The beauty and power of art was described in terms of lightning bolts and electric currents. In the depiction of mountains, waterfalls, and valleys, landscape painters like Thomas Cole and Asher B. Durand seemed to conduct the energies gestured toward by Morse and Emerson. After Morse's telegraph began to sweep the nation, landscape connoisseurs such as Henry David Thoreau still attempted to channel nature's timeless, organic electricity. A comparison of Emerson's and Thoreau's prose shows that their "landscapes" operate as what Eric Wilson has defined as "electric words."[2] These organic, pantheistic forces were often related to the notion of sublimity, and, in the final section, I offer the "shock" and "buzz" as a new dialectic for thinking about America's wirelessly electrified landscapes.

Glimpses of the New World and Its Untamed Landscapes

The first Anglo Europeans to sail across the Atlantic approached the New World as an undiscovered, blank space. For both God and nation, they framed the lands and peoples they encountered through various ideological lenses. Groups of explorers, pilgrims, and colonizers abstracted religious inspiration from the simultaneously harsh and abundant environment. Popular depictions of the New World were often mysterious, even terrifying: an alien landscape with devilish natives, monstrous beasts, and nearly uninhabitable tracts. Preachers sometimes presented the New World as a providential gift, a sacred land preserved for a mission of biblical proportions. Jonathan Edwards argued that "the book of Scripture is the interpreter of the book of nature . . . by declaring to us those spiritual mysteries that are indeed signified or typified in the constitution of the natural world."[3] The Bible was a key or a lens through which to decode the environment. A deep understanding of scripture could help one see rivers as symbolic of "how all things tend to one, even to God" and trees as proof of the reverse condition: "the dispensations of providence since the coming of Christ."[4] Edwards and other early American Puritans looked at landscape as a cornucopia of biblical types. It reflected the truths found in the Bible and the spiritual design of the universe.

The effort needed to survive in this new physical environment and the impulse to connect theological beliefs to the immediate surroundings helped to create what Perry Miller calls "Nature's Nation."[5] Thomas Jefferson considered landscape part of a wider discourse about American history and culture.[6] According to Leo Marx, Jefferson believed that the "physical attributes of the land" are less important than its "metaphoric powers," and that "what finally matters most is its function as a landscape—an image in the mind that represents aesthetic, moral, political, and even religious values."[7] Jefferson's ideal citizen did not just cultivate the land, but cultivated land-*scape*. The nurturing of these scenes could be enacted through theology in the form of typology, politics in the form of treaties, and science in the form of maps and detailed accounts of animals and wildlife. In the most general terms, the "proper" combination of visual and symbolic parts, either in a painting, botanical study, or peace agreement between states promised to bring individual Americans into harmony with their environment and teach them about the land's collective purpose: The *evil* landscapes needed to be converted, the *wild* landscapes tamed, the *plentiful* landscapes farmed and harvested.

Preachers and politicians may have framed the landscape just so, but the majority of farmers and businessmen approached the environment as an adversary and potential resource. The Louisiana Purchase was not based on Jefferson's belief in the "metaphorical powers" of landscape. Indeed, after it doubled the nation's size and the War of 1812 challenged the newly formed republic's strength, American land—and its agrarian opportunities—became a vital source of wealth and sustainability. By 1837, the republic expanded to include twenty-six states. The national boundaries reached north to Maine, west to Missouri, and south to Alabama. The development of roads, canals, and railroads between these states and other territories also exposed individuals to new ways to view and travel through the New World.

Americans viewed their land as a commodity or an investment instead of a place for spiritual and aesthetic nourishment. Giving our attention to the ways that landscape was evaluated, cultivated, and dominated in popular discourse can still help us understand the nation's cultural attitudes, economic policies, political structures, and religious beliefs. Again, each time we come to a landscape, it is important to remember it is not a fixed object, but a *framed* subject.

Defining Landscape: Land Scaped, Frames Shaped

The genealogy of *landscape* indicates how, throughout the extended nineteenth century, the genre "American landscape" helped create a national identity for the United States. The Dutch term *landschap*—which combines words for *land* and *create*—initially referred only to paintings or pictures that depicted natural scenery. Putting pen to paper or brush to canvas created a two-dimensional landscape. In this case, the activity that would be called landscaping did not change the earth's surface by plowing, digging, or planting. Landscaping would have meant drawing or painting a visual approximation of a real place or the re-creation of an imaginary space.

During the seventeenth century, English speakers began to use the word *landscape* to refer to both the genre of painting and the direct view of the outdoors. The double connotation of landscape challenged the division between the skilled artist and the casual perceiver. Almost any individual could see and experience a landscape. It also became more difficult to suggest when and how to separate “land” from “landscape.”

When we see the things our ancestors called “landscape,” it can be difficult to distinguish which aspects of that thing were framed, created, or *scaped* and which ones we frame through our own perceptions of the past and its peoples. A nineteenth-century painter may have scaped the environment in a particular way or to bring out a certain message, but the viewer always reframes it and generates one’s own meaning. Thus, land can be “created” by accurately representing rock formations, transcribing the view from a cliff, gazing through a telescope, or looking out the window.

Today, the word *landscape* is used to refer to a general view that considers a collection of objects, ideas, or institutions. *Landscape* appears in contexts that have nothing to do with natural scenery or even a particular time or space. Consider the following sentence from Jeffery Sconce’s *Haunted Media: Electronic Presence from Telegraph to Television* (2000): “Where there was once ‘meaning,’ ‘history,’ and a solid realm of ‘signifieds,’ there is now only a haunted landscape of vacant and shifting signifiers.”[8] Sconce uses the “haunted landscape” to mark an open historical moment and he assumes his meaning is understood without specifying the location, shape, or scope of the haunting. Sconce’s separate references to the “phantasmagoric landscape” and “aural landscape” reinforce the idea that landscape can refer to invisible and porous spaces and views of mysterious, amorphous processes. In modern use, landscape can refer to an atmosphere, concept, or mood.[9] Thus verbal, visual, and physical creations of landscape are constructs of the artist or writer as well as the viewer or reader.

It can be difficult to separate the landscape-as-artifact—a painted, transcribed, or conceptual landscape—with those encountered in everyday life. This blurred boundary between creator and created, reader and text speaks directly to W. J. T. Mitchell's argument that landscape should be thought of as a verb instead of a noun. For Mitchell, it is more like a verb because it presents "both a represented and presented space, both a signifier and a signified, both a frame and what the frame contains, both a real place and its simulacrum, both a package and the commodity inside the package."[10] Returning to its role and meaning in U.S. cultural history, around the beginning of the nineteenth century, the lands "created" by and for Americans became a strong reminder of spiritual, political, and economic values. Some of the first popular American landscape paintings like John Trumbull's *Niagara Falls* (1807–8) generated pride in the new republic, awe for the forces of nature, and a sense that only through the great efforts of industry could the rest of the American wilderness be conquered and controlled. Landscape surveys, landscape poems, and landscape paintings gave Americans a special frame through which to look at and think about their surroundings. In hindsight, many of these popular views cast a colonizing gaze across the continent and helped tame or insulate the boundless stretches of land and even eradicate the peoples and institutions that had been here for thousands of years.

Landscape depictions' cultural usefulness or utility (which I will more fully discuss in this chapter's second half) is one reason why it became an important tradition in American art and culture. Industrial, political, and scientific developments multiplied its meanings and uses. As a physical and figurative space, the nascent nation's landscapes demonstrated positive relationships among art, industry, and expansionism. As the genre developed, at least one half of the continent continued to resist fixed descriptions: a relatively small portion of Jacksonian Age Americans had experienced "the frontier," but almost everyone knew what it looked like: vast, rugged, magnificent, and wild. The frequent use of "boundless" in the journals written during the Lewis and Clark expedition (1805–6) suggests that, despite the Enlightenment's new physical and conceptual tools, at the opening of the nineteenth century most of the American landscape seemed like a never-ending frontier that could not be placed into physical or conceptual bounds.[11]

The Aesthetic Electrician and the Electric Aesthete

Although Morse is most often remembered as the inventor of the telegraph and its dot-and-dash code, he also exemplifies the early nineteenth-century transition from "insulated" landscapes to "charged" landscapes. Beginning with his first trip to Europe in 1810 to study art at the Royal Academy in London, and continuing through the 1840s when he was professor of arts and design at New York University, Morse was deeply invested in painting and its relationship to American culture. His efforts as a curator, arts organizer, and lecturer contributed to the rise in popularity of the landscape genre. He also painted them. In fact, it is likely that he felt vindicated in 1844 when he inaugurated his electrical apparatus in the Capitol building in Washington, D.C., because, between 1832 and 1837, Morse campaigned vigorously for a chance to paint a landscape on one of the empty panels inside its rotunda.

Morse's proposal for the Capitol commission involved a scene that would depict Columbus landing on the shores of America. To prepare, he traveled to various locations on East Coast and made drawings of possible sites, which he thought could serve as templates for this grand historical moment. Morse also wrote to numerous officials in Washington and asked them to vouch for his skills as a painter.[12] The politicking failed and Morse was denied the commission again and again.

This failure signaled the bitter end of Morse's painting career, and yet, as fate would have it, in 1844, instead of going to the nation's capital to unveil a painting of the American landscape, he went to the capital to send an electric current through the American landscape. Instead of reflecting his own prophetic vision of America's "virgin" past and fixing it in time and space, Morse invented an electric technology that foreshadowed a complex technological future, where time and space could be seemingly annihilated. His inaugural message, taken from Numbers 23:23—"What hath God wrought"— can be read as both a statement and question. This particular biblical quote reflected the pride and hopes the invention inspired as well as anxieties about how this technology might affect the nation. Was it something that "God" wrought or that humans unleashed?

It seems clear that the invention of the electromagnetic telegraph initiated a series of events that would link Morse, not only to the eponymous code, but also to the wires in the material landscape. Years later, his close friend William Cullen Bryant declared: "Every telegraph wire strung from post to post, as it hums in the wind, murmurs his eulogy."[13] The fact that the telegraph would be considered Morse's lasting mark on the American landscape is ironic. The failure to earn a chance to paint a landscape depicting a moment of contact (or colonization) inside the rotunda signaled he was finished as a painter, while much earlier, in the 1820s, at the crossroads in his artistic career, Morse had found himself at the center of a group of artists who shaped the contours of the genre that is today referred to as "American landscape."

Morse's Fine Arts and the "Refined" Republic

> *For as some poets excel in the different species of poetry and stand at the head of their different kinds, in the same manner do painters have their particular branch of their art; and as epic poetry excels all other kinds of poetry, because it addresses itself to the sublimer feelings of our nature, so does historical painting stand preeminent in our art, because it calls for the same feelings. For poets' and painters' minds are the same. . . .*
>
> *I can not be happy unless I am pursuing the intellectual branch of the art. Portraits have none of it, landscape has some of it, but history has it wholly.*[14]
>
> —Samuel Morse

Morse's intellectual and creative prowess made this "learned, literate, articulate, cultivated, and cosmopolitan" young American the "most richly endowed artist of his generation."[15] Paul J. Staiti says Morse had a knack for "spatial recombination and social recontextualization."[16] Morse combined his strong intellect with his technical skills to invent his telegraph apparatus during the 1830s. Yet throughout his various careers—painter, arts organizer, educator, and inventor—he capitalized on his understanding of "minds [that] are the same" and their respective treatments of aesthetic, social, and mechanical processes. This combination of an overly academic approach and his evangelical background would eventually restrict him as artist, and, as we will see, it contributed to his insular and "insulated" approach to American politics and landscape painting.

For instance, Morse held a firm belief about painterly subjects and the sublime. Although financial constraints forced him to become a traveling portrait painter in the

1820s (a task he often felt was beneath him), he had a strong desire to make the same kind of grand, iconic, historical paintings made famous by Benjamin West and Sir Joshua Reynolds. For Morse, the greatest art works depicted an epic moment and only the artistic re-creation of such events could hope to achieve the sublime. Thus, interspersed throughout his career as a portrait painter, Morse created more ambitious works such as *The Dying Hercules* (1812–13), *House of Representatives* (1822–23), and *Gallery at the Louvre* (1832–33). The paintings feature, respectively, Greek mythology, American politics, and the most famous works of European art. Morse's paintings display a refined painterly skill and adherence to aesthetic principles of light and shadow, form and centering. They also exemplify his attempts to project a "sublime" narrative onto the canvas. The broader American public, to his dismay, did not see the sublimity in these three pieces. Good by many standards, they failed to earn critical praise or commercial success. The lack of popular support was particularly troubling for Morse who saw himself as something of the American arbiter of art. Between the time when Morse completed *Dying Hercules* and *Gallery at the Louvre*, some historical and dramatic paintings, such as John Trumbull's *Declaration of Independence* (1818) and Rembrandt Peale's *The Court of Death* (1820) drew large audiences in the United States and Europe, but in late 1820s and 1830s, the American masses preferred more entertaining spectacles. Audiences flocked to see paintings that depicted native places. They found the sublime, moralizing effect was produced not only by detailed re-creations of human subjects caught in the throes of epic events, but by grand scenes of nature seemingly void of human interference. Morse's work was caught in a conflict between the call for the historical sublime and the popular desire to be awed by the sublime effects of nature.

Morse did not readily adjust to this new trend and enjoy, as Emerson emphasized, "*an original relation* to the universe."[17] Contemporaries used landscapes to celebrate or critique American history, government, and religion, but Morse seems to have been convinced that landscapes alone could not fully satisfy more intellectual appetites. History painting was the "preeminent" and most sublime subject; landscape was secondary. He was not, however, so committed to his ideas about the historical sublime that he did not try his hand at landscapes. Between the years 1826 and 1836, he completed three major landscape paintings, lectured about landscape aesthetics, and promoted the works of other landscape painters in exhibitions. These three activities—painter, lecturer, and curator—prove that during the apex of his artistic career, he was entertaining the idea of landscape as the next thick, intellectual branch of art. I am not suggesting that Morse was the leading of figure of the American landscape genre or that his landscape paintings deserve to join the ranks of Cole, Durand, and Church in American art history. Yet, Morse's landscapes do shed new light on the attraction of landscape painting in the United States, and the ways that landscape became one of the most celebrated and distinct tropes in American culture.

Morse and the "American" Landscape

In 1824, the City of New York awarded Morse a $1,000 commission to complete a portrait of Marquis de Lafayette. Morse followed the famous French statesmen on his grand tour of the United States and during sittings in New York and Washington, D.C., they seemed to develop a close friendship. The completed portrait, *Marquis de Lafayette (1824-1825)* brought Morse national recognition, and he moved to a studio in New York's financial district in an attempt to capitalize on this fame. From the time he finished the portrait in 1825 and his failure to earn the Capitol Rotunda commission in the late 1830s, Morse was part of close-knit group of New York artists whose works helped to define and celebrate the genre now referred to as American landscape. Here is a brief overview of events that helped contribute to this movement: In 1825, Thomas Cole took his first trip up the Hudson River to paint the Catskill Mountains, initiating what would later be referred to as the Hudson River School of landscape painting. In winter 1826, with the support of Cole and the painter Durand, Morse founded the National Academy of Design in New York City to both teach and promote aspiring American artists. Morse, already famous for his portraits, was president, but many founding members were landscape painters. That spring, he delivered a series of four lectures titled and later published as *Affinities of Painting to the Other Fine Arts*, which devoted an entire section to the art of landscape gardening. In the fall, James Fenimore Cooper (who had invited Morse to join the Bread and Cheese Club in 1824) published *Last of the Mohicans*, a canonical text that celebrates the rustic scenery and grandiose vistas of upstate New York.

In 1828, Morse organized the third annual exhibition for the National Academy of Design, which featured hundreds of landscape paintings, including two of Cole's most famous early works: *Expulsion from the Garden of Eden* (1828) and *Last of the Mohicans* (1827). The show featured living American artists and was restricted to paintings never before put on display—both new trends at that time. With these two guidelines, Morse directly contributed to the development of the U.S. art scene. As Staiti points out, "without the agency of Morse's Academy, the Hudson River School would not have flourished so rapidly or so fully."[18] Morse helped this new generation of artists find a place in the public eye and a value for private collectors. Finally, in 1830, Morse and Cole traveled to Italy and France to paint classical scenes from countryside. After about two years of traveling together, the two split and Morse stayed with Cooper's family in Paris where he made sketches for *Gallery of the Louvre*.

Meanwhile, back in the states, Durand and the poet Bryant (Morse's closest friend in the group) worked together on a book series titled *The American Landscape* (1830). According to Bryant's foreword, the book was designed to celebrate "the absence" of "tamings and softenings of cultivation," which "change the general face of the landscape" and "break up the unity of its effect." This publication was the first to "accomplish accurate views" of the landscape in a form that could be redistributed widely so that "the possessors of these pictures will thus have it in their power, while they promote the success of an experiment hitherto untried, and perhaps hazardous, to contribute to the advancement of a taste for the arts." *The American Landscape* combines drawings, historical allegory, and poetic illustrations of places like the Delaware Water Gap, Catskill Mountains, and Winnipisogee Lake. These views were part of a general attempt to distinguish American landscape from those found in Europe. The appreciation of nature may have been founded in the Old World, but Bryant argued, the "perception of her charms is not less quick and vivid among our countrymen."[19]

Between 1826 and 1836, a select group of poets, writers, artists, and close friends was deeply involved with depicting and developing "quick and vivid" perceptions of nature. For Cole, Durand, Cooper, and Bryant, painterly and prose illustrations of landscape served at least four general functions. Aesthetically, the landscape provided a fresh, wild setting for the treatment of Old World conflicts. Politically, renderings of the nation's landscape evoked pride in the newly formed United States and reinforced the idea of American exceptionalism and the myth of an abundant New World. Spiritually, the landscape was a repository of nature and a symbol of God's creation. Culturally, the framed or described landscape metaphorically preserved the places—like the Catskill region—and the persons—like Natty Bumppo—that that these artists feared would soon disappear. This genre offered a space to critique the people and social systems they predicted would replace the rugged individual and his or her "pure" environment.

For centuries, American studies have analyzed these four figures because their works reflect contemporaneous conflicts between Old World ideals and New World realities. Their depictions of landscape seem to reconcile natural beauty and industrial progress, the secular and the divine, the individual part with the scenic whole. Yet studies of Cole, Durand, Cooper, and Bryant and their respective roles in this pivotal moment in the history of the American landscape push Morse to the margins.[20] And, as noted earlier, Morse's idealistic, fantasized landscape paintings were not, on the whole, well received. He envisioned the landscape as a reflection of "Fine Taste," virtuous and tame, and his life and works did not seem to match the Romanticists' celebrations of "Nature red in tooth and claw."

The debate about Morse's views on Romanticism continues.[21] His strict religious upbringing suggests that he would have been ideologically opposed to some of the pantheistic undertones of works by Cole, Bryant, and Durand. Recall that it was God, not nature, technology, or science, to which Morse offered credit for electromagnetic telegraph. In addition, Morse struggled to reconcile his beliefs in Calvinist Protestantism and American imperialism, strains passed down from his father, Jedidiah Morse. As

David Reynolds observes, the elder Morse was a "Congregational minister and famous geographer, who prophesied that America would create 'the largest Empire that has ever existed.' If Finley Morse could not serve America's providential destiny through painting, he would help fulfill it with electromagnetic current."[22]

Another difficultly in situating Morse's landscape paintings in the context of his contemporaries is his awkward political statements. His *Foreign Conspiracy Against the Liberties of the United States*, first published in 1834, was an incendiary and widely popular polemic, in which he warned the American public of Austria's plans to Catholicize and overrun the U.S. government. In 1836, in part due to the success of *Foreign Conspiracy*, Morse ran for mayor of New York as part of the Native American Democratic Association, a party that was pro-slavery, anti-Catholic, and anti-immigration. Morse occupied a dynamic political space. He viewed the fine arts, and later, electricity and the telegraph, as great national unifiers—symbols of both Jacksonian democracy and more Whiggish beliefs in technological progress. While primarily occupying the middle, his radical swings to the right make his landscape paintings seem insular. American Romantics like Cole and Durand seem to have consciously reflected the social, political, and racial turmoil gripping the nation, but Morse chose to erase or ignore markings of conflict. His consistent, idealized landscapes seem as safe and apolitical as possible. Morse's narrow ideas about (and depictions of) landscape can be read as an extension of his disgust with the masses and his general xenophobia. His paintings and lectures are also representative of the "insulated" views that defined early-nineteenth-century landscape aesthetics.

Lectures of Initiation and Insulated Landscapes

Morse's "Lectures on the Affinity of Painting with the Other Fine Arts" occupy an important place in American art history and landscape painting.[23] Delivered just after the formation of the National Academy of Design, they were the "first public lectures on painting given in the United States by a practicing American artist."[24] Morse composed the four lectures as part of Athenaeum series at Columbia University, which in spring 1826 were organized around the theme "*Ut pictura poesis*," which roughly translates to "As in painting, so in poetry." Bryant delivered the "Lectures on Poetry." The respective titles of Bryant's and Morse's lectures suggest that Morse felt obliged to prove to his audience that painting deserved to be considered as one of the arts. Instead of following Bryant's lead and titling his piece "Lectures on Painting," Morse took great pains to show the connections between painting and a range of other more renowned and accepted art forms—poetry, music, and landscape gardening. Morse defines these four as the "Perfect Fine Arts" because they have "the quality of aiming to give pleasure to the imagination."[25] His basic argument is that poets, painters, composers, and landscape gardeners all use the same principles to create such enjoyable works. For him, principles such as motion, congruity, and resemblance are distinct features of the four perfect fine arts. Morse acknowledges that Sir Joshua Reynolds's *Discourses*, published in 1797, posited a similar thesis about the "correspondence" among aesthetic principles, but he argues that these principles must now be adapted to "the peculiar situation of our country."[26] In a moment that foreshadows Emerson's dramatic statement in the "American Scholar" (1837)—"Our day of dependence, our long apprenticeship to the learning of other lands, draws to a close"[27]—Morse connects the principles of art to the process of civilizing the New World:

> *Foundations* are to be laid, and that the superstructure may be lasting they must be solid and sure. As in national character we combine the various traits of the many nations of which we are composed, so in regard to the Fine Arts we have as yet no decided character, no truly distinctive American school. . . . It becomes a question of some importance whether it be not possible to lay the foundations of a just taste in the Fine Arts in our country on such principles that a substantial fabric may rise in as beautiful proportions as the temple of our political constitution. That the foundation may be strong it should be laid not in authority, however atient [sic], but in the never changing principles of nature (emphasis in original).[28]

By focusing on eternal “principles of nature” instead of “authority” (that is, European principles), American painters, poets, composers, and landscape gardeners could work together to form a “distinctive American school.” Morse believed that this place of training and education would be closely related to the National Academy of Design, an institution that he founded in order to circulate the principles of “taste” among art teachers, art students, and the general public. The academy’s formation and his argument about the affinities among the arts were part of the same goal: to promote new American artists and teach the general public how to appreciate them. Ultimately, Morse felt that best way to elevate the fine arts was to “to elevate and purify the public mind by the dissemination of purity and taste, and raise our art to its natural dignity as the handmaid of Truth and Virtue.[29] Today, Morse’s academy and his hierarchy of scholars and artists who “disseminate” purity and taste to the public seem lofty and elitist. Compared to artists like Emerson or Cole, Morse seems to epitomize the academic approach and an insulated view of the objective “principles” of nature. Even as Morse tried to initiate such principles in American art, the Hudson River School painters and the Transcendentalists, movements that embraced the individual’s role in the process of democracy and formation of landscape, were challenging his core aesthetic beliefs.

Yet this rebukes Morse too strongly. For instance, focusing on his aesthetic elitism ignores the fact that he was committed to cultivating the artists' skills and the public's appreciation of the arts. He was not so much opposed to the individual, immediate experience of nature as convinced that training was required to access the full artistic potential of these experiences. The doctrine of "train first" and "create later" has its advantages, even if it seems to "insulate" the young artist from external realities. Morse was not oblivious to the alternatives, and he responded to the challenge that art academies are "shackled by their discipline" by arguing that we cannot be resigned to "teach nothing" or believe that "no system should be observed."[30] Morse compares the painter's development to that of a poet, saying that, on the one hand, if the latter was studied "measure and versification" and other "graces of style," then these would be "obstacles in the way of genius." On the other hand, society cannot afford to "leave the poet to his wild sallies and unrestrained enthusiasm, and be content with the diamond in its rough coat."[31] In the ensuing decades, poets like Walt Whitman would achieve greatness by seemingly distancing themselves from the "graces of style" and embracing what Morse warned against: "wild sallies" and "unrestrained enthusiasm." But again, Morse's struggle is representative. On the one hand was aesthetic training, rigid hierarchies, and European-inflected formulas, and on the other a new, unpredictable, egalitarian American environment.

Morse's call for discipline in the American art scene stemmed from two opposing facts. First, artists were operating in a Puritanical culture that warned against "enthusiasm" as well as Catholic or aristocratic "ornamentation." Morse, as much as any painter, had inherited what Perry Miller calls the "plain style," which defined American aesthetics during the seventeenth and eighteenth centuries.[32] Secondly, Morse knew from experience that talented artists were often required to paint "lesser" subjects like family portraits. Wealthy patrons embraced these types of practical genres and were skeptical of more cerebral, affective paintings. Thus, economic and social constraints challenged painters who tried to embellish their practice. Morse was one of the first to suggest that artists must band together in order to survive in the new and relatively unsupported American art market. This cohort could uphold the principles of "Purity and Taste" and teach the American public how to properly appreciate (and subsequently fund) painters and their paintings.

Morse's discussion of landscape gardening in the *Lectures* is indicative of his desire to teach artists to create landscapes and edify the American public about how to appreciate them. Borrowing heavily from Thomas Whately's *Observations on Modern Gardening* (1770),[33] Morse begins by defining landscape gardening as "the Art of arranging the objects of Nature in such as manner as to form a consistent landscape and requires in the professor a knowledge of all those qualities of objects which give pleasure or pain to the imagination through the sense of sight."[34] In addition to producing pleasure, the proper landscape would refine one's sense of taste. The idea was that fine arts were an important way to reform and polish American peoples and strengthen dominant cultures. While Morse seems to have initiated a public discourse about landscape aesthetics, his work has not, as far as I can tell, been considered in relationship to the vastly more popular landscape theorist of the day, Andrew Jackson Downing. In 1841, Downing published his *Treatise on the Theory and Practice of Landscape Gardening*, which secured him as "the premier apostle of taste" with regard to landscaping. Morse, in his own way, also helped garner appreciation for the art.[35]

For Morse, the only difference between a landscape painter and a landscape gardener is that the latter "paints with the objects themselves." Whether painting rocks and trees with oils or painting with rocks and trees, the goal is to produce pleasure by creating a "consistent" vista. This consistency, Morse explains, is the art of "hiding defects by interposing beauties; of correcting the errors of Nature by changing her appearance." The main objective is "to select from Nature all that is agreeable, and reject or change all that is disagreeable."[36] This statement suggests that Morse believed nature—or possibly the human perception of it—was inherently flawed. The artist's task was to correct its errors and place objects in their correct and polished order. Such an approach seems to be an extension of contemporaneous Dutch and British landscape practices, especially the Claudian mode. The Claudian convention, Novak observes, is "most easily recognized by the trees that frame the picture's lateral edges, as well as by the dark foreground coulisse, the middle ground scoop of water, and the distant mountains."[37] These conventional approaches gave early Americans the sense that they too could provide the controlled and consistent replicas of nature that were being celebrated in Europe.[38] Also, as the son of a Calvinist preacher, Morse likely felt that the selection of smooth, tame, and consistent objects best reflected the power of God's creation. The desirable landscape was designed with proper "arranging" and "selecting," and such an aesthetic, as much as anything else, helped to protect the landscape from the "defective" forces of nature, disordered state of politics, and sinful state of the masses.

Morse's three major landscapes, *The View from Apple Hill* (1828–29), *Allegorical Landscape of New York University* (1832–33), and *Niagara Falls from Table Rock* (1835) embody the artistic selection of consistent, pleasurable parts of nature. *The View from Apple Hill*, which Morse painted during trips upstate in 1828 or 1829, looks out over the Dix family estate in Cooperstown, New York. To the right side is Mount Vision, to the left are a few buildings on the outskirts of Cooperstown, and in the center is Lake Otsego drawing into the mouth of the Susquehanna River. Staiti grants that Morse's landscape has "extraordinary balance, centering, stasis and clarity" but also observes that, in contrast to Cole, who "celebrated the organic, unpredictable, almost mysterious flux of nature," Morse "tamed the ubiquitous wilderness of central New York, made the forces of nature cohere in strict formal patterns, and built a rural paradise in rich classical beauty."[39] Morse's landscape painting displays "consistency" and attempt to "please the imagination" by adhering to objective, aesthetic principles and selecting nature's best parts.

Allegorical Landscape of New York University (Fig. 1) also reveals Morse's adherence to artistic principles but further embellishes an insulated American paradise. On the left is a replica of the University Building designed by Alexander Jackson Davis. To the right, Washington Square has been changed into an Arcadian landscape filled with neo-Gothic Italianate palaces, toga-clad figures, and a statue of Athena standing before a still lagoon. The detailed forms and structures are likely based on sketches Morse made during his second European trip, where, along with Cole, he studied such Gothic structures first-hand. *Allegorical Landscape* was painted around the same time as Cole's

The Arcadian State (1833-1836), and it is plausible that the two artists visited one another's studios in New York.

Cole's painting is almost twice as large as Morse's, but both exhibit a classical framing of space: a body of water at the center of the frame and a looming mountain peak in the distance. Both landscapes are suffused with a soothing, early morning light that seems to reflect a harmony between nature and civilization. These two paintings do have some striking differences. In *Allegorical Landscape* there are no human figures, activity, or signs of labor. The allegory connects New York University to the renowned institutions of Greek thought but fails to make any statement about how New York's intellectual establishment will engage its student body or the rest of the city. The viewer is left to assume that the buildings and porticos are places of learning, but by replacing Washington Square Park with a blank lagoon, the painting downplays or even erases the relationship between the university and the non-university culture of New York. Staiti claims that the "lavenders, pinks, and metallic yellows" constitute one of the most "bizarre palettes" in American landscape painting.[40]

Indeed, some of New York's most colorful mixtures of human creativity and imagination have been gathered in Washington Square Park over the years. Morse's "bizarre" palette seems to have replaced the colorful citizens who have frequented that space. The park's life and activity are wiped clean and replaced with a calm body of gray water that reflects a broad open sky. The painting essentially allegorizes a static, sealed-off wonderland, downplays nature's raw energy, and seems deaf to the political turmoil involved in any place of higher learning. In a sense, it reflects what Morse desired—a place where students and educators intermingle beneath neoclassical architecture, a bubble for artists and intellectuals.

Cole's *Arcadian State* is also pastoral, but it represents a single landscape in a five-part series, a position on the "course," and a transitional moment in a greater historical cycle. The *Arcadian State* draws from the previous painting, *The Savage State* and flows into third painting *Consummation of the Empire*, the fourth, *Destruction of the Empire,* and the series finale, *Desolation*. As the second scene in a narrative that extends far beyond its frame, the pastoral "state," while seemingly peaceful, is one that is about to change, a landscape that must inevitably embrace the "consummation." After this apex, the empire begins to decline. The landscape seems to be spectacularly destroyed in Cole's fourth painting before finally becoming a picturesque, desolate wasteland in the fifth. Therefore, while both Morse's allegorical landscape and Cole's *Arcadian State* are composed with fine colors and exhibit refined compositional principles, most critics have agreed with Phillip Larkin who states that the "garish whole" of Morse's "romantic half-imagined landscape" is further proof of his "inferiority to Thomas Cole." [41]

Larkin's critique hinges on an understanding of the way Morse and Cole "imagined" their landscapes. As my comparison suggests, Morse and Cole used landscape as an allegorical device that could speak to their respective outlooks on nature and American history. In addition, these two specific paintings contribute to our understanding of how the idea of the sublime changed during this period.

Morse's focus on a selection of landscape's pleasurable parts and rejection of its defects limited his attempts to evoke sublimity. Morse realized that landscapes offered opportunities for painters to achieve this state, as evidenced by his 1835 painting, *Niagara Falls from Table Rock* (Fig. 2). This work was completed after Morse returned from his second trip to Europe and may suggest his attempt to share in Cole's and Bryant's success with their large-scale landscapes. The right side suggests a soft and relaxing mood. Two groups of Native Americans stand gazing majestically at the wonder, worshiping nature without dominating the scene. The painting is divided in half by a shadow that crosses from the top of the deluge to the billowing mists, and the top half reveals hints of the sublime: ominous thunderclouds, boiling foam, and the almost conventional trope of the rainbow as if this transparent fluid had emerged from the dark abyss.

This painting has sublime elements, but it seems flat in comparison to the views of Niagara Falls painted by Turnbull and Frederic Edwin Church (Fig. 8). Morse's career shows he could not channel the sublime qualities of nature. He focused on political histories and historical institutions (the United States Congress, Louvre, and New York University). For his contemporaries, Novak argues that the "historical overtures to sublimity" were "readily transferred to the landscape."[42] In other words, during the 1820s and 1830s, painters like Cole and Durand gave the same sublime intensity to landscape as they previously had to religious myth, tragedy, or history. Gnarled branches, steep cliffs, and expansive valleys advanced into the foreground and replaced humans as the primary characters. In these decades Americans felt they could be patriotic by celebrating the *absence* of old buildings and institutions. They turned to landscape painting as proof that their nation was as sublime or more sublime than anything in Europe. I will return to the idea of sublimity, and how painters transferred the American sublime to the canvas near the end of this chapter, but for now, I suggest that Morse, unlike his close friends, failed to make this move. Morse approached landscape painting and landscape gardening as a strictly intellectual process designed to cultivate taste and please the imagination.

Morse's aesthetic prescriptions for landscape were never popular. The American public was not receptive to the particular brand of taste that he tried to disseminate through his landscapes. Cole seems to have shared Morse's attitude in part, lamenting that American audiences preferred "things" instead of "thoughts." Cole's landscapes had a distinct metaphysical purpose that he tried to transmit through forms and figures that would excite broader audiences. His paintings blended the powerful thoughts of nature with shocking views of it. When his paintings were displayed in metropolitan galleries or museums, they seemed to bring the vague, dangerous wilderness into a sharper, tamer focus. Americans wanted their wilderness to be so real and intense that it seemed to spill off the page and threaten to extend beyond the canvas.

It is helpful to recall Durand and Bryant's project, *The American Landscape*. Though not widely popular, the book set the tone for other ideas about American landscape that would develop over the next century. American landscape seemed greater than those of Europe because it reflected the "absence" of cultivation and was oblivious to historical and cultural associations. Artists such as Cole and Durand found success in focusing on such omissions of civilization. They cherished the rugged, unsettled views of what seemed like an undiscovered continent. Morse, by contrast, believed in erasing nature's "defects." It follows that Morse—and subsequent landscape artists such as Downing—believed that "absence" in the landscape was an invitation to refine, parse, and cultivate.

Morse believed that, through institutions like the National Academy of Design, painters and landscape gardeners alike would learn to contribute to the promotion of an elevated art, politics, and culture. He implies as much in his concluding remarks on landscape gardening: “It is he alone who with the ‘prophetic eye of taste’ sees prospectively the full grown forest in the young plantation and *selects* with a poet’s feeling passages which he knows will affect agreeably the imagination.”[43] In Morse’s formula, the gardener, painter, or poet uses poetic vision to “select” parts that “affect agreeably the imagination,” just as the politician, aesthete, or inventor uses his “intellectual vision” to select the parts that “most agreeably” affect the nation. The pieces of nature in Bryant and Durand’s landscapes did not seem to be made up of “select” parts as much as they reflect the free, everyday places of an inclusive, democratic, and boundless country.

Morse’s institutions, affinities, and principles helped develop an appreciation of fine arts in the United States and, more specifically, to initiate discourse about the aesthetics of landscape. Yet Morse was not as successful as his peers at incorporating new forms (including the sublime) into his landscape paintings. He maintained his strict aesthetic principles, which selected objects and arranged them into what I have called an insulated view. This perspective is reflective of a mentality that America was a new republic, a garden that should be cultivated and preserved for and by the elite. Eventually, this attempt to isolate American politics and culture gave way to new developments in landscape paintings and prose, which were marked less by insularity than by conductivity.

After viewing Morse's work at the National Academy exhibition in 1832, Phillip Hone wrote a journal entry about his friend that serves as a good summary of Morse's insulated landscapes as well as a prophetic critique:

> [Morse] is an excellent fellow and is well acquainted with the principles of his art, but . . . there is no poetry about his paintings, and his prose consists of straight lines, which look as if they had been stretched to their utmost tension to form clothes-lines.[44]

Shortly thereafter, Morse turned his full attention to the telegraph—a revolutionary technology that also stretched "clothes-lines" of "utmost tension" into the landscape. The telegraph wires would be a further reminder of the division between selected landscapes and views that juxtaposed nature's absences with the more rugged, electric aspects of the nature-experience. Before the telegraph, electricity was an organic part of nature. Forever after, it was inserted into the landscape in the form of lines and poles, forcing artists to deselect or even erase the electric from their views of nature.

The Wireless Electrification of American Landscape

Morse's landscape paintings and his *Lectures on the Fine Arts* are representative of the "insulated" American landscapes created during the late eighteenth and early nineteenth centuries. Yet Morse is also a valuable figure for talking about the electrification of American landscape—electrification, but not by way of telegraph wires, rather through painting and prose. In 1827, almost five years before he first imagined he could harness electricity and use it to send messages, Morse, still an active painter and president of the National Academy of Design, delivered an address to commemorate the academy's first anniversary. His speech offered a detailed history of art academies in Europe, applauded the National Academy's harmony, and encouraged the gathered group of struggling artists to be patient. It would be difficult, Morse advised them, to turn the

American public toward the subtleties of "Taste," but their genius would eventually persevere. Thus, toward the end of his address, speaking about the difficulties of their profession, Morse declared:

> They are the glory of genius, without which its energy and its brilliancy would pass unnoticed away, like the electric fluid which flows unobserved along the smooth conductor, but when its course is thwarted, then, and only then, it bursts forth with its splendor, and astonishes by its power.[45]

It was a visionary metaphor.[46] In so many words, Morse foreshadowed his future career as an inventor and offered a directive for the next generation of American artists. In the years following this address, Morse's commercial and political failures diminished his drive to become a famous artist. When the idea for an electric communication device operating with a dot-and-dash code struck in 1832, he transformed his art studio at New York University into a workshop where he invented a machine that could send and detect breaks in an electric current. Morse used these breaks to create what he considered "instantaneous" communication. The telegraph earned him the title of "genius" he so badly desired while the wires and poles required for long-distance communication eventually transformed America. Of course, this success was ironic, as Morse's invention allowed individuals to break down the barriers and insularity exemplified by Morse's art, politics, and religious beliefs.

The coupling of artistic genius and electric currents in the "Academies of the Arts" speech represents one of the first instances when an American thinker made the connection between electricity and aesthetics. From the time of Morse's address to the initial proliferation of the telegraph, some of America's most prominent painters and writers tapped the figurative currents that "flowed unobserved" through nature, poetically diverted their course, and let them "burst forth" with astonishing power. As Morse and

European engineers and electricians such as William Fothergill Cooke, Charles Wheatstone, and Alexander Bain raced to harness electricity and perfect the electromagnetic telegraph, artists listening to Morse's speech, such as Cole and Durand, as well as other like-minded writers, such as Emerson, saw themselves as the "conductors" of nature. As they conducted nature's energies, they used metaphors of unharnessed electricity to portray the nation's powerful and immense landscapes.

The remainder of this chapter follows figurative transmissions of electricity through American landscape painting and landscape prose. Statements like those made by Morse are indicative of the way American painters (and especially landscape painters) thought of themselves and their texts as conduits for artistic, moral, and spiritual forces. In Morse's cultural milieu, electricity was a mysterious force responsible for phenomena like the charge, current, shock, buzz, or bolt. Landscape was general enough to be modified by almost any adjective or noun. Thus it was attached to landmarks like a *mountain* landscape, weather such as a *rainy* landscape, or seasons such as a *winter* landscape. Landscape might contain anything, but when filled in the right way, it conveyed a rich and powerful message. For some nineteenth-century artists, electricity signified more than just an affective jolt and landscape was more than a pleasant nature scene: accessing and conducting electric forces through landscape (or *electrifying* the landscape) was the result of an intimate process that aimed to re-create places of mystery, tension, and excitement.

The intersections between electric forces and depictions of landscape can be used to interpret what I call the "metaphorical utility" of electricity and landscape. Metaphorical *utility* might also be thought of as metaphorical *currency*. In everyday language, currency means "the fact or quality of being generally accepted or in use." Metaphorical currency would make a nice pun on the *currents* of electricity. Indeed, it is important to acknowledge that electricity was originally considered to be a fluid, and as the paradigm of electricity-as-fluid began to shift in the nineteenth century, *currents* could be associated with liquid movements, electric forces, or both. Poets and artists used the idea of currents, and especially invisible or undercurrents to refer to seemingly limitless forces that flowed throughout nature. (In Chapter 4, I argue that "currents" of consciousness replace the "stream of consciousness.")

A good example of the multiple connotations of currents is presented in Bryant's poem "The Poet" (1863). Early in opening lines, Bryant notes "the warm *current* tingles through thy veins, / Set forth the burning words in fluent strains." Later, he writes, "Yet let no empty gust/ Of passion find an utterance in thy lay, / . . . / But feelings of calm power and mighty sweep, / Like currents journeying through the windless deep."[47] The currents in the veins and those at the bottom of the ocean act similarly, though their actual substance is markedly different. The "currents" that are transmitted through certain metaphors might involve either liquid or electric movements that are placed in the context of a landscape, whether external or internal (as in the case of the body).

I have selected metaphorical *utility* instead of metaphorical *currents* because the former phrase suggests how concepts of electricity and landscape are used to communicate. When writers use a powerful metaphor, they tap-in, as it was, to the organization of language, the contours of which are continually mutating and evolving. Like a public utility, the organization of language supplies its users or consumers with words or currents that are regulated. Most words have a general use: most outlets have a regulated voltage. This regulated form of transmission does not limit the ways that the electric current or the word can be used (that is, just as humans can plug many different gadgets into a socket, English speakers can place disparate objects into a metaphorical relationship with electricity or landscape).

Words are meant—or at the very least attempt—to convey meaning. A word or phrase that has metaphorical utility is able to aid artists and thinkers as they try to reconcile and convey aesthetic experiences of nature with scientific facts about nature. During the antebellum period, metaphors of electricity and landscape seemed to form a conceptual network that traversed politics, religion, and science. In other words, ideas surrounding electricity and landscape facilitated the circulation of various facts like the way modern day utility companies circulate electric power through a grid. Preceding the decades when electric wires traversed the continent, metaphors of electricity and landscape set up *wireless* power–lines between sites such as Emerson's syntactical landscape fragments and Faraday's "spherules of force," Church's paintings of Niagara Falls and Immanuel Kant's sublime "mind [that] feels itself set in motion."

The following section weaves together three narrative threads that span the late 1820s to the early 1850s. The first features the correlation between aesthetic electricity and charged landscapes; the second, the purposefully alternating or radiating function of the word *landscape* in Emerson's and Thoreau's writings; and the third, the electric qualities of the sublime American landscape, which I separate into "sublime shocks" and "sublime buzzes."

Aesthetic Electricity and Charged Views of Nature

In the first half of the nineteenth century, the fields of science and aesthetics developed in tandem, often using similar approaches in their attempts to find and to reflect on universal truths. Electricity was a force most thoroughly addressed by science, but its study was also influenced by aesthetic principles, and in turn, electric properties provided models for aesthetic theory. The applications of science and aesthetics to electricity and the influence of ideas about the so-called electric fluid on those two fields produced what Paul Gilmore calls "aesthetic electricity." While landscape was a genre with its own aesthetic principles, it was also heavily influenced by scientific studies such as geology, botany, and geography. The combined stimulus of scientific facts and aesthetic feelings produced what I call "electrified landscapes." (These relationships are represented by Fig. 4).

Before discussing the crossovers between aesthetics and electricity, or landscape and science, it is important to note that between the Age of the Enlightenment and spread of American Romanticism, science and aesthetics were both, as Joan Richardson observes, "containers for what theology once held, the excess of experience described by 'more than rational distortion.'"[48] In the eighteenth century, electricity, and especially lightning, was certainly contained by a theological perspective. Edwards sums up this view of electricity: "The extreme fierceness and extraordinary power of the heat of lightning is an intimation of the exceeding power and terribleness of the wrath of God."[49] Gradually, scientists and philosophers began to learn more about electricity and lightning, new discoveries that seemed to give man godlike and sometimes terrifying powers.

Franklin's *Observations on Electricity* (1754) was the first work to define positive and negative charges. In addition to his famous kite experiment, his electrical displays seemed like crowning achievements of the American Revolution and the American Enlightenment. Franklin was emblematic of the informed, powerful, and electric citizen. After the revolution, the myth of his exploits with electricity became even more potent. Franklin had "snatched the lightning from heaven and the scepter from tyrants."[50] The lightning bolt symbolized a brilliant, pervasive, and unpredictable force of the American democracy. Franklin's lightning rod provided protection from electricity, but there was not yet practical use for electricity. The force's powerful connection to divine providence and its uncertain future in the realm of technology made it an effective tool for writers and thinkers trying to channel nature's effects.

As hinted at earlier, Jefferson made an indirect connection between electricity and the ways that political power spread through the colonies. In his autobiography, he recalls the first days of the revolution and "the necessity of arousing our people from the lethargy into which they had fallen." As a sign of protest, he helped organize a day of fasting and prayer, and "the effect of the day, through the whole [Virginia] colony, was like a shock of electricity arousing every man and placing him erect and solidly on his centre."[51] Jefferson presents what began as a religious protest and became a national revolution in terms of electric shocks. The metaphor also suggests how the "electric" came to signify an intangible quality of the American citizen and his or her role in the broader network of democracy.

The empirical study of electricity continued to impart a state of fear and wonder on early Americans. Contact with electric currents epitomized an "excess of experience," and even the removed, objective study of electric currents distorted the Enlightenment's rational, "quantifying spirit."[52] Theories about positive and negative charges as well as displays of static electricity and its animating effects were widely disseminated. Electricity was considered an unstable and dangerous force, but it was also becoming familiar enough to engage "the full range of human concerns—social, political, philosophical, and religious."[53] Electricity was visibly powerful but empirically and epistemologically unstable.[54]

Scientists and natural philosophers struggled to get a clear view of this pervasive, elusive force, and this challenge had broader implications about what theologians believed about God and the universe. What we now term "static electricity" displayed electricity's pervasiveness, while the electric bolt displayed its explosiveness. The findings of Hans Christian Oersted and André-Marie Ampère linked electricity to magnetism and suggested that electric currents suffused the universe. Such discoveries supported the notion of God as a fine, universal electric fluid. Experiments like those performed in 1834 by the British physicist Wheatstone found that electricity was faster than the speed of light.[55] The idea that electricity was faster than light (which, as we now know, is not true) made it seem even more powerful and pervasive and thus complicated the Christian trope of God-as-light-of-the-universe. In addition, the links between electric currents and the nervous system suggested the intricate design of living bodies, each of which seemed imbued with a divine spark. Indeed, electricity, in part due to its flexible, unstable expressions, was the source of both uplifting as well as threatening messages about the relationship among the limits of human knowledge, God, and nature.

As the source of mysterious, potentially ominous messages and transmissions, electricity, in all its shapes and forms, inspired general awe and demanded a certain reverence. Astronomers studying the cosmos and neurologists studying consciousness still display such respect for the unknown, but electricity is no longer seen as the popular enigma that it was two hundred years ago. In the past, discovery of electric properties such as magnetic induction or animal magnetism seemed akin to revelation, insights into the workings of the universal ether that connected the material to the divine.[56] T. Gale, an electro-therapist operating in upstate New York at the beginning of the nineteenth century, wrote that "the first cause of motion" was God, the second, electricity or the "ethereal fire," which could "produce and support all life throughout all nature."[57] James Delbourgo explains that for many Enlightenment thinkers like Cotton Mather and post-Enlightenment thinkers like Gale, "the relationship among God, electricity, and the soul" was the universe's ultimate mystery.[58] In the presence of such a religious and epistemological enigma, scientists searching for the truths about electricity often considered themselves similar to ministers searching for revelations in the Book of Nature.

During the 1790s and early 1800s, scientists such as the Italians Luigi Galvani and Alessandro Volta argued about the relationships between artificial (or manmade), natural, and animal electricity. Their debates helped initiate the study of electromagnetism on both sides of the Atlantic. Galvani believed that the brain secretes an "electric fluid" that flows through the body, stimulating the nerve fibers. Volta was skeptical of the animal source of electricity, and in attempts to prove Galvani was wrong, Volta created "artificial" currents by laying down layers of zinc and copper into what is now called a "Voltaic pile." This invention was one of the first powerful batteries, and a practical use for electricity now seemed within reach. Performances featuring electric batteries or and feats of mesmerism increased the frequency with which English speakers described thoughts and feelings in terms of electricity. Electricity continued to connote a spiritual presence, an intersection between the material and the metaphysical, but secular expressions of electricity allowed metaphors to emerge from some of their typological associations. Thus, artists and philosophers began using electricity to think about some of spiritual qualities in various works of art.

Morse's statement in "Academies of the Arts" about electric current "bursting forth" suggests that the presence of electricity in fine arts like painting is an indication of genius. Emerson makes a similar connection in his 1838 speech, "Literary Ethics":

> The mark of American merit in painting, in sculpture, in poetry, in fiction, in eloquence, seems to be a certain grace without grandeur, and itself not new but derivative; a vase of fair outline, but empty,—which who so sees, may fill with what wit and character is in him, but which does not, like the charged cloud, overflow with terrible beauty, and emit lightnings on all beholders.[59]

Emerson suggests that American art lacks "grandeur." Once the American arts meet the mark of eloquence, grandeur, or genius, then they would, in Morse's terms "burst forth," and, in Emerson's, "emit lightnings." Morse uses a controlled, technological image (smooth conductor) and Emerson offers an effervescent, natural image (charged cloud), but both authors imply that when Americans do create great paintings and poems, these works will be recognized because of their ability to generate a feeling that is similar to that felt when watching electricity erupt from a circuit or tear across the sky.

Emerson's most distinct figuring of the artist or poet as a conductor of electricity was published in 1844, the same year Morse sent the first official telegraph message. In "The Poet," Emerson states:

> Doubt not, O poet, but persist. Say, "It is in me, and shall out." Stand there, balked and dumb, stuttering and stammering, hissed and hooted, stand and strive, until, at last, rage draw out of thee that dream-power

> which every night shows thee is thine own; a power transcending all limit and privacy, and by virtue of which a man is the conductor of the whole river of electricity.[60]

Refining and calibrating the internal explosions of dream-power, the poet transmits the "river of electricity" through his poems. Emerson's call for the painter or poet to be a conductor of electricity proves that, even before the telegraph, the language of electricity was a valuable way to see and interpret nature.

These passages from Morse and Emerson were recently cited by Gilmore to support his argument about the correlation between electricity and aesthetics. Gilmore's *Aesthetic Materialism: Electricity and American Romanticism* (2008) makes a number of convincing links and presents a trans-Atlantic cast of poets, aestheticians, scientists, and philosophers, including Humphry Davy, Samuel Coleridge, Mary Shelley, Edgar Allan Poe, Whitman, and Frederick Douglass. Gilmore describes the metaphors of "aesthetic electricity" as "a distinct strain of romantic thinking" that emerged from literary, popular, and scientific understandings of electricity.[61] The sensuous experience of the aesthetic initially fostered a sense of "subjective universality" that seems to lie outside both society and politics, but after the shock subsides, this subjectivity "inexorably moves towards the recognition of a larger community and the recognition that others might not share the reaction."[62] In order to examine the material and bodily aspects of this electric subjectivity, Gilmore claims it is "essential" to "bracket aesthetic experience as distinctly pre-political, as occupying a moment determined by socio-historical conditions yet yielding no definite political effect in and of itself."[63] This bracketing is part of his larger project to explore a theoretical approach he defines as "aesthetic materialism."

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Before continuing, it is useful to address Gilmore's argument and other recent studies of how electricity influenced ideas in nineteenth-century American culture. Gilmore analyzes the metaphors of electricity from the early nineteenth century (when it was still unharnessed and did not have a widespread material use). Gilmore then uses these "bracketed" instances to understand electricity's political and cultural effects both before and after the advent of the telegraph, which provided an entirely new code through which to understand and situate the electric experience. While notions of the "aesthetic electricity" formed in the early part of the nineteenth century persisted, wires and electric technologies majorly influenced how the electric intersected with concepts of space, nature, and landscape.[64] Gilmore admits: "With the invention of the telegraph and its use in the growth and development of global markets, the figure of electricity increasingly represented sophisticated market methods and mechanism."[65] I agree. Morse described his invention as a new "system of signs," which instantaneously transmitted intelligence and changed the nature of communication, commerce, and culture. It revolutionized what Gilmore calls the figure of electricity and the way it was used as a metaphor for aesthetic experiences of nature. In other words, the telegraph permanently altered the meaning and use of *electricity* as a way of understanding nature.

Gilmore also writes that the telegraph as a cipher for electricity conflated the "figural and the literal (or material)," and this fusion "parallels the imprecise nature of aesthetic experience."[66] His argument is valid in a few specific instances, but the notion of aesthetic experiences as "electric" became more frequently cited and experienced after the advent of electric technologies like the telegraph. The telegraph offered a clear material and commercial application of electricity. It was a model for how to transmit something "electric." Linked to ideas of the divine (as suggested by the phrase "lightning lines"), it also amplified the possibilities for political cohesion as well as fears about unequal distributions of information and wealth. Communicating with a family member across the continent could be as easy as tapping a key. Buying and selling commodities could be done invisibly. Battles could be won or lost through the manipulation and control of telegraph wires. Some Americans celebrated the invention as the crowning achievement of American science and technology, but others were more skeptical of the destabilizing effects of instant, invisible messages.

The proliferation of the telegraph and subsequent telephone and power line networks changed the affects and associations produced by electricity. Metaphors of electricity increasingly entwined the ambiguous politics of recognition in communities divided by class, race, gender, and other identifications and demographics. A statement such as "Her art generated electricity" has a different meaning in a "wired" society. Therefore, instances of the language of electricity cannot be simply "bracketed" from their techno-historical context. The aesthetic experience of electricity after the telegraph inherently merges with the coded, somewhat controlled transmissions of text (in the form of dots and dashes) and power (in the form of both electricity and information). If it were possible to bracket an experience of electricity from its political and technological effects (and this is a big if), it seems that such a move would be more effective if it were limited to the period before, and the places beyond, the influence of popular electric technologies like the telegraph.

Before the telegraph, electricity as unharnessed energy was not associated with any specific, technologically engendered code. Again, religious beliefs as well as theories about animal magnetism heavily influenced the idea of electricity, but, at that time, from the view of science and technology, it was still an unharnessed, organic force. Electricity was produced in the sky, the layering of different chemicals, and movements within the nervous system—not through wires crisscrossing the horizon. Gilmore deserves credit for publishing one of the first book-length studies of how concepts of electricity influenced Romantic aesthetics. Rather than reexamine the ways artists and writers experienced electricity and separated their individual "bodily physicality and socio-historical materiality" from the "political effects" of their art, this discussion tries to understand how writers, philosophers, and artists experienced electricity as a part of the landscape. More specifically, this chapter looks at the ways electricity factored into concepts of landscape in the time before and the spaces beyond the all-entwining Line. (Thoreau was especially aware of this transition, and, in Chapter 2, I show how Thoreau's engagement with a wireless, electric landscape versus a wired, machinated one reflects contemporaneous responses to the presence of electric wires in nature. For Thoreau, telegraph wires were indicative of the broader changes to the aesthetic, industrial, and epistemological landscapes of the late nineteenth century.)

Furthermore, other recent scholarship has focused on how electricity's scientific, pseudo-scientific, and technological expressions affected American art and literature after the advent of the telegraph. Sam Halliday's *Thinking and Writing Electricity* (2007) draws a line from the authors of the American Renaissance to their late-nineteenth- and early-twentieth-century heirs such as Mark Twain and Henry James. Gilmore argues that for these writers electricity was "both a means and end of thought: simultaneously a means of representation and an object of representation." Halliday continues, "The conceptual resources that science and technology made available" allowed electricity to become something "to think about and *with*."[67] Technologies like the telegraph and telephone offered models for thinking about and with electricity, but before electrical networks became a ubiquitous part of American culture, the technological or utilitarian manner of thinking about electricity was not as accessible or potent. Ideas and feelings of electricity that evoked an "excess of experience" were not readily associated with ideas about communicating through wires or receiving coded messages from distant, invisible sources. Therefore, the non-technological, "pre-wired" meanings and forms of electricity are important to understand how the telegraph was eventually received.

Finally, it is worth mentioning that Delbourgo, Gilmore, Halliday, and Laura Otis have already shown how electricity challenged the way Americans thought about their bodies. Volta's and Galvani's research on animal magnetism and the relationship between electricity and nervous impulses suggested that electricity was a vital fluid, and thus a dead body literally lacked electricity. Mary Shelley's *Frankenstein*, first published in 1818, most famously displays the notion of electricity as life force.[68] This connection survives today in the way we refer to a battery as being "dead." In addition, from the pseudosciences of mesmerism, early-nineteenth-century Americans understood that a powerful, magnetic mind could assert itself on and possibly even control another human being's consciousness. Poe's "Mesmeric Revelation" (1850) also suggests the popularity of such pseudoscientific ideas.[69] The study of bodily, political, and epistemological affects of electricity all enhance my argument about the metaphorical utility of "electricity," but for now, I hope to extend the discourse that Otis, Delbourgo, and Gilmore, and Halliday map out by using these historical ideas about electricity to think about the creation, development, and affect of the nineteenth-century American environment.

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Electric Brushes, Pencils, and Eyeballs

With prompts from Emerson's and Morse's influential voices, American artists began to embrace the scientific and pseudoscientific notions about electricity circulating throughout the United States and Europe. The idea of electricity was first linked to the powers of art and artists around the same time that science was used to heighten the rhetorical powers of landscape. Cole's "Essay on American Scenery," published in 1836, reported on the "quickening spirit" found in nature. He cited one rare moment of sublimity "such as I have rarely felt," when the rocks, wood, and water "brooded the spirit of repose" and "the silent energy of nature stirred the soul to its inmost depths."[70] This statement seems to prove Staiti's claims that "[Cole] celebrated the organic, unpredictable, almost mysterious flux of nature."[71] The "mysterious flux," which Cole calls "silent energy," is intended to alert would-be landscape painters to look for and cherish the invisible powers of nature, but a similarly silent, mysterious, fluctuating energy was also being expressed through the theories of electromagnetism.

One way to better understand nineteenth-century American landscape is by tracing and defining the way the nation's landscapists viewed the energies understood to be underlying natural processes like growth and erosion. Emerson's study of electricity, for example, had a profound effect on how he interpreted the natural world. Inspired by the scientists of his day, including Humphry Davy and Michael Faraday,[72] Emerson was intrigued by the argument that all matter in the universe was held together by invisible forces. He wrote in an 1833 journal entry about the "long expected discovery of the identity of electricity and magnetism lately completed by Dr. Faraday." The forces that created lightning bolts in the sky and in Leyden jars were somehow related to the deep, sublime forces, which spin the earth and move the ocean's tides. For Emerson, this scientific discovery was like a particularly jarring "paragraph of a newspaper" or an "eloquent word." Such phenomena "touch us so to the quick," as if we have discovered "the secret mechanism of life and sensation."[73] Faraday's work seemed to hold some valuable key, and Emerson had the *feeling* that this information would help him and others unlock more secrets of the universe.

In "Poetry and Imagination" (1872), Emerson writes: "Faraday, the most exact of natural philosophers, taught that when we should arrive at the monads, or primordial elements, . . . we should find not cubes, or prisms, or atoms, at all, but spherules of force."[74] Emerson goes on to speak about the "currents" that exist in all thoughts, the "electric word pronounced by John Hunter," and that "galvanism, electricity, and magnetism are varied forms of the selfsame energy."[75] Strong attraction to Faraday was generated between *Nature* (1836) and *Essays: Second Series* (1844). During this eight-year period, the scientist was actively investigating the physical existence of what he termed "lines of force," or what are now referred to as "magnetic fields." His investigations of these "spherules of force" certainly touched Emerson, both expanding his thought and making his mind feel quick.

Faraday devised tests to determine how an electric current's direction and intensity relates to its corresponding magnetic field's size, magnitude, and shape. He argued that speculations concerning the form and qualities of electromagnetic fields surrounding a current, even if they proved to be false, were “useful in rendering the vague idea more clear for the time, giving it something like a definite shape, that it may be submitted to experiment and calculation.”[76] (Attention to the “vague” as the source and site of experiment is also a primary intention of William James’s *The Principles of Psychology* (1890)—“the reinstatement of the vague to its proper place in intellectual life.”)

Faraday’s theory about the “lines of force” surrounding an electric current can also be used to think about what Teresa Brennan has recently theorized as the “transmission of affect.”[77] Faraday explains that, since ancient times, philosophers and scientists have studied “forces acting at a distance.” It was now time, he felt, to turn attention toward the “manner” in which these forces are transmitted. Faraday continues:

> And even when [the philosopher] can learn nothing of the manner, he is still able to make clear distinctions in different cases, by what may be called the *affects of the lines of power*; and thus, by these and other means, to make distinctions in the nature of the lines of force of different kinds of power as compared with each other (emphasis mine).[78]

Varying forms and intensities of electric currents create different lines of power. Sketches of these invisible lines offer an idea about the shape and size of magnetic fields. In this passage, Faraday is using “affects” to describe the way electric currents reveal an action at a distance. But we might see how such phrases as “the affects of lines of power” took new shape in Emerson’s fertile philosophical mind and made him feel Faraday’s idea. Like electromagnetic fields, pain, happiness, confusion, and other affects still come to us suddenly and inexplicably as if from an undisclosed location, but during the late Enlightenment, natural philosophers began to study the “manner” in which such affects were transmitted.

Emerson was especially acute at following the epistemological and emotional lines of power, noting how they were transmitted through his body and the landscape. In "Nature," Emerson relates the act of reasoning to "an instantaneous in-streaming causing power."[79] In "The Divinity School Address" (1838), he urges his audience to "see how this rapid intrinsic energy worketh everywhere, righting wrongs, correcting appearances, and bringing up facts to a harmony with thoughts."[80] Broadly stated, an important part of Emerson's mission is the definition and reproduction of the lines and fields coursing through history, language, and nature.

Emerson and other philosophers of nature were jolted by Faraday's electric ideas, and painters and other visual artists were also interested in discovering the invisible forces that lay beneath the visible landscape. Novak observes:

> The American sciences and the art of landscape painting developed rapidly and concurrently. Botany, zoology, meteorology, astronomy, geography, geology, emerging from under the rubric of natural philosophy and natural history, separated out into quickly moving currents.[81]

The American landscape was a site of discovery and interpretation for both artists and scientists. Geographers and plein air painters framed and defined particular places with pictures, data, and maps. Reports about vegetation and climate influenced renderings of valleys, mountains, and forests. A shared body of literature and operated within similar modes of questioning affected the act of sketching a field and surveying a piece of land. The botanist and the landscape painter attempted to incorporate their initial impressions of a tree or flower and view it comprehensively. Novak writes: "It was the artists' task, as much as the scientists', to discover and interpret the truths of nature."[82]

Novak goes on to show how geology, botany, and evolutionary biology influenced American landscape painters. Benjamin Silliman, one of the first famous

American geologists, saw a prehistoric record of divine creation etched into every rock, river, and canyon. Cole, Durand, Trumbull and other landscape artists familiar with Silliman's work were inclined to view nature in similar terms. They tried to create a lasting, meaningful record of mountains and valleys in their canvases. Rocks were meant to evoke a sense that the landscape has been shaped throughout the ages.

If, as Novak suggests, scientists such as Silliman, Charles Darwin, Lyell, and Humboldt offered "a scientific frame of reference through which nature's basic working principles could be grasped and made a part of the work of art,"[83] then scientists such as Volta, Oersted, Faraday, and Joseph Henry animated that scientific frame with facts about the quickly moving currents coursing throughout nature. As artists learned more about the "electric" qualities of matter, American landscape paintings seemed to be supported by scientific facts. Discoveries of "magnetic fields" converged with aesthetic injunctions to seek out what Emerson called the "rapid intrinsic energy" working everywhere.[84] Together, science and aesthetics set in motion a process that might be referred to as land-*scaping*.

Recall that *landscape* is a constructed view of the earth's surface. The artist's drawing of Niagara Falls, the botanist's description of the Everglades, and the poet's rhetorical use of "landscape" not only reflect a particular place but also the result of a process. These lenses of science and the tools of the artist are embedded in the act of landscaping. Presenting the landscape as something "new," the "undiscovered," and the "virgin" has become an American tradition; we draw the public's attention to nature's overlooked, wild, untamed features of this great and complex continent.

Thus, during the mid-nineteenth century, American painters, poets, and prose writers working in Romanticism tried to move beyond a two-dimensional view of the facts in nature and present a three-dimensional experience of an environment. They aimed to include themselves and their audiences in the act of landscaping to bring movement into their vistas, making the facts seem to come alive.

These living American landscapes were also used to promote political agendas and industrial progress. The artistic depiction or figurative creations of landscape invited farmers, politicians, engineers, and entrepreneurs to shape their own, real-life replicas. Indeed, Jacksonian-era policies geared toward westward expansion, industrial development, and Indian removal were all part of a general mission to tame and create the lands "owned" by the United States. Paradoxically, America's most famous landscape artists and writers often rallied against the creation or occupation of new lands whether by industrial advancements like the railroad or political maneuvers like the Annexation of Mexico. Cole, Emerson, and Thoreau tried to bring attention and value to the uncharted and seemingly uninhabitable places. They resisted the notion of owning the landscape. Their goal was not to frame or document a place and thus prepare it for settlement or statehood. They wanted to bring the viewer or reader into the canvas or the page, re-create the roar of a waterfall or the feeling of a tree bark covered with dew, and inspire the audience to behold nature's wonders.

As American writers began to have more electric ideas and painters became more cognizant of the "lines of force" in the landscape, electricity became a more rich and potent metaphor. It could straddle the boundaries between order and disorder; the stable, sterilized view and the rugged, destabilized whole; the solitary, obedient self and the bombastic Over-Soul. Electric language could both mark and illuminate the vague and sometimes painful thresholds that an individual confronted in the wilderness. It was an invisible force that, if one looked closely or with a certain lens, could be seen working everywhere and in everything.

Electric Landscapes in Emerson and Thoreau

Electricity provided a schema that uncovered an entirely new layer of nature. The presence of such forces is represented by the way the word *landscape* operates in Emerson's and Thoreau's prose. According to Eric Wilson, Emerson's study of science and natural history between 1832 and 1836 inspired the young Unitarian minister to formulate his own "sublime science." The essay, like the forest, was Emerson's laboratory, and he "came to believe that words should operate like electricity."[85] Wilson focuses on Emerson's electric words, like *spirit*, *energy*, *force*, *attraction*, *repulsion*, *current*, and *electricity* for they signal a "deliberately shocking syntax" that was crafted in order to "shock and attract [readers] into an awareness of the relationship between matter and spirit."[86] More specifically, Wilson says that electric words charged Emerson's composition of "Nature":

> Soon after learning of Faraday's model of matter, [Emerson] began to equate strong writing with electricity, wishing his words to imitate the scientist's grain of water by containing the charges of lightning. The result of this electromagnetic poetics is *Nature*, whose tropes are conductors of electricity acting upon one another as if they are electric charges of force, not units of a linear argument. Nature's electric tropes work to shock readers into theoptic moments.[87]

Ideas about electricity, especially Faraday's theories about electromagnetic currents, affected Emerson's idea of the landscape and these charged views filtered into what and how he wrote about nature. One of his most famous passages is an outgrowth of this electrical thinking:

> In the woods, we return to reason and faith. There I feel that nothing can befall me in life,—no disgrace, no calamity, (leaving me my eyes) which nature cannot repair. Standing on the bare ground,—my head bathed by the blithe air, and uplifted into infinite space,—all mean egotism vanishes. I become a transparent eye-ball; I am nothing; I see all; the *currents* of the Universal Being circulate through me; I am part or particle of God.[88]

The circulating "currents" from the transparent-eyeball passage may refer to either electric currents or to a liquid current. In light of ideas about electricity as the animating force of all living things, it seems that when Emerson *feels* currents circulating through his body, he is most likely feeling and thinking in terms of electricity. In addition, having become versed in Faraday's writings about electromagnetism, Emerson understood that silent, invisible electric currents circulated beneath the calm surface of all visual elements (such as rocks, trees, lake, or sky), and these currents extend throughout the "Universal Being." Wilson is right to link this passage to Emerson's understanding of electromagnetism and his notions of the sublime. In the next section, I hope to enhance Wilson's reading by showing how Emerson's texts transmit a "sublime shock" and a "sublime buzz." For now, I would like to redirect attention to the "landscapes" in Emerson's text. Acknowledging his appreciation for Faraday's research gives such passages a rhetorical resonance and offers a better understanding of what Emerson means when he says he is "part or particle of God," but it is also instructive to note where his electric experience takes place.[89]

The parallels between Emerson's electric language and his process of landscaping are indicated by the meanings and uses of *landscape* in his seminal essay "Nature." "Landscape" appears four times, more often than the words "God" (3), "poet" (3), "mind" (3), or "beauty" (2). The only words Emerson repeats more often are "nature" (13) and "man" (12). Walking across the "bare common" and being "in the woods" incite

Emerson's most electric, transcendental experiences, but specific references to "landscape" signal a synthesis of matter and spirit, man and nature. Indeed, the meaning of "landscape" alternates, much like Emerson's other "electric words." For instance, the "transparent eyeball" passage concludes:

> In the wilderness, I find something more dear and connate than in streets or villages. In the tranquil landscape, and especially in the distant line of the horizon, man beholds somewhat as beautiful as his own nature.[90]

Here, "tranquil landscape" does not exactly mirror the beauty of man's nature; it is "somewhat" as beautiful. The "somewhat" obfuscates the relationship between man and landscape. At first, the reader might assume that "somewhat" is an adverb, which would imply that Emerson believes man's nature is inherently *more* beautiful that the *somewhat*-as-beautiful landscape. But based on other instances of "somewhat" in Emerson's writings, the word seems more like a pronoun, or "something."[91] A new meaning emerges with the substitution of "something" for "somewhat." The beholder sees something like his own nature in the tranquil landscape, but landscape is not always an exact replica of his inner nature. In addition, neither man's nature nor landscape is a fixed or solitary thing, but a vaguer, interconnected "some" thing.

The second and third instances of "landscape" are based on the idea that viewing nature requires a discriminating aesthetic. Emerson states:

> The *charming landscape* which I saw this morning, is indubitably made up of some twenty or thirty farms. Miller owns this field, Locke that, and Manning the woodland beyond. But none of them *owns the landscape*. There is a property in the horizon which no man has but he whose eye can integrate all the parts, that is, the poet. This is the best part of these men's farms, yet to this their warranty-deeds give no title. To speak truly, few adult persons can *see* nature.[92]

Emerson sees a "charming landscape" in the morning but later reassesses the situation and realizes that the individuals who own those charming farms do not "own" their landscapes. These farmers are, in a sense, charmed into the false notion that their warranty-deed grants them ownership of the landscape, but they do not own nor can they see "the best part of [their] farms." Only a few adult persons, indicated by their poetic vision, can secure that "property in the horizon."

Note that for Emerson, the metaphysical ownership of a landscape is not the same as creating one on a canvas. Emerson believes that landscape painters use poetic vision to find the best expression of nature, much like a poet writing about the landscape. In the essay "Art" (1841), Emerson writes:

> In landscapes, the painter should give the suggestion of a fairer creation than we know. The details, the prose of nature he should omit, and give us only the spirit and the splendor. They should know that the landscape has beauty for his eye, because it expresses a thought which is to him good: and this because the same power which sees through his eyes, is seen in that spectacle; and he will come to value the expression of nature, and not nature itself, and so exalt in his copy the features that please him.[93]

Recall that for Morse, selecting certain parts of nature allows the landscapist to "affect agreeably the imagination." For Emerson, valuing the "expressions of nature" and not nature itself helps the landscapist "give us only the spirit and the splendor." What Emerson calls the painter's "abridgement and selection" is not the same as the poet's call to "integrate" what can be seen in nature. The distinction between painterly selection and projection onto a canvas and the act of poetic ownership seems contingent on the landscaping process.[94] The landscape painting offers a valuable expression of nature, but the landscape that none of the farmers can own is produced by a proper metaphysical adjustment with nature which is beyond their imagination. The goal is to access what Emerson calls the "power which sees *through* his eyes." This approach seems to be a call to embrace Eastern philosophy as well as Native American beliefs: lands, and landscape, are sacred objects that no man owns. The earth is more than physical places composed of various states, nations, or parts. Nature's landscapes are created through the sensual, spiritual, and cultural aspects of experience.

The aesthetic function of this experience is reinforced in the essay "Beauty" (1860). Emerson explains that "by the mutual action of [the eye's] structure and the laws of light, perspective is produced, which integrates every mass of objects, of what character soever, into a well colored and shaded globe, so that where the particular objects are mean and unaffecting, the landscape which they compose is round and symmetrical."[95] Returning to "Nature," we see that the poet's integration of "particular objects . . . mean and unaffecting" earns him a figurative deed to the "round and symmetrical" composition set before his eyes. It is not just that the collection of parts is greater than the whole, but that the eye actually works to make what comes into our field of vision into a whole. To secure that important "property" of landscape and feel the currents that circulate through the universe, the person looking at nature must be attuned to pervasive, undulating objects and unseen frequencies. Then, the poet can conceptually integrate the rippling, concentric "circles" of experience, language, soul, and nature.

The fourth instance of landscape in "Nature" returns to the idea of calibrating the self in order to see landscape. "Nature always wears the colors of the spirit," Emerson says. "To a man laboring under calamity, the heat of his own fire hath sadness in it. Then, there is a kind of contempt of the landscape felt by him who has just lost by death a dear friend. The sky is less grand as it shuts down over less worth in the population."[96] A landscape might contain parts of land or sky, but an individual's particular situation affects the meaning he or she draws from those framed elements. As a frame for nature and the container of human nature, the landscape "wears" the "colors of the spirit."[97] Human attitudes or emotions mix with natural elements and together they clothe the landscape. In certain emotional states, such as "laboring under calamity," the landscape may be clothed with false or backward images, so that even fire seems cold. Other emotional states, such as the one following the "death of a dear friend," might transform what we see when we look on a field or forest. Then, the landscape will seem unconcerned and impervious to our own painful circumstances. It will evoke "a kind of contempt." In short, the same landscape might be brightened or darkened by the mood of the perceiver.

Emerson's use of *landscape* in his essays suggests that it was like a microcosm of his broader philosophy. To review: The currents of the Universal Being are accessed through a fluctuating, multilayered landscape. Secondly, nature's spirit is replicated in the landscape, but that replica is something like man's nature. Finally, the individual projects his or her mood onto the landscape. Accessing the Universal Being, nature's spirit, or the medium between man and spirit through the landscape (and to thus "gain an original relationship to the universe") requires aesthetic vision and metaphysical integration, which are susceptible to individual moods and circumstances. Together, these three distinct uses of the term call for the individual to calibrate him or herself to nature's "universal currents," which seem to alternate like electric currents. Indeed, the landscapist must first acknowledge that the energy of nature shifts back and forth in order to make the self a conductor of visible parts and invisible forces.

Emerson's most famous literary disciple, Thoreau, also embraced the unharnessed, electric qualities of landscape and expressed his devotion to creating them through his prose. In the chapter of *Walden* (1854) titled "Where I Lived and What I Lived For," Thoreau admits that he was "a sort of real estate broker" before he built his cabin at Walden Pond:

> I walked over each farmer's premises, tasted his wild apples, discoursed on husbandry with him, took his farm at his price, at any price, mortgaging it to him in my mind; even put a higher price on it—took everything but a deed of it—took his word for his deed, for I dearly love to talk—cultivated it, and him too to some extent, I trust, and withdrew when I had enjoyed it long enough, leaving him to carry it on.[98]

The underlying idea is similar to Emerson's: none of the deed-possessing farmers whom Thoreau interviews actually "own" their landscape. Instead, Thoreau gains ownership of this poetic quality of each farm, and thus after withdrawing and letting the farmer "carry it on," he states, "Wherever I sat, there I might live, and the *landscape radiated* from me accordingly."[99] The "radiation" of landscape seems akin to electric phenomena such as magnetization, attraction, or repulsion. (Emerson writes in another essay from *Nature*, "Discipline" (1836): "The moral law lies at the centre of nature and radiates to the circumference."[100]

As the landscape-force is emitted from his body, Thoreau seems to be energizing his surroundings by creating his own magnetic field. The landscape he sees is a plastic, charged panorama. The places and objects fixed around him might be trees, farms, or farmers, but his creative force, which, like light or electromagnetic waves, radiates the landscape. In the Chapter "Sounds," Thoreau relates how the railroad offers the individual a chance to show up at a particular time and hour and be "shot towards particular points of the compass." However, such predetermined trajectories provide only a fraction of fate's paths: "The air is full of invisible bolts. Every path but your own is the path of fate. Keep on your own track, then."[101]

Thoreau's attention to the radiating quality of landscape and invisible bolts in the atmosphere illuminate his relationship to land, land ownership, and labor on the land. After surveying and imagining the purchase of all the farms around Concord, Thoreau finally agrees to buy one from a local man named Hollowell. They reach a verbal agreement, but then Hollowell changes his mind. He returns to Thoreau hoping to annul the contract. Hollowell even offers to pay Thoreau ten dollars for the inconvenience. Thoreau confesses to his readers that when he agreed to buy the farm, he only had "ten cents in the world" and so he releases Hollowell from the contract without penalty. Thoreau tells the unfortunate farmer to keep the ten dollars as a present. Reflecting on the series of events in which he "owned" a piece of land and then "gave away" ten dollars, Thoreau writes: "I had been a rich man without any damage to my property."[102] Relieved of the burden of proprietorship, Thoreau finds himself a "rich man" because he could give ten dollars to a poor man like Hollowell. (Despite the apparent generosity, Thoreau likely believed that neither a farm nor ten dollars will do much good for any man who is a "hollow well.") At the end of the anecdote, Thoreau gestures to another benefit of the failed transaction, concluding:

> but I retained the landscape, and I have since annually carried off what it yielded without a wheelbarrow. With respect to landscapes,
>
> > "I am monarch of all I *survey*,
> > My right there is none to dispute"[103]

Once again, owning a farm is not the same as owning a landscape, which is a farm's "most valuable" feature. Thoreau extends the Emersonian metaphor of a poet's claim to "that certain property in the horizon" by implying that it can be carried away and cultivated until it offers a yield. Thoreau sees the poet's warranty-deed to the landscape as a poetic investment from which he will gain an annual return. His coffers contain so many "valuable parts" of the landscape that he is like the undisputed ruler of all he sees as he makes his daily rounds.

Thoreau radiates landscape and carries off its yield. These seemingly disconnected activities actually provide insights into his beliefs about individual agency and the poetic activity of landscaping. The landscapes in his essays as well as those around Walden Pond both offer a metaphysical frequency. His alternating perspectives charge the landscape. As "self-*appointed* inspector of snow storms and rain storms" and "*surveyor* of forest paths,"[104] Thoreau depicts with keen sensitivity the faint changes in the physical environment as well as shifts in his point of view. Consider the following description from *A Week on the Concord and Merrimack Rivers*:

> Sitting with our faces now up stream, we studied the landscape by degrees, as one unrolls a map, rock, tree, house, hill and meadow, assuming new and varying positions as the wind and waters shifted the scene, and there was enough for our entertainments in the metamorphoses of the simplest objects.[105]

The particular landscaping process begins with a scientific approach, a study undertaken "by degrees," that tries to "unroll" the objects in the landscape as one might unroll a map. The wind and water "shift" the scene. Attention to the effects of such changing currents provides a renewable source of entertainment, which might be another way of saying that it offers a "yield" that can be carried off without a wheelbarrow. Such passages also seem to support John Conron's claim that "nineteenth-century writers learned how to collect a landscape around movement. . . .Movement energizes the heart of the sentence."[106]

In the passage quoted above, the dual movements of sentence and landscape unroll by degrees, the waters and winds subtly shifting the scene and carrying the sentence from "stream" to the stream's "degrees" then to "shifted . . . scene" before reaching its final resting place, which is, paradoxically, the statement that evokes a drastic movement and change: "the metamorphoses of the simplest objects." From his canoe, Thoreau watches as the wind and water subtly wave across the landscape, seeming to animate every object in their wake. These calm, steady movements turn the immediate environment in an active hallucination. In the next moment, a shift in Thoreau's point of view produces a more drastic, sharp effect:

> As if our birth had at first sundered things, and we had been thrust up through into nature like a wedge, and not till the wound heals and scar disappears, do we begin to discover where we are, and that nature is one and continuous everywhere. It is an important epoch when a man who has always lived on the east side of a mountain, and seen it in the west, travels round and sees in the east. Yet the universe is a sphere whose center is wherever there is intelligence. The sun is not so central as a man.[107]

Thoreau implies that the perceiver's movement, in this case to the other side of a mountain, can dislodge all previous experiences, transforming the landscape "commonly known" into a site of shocking recognition. (This passage also hints at Thoreau's reading in Eastern philosophy, which shifted his perspective of nature from "West" to "East.") The allegory reinforces this shocking view of the landscape: birth is a "sundering" through which man is "thrust up into nature." Only after this rupture has scarred and healed can we "discover where we are" and thus find an intelligent center. The last line—"The sun in not so central as man"—should also recall the notion of the self as a central source of energy from which landscape "radiates."

Emerson's and Thoreau's uses of the word *landscape* represent the ways they labored with language, pushing, pulling, and retooling their words and sentences to make them powerful conductors of nature. In general, Emerson presents landscape as a fluid, aesthetically integrated quality: his adjustment to landscape provides an instructive model. Each landscape is like an "important teacher, set before us for our illumination, enjoyment, and spiritual instruction."[108] Emerson sees the landscape as entwined with other materials and concepts such as "space, time, society, labor, climate food, locomotion, the animals, the mechanical forces" that he says "give us sincerest lessons, day by day, whose meaning is unlimited."[109] (Based on the history of American studies, it seems Emerson's landscape and nature essays are also lessons whose meanings seem to be unlimited.)

In contrast, Thoreau is "much more dependent on experience in the landscape than Emerson."[110] For the former, the land is a site where a man physically labors, and the equally privileged poetic labor of integration allows the individual to gather a "yield" from the landscape. The landscape's yield or utility is a material and spiritual, commodity, a power that Thoreau is able to channel, conduct, and carry off without a wheelbarrow.

The Sublime Landscape; or Nature's "Shock" and "Buzz"

Faraday's theories about electromagnetism and "invisible lines of force" provided Emerson with a scientific framework for understanding landscaping. This sensation of the landscape as electric seems exemplified in the moment when Emerson feels the "currents of the Universal Being" flowing through his body and is renewed when Thoreau says that he "radiates" landscape. Acknowledging the scientific inflections of these experiences enhances our recognition of how landscapes and landscaping likely affected a broader swath of nineteenth-century Americans. When some of them looked at especially grandiose landscapes, they felt something nearly indescribable, and sometimes turned to the language of electricity to present readers with an idea of what it felt like to behold the nature's awe-inspiring powers. Contemporaneous scientific theories provide valuable context for Emerson's and Thoreau's electrified landscapes, but the sublime offered an equally important model for more widespread landscape practices.

Rob Wilson writes that during the nineteenth century, the genre of the sublime helped to "consolidate an American identity founded in representing a landscape of immensity and wildness ('power') open to multiple identifications ('use')."[111] A few lines from Emerson's poem, "Musketaquid" (1847), indicate the general link between what Wilson calls "a landscape of immensity and wildness" open to multiple identifications or uses:

> Traveler, to thee, perchance, a tedious road,
> Or, it may be, a picture; For these men,
> The landscape is an armory of powers,
> Which, one by one, they know to draw and use.[112]

The passage does not offer explicit directions about how to draw or use the landscape's "armory of powers." The "Americanized" sublime reads the landscape as a space amenable to various political, industrial, and religious ideologies. Its flexibility is a driving force of its sublimity. As a new and untried political experiment, the creation of the United States was sublime. Abounding with resources like fertile land and great rivers, America bears a varied terrain that inspires equally uplifting encounters with nature. To match and harness the continent's sublime powers required the ingenious use of the machine (or machines), which later became part of what Leo Marx and other scholars call the "technological sublime." Politicians, farmers, engineers, artists, and entrepreneurs continued to find unique ways to use the landscape's sublime "armory of powers." Yet, for Emerson in the nineteenth century, metaphysical release of the landscape's armory was closely associated to the transmission of electricity.

Sublime landscapes jolted and/or dematerialized readers or perceivers like Emerson, and in the ensuing pages I argue that the sublime's two different inflections in the genre of American landscape correspond with two different ways that electricity is wirelessly transmitted. The grand, apocalyptic, paralyzing landscape delivers a "sublime shock." Eighteenth-century philosophers and aestheticians suggested that the sublime produced a sudden, overwhelming, and healthy discharge in an individual's sublimated mind. It follows that painters sometimes depicted shocking and sublime objects like mountains, waterfalls, valleys, and cliffs in order to create a grand, theatrical effects. Other times, the artist tried to tap into a smoother calmer energy. Believing that all matter is composed of electric currents makes it seem as if lakes, blank skies, and boundless plains were filled with an invisible energy waiting to be released. Re-creating this mood on the canvas seems almost to hypnotize the perceiver. Their silent, transcendental, luminous landscape produces a "sublime buzz."

It seems fitting to situate discourse about the shock and the buzz of nature within Edmund Burke's and Kant's famous theories of the sublime. Burke's *A Philosophical Enquiry into the Origins of Our Ideas of the Sublime and Beautiful*, first published in 1757, argues that sublime objects offer a glimpse into the workings of infinite powers beyond human control. For Burke, sublimity resides in objects that inspire feelings of darkness, obscurity, privation, vastness, succession, loudness, suddenness, and, most importantly, terror. He notes: "Indeed, terror is in all cases whatsoever, either more openly or latently, the ruling principle of the sublime."[113] The desire for self-preservation "wells up" when faced by all-consuming terrors and the mind cannot think beyond the object and the threat that it poses. The feeling of sublimity arises not from a mental anguish or the perception of an immediate danger, but rather from a fantasy of what Burke calls the "what if" of an experience. A landscape painting or any other removed view of objects like volcanoes, the vast wilderness, or high waterfalls are sublime because looking at them makes us feel as if we might be crushed by river of lava, become woefully lost in the wild, or be swept over and drowned in the deluge. Then again, this terrifying idea is pleasurable because in the final moment we remember that we are only looking at a painting or viewing the terrifying object or event from a safe distance and therefore are not in any real danger.

In contrast, Kant's *Observations on the Feeling of the Beautiful and Sublime* (1764) argues that the sublime quality of any experience is not a quality in the object, but a product of the judging subject's relation to an idea or object: "It is the attunement of the spirit evoked by a particular representation engaging the attention of a reflective judgment and not the object that is to be called sublime."[114] Kant's sublime is located in the mind, more specifically the mental state of displeasure, or an "inadequacy" of imagination. Nature is only "sublime" when its features convey "the idea of their infinity" such that the landscape "immediately" invokes limitlessness beyond the reach of the senses. "The mind feels itself set in motion," and "this movement, especially in its inception, may be compared with a shaking, i.e. with a rapidly alternating repulsion and attraction produced by one and the same object."[115] While the mind feels itself in motion, the sublime arises "indirectly": "being brought about by the feeling of a momentary check to the vital forces followed at once by a discharge all the more powerful."[116]

Burke and Kant contextualize the sublime within broader philosophical arguments. For instance, Burke stresses the fact that, by their nature, some subjects like waterfalls are sublime while other objects, such as lakes and ponds, are inherently beautiful. His project, broadly speaking, is to separate, define, and categorize objects. Kant is concerned with experience, and how the sublime relates to facts about all human perceptions. While both writers present valid philosophical approaches, most American painters were less concerned with the philosophy behind the sublime and more concerned with producing sublime effects. And, as I have shown, the landscape was one of the most powerful ways to evoke sublimity. Wilton notes, "Growing interest in the natural world ensured that much eighteenth-century writing on the Sublime and the Beautiful [was] explicitly associated with landscape and its representation in art and literature."[117] In other words, the American environment was the site where artists, thinkers, and tourists could experience and appreciate Burkean and Kantian notions of the sublime.

Returning to Wilson's argument about the Americanized version of the sublime, we recall that, for Emerson, "grains of sand, volcanoes, ants, words, a bare common: all are sublime, patterns of boundless force, if seen with the eyes of science."[118] Emerson certainly viewed the landscapes around Concord as electrical sources of sublime "patterns." While Wilson's work uncovers the scientific foundation of Emerson's sublime transmissions of electricity, I want to look further into the manner in which Emerson and other nineteenth-century artists experienced and transmitted the sublime through their landscapes.

At times, the electric, boundless energy of nature shocked Emerson. Yet other electric forces gave him a more smooth and tranquil buzz. For instance, crossing the bare common, Emerson feels an intense emotion that overwhelms from above and brings him "to the brink of fear."[119] This stunning experience adheres to Burke's definition of the sublime as “tranquility shadowed with horror.”[120] Later in the essay, Emerson’s transcendent experience of nature produces a slightly different affect. “In the woods,” Emerson feels the “universal currents” coursing through his body. This second situation seems more like a “sublime buzz,” which is marked by Kant’s “attraction and repulsion” but, instead of a Kantian “discharge,” this alternating mental state corresponds to Emerson’s sense that “I am nothing; I see all. . . . I am part or particle of God.” The sublime buzz also relates to what Emerson elsewhere terms a feeling of “the low degree of the sublime.”[121] This lower form produces a meditative quality of mental equipoise. As one beholds “a rich landscape, . . . all thought of multitude is lost in a tranquil sense of unity.” This tranquility is necessarily unmarked by the “shadow of horror.” This bodily sensation is what Emerson calls “that deep force, the last fact behind which analysis cannot go.”[122]

In contrast, the sublime shock unsettles. The shock is present when Emerson says “the rage draw[s] out of [the poet] that dream-power” to conduct “the whole river of electricity.”[123] Wielding such a river calls to mind Zeus handling his lightning bolts and tossing them down from Mount Olympus. The poet is charged with delivering nature’s flash and sparkle through language. Wilson refers to Emerson’s “shock of the sublime sensation” as an abrupt and overwhelming insight into the divine principle. The sublime shock is rarely peaceful, but it can be healthy. For Emerson, “We come to them who weep foolishly, and sit down and cry for company, instead of imparting to them the truth and health in rough electric shocks, putting them once more in communication with their own reason.”[124] According scholars such as Novak, the shocking aspects of painted landscapes were purposefully designed for a distinct moral purpose. Landscape painters encourage their audiences to question their own spirituality and attempt to bring them into a more intimate relationship with nature.

Thoreau attempted to shock readers into an awareness of nature's sublime energy. This point has not been lost on previous scholars. Gilmore observes, "Despite [Thoreau's] anti-technological tendencies, electricity comes to mirror the ability of art to *shock* individuals into recognition of their ever-shifting, fluid relationship to the world." (emphasis mine)[125] His *shock* project relates directly to his desire to "brag as lustily as the chanticleer in the morning, standing on his roost, if only to wake my neighbors up."[126] Thoreau's special relationship to the telegraph and the wired landscape will be more fully discussed in the next chapter, but for the present discussion, it is important to note that Thoreau wants to both explore and re-create wild, uncharted landscapes in his travels and his writings. His views of landscape are meant to be beautiful and sacred, but his message is also meant to be alarming. In the earlier passage, traveling from the west side of a mountain to the east is like being "thrust up through into nature like a wedge," and it flows into the shocking recognition that nature is "one and continuous everywhere."

Thoreau's experiences and depictions of landscape offer many shocking moments, but he seems to try to harness another power of the landscape: "to reawaken and keep ourselves awake, not by mechanical aids, but by an infinite expectation of the dawn."[127] This sense of expectation keeps us alert and actively engaged in the perception of nature. For Thoreau, "we are enabled to apprehend at all what is sublime and noble only by the perpetual instilling and drenching of the reality which surrounds us."[128] The "perpetual instilling and drenching" of the landscape is mirrored in its calm, steady fluctuations. Again, Thoreau states: "When we are unhurried and wise, we perceive that only great and worthy things have any permanent and absolute existence. . . . This is always exhilarating and sublime."[129] To feel the sublime buzz requires attentiveness and patience. When one is still enough to tap into that frequency, constructed boundaries dissipate and our views of the "simplest objects" are renewed.

Novak's Concept of the Baroque Sublime and Silent Sublime

The sublime shock and buzz found in Emerson's and Thoreau's writings are also in American landscape paintings. In her study of the sublime American landscape, Novak distinguishes between the "baroque" and the "silent" sublime. She argues that some of Cole's and Durand's paintings, and especially those of Albert Bierstadt and Church embody the baroque style of the "older romantic Gothick sublime."[130] Paintings of Niagara Falls, the Catskill Mountains, or the volcanoes of Ecuador produce astonishing visual effects. In most cases, the painters chose sublime subjects: violent eruptions, jagged cliffs, or a seemingly endless deluge. Elevated positions; seemingly limitless vistas; sharp contrasts in color; strong beams of light; and dark, ominous spaces are used to overwhelm the viewer and thus enhance the sublimity of these subjects. The increased size of the canvas, which invites the viewer to enter the landscape, also heightens the sense of the sublime: once inside, the eye cannot remain fixed on one object. The colors and images seem to produce something akin to bursts of electric current. A good example of this shocking sublime is depicted in Durand's religious allegory *God's Judgement upon Gog* (1851–52) (Fig. 6). A lightning bolt rips over the sky threatens to strike Gog's army. The bolt embodies God's wrath and seems to place the viewer in seemingly direct contact with God as landscape. This connection provides a figurative shock or jolt, reminding the viewer of divine power as expressed in nature.

While Cole and Durand startled some viewers, the next generation of artists including Church and Bierstadt popularized the vogue for violent, rapture-induced landscapes. Church's dramatic rendering of South America revealed nature's grandeur and immense, limitless power. For example, in *Cotopaxi, Ecuador* (1862), the sunset is clouded by the smoke and ash from the erupting volcano in the upper left which shoots black plumes into the cobalt sky. In the center right is a lake, which moves to the left to crash over a waterfall, filling the center foreground with dashes of white foam, which contrasts with the billowing black cloud.[131] The painting is representative of how the landscape could transmit a loud, powerful jolt.

Other paintings, often associated with unlimited and invisible energies, produce a more quiet effect that Novak calls the "silent sublime." The "silent sublime" produces a "sublime buzz" through the fact that, during this period, scientists like Faraday suggested that all matter is composed of invisible electric currents. At the same time, aestheticians and scholars were promoting the Romantic idea that "landscape" was metaphysical process, a visionary activity that unsettles boundaries of place and time. Beneath the visible surfaces of rocks and trees lay a vast, silent energy. Understanding that such energy exists seems slightly electrifying. Perception and object seem to blend together and buzz.

The sublime buzz, like the silent sublime, is often represented by intermingling light and water. The landscape is presented as a place of repose, where the viewer "taps in" to a primal, vital source. The sublime buzz is not produced by terrifying objects or a mental discharge but by the sense that the individual has accessed some underlying force of nature. Cole described a moment of being "overwhelmed with an emotion of the sublime" in one of his only essays about landscape painting. He says that what he felt "was not [that] the jagged precipices were lofty, that the encircling of woods were of dimmest shade, or that the waters were profoundly deep; but that over all rocks, woods, and water, brooded the spirit of repose, and the silent energy of nature stirred the soul to its inmost depths."[132] This sublime experience is neither depicted in terms of as Burkean terror nor Kant's mental attraction, repulsion, and discharge, but as a vague energy that stirs the soul.

Picturing this "silent energy" seems to have been the driving force of the late-nineteenth-century movement referred to as Luminism. These painters tapped into nature's silent energy and made it visible on the canvas. They imbued their landscapes with a general suffusion of light and often offered a horizontal view from the ground level (in contrast to the shocking view from above). In addition, Luminist frames were stretched on the horizontal axis. Objects such as rocks, clouds, and trees were situated around a calm body of water. Wilton connects Luminism with Transcendentalism, arguing that Gifford, Heade, Kensett, and Lane ever belonged to the philosophical movement, but Emerson supplied them with "a verbal account of the subjective experience of nature. . . . In particular his emphasis on the rapt calm of the soul in the presence of nature is close to their vision."[133] The paintings evoke a relative ease and repose, and, in Novak's terms, bring about the "erasure of self":

> Such paintings, in eliminating any reminders of the artist's intermediary presence, remove [the painter] even from his role of interpreter. In their quiet tranquility, they reach to a mystical oneness above time and outside of space."[134]

Removed from the role as "interpreter" or a generator of a shock, the painter is able to "conduct" the tranquil energy. The sublime buzz passes from nature, through the painter, into the painting, and finally engages the audience.

Landscapes Electrified

The idea of nature as a site of both spiritual and scientific forces inspired nineteenth-century American painters and writers to charge their depictions of American landscape with electric qualities. Sometimes the conduction of such energy seemed to "burst forth" like lightning bolts. Other times, the electric was quieter. The specific landscape provided an example of the energy present throughout the universe.

The theories of electricity gleamed from Volta, Davy, and Faraday helped electrify the perception and interpretation of nature. For artists, the cultivation of the vague, non-commoditized energy of nature was one way to counteract the materialist forces that they feared had too strong a hold over American society. Nature's electric sublime was a counterbalance to the steamship, railroad, and other forms of industrial progress. This wireless electricity would soon be challenged by a new addition to America's machine ensemble—the telegraph. This new communication system further increased the urgency of transcribing, celebrating, and preserving the untamed, wirelessly charged landscape.

[1] For more on the ways classical and European ideas created insulation in early American culture see Perry Miller's chapter, "Plain Style," in *The New England Mind: The Seventeenth Century* (Cambridge, Mass.: Harvard University Press, 1983), pp. 331–362.
[2] Eric Wilson, *Emerson's Sublime Science* (New York: St. Martin's Press, 1999), p. 9.
[3] Jonathan Edwards, *Images or Shadows of Divine Things*, ed. Perry Miller (New Haven: Yale University Press, 1948), p. 109.
[4] Ibid., p. 78.
[5] See Perry Miller's *Nature's Nation* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1967).
[6] For more on the role of nature writing and landscape in Jefferson's politics see Charles A. Miller, *Jefferson and Nature: An Interpretation* (Baltimore: Johns Hopkins University Press, 1988).
[7] Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1967), p. 128.
[8] Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Winston-Salem: Duke University Press, 2000), p. 171.
[9] Ibid., pp. 182, 67.
[10] Mitchell, *Landscape and Power*, p. 5.
[11] As the Lewis and Clark expedition ventured past the Missouri River into the states now called Nebraska, South Dakota, Wyoming, and Montana, they often used the word *boundless* and the phrase *as far the eye can reach* in their reports. For example, Lewis wrote on May 26, 1805, that, as he viewed the Rocky Mountains from Wyoming, he felt "a secret pleasure in finding myself so near the head of the heretofore conceived boundless Missouri." *The Lewis and Clark Journals: An American Epic of Discovery; The Abridgement of the Definitive Nebraska Edition*, ed. Gary E. Moulton (Lincoln: University of Nebraska Press, 2003), p. 136. On Monday, April 22, 1805, Lewis wrote from a bluff overlooking North Dakota: "I ascended to the top of the cutt bluff this morning, from whence I had a most delightful view of the country, the whole of which except the valley formed by the Missouri is void of timber or underbrush, exposing to the first glance of the spectator immense herds of Buffaloe, Elk, deer, & Antelopes feeding in one common and boundless pasture." Ibid., p. 118.
[12] In 1832, Morse wrote to Gulian Verplanck, who was at that time chairman of the Congressional Committee on Public Buildings: "I have too long lived in the hope of doing something for the capitol. I have studied and traveled to prepare myself, I have made sacrifices of feeling of pecuniary interests buoyed up with this phantom hope which is daily growing dimmer and will soon vanish." Morse to Gulian Verplanck, 1832, quoted in Oliver Larkin, *Samuel F.B. Morse and American Democratic Art* (Boston: Little, Brown, 1954), p. 106. Washington Allston, the painter who was offered the rotunda commission in 1836, deferred to Morse, but the committee refused Allston's suggestion. In February 1837, commissions for scenes of "Early Exploration" were given to John Vanderlyn, John Chapman, Robert Weir, and Henry Inman. Inman also declined in favor of Morse, but again the committee rejected the suggestion. Vanderlyn painted "Landing

of Columbus," and Weir painted "Embarkation of the Pilgrims." When Morse eventually gave up painting in the 1850s, he said it was because he had been "betrayed by his artistic Muse": he also felt betrayed by the Congressional Committee. In 1846, Inman died, and the panel Morse so badly coveted over a decade earlier, before he had invented the telegraph, was still empty. This time a group of Morse's friends lobbied Washington on his behalf. The committee rejected Morse for a third time. Even the invention of the telegraph had not earned Morse enough favor to sway the committee. They decided to award the commission to the twenty-three-year-old upstart painter, William H. Powell. More on Morse and the rotunda commission can be found in Paul J. Staiti's *Samuel F.B. Morse* (1990) and Kenneth Silverman's *Lightning Man: The Accursed Life of Samuel F.B. Morse* (2004).

[13] William Cullen Bryant, *The Life and Works of William Cullen Bryant*, ed. Parke Goodwin, vol. 5, *Prose Writings* (New York: D. Appleton, 1889), p. 281.

[14] Samuel Morse, *Letters and Journals*, vol. 1 (Boston: Houghton Mifflin, 1914), pp. 163, 132.

[15] Nicolai Cikovsky, Jr., introduction to *Lectures on the Affinity of Painting with the Other Fine Arts* by Samuel F. B. Morse (Columbia: University of Missouri Press, 1983), p. 1.

[16] Paul J. Staiti, *Samuel F.B. Morse*, Cambridge Monographs on American Artists (Cambridge: Cambridge University Press, 1990), p. xix.

[17] Emerson, "Nature," p. 9.

[18] Staiti, *Samuel F.B. Morse*, p. 160.

[19] Page numbers are not included for the introduction from which the quotes are taken. Durand, Bryant, Cole, et al., *The American Landscape*. New York: 1830.

[20] For example, there is almost no mention of Morse in Barbara Novak's two major studies of American landscape painting, *Nature and Culture: American Landscape Painting, 1825–1875* (1995) and *Intimate Friends: Thomas Cole, Asher B. Durand, and William Cullen Bryant* (2000), with Ella M. Foshay. There is a passing reference to Morse as president of the National Academy of Design in Wolfgang Born's *American Landscape Painting: An Interpretation* (1948).

[21] In general, Staiti claims that Morse consciously rejected Romanticism, while Cikovsky claims Morse struggled with the ideas attributed to Romanticism.

[22] David S. Reynolds, *Beneath the American Renaissance: The Subversive Imagination in the Age of Emerson and Melville* (Cambridge, Mass.: Harvard University Press, 1989), p. 692.

[23] One of the first essays about painting written by an American painter was John Trumbull's "Essay on the Use and Advantages of the Fine Arts," which was first published in 1770.

[24] Cikovsky, introduction, p. 11.

[25] Samuel F. B. Morse, *Lectures on the Affinity of Painting with the Other Fine Arts*, ed. and with introduction by Nicolai Cikovsky, Jr. (Columbia: University of Missouri Press, 1983), p. 49.

[26] Ibid., p. 46.

[27] Ralph Waldo Emerson, "The American Scholar," *Essays and Poems*, p. 53.

[28] Morse, *Lectures on the Affinity*, p. 46.

[29] Ibid., p. 26.
[30] Samuel F. B. Morse, "'Academies of the Arts; a Discourse.' delivered on Thursday May 3, 1827, in the Chapel of Columbia College, before the National Academy of Design on its First Anniversary" (New York: G. and C. Carvill, 1827), repr. in *North American Review* 26, no. 58 (January 1828): 6.
[31] Ibid.
[32] Miller, *New England Mind*, p. 332.
[33] Cikovsky suggests much of Morse's writing on landscape was unoriginal: "[Morse's] consultation of encyclopedias and other reference books and his close, extensive, and not always clearly announced paraphrases, particularly of Blair's *Rhetoric* and Whatley's *Modern Gardening*, may still be other signs of his attempt to give the impression of wider learning than he actually possessed." Cikovsky, introduction, p. 24.
[34] Morse, *Lectures on the Affinity*, p. 50.
[35] For more on American landscaping traditions see David Schuyler, *Apostle of Taste: Andrew Jackson Downing, 1815–1852 (Creating the North American Landscape)* (Baltimore: Johns Hopkins University Press, 1996), p. 132. Morse's ideas about landscape gardening were put into practice in the estate he built near Poughkeepsie, New York. For more on this see Robert M. Toole, "The 'Prophetic Eye of Taste': Samuel F. B. Morse at Locust Grove," *Hudson Valley Review* 12, no. 1 (March 1995): 1–48.
[36] Morse, *Lectures on the Affinity*, p. 50.
[37] Barbara Novak, *Nature and Culture: American Landscape and Painting, 1825–1875*, rev. ed. (New York: Oxford University Press, 1995), p. 228.
[38] For more detail about the influence of European conventions on American art see Novak's chapter, "American and Europe: Influence and Affinity," in *Nature and Culture*, pp. 226–73.
[39] Staiti, *Samuel F.B. Morse*, p. 136.
[40] Ibid., p. 212.
[41] Oliver Larkin, *Samuel F.B. Morse*, p. 126.
[42] Novak, *Nature and Culture*, p. 19.
[43] Morse, *Lectures on the Affinity*, p. 51.
[44] Phillip Hone's review of Morse's work, quoted in Larkin, *Samuel F.B. Morse*, p. 114.
[45] Morse, "Academies of the Arts," p. 23.
[46] Morse's quote about the splendid "bursts" of the electric fluid was likely inspired by his studies with Benjamin Silliman, one of the leading American scientists of the early nineteenth century. Morse studied with Silliman at Yale and later sought his former professor's advice when building the telegraph.
[47] Bryant, *The Life and Works of William Cullen Bryant*, ed. Parke Goodwin, vol. 2, *Poems* (New York: D. Appleton, 1889), p. 135.
[48] Joan Richardson, *A Natural History of Pragmatism: The Fact of Feeling from Jonathan* Edwards to Gertrude Stein (New York: Cambridge University Press, 2007), p. 3.
[49] Edwards, *Images or Shadows of Divine Things*, p. 50.
[50] This quote is attributed to Anne Robert Jacques Turgot and first appeared in print in approximately 1778. Paul Gilmore, *Aesthetic Materialism: Electricity and American Romanticism* (Stanford: Stanford University Press, 2008), p. 13.

[51] Jefferson, *Life and Selected Writings*, pp. 9–10.
[52] Giuliano Pancaldi, *Volta: Science and Culture in the Age of Enlightenment* (Princeton: Princeton University Press, 2005), p. 278.
[53] Delbourgo, *Most Amazing Scene of Wonders*, p. 13.
[54] According to Pancaldi, recent historians have "often implied that, by endorsing and advancing 'the quantifying spirit,' the best electricians of the late Enlightenment were joining in a common tradition and were paving the way for the sort of standard mathematical physics that became customary in the nineteenth century and beyond." *Volta*, p. 278. Yet the less math-orientated studies of natural history and philosophy were crucial to the invention of the Voltaic battery and the discovery of magnetic fields. Thus, the quantifying spirit "harbored more diversity . . . that we may be prepared to concede." Ibid., p. 279.
[55] Experimental error led Wheatstone to conclude that this velocity was 288,000 miles per second, which would be faster than the speed of light. Today, the laws of physics tell us that this is not possible.
[56]*Magnetic induction* is the process by which an object or material is magnetized by an external magnetic field. *Animal magnetism* is a supposed emanation to which the action of hypnotism was ascribed.
[57] T. Gale, quoted in Delbourgo, *Most Amazing Scene of Wonders*, p. 213.
[58] Delbourgo, *Most Amazing Scene of Wonders*, p. 215.
[59] Ralph Waldo Emerson, "Literary Ethics," *Essays and Poems*, p. 96.
[60] Ralph Waldo Emerson, "The Poet," *Essays and Poems*, p. 467.
[61] Gilmore, *Aesthetic Materialism*, p. 6.
[62] Ibid., p. 12.
[63] Ibid., p. 5.
[64] Gilmore's move to bracket the aesthetic experience seems to follow Kant's philosophy as discussed by Niklaus Largier in "Mysticism, Modernity, and the Invention of Aesthetic Experience," *Reflections* (Winter 2009): 37–60. Largier's primary focus is the way materialism and aesthetics informed religious sentiments.
[65] Gilmore, *Aesthetic Materialism*, p. 15.
[66] Ibid., p. 7.
[67] Ibid., p. 2.
[68] For more on this see Richard Holmes, *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science* (New York: Vintage Books, 2008).
[69] Edgar Allan Poe, "Mesmeric Revelation" (1844), in *The Collected Works of Edgar Allan Poe,* ed. Thomas Ollive Mabbott, vol. 3, *Tales & Sketches II* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1978), pp. 1024–42.
[70] Thomas Cole, "Essay on American Scenery" (1836), p. 4, 11.
[71] Staiti, *Samuel F.B. Morse*, p. 136.
[72] A more thorough account of Emerson's readings about electricity can be found in Wilson's *Emerson's Sublime Science*, pp. 87–89.
[73] Ralph Waldo Emerson, *The Journals and Miscellaneous Notebooks*, ed. William H. Gilman, Ralph H. Orth, et al. (Cambridge, Mass.: Belknap Press of Harvard University Press, 1960–82), 4:94.

[74] Ralph Waldo Emerson, "Poetry and Imagination," in *Ralph Waldo Emerson*, ed. Richard Poirier (Oxford: Oxford University Press, 1966), p. 440.
[75] Ibid., p. 441, 442.
[76] Michael Faraday, quoted in Laura Otis, ed., *Literature and Science in the Nineteenth Century: An Anthology* (Oxford: Oxford University Press, 2002), p. 56.
[77] More specifically, I am thinking of Teresa Brennan's *Transmission of Affect*, a project about the ways different types of media—the environment, the body, language, and visual texts—transmit emotional conditions between individuals and groups. Brennan argues that we are not self-contained in our energies, with no secure distinction between the "individual" and the "environment." *Transmission of Affect* (Ithaca: Cornell University Press, 2004), p. 6. Another interesting parallel comes from Brennan's discussion of "electrical entrainment" as a neurological process whereby "people become alike": "one person's, one group's nervous and hormonal systems are brought into alignment with another's." Ibid., p. 9. Furthermore, "the social, physical vibrations of images, as much as words, are critical in the process of electrical entrainment, although they lack the rhythmic dimension of auditory entrainment. . . . But the immediate point is simply that sights and sounds are physical matters in themselves, carriers of social matters, social in origin but physical in their effects. Every word, every sound, has its valence." Ibid., p. 71.
[78] Faraday, *Experimental Researches*, quoted in Otis, *Literature and Science*, p. 56.
[79] Ralph Waldo Emerson, "Prospects," *Essays and Poems*, p. 47.
[80] Ralph Waldo Emerson, "The Divinity School Address," *Essays and Poems*, p. 77.
[81] Novak, *Nature and Culture*, p. 49.
[82] Ibid., p. 49.
[83] Ibid., p. 50.
[84] Emerson, "Divinity School Address," p. 77.
[85] Wilson, *Emerson's Sublime Science*, p. 15.
[86] Ibid., p. 11.
[87] Ibid., p. 99.
[88] Emerson, "Nature," p. 10.
[89] Landscapes ascribe power "to the unitary viewer who can also be understood to depend on his of her eyes for a 'point of view' . . . [and] naturalize distinctions between the self and the living world." Ken Hillis, *Digital Sensations: Space, Identity, and Embodiment in Virtual Reality* (Minneapolis: University of Minnesota Press, 1999), p. 86. Emerson makes a similar conclusion about what it means to look at the landscape in his essay "The Over-Soul": "Meantime within man is the soul of the whole; the wise silence; the universal beauty, to which every part and particle is equally related; the eternal ONE. And this deep power in which we exist, and whose beatitude is all accessible to us, is not only self-sufficing and perfect in every hour, but the act of seeing and the thing seen, the seer and the spectacle, the subject and the object, are one." "The Over Soul," *Essays and Poems*, p. 386. This last statement also reinforces Jackson's idea of landscape as both the "frame and what the frame contains." Mitchell, *Landscape and Power*, p. 5.
[90] Emerson, "Nature," p. 10.
[91] The use of the word *somewhat* in Emerson's and Thoreau's writing deserves more attention. Emerson's essay "Spirit" opens: "It is essential to true theory of nature and of

man that it should contain *somewhat* progressive." "Spirit," p. 40. And from Thoreau's *Walden*: "The true harvest of my daily life is *somewhat* as intangible and indescribably as the tints of morning or evening." *A Week on the Concord and Merrimack Rivers, Walden, The Maine Woods, Cape Cod*, ed. Robert Sayre (New York: Library of America, 1989), p. 495.
[92] Emerson, "Nature," p. 10.
[93] Ralph Waldo Emerson, "Art," *Essays and Poems*, p. 431.
[94] Both Emerson and Morse were raised in religious families (Morse's father was a Calvinist Pastor, Emerson's a Unitarian Minister), and as young artists they felt the need to account for the presence of the supernatural forces in artistic expressions. For Morse, art was an extension of providential forces—he claimed his paintings and his invention of the telegraph were expressions of God's will. Emerson would come to understand divine forces as extensions of Nature. Despite their broad ideological differences, both men were intellectual polymaths and well-respected lecturers who wrote about the aesthetics of landscape. They are also the two most prominent American thinkers to view artistic processes in terms of electricity.
[95] Ralph Waldo Emerson, "Beauty," *Essays and Poems*, p. 14.
[96] Emerson, "Nature," p. 11.
[97] Further discussion of Emerson's idea that "the universe wear[s] our color" can be found in Stanley Cavell, *The Senses of Walden* (Chicago: University of Chicago Press, 1992), pp. 128–29.
[98] Thoreau, *Walden*, p. 387.
[99] Ibid., p. 387.
[100] Ralph Waldo Emerson, "Discipline," *Essays and Poems*, p. 29.
[101] Thoreau, *Walden*, p. 416.
[102] Ibid., p. 388.
[103] Ibid.
[104] Ibid., p. 337.
[105] Thoreau, *A Week on the Concord*, p. 284.
[106] John Conron, ed., *The American Landscape: A Critical Anthology of Prose and Poetry* (New York: Oxford University Press, 1974), p. xxii.
[107] Thoreau, *A Week on the Concord*, p. 284.
[108] James McIntosh, *Thoreau as Romantic Naturalist: His Shifting Stance toward Nature* (Ithaca: Cornell University Press, 1974), p. 28.
[109] Emerson, "Discipline," p. 26.
[110] McIntosh, *Thoreau as Romantic Naturalist*, p. 33.
[111] Rob Wilson, *American Sublime: The Genealogy of a Poetic Genre* (Madison: University of Wisconsin Press, 1991), p. 5.
[112] Ralph Waldo Emerson, "Musketaquid," *Essays and Poems*, p. 1163.
[113] Edmund Burke, *A Philosophical Enquiry into the Origins of Our Ideas of the Sublime and Beautiful: And Other Pre-revolutionary Writings*, ed. David Womersley (1757; repr. London: Penguin, 1998), p. 102.

[114] Immanuel Kant, *Observations on the Feeling of the Beautiful and Sublime,* ed. John T. Goldthwait (1764; repr. Berkeley: University of California Press, 1960) p. 81.
[115] Ibid., p. 88.
[116] Ibid., p. 74.
[117] Andrew Wilton, *American Sublime: Landscape Painting in the United States, 1820–1880* (Princeton: Princeton University Press, 2003), p. 13.
[118] Wilson, *Emerson's Sublime Science*, p. 49.
[119] Ibid., p. 10.
[120] Ibid., p. 82.
[121] Ralph Waldo Emerson, "Idealism," *Essays and Poems*, p. 34.
[122] Ralph Waldo Emerson, "Prospects," *Essays and Poems*, p. 43; "Self Reliance," *Essays and Poems*, p. 269.
[123] Emerson, "The Poet," p. 467.
[124] Emerson, "Self Reliance," p. 276.
[125] Gilmore, *Aesthetic Materialism*, p. 15.
[126] Thoreau, *Walden*, p. 389.
[127] Ibid., p. 394.
[128] Ibid., p. 399.
[129] Ibid., p. 398. In addition to Thoreau's work, Walt Whitman's "Song of Myself" also presents the poet as a conductor of the landscape's shocks and buzzes.
[130] Novak, *Nature and Culture*, p. 30.
[131] Another interesting association can be drawn between Church's landscapes and electricity. Henry T. Tuckerman suggests that Church's "taste in reading suggests a scientific bias; he has long been attracted by the electrical laws of the atmosphere, and has improved every opportunity to study the Aurora Borealis." *Book of the Artists* (New York: G. P. Putnam and Sons, 1867), pp. 372–73. Indeed, the Aurora Borealis was thought of in terms of the atmosphere's electric qualities. Faraday wrote, "I hardly dare venture, even in the most hypothetical form, to ask whether the aurora borealis and Australis may not be the discharge of electricity, thus urged towards the poles of the earth, from whence it is endeavoring to return by natural and appointed means above the earth to the equatorial regions." Faraday, *Experimental Researches*, quoted in Otis, *Literature and Science*, p. 56. Faraday speculates, here, that aurora borealis and aurora australis each result from the "discharge of electricity." Although Faraday may not have known the source at the time, clearly the discharge of electric energy has been attributed to solar flares. Church's study of electricity and atmosphere could have certainly influenced his view of landscape.
[132] Cole, "Essay on American Scenery," p. 95.
[133] Wilton, *American Sublime*, p. 26.
[134] Novak, *Nature and Culture*, p. 44.

Chapter Two

Wires in the Garden (1844–66)

In 1844, Samuel F. B. Morse and Alfred Vail strung the first long-range telegraph wire in the United States between the Capitol Building in Washington, D.C., and a train station near Baltimore. Twenty-two years later, in 1866, Western Union took control of a vast, international network with over 100,000 miles of operating telegraph lines. In the interim, the telegraph affected at least four areas of American life: politics, industry, the national psyche, and popular spiritual beliefs.

Politically, the new lines on the horizon reflected the spirit of the age and injected Americans with a sense of pride. Benjamin Franklin's lightning rod offered to protect Americans from nature's most sublime and mysterious force. Morse's telegraph line provided visible proof that Americans could use nature's greatest force. The telegraph's invention and development also sent a message to the rest of the world: the United States of America was not only a nation of democratic institutions and abundant resources, but also one of scientific and technological progress.

As a machine that seemingly annihilated space and time, the telegraph made an immediate impact on the economic and industrial landscape. Within two decades after Morse initiated the age of seemingly instantaneous communication, any place or person conducting business on a regional, national, or global scale needed access to a telegraph network. As telegraph lines spread across the continent, they often followed the flow of people and goods, but sometimes people and goods followed the lines. For instance, the telegraph spurred the development of the railroad. Wolfgang Schivelbusch argues that the telegraph provided “the most important technological addition to the railways.”[1] Without it, the railroad would not have spread as far or as quickly through the American West.

The telegraph also profoundly affected the American psyche. Sam Halliday explains that scientists, politicians, poets, and philosophers used electricity as something, “to think about and *with*.”[2] The science of electricity and the corresponding telegraph networks provided an interchangeable set of words and metaphors that could be used to describe figurative feelings such as the sense of being “shocked” by the news, as well as physical reactions such as a sudden “jolt” of emotion. References to the telegraph’s throbbing wires and the telegraph network as the “nation’s nerves” suggest the telegraph was viewed as an anthropomorphic entity and mirrored the electric body politic. This mirroring of technology and culture is not only a twentieth-century trend of modernism; it is firmly present in the middle part of the nineteenth century in Walt Whitman’s singing of the “body electric” as well as Henry David Thoreau’s discovery of the instrument he called the “telegraph harp.”

Thoreau and Whitman also show how the telegraph influenced and reflected spiritual beliefs. Sending and receiving instant, invisible messages called to mind the process whereby individuals were infused with sudden, inspirational messages from God or those beyond the grave. Proponents of pseudoscientific theories such as animal magnetism and spiritualism argued that Morse’s invention was a physical model for a “spiritual telegraph” that linked the human race in a worldwide affective network. The transmission of electric messages inspired a kind of teleological argument that human ingenuity was teasing out a divine, benevolent, and scientific order. God, like the telegraph, communicated everywhere and through everything. Therefore, developing the telegraph would spread God's message, and once humankind accepted that message, God would offer worldwide salvation.

In this chapter, I argue that these four effects—political, industrial, psychological, and spiritual—were caused not only by acts of telegraphic communication and the myth of technological progress but also by direct experience of a new infrastructure exemplified by "the Line." During the nineteenth century, the Line—which, by my definitions, includes batteries, wires, poles, insulators, and other parts required to create an overhead electrical network—entered into a synecdochic relationship with electric communication. Only a relatively small number of Americans used Morse code and telegraph keys to send and receive messages, but any person near a route of commercial activity could see the poles and wires. The act of sending and receiving information through an electrical wire signified the wonders of connectivity and simultaneity between minds, bodies, peoples, and nations. Yet those acts of information exchange required wires, and as the metallic threads occupied physical spaces, they transmitted meaning all on their own. The Line's connotations were often related to connectivity and simultaneity, but sometimes its presence undermined the wonderful effects occurring on either end of the electric circuit. Information could overload the individual, the wires could seem to tether the landscape, and the technological web could spread so fast that it threatened to spin out of control.

During the period between 1844 and 1866, a series of three or four upright poles connected by a wire instantly signaled that a landscape was connected to distant locations. As wires, poles, and other parts of the electrical infrastructure spread across the earth's surface, they framed the way individuals interacted with the environment. Artists and thinkers began to use these frames as rhetorical instruments and metaphors, which, in turn, reflect the subtle cultural contradictions involved in the development of new media and technological systems. The cultural history of the Line endows modern thinkers a window into the complex and far-reaching processes of wiring the nation and its influence on the American landscape.

Daniel Czitrom's study, *Media and American Mind* (1993), provides a helpful entry point into our discussion of how Americans generally responded to the Line. Czitrom states that Americans were "intoxicated with what the telegraph would bring to the future," and that their accounts "spoke of a twin miracle: the grand moral effects of instant communication and the wonderful mystery of the lightning lines themselves."[3] True to form, Thoreau listened to the wind play across what he called the "telegraph harp" and said the discordant melody "intoxicates me, makes me sane, reverses my view of things").[4] Thoreau was intoxicated by the sound made by the wires, but he doubted if telegraphic communication would elicit "grand" changes to American morals. For this skeptic, the "instant" transmission of intelligence was unsettling, and Thoreau feared that a nation linked by talking wires would soon be crazed about the latest, fastest information, not necessarily the most accurate or significant information. In this light, Thoreau was one of the few individuals who saw the telegraph as a sobering reminder of America's unhealthy addiction to the latest technological wonder.

The Lines Between the Garden's Machines

Since the time of Morse's first battery-operated telegraph apparatus, the electricity transmitted through the United States has brought power to millions of individual machines. As I noted earlier, the electromagnetic telegraph, the first widespread electric technology, shaped the nation's commercial, political, spiritual, and psychological landscapes. Yet, the lines, poles, insulators, and wires that supported the telegraph network—and subsequent telephone, electric power, and fiber optic networks—have been pushed to the side or completely overlooked in scholarly discourse.

Leo Marx's *The Machine in the Garden* (1967) indirectly answers for the lack of critical attention given to our electrical nervous system. In his seminal text, Marx traces depictions of "the Machine" in works by William Shakespeare, Thomas Jefferson, Ralph Waldo Emerson, and Mark Twain, among others. In Marx's view, pastoral depictions of America reconcile the forces of technology—extensions of *techne*, or the arts—and the forces of nature—which are "represented by an idealized image of landscape."[5] The reconciliation of technology and nature often occurs on the outskirts of civilization or a "middle landscape." In paintings such as George Inness's *The Lackawanna Valley* (1855), modern machines such as the railroad, plow, or saw mill provide a glinting accent on the seemingly open, blank, bucolic frontier. In such contexts, the machine conveys cohesion, civilization, and progress, but these qualities could also be turned in the opposite direction. Machines could also be powerful, mythological beasts that humanity set forth to conquer and destroy the wilderness.

Marx creates a number of thoughtful juxtapositions of the machine in the American landscape. Emerson, the great philosopher of nature, tried to cast it in an optimistic light. In 1844, the same year that Morse inaugurated his electromagnetic telegraph, Emerson published "The Poet," an essay in which he observes:

> Readers of poetry see the factory-village, and the railway, and fancy that the poetry of the landscape is broken up by these; for these works of art are not yet consecrated in their reading; but the poet sees them fall within the great Order not less than the beehive, or the spider's geometrical web.[6]

Emerson urged the poet to see the machine as part of "the great Order." Thus, Marx sees Emerson encouraging American artists "to dispel the ugliness which surrounds the new technology, whether in a poem or a landscape" and "to assign it to its proper place in the human scale."

In addition to Emerson, many American businessmen, politicians, and journalists saw machines as part of a poetically "webbed" and orderly landscape.[7] Not all nineteenth-century Americans agreed. As Marx shows, nature lovers and proto-environmentalists like Thoreau felt it was difficult if not impossible "to dispel" the harsh and aesthetically harmful qualities of new machines or assign them within a higher order. For Thoreau, the problem was that machines were quickly becoming the only "Order." He thought Americans had begun to "mythologize [the machine's] forces, project them into demigods, and then serve their projections."[8] He worried that the consecration of the machine would lead to its idolization. As the "machinated" forces of predestination and divine election had shaped American thought during the eighteenth century, Thoreau believed that machines were beginning to dominate the world and would soon determine the nation's fate.

Marx's argument about the ambiguous role of the machine in the American Garden focuses on objects with an immediate, commanding, and transformative presence: the plow, railroad, factory, mill, and steam engine. Such items are certainly central to Emerson's celebrations and Thoreau's critiques of the machine and the startling suddenness with which it interrupts nature. Yet it seems Marx started a trend in studies of the history of technology and the environment. This subfield of scholarly investigation often focuses on the effects of powerful, startling, and transformative machines like automobiles, mining equipment, farm equipment, tanks, submarines, airplanes, space shuttles, bombs, and computers. Even the particular studies of electrification and electric systems by scholars such as Thomas Park Hughes and David Nye do not include more than passing references to the cultural and aesthetic effects of wiring the nation.

The Line has not ripped, torn, or permanently desecrated our landscape: directly consumed natural resources like coal or oil; or generated power like batteries and nuclear reactors. It has been characterized by the transmission of electric currents and, for as long as that movement requires wires, the Line continues to weave and creep through the American landscape like vines through an untended garden.

While the Line may be less environmentally damaging and aesthetically obtrusive than cars, cell phones, or airplanes, recent scholars have begun to look at how subtle environmental changes can have drastic effects on our beliefs and behaviors.[9] I believe that if we turn our attention to the margins, to the thin raised lines running from the mid-nineteenth century into the present, we discover three important effects of wiring the nation. First, electrical infrastructures have shaped our views of technology and progress. Second, static wires have challenged the fluid associations between electricity and nature. Finally, poles and wires have played an important role in the aesthetic experience of landscape. In terms of the present chapter, this final point deserves brief elaboration. Between 1844 and 1866, as the nation was in the process of being wired, the genre of "American landscape" was also an increasingly important indicator of popular attitudes and beliefs. Advancements in plein air painting, the ability to travel the country by railroad, and the development of lithographs all contributed to the mass appeal for landscapes. Noting the dual development of the wire infrastructure and the popularization of this uniquely American genre suggests that the Line subtly enhances, and complicates, the qualities that Americans cherish about their natural environment.

Wiring a Continent

In spring 1845, almost a year after the telegraph's official inauguration, Morse's forty-mile line was opened to the American public. The ensuing development of telegraph lines laid the groundwork for future electric technologies and wire infrastructures. This section provides a brief overview of that initial development.

When the first telegraph stations opened for business, paying customers were few and far between. Questions lingered about what the telegraph did and how to use it. Visitors to the two offices managed by Morse and his partner, Alfred Vail, wanted to see the new machine and learn how it worked, but many viewed the device as more of a parlor trick than a revolutionary technology. They crowded into offices to see if the operators could send their name in Morse code or write simple greetings to friends or family in nearby locations. The American public did not immediately grasp the value of communicating "instantly" through the wires, but officials and entrepreneurs believed that the telegraph would soon turn a huge profit, and they began planning lines that would run north—from Baltimore to Philadelphia and on to New York—and south—from Washington, D.C., to Charleston and on to New Orleans. Before building additional telegraph lines, an intense debate surfaced about whether government or by private enterprise should own and manage Morse's invention and the telegraph network.[10]

The invention and ensuing conflict about system ownership and control seems to follow a general response pattern to our most transformative widespread technologies: initial incredulity, reluctant government funding, casual interest, full-fledged support, privatization, and finally, the sense that the technology and its infrastructure were so necessary that they must be returned to federal control so that greedy individuals (or states) would not hold the system hostage.

Cave Johnson, a congressional representative from Tennessee during the 1830s and 1840s, is representative of this general response pattern. At first, Johnson scoffed at the idea of sending messages through wires. When Morse brought a prototype of the telegraph to Congress in 1838 and requested $30,000 to fund further research and development, Johnson joked that he would support the allocation of funds, but only if the $30,000 were divided between Morse and a local man who claimed he could read minds. Johnson and many other Americans believed that Morse's proposal was as plausible as mesmerism. A few years later, the funding was approved, and Morse built and displayed his apparatus. Johnson went to see the telegraph in action and seems to have been converted. Soon thereafter, Johnson was appointed as postmaster general by the Polk administration, and in 1845, he believed that the telegraph was so vital that he warned Congress: "The use of an instrument so powerful for good or evil, cannot with safety to the people be left in the hands of private individuals uncontrolled by law."[11] Johnson ridiculed the invention at first, but then realized that it worked so well that he predicted that it would become a necessary component of the nation's commercial and political health. If offered to the public or controlled by market forces, this miraculous invention might become an instrument of evil.[12]

Even before he inaugurated his electromagnetic telegraph, Morse felt the government should control the electric telegraph system. In 1837, he wrote to an official in Washington, saying: "It would be most natural to connect a telegraph system with the

Post Office Department; for, although it does not carry a mail, yet it is another mode of accomplishing the principal object for which the mail is established, to wit: the rapid and regular transmission of intelligence."[13] After his successful demonstration in 1844, Morse remained convinced that the government should buy the rights to the telegraph and keep the nation's telegraph system under tight federal control.[14] The federal government passed on the opportunity to own and control Morse's invention. Some senators and congressional representatives were relieved when Morse's experimental line actually worked. They may not have been ready to risk more money on an enterprise that had yet to turn a profit. Another likely reason that they declined was that, in 1845, an escalating war with Mexico was draining federal resources. In addition, the postal system seemed to provide adequate service, and President James Polk had "declared against aid to internal improvements."[15]

By the spring following his successful launch, Morse was likely growing impatient with government officials. Some of these same men had scorned his dream of painting a landscape mural in the Capitol rotunda, and others had been skeptical and even derisive of his new invention. He was prone to listen to his supporters, including businessmen like Postmaster General Amos Kendall, who was eager to represent Morse's interests in the private sector. With Kendall as director and Morse as majority owner, the first telegraph company in the United States—The Magnetic Telegraph Company—began raising capital for the construction of "Morse lines."[16] In summer 1845, Magnetic Telegraph began building the nation's second telegraph line from Philadelphia to New York. Difficulty crossing the Hudson River, lack of capital, and shoddy engineering pushed back its schedule, but the company made a connection between Philadelphia and

Newark in January 1846.[17] By that summer, Philadelphia and Baltimore were connected. This first major line to run up and down the Eastern seaboard was 260 miles long and connected Washington, Baltimore, Philadelphia, and Jersey City.[18] Later that year, lines reached from New York to Boston, and then New York to Albany. By winter 1846, about eighteen months after the first line was opened for business, the "outlines of empire had taken shape," and "foundations had been laid for a vast telegraph network radiating from New York."[19] Telegraph companies and new lines seemed to flourish, and telegraph networks stretched north to Nova Scotia, south to New Orleans, and west to the Great Lakes and settlements on the Mississippi River.

Many of the first telegraph companies struggled to make a profit, but their networks aided a number of other industries, none more than the American newspaper business. Shortly after the lines opened, newspapers began circulating stories at speeds and in numbers that were never before possible. In 1846, one writer predicted, "In a few years, a vast revolution will have been affected in the newspaper business through the medium of the magnetic telegraph."[20] Newspapers were often eager to publish sensational or even far-fetched stories. They used the device to get the latest from both the big cities and the rugged frontier. About a year after Baltimore was first wired for the telegraph, one paper published the following blotter-type item: "Lama Chaney lately ran away from Baltimore with a considerable sum of money, & c. [cash], but forgot to cut the telegraph wires, and was consequently headed and arrested. The Yankee rogues understand these things better."[21] In addition to generating news stories, the telegraph was also a weapon—for both sides of the law. Police could use it to hunt down criminals who tried to flee and find anonymity, and criminals could use it (or vandalize it) to make their escape.

The new technology also initiated what we now refer to as “white-collar” crime. Stockbrokers and lottery sharks used the telegraph to corner volatile markets or get winning lottery numbers in advance of the drawing. These con men sometimes built, owned, and operated secret telegraph lines. Private communication helped them “wager” and essentially cheat systems designed around older, slower forms of communication. The phenomenon of wiretapping and wire-cutting is further discussed in Chapter 4, but for now, the invention of the telegraph began a narrative that has been repeated with the invention of the telephone, fax machine, and the Internet: Wall Street financiers, media organizations, the military, law enforcement, and organized crime are the first groups to figure how the use and exploit new forms of communication. The general public is often the last to adopt and receive their benefits.

In the first two years after Morse’s demonstration, few individuals could understand the full effect that telegraphic communication would have on industry and culture. It soon became clear, however, that it was not just an experiment or a parlor trick. The lines worked, and, for better or worse, the need for instant communication and the expansion of communication networks and interconnected markets became engrained into American society.[22]

Only a mere 40 miles of wire were operating in the United States at the start of the 1846, but by the beginning of 1848, there were more than 2,000 miles. By 1850, the number of miles of telegraph wire had increased to 10,000. Almost 15,000 miles of wire were built during the Civil War, and most of them were abandoned soon after, adding another layer to the devastation that the war inflicted on the American landscape. Ironically, as the nation was caught in the midst of that violent schism, technology also unified it. In 1861, near the height of the conflict between the Union and the Confederacy, the first transcontinental telegraph message was sent west from New York to San Francisco over a line that passed through Nebraska, over the Rocky Mountains, and across the Nevada desert into California. In 1858, the first transatlantic message was sent from Queen Victoria of England to the newly elected president, James Buchanan. The transatlantic line was broken a few months later, and it was not until 1865 that a second (and more durable) transatlantic cable linked the Old World to the New. The next year, 1866, Western Union merged with its main rivals to form the first massive monopoly in American history.

George Thompson succinctly summarizes the telegraph's initial development in the United States in his conclusion to *Wiring a Nation* (1947):

> In two decades the American telegraph industry had grown from a business with a total capitalization of a few hundred thousand to one of more than $40,000,000; from a business with a few hundred miles of wire connecting several of the chief business centers in the country to one with more than 100,000 miles connecting nearly every village and town of any significance in the United States; and from a business employing a few hundred people to one employing thousands. In these two decades [1846–66] the telegraph industry may be said to have come of age.[23]

During this period of wild speculation, the often unregulated telegraph industry built and abandoned new lines without regard for the environment or systems management. Telegraph lines did not spread through the American landscape like a silvery net cast into the ocean. Rather, each new line met resistance, most often, generated by financial, legal, and engineering constraints. Other times, individuals or communities opposed the lines. The telegraph stations and telegraph lines threatened to take over their lives. It turns out that, in some ways, Thoreau was right: the lines helped “distract . . . attention from serious things” and were “but improved means to an unimproved end.”[24] During this period of industrial development, Civil War, and imperial expansion, it was difficult for many Americans to distinguish between cohesive progress and dangerous distractions.

The Telegraph’s Internal and External Networks

Before examining specific representations of telegraph lines in American literature, it is helpful to understand some broad external and internal effects of electromagnetic communication in everyday life. Telegraph lines connected small villages and metropolitan cities, facilitating the circulation of ideas, people, and goods. As the telegraph system linked to machines like the plow, cotton gin, mill, steamship, canal, and expanding system of railroads, Americans found themselves surrounded by what seemed like one far-reaching, interconnected machine. Telegraph lines provided the nerve fibers of this machine body. A wire through the center of town might indicate that a place had a certain commercial and cultural standing and was “on the grid,” to use a modern phrase. A line on the horizon suggested that a rural or “blank” frontier would soon become a safe settlement.

The telegraph rewired the connections between rural sites of production and urban sites of consumption. Farmers could check the price of grain or cotton in a distant market and then decide if they should harvest their crops or hold back in hopes of getting a better price. Goods shipped up the Mississippi or through the Erie Canal could be “sold” before they arrived. Bankers could check a customer’s credit from another city, even another state. Czitrom notes that sending and receiving telegraphic messages “split communication (of information, thought) from transportation (of people, materials).”[25]

The split was not as apparent in the physical landscape, where the icon of communication (the telegraph) and the icon of transportation (the railroad) were often situated side by side.

The telegraph and the railroad developed in tandem. Without the telegraph, the railroad would not have proliferated as far or as quickly through the United States. Indeed, Wolfgang Schivelbush argues that the telegraph provided the "most important technological addition to the railways."[26] Telegraph lines allowed train operators to signal ahead, avoiding dangerous head-on collisions. The telegraph also allowed station operators to keep a consistent schedule based on nationally regulated railroad time. Telegraph poles and wires stitched together what Schivelbusch calls the "machine ensemble" of the nineteenth-century railroad industry.

The lines that provide power for our current machine-ensemble seem familiar, even banal. We are familiar with the visual rhythm produced by wires rising and falling through the landscape as we drive by them in our cars. Yet during the mid-nineteenth century, the wires looped over the poles alongside the railroad tracks created a novel and sometimes astonishing visual effect. Consider the following passage from an essay titled, "Curiosities of Railway Traveling," published in 1851:

> The farm-house expands, shuts up again, turns itself completely round, a window winks at you for an instant under one of the garbles, and then disappears; presently the farmhouse itself vanishes, and a rough, half-shaved cornfield, with sturdy sheaves of wheat staggering about its back, comes running up out of a coppice to overtake the farm. Then, as we hear the pulse of the engine throbbing quicker and quicker, and the telegraph posts seem to have started off into a frantic gallopade along the line, we plunge into a plantation.[27]

The movement of the landscape seems reflected in the sentence structure as it "expands, shuts up again, turns itself completely round." In this whirling flurry of images, the wire appears to be "galloping" alongside the train, reminding the passenger of the "frantic" pace of the railroad cars that suddenly "plunge[s] into a plantation." Whether parallel to the tracks or veering off from them, the telegraph lines framed the landscape and set the objects beyond the frame into motion. As Schivelbush notes, the telegraph's visual imagery "became a major emblem of railway travel":

> The outer world beyond the compartment window was mediated to the traveler by the telegraph poles and wires which flashed by—no longer did he see only the landscape through which he journeyed, but also, continuously, the poles and wires that belonged to the railroad as intimately as the rails themselves do. The landscape appeared *behind* the telegraph poles and wires; it was seen *through* them.[28]

The wires and poles in the foreground framed the landscape beyond. The parallel telegraph posts, connected on one side by the wire and on the other side by the ground, formed a series of rectangles and these repeating frames not only controlled how individuals saw the landscape beyond the frame, it transformed what they saw. The railroad and the telegraph wire provided the lines and figures, which mediated the landscape.

As telegraph lines transformed the external environment, they also worked their way into the American mind. Even before an electric wire entered a landscape, surges of inspiration was understood in terms of electricity—recall Emerson urging the new American poet to be "a conductor of the whole river of electricity."[29] The telegraph offered a visible model for how such internal thoughts and emotions could be transferred, both within the body and to the world outside it. Telegraph networks provided a schema through which to understand the feelings of shock and renewal that accompanied the electric transmission of nature through the powerful currents of language and the mysterious forces in the body.

The lines in the landscape were seen as analogous to nerves. Laura Otis's *Networking: Communicating with Bodies and Machines* (2001) presents stunning examples of how nineteenth-century scientists looked at the telegraph as a model for the nervous system. Drawing parallels through science, engineering, and literature, Otis describes how "a discourse celebrating individuality collided with an ideology of connectedness, and the interference pattern they created can be seen in scientists' and novelists' representations of communications systems."[30] The body's nerves and the network's wires both sent and relayed messages at almost unimaginable speeds. Touch was as seemingly instantaneous as a telegraph message. In addition, the nervous system and the telegraph network had similar structures for sending and receiving information. Telegraph operators gathered information received over the wires in a central hub and then dispatched the information to smaller stations sited around the hub in radial, web-like networks. Like telegraph wires, nerves transmitted messages back and forth between the brain and the furthest reaches of the sensory system.

Doctors and scientists used the telegraph as a model for understanding bodily functions. To describe a touch, one might use the following analogy: When a normal, healthy body steps on a scorching patch of sand, a message is sent from the skin of the big toe through the body's "wires" to the telegraph operator, the brain. The brain decodes the message, "pain," and sends a second message to the foot muscle telling it to retract. This saves the toe—and the entire body—from further pain. The telegraph enacts a similar process in the nation's geographic body. If bandits attack a station on the frontier, the station operator (the toe) relays a message to the hub, which would likely be in a more urban location (the brain). Once the message "help" is received at the central station, the telegraph operator sends a message to a third station (the muscle) calling for reinforcements to rescue the station under attack. These scenarios are not exactly analogous, but during the nineteenth century, they were similar enough to view the lines looped throughout the landscape as nerves radiating through the flesh and vice versa.

As poles and wires reframed the landscape, metaphors based on the nation's "electric body" were also used to understand the political landscape of antebellum America. Paul Gilmore writes of the way the telegraph "conjured up images not simply of the nervous system, but of blood and semen, of a flow of all sorts of bodily fluids."[31] As the issue of slavery in the United States became increasingly untenable, the idea of the telegraph-body "eliminate[d] the need of individual white bodies" in favor of "one (white) national body." The electrically unified white body promised to "eradicate regional difference and thus underwrite the continuation of slavery."[32] The telegraph was seen as an enlightened tool that could uphold the older, out-of-date institution of slavery while simultaneously engendering the myth that the entire nation was enjoying the fruits of scientific and technological progress. Gilmore's argument suggests that depictions of the telegraph privileged certain geographical locations, skin colors, and political platforms. My project is not to rehearse nineteenth-century body politics, analyze the history of racial or racist science, or offer further evidence that technology has been used to create and maintain divisions based on race and class. Gilmore's thoughtful examinations provide further proof that the first widespread electric technology had diverse, long-range, and sometimes unintended effects.

The telegraph also inspired new ideas about spirituality and the transmission of affects between human and divine. Those who called themselves "animal magnets" believed they could control the electrical balance in any living thing. Animal magnetism, like mesmerism, was historically rooted in the late-eighteenth- and early-nineteenth-century followers of Franz Mesmer, who argued that *magnétisme animal* was the imperceptible fluid (later referred to as the Odic force) that bound together all living things. Controlling this substance allowed individuals to transmit and even control thoughts and emotions across time and space. In the United States, mesmerism and animal magnetism supported the careers of some of the great "operators" of the day, including George Beard and John Bovee Dods. While others thought of ways to use electricity to speak with spirits or the dead, these doctors, writers, and mesmerists also used their electric powers to heal the living.

The invention of the electromagnetic telegraph reinforced the tenets of animal magnetism and inspired visions of a divine network. The "spiritual telegraph"—a phrase first coined by John Murray Spear—was thought to transmit ideas and feelings beyond the parlor or even the theater.[33] The invisible spiritual telegraph connected people and events around the globe. Thus, those who believed they were conductors or magnets used the spiritual telegraph to send messages among humans, animals, and spirits. Increasing the strength and reach of these metaphysical lines would incite a moral revolution and eventually spread peace and prosperity around the world.

S. M. Partridge, writing in the *Knickerbocker* in 1846, argued that the "mighty social and intellectual fulcrum" of animal magnetism was "destined ultimately to upheave and remodel society on an entirely different basis." Most metaphors dealing with the spiritual telegraph seem to imply the entire electric communication system—senders, receivers, batteries, keys, sounders, decoders, and lines—but Partridge's account is unique because it focuses on the telegraph wires themselves:

> The magnetic telegraph wires, about which the world has made such a fuss, are but strings on the fiddle of Animal Magnetism; and not till they are stretched from pole to pole can a perfect tune be expected; then will it raise its immense fiddle-bow wide as the heavens, and strike a harmonious movement that shall rock all the earth into a slumber. This they have imparted to us as their future plan of operation.[34]

The sight of wires in the landscape inspires Partridge's vision of the future. They foreshadow the spiritual network and impart the future operation of the spiritual network. The vision is not sent and received through an animal magnet, telegraph key, or telegraph sounder. The vision is transmitted by the image of lines "stretched from pole to pole," and these lines will eventually play a "perfect tune" and "rock all the earth into a slumber." The telegraph wires in the landscape led Partridge to believe that a miraculous (and invisible) human network was gaining force and would soon incite a global revolution.

Whitman also viewed electricity as a bridge between the physical work of the nation and the medicinal, spiritual, and moral work undertaken by the proponents of animal magnetism, spiritualism, and harmonialism. As David Reynolds shows in *Walt Whitman's America* (1996), the poet was well versed in the electrical sciences and pseudosciences of his day. Reynolds observes, "So well attuned to the electrical theory [of magnetism] was Whitman that at times his poetic persona seems like a bundle of electrical impulses coming into contact everywhere with electrically charged things."[35] Reynolds also notes how, in "Song of Myself" (1855), Whitman feels the currents of the masses coursing through him. Whitman boasts, "I have instant conductors all over me whether I pass or stop/ They seize every object and lead it harmlessly through me."[36]

What has not yet been observed in relation to Whitman's electrical imagery is how the charges and currents circulating through the body and nature relate to his view of the American landscape. Approximately forty lines after feeling conductors all over his body, Whitman's sense of electric titillation and dangerous sensation dissipates. As the energy seems to ebb from his body, Whitman "stand[s] by the curb" and bears witness to "prolific and vital/ Landscapes projected masculine full-sized and golden."[37] After drawing the electricity into his body through conductors, he can now transmit some of that energy into the landscape.

Whitman's electrical connections among body, language, and landscape were inspired by the popular pseudoscientific writers John Bovee Dods and Marx Edgeworth Lazarus. In 1850, the Brooklyn publishing company Fowler and Wells released *The Philosophy of Electrical Psychology*, which contains twelve lectures that Dods had delivered around the country over the previous twenty years. Dods argues that "all impressions are made upon the soul through the medium of electricity."[38] Later in his manifesto he explains: "It is through electricity, that the mind conveys its various impressions and emotions to others, and through this same medium receives all its impressions from the external world."[39] Electricity is an agent that holds the soul in communication with the external world. Lazarus also celebrates the force's connective powers and even suggests that, because electricity pervades nature, the enjoyment of the landscape could have a homeopathic power to help cure disease.

In the years surrounding the proclamations of Dods and Lazarus, telegraph wires offered visible correspondents to what were perceived as the lines of communication between the individual soul and rest of the world. Like the organic electricity of nature, which, Dods argues, "actuates the whole frame of nature, and produces phenomena that transpire throughout the realms of unbounded space," the electricity pulsing through the wires promised to give the individual an unbounded connection.[40]

The balance between the single, personal sense of the electric body and the unified, cosmic network appears in Whitman's later poem, "Passage to India" (1869) in which he refers to our "modern wonders": "In the Old World the east the Suez canal/ The New by its might railroad spann'd/ The seas inlaid with eloquent gentle wires."[41] The wires are visible proof of humanity's ability to channel, reflect, and transmit the energy of nature. It seems that Whitman's long, resonating lines resemble the telegraph lines he saw stretched through New York and throughout the country. Most readers of Whitman's poetry admit its electric effects and affects, but it also seems helpful to read *Leaves of Grass* (1855; 1891) as extensively conducting words or lines that transmit sensations and symbols through a panoramic, worldwide network. Such a new approach seems germane to the twenty-first-century digital humanities and their studies of Whitman.[42]

The various inflections of the Line were transposed in field of animal magnetism and spiritual theories (which facilitated communication between mind and matter). Readings of the Line also connected commercial systems (which circulated people and goods) and interior spaces (which circulated thoughts and feelings either through a single or collective body). The first telegraph networks were tools of connection: they linked social progress and individual, metaphysical projections.

Reading the Line in the Landscape

As the nation was being wired, the telegraph evoked spiritual and economic possibilities that were overwhelmingly positive, but the negative effects of technologies and tools of conquest and occupation have since come to light. We now turn to specific depictions of the Line in order to better understand its ambiguous effects. Instead of analyzing it through museum artifacts—wooden pools, steel plates, glass insulators, and copper wires—or merely gathering historical data concerning the number of miles of wire, line routes, or specific line designs, the rest of this chapter examines written and painted telegraph lines as they appeared in the American landscape.

The Line appeared in various genres including novels, short stories, landscape paintings, and histories of the telegraph. Together, these examples suggest that the Line was an operative symbol, with sufficient flexibility and utility to have three distinct connotations. First and foremost, it was understood to be an industrial icon. A single wire sweeping across the horizon suggested a connection to a broader network. On the frontier, the Line signified the extension of "American approved" institutions such as advanced communication, big business, and the taming of the landscape. A second set of depictions portrays wires as conduits of intelligence and affect. These pathways seemed to flow through the landscape like rivers of emotion, reaching all citizens and offering them a chance to take (and feel) the national pulse. In the words of one historian, telegraph lines made distant settlements "present to our affections."[43] A third reading relates specifically to Thoreau, who saw the telegraph line as a powerful instrument, one that could be used, as Cave Johnson suggested, both for evil and for good. The young man living at Walden Pond liked the idea of instant communication but feared that if the electromagnetic telegraph were put to its intended use—to send and receive messages via electric circuits—this instrument could spread meaningless and/or dangerous information and wear on moral fiber. Thoreau's physical experience with the Line transcended the positive-negative dialectic attached to telegraphic communication. He walked through the woods around Concord to hear the wind whistle through the wires, and he described the whistling as "the sound of a far-off glorious life, a supernal life, which . . . vibrated the lattice-work of this life of ours."[44] What Thoreau named "the telegraph harp" was a miraculous, albeit unintended consequence of the new infrastructure. He dreamed that the harp could be properly tuned to send sublime, electric, and uplifting messages around the entire globe.

Overall, the Line—and the electric currents and messages it transmitted—was an ambiguous figure. If it was considered an icon marching to the tune of industrial progress, then it was also a static web that framed and obscured the view of nature. If the Line was considered a conduit that spread intelligence and strengthened affective bonds, then it also carried bits of contaminating information and barbed, destabilizing affects. Finally, if the Line was considered as an instrument that played divine music and elevated its listeners to what Thoreau called "higher strains of existence," then the instrument could also fall out of tune; it could rust, slacken, or become another improved means to an unimproved end. Indeed, close readings of the Line in nineteenth-century American literature suggests that, from the time the first lines were drawn through the nation, Americans enjoyed new technologies but were skeptical about "wiring" the nation.

The Line and the Pastoral Landscape

As wire networks spread throughout the American landscape, the Line emerged as a singular image of the telegraph and, more broadly, advanced technology. The metaphorical and visual language was fairly straightforward. The telegraph wires in the landscape implied that "invisible intelligence" and its related commercial and cultural enterprises were passing through a place. Coded messages were likely sent and received in a nearby station. The iconic Line of progress was used in narratives concerning the advancement of civilization, harvesting of natural resources, and taming of the frontier. In these narratives, the Line implies the positive, healthy combination of science and industry, technology and nature. Businessmen, engineers, and politicians had the most to gain from this particular iconography, but historians and landscape painters adopted and promoted it.

The first book-length history of the telegraph published in the United States idealized the interaction among science, nature, and the Line. Alexander Jones's *Historical Sketch of the Electric Telegraph* (1852) opens with the following statement: "Electricity is the poetry of science; no romance—no tales of fiction—excel in wonder its history and achievement."[45] Jones immediately compares the "poetry of science" not just with "romances" but all fictional genres. If electricity, as Jones states, is "the poetry of science," then it follows that the electromagnetic telegraph was electricity's greatest poem. As indicated in the previous chapter, famous American writers and thinkers such as Jefferson, Morse, and Emerson had used the language of electricity to describe the democratic spirit and the powers of the poet, but in the years following Morse's invention, electricity was often converted from a political or poetic force into the allegorical hero of industry.

Jones's introductory paragraph shifts from poeticizing electricity to mythologizing it, claiming that heroes from "even the most extravagant records of fancy" cannot compare to the "exploits of electricity." Jones presents electricity as an errant knight or angelic messenger whose prop is the telegraph line and whose stage is the American landscape:

> In one moment we find it [the telegraph] conveying messages of intelligence in advance of time over a continent, measuring the degrees of longitude, and dropping copies of its news at each hamlet, village and town in its flights over mountain peaks "Where Alpine solitudes extend" across valleys wide and rivers deep and strong; and as quickly at its post again.[46]

Like other technological marvels of the day such as the steamship and the railroad engine, the telegraph was often seen as a tool that "annihilates" space and time. Most accounts of this "annihilation" assumed that space and time were antagonistic forces that technology should overcome. And, at first read, the above excerpt seems to assume that the telegraph line had destroyed time and space. Yet in this passage it does not exactly eradicate time. Rather, telegraphic communication is so fast that it troubles temporal structures: messages fly across the continent both in "one moment" and "in advance of time." Electricity's poetic or heroic qualities allow the telegraph to be everywhere at once, and it sends and receives messages so quickly that they seem to so arrive *faster* than time.

At the same time, the telegraph line depicted in Jones's quote does not wipe out space—it expands and contracts conceptual boundaries. The telegraph line is a great string that measures the "longitudes" of the continent from east to west. By the end of the sentence, the image of the wires stretching from Atlantic to Pacific has collapsed into a series of little swoops that move above and between each village and town and "drop" the news. Also, in the last poetic sweep, Jones, perhaps deliberately, misquotes Oliver Goldsmith's poem "The Traveler" (1764), which reads: "E'en now, where Alpine solitudes *ascend*, I sit me down a pensive hour to spend" (emphasis mine). By replacing

Goldsmith's verb "ascend" with "extend," Jones' text evokes the linear extension of wires across the continent. The perception of the telegraph "extended" seems directly related to the fact that, as networks spread into the flat, plains states like Ohio, Indiana, and Missouri, it seemed to pull the seemingly boundless distances of the continent within reach of eastern settlements. This phenomenon forms one of the primary reasons the telegraph developed differently in the United States than in Europe and other continents: with so much distance between commercial centers and so many resources to be shipped, the telegraph, like the railroad, was crucial to advancing trade and industry throughout the states and beyond.

Laurence Turnbull's history of the telegraph, published in 1853, also opens by presenting the telegraph line as if it were already a natural feature in the American landscape. In his introduction, he says that his book will describe the telegraph in terms that the average American will understand. He explains:

> In this country, it becomes us to be proud of the electro magnetic telegraph, having in operation a greater number of miles than all world; and yet, many of our people are as little acquainted with it as if they never knew its name although its lines of iron wire pass before their very doors and extend even into the most distant wilds of the country.[47]

This passage implies why wiring the United States was unique: it covered more distance and therefore its ability to connect distant places seemed even more stunning. The long-distance wires also created a situation wherein most Americans were exposed to the telegraph line without understanding how the machine worked. Those who read Turnbull's history stood to gain better knowledge of the "lines of iron" that crossed in front of their homes and extended into the frontier. The sense of extension and connection resurfaces later in the text when Turnbull argues that it is difficult to come to a consensus about the number of miles of line operating in the United States because the lines "are like the spider's web forming a complete network over the length and breadth of the land from the extreme north eastern point to the western boundary of Missouri adjoining the Indian Territory." Turnbull goes on to describe how "a continuous line of telegraph now extends from the verge of civilization on the western frontier east of the Rocky Mountains to the north eastern extremity of the United States and the time is not far distant when we shall have a telegraph from the Mississippi River to San Francisco."[48] Rather than give specific data, Turnbull explores the network's geographical parameters, first in terms of an organic metaphor, "the spider's web," and then in terms of specific, outstretched locations.

On the following page, Turnbull predicts that as the telegraph extends into the western territories the persons living there "will be again restored to us in feeling, and still present to our affections, through the help of the noiseless tenant of the wilderness."[49] Telegraph lines were seen as conduits for sending and receiving emotions, but Turnbull's metaphor also supports the idea that the spider webs and the other noiseless tenants of the wilderness made distant peoples "present," and for this, they positively contributed to the aesthetics of the landscape. The telegraph line is a quiet, trusty partner in civilization's westward march. Turnbull's metaphors do not call to mind the powerful, loud impact of the railroad and other machines. They give readers the sense that the wires will continue to strike a harmonious chord with the landscape.

The different depictions offered by these historical texts indicate the telegraph line's flexible iconography. Figuring the line as an animated, heroic knight or a silent, static sidekick also reminds us that, while messages were sent and received in telegraph stations, the lines sent other messages all by themselves. In other words, the visible poles and wires in the landscape conducted more than electric currents, they also emitted meaning, and this meaning was originally enthusiastic. Americans wanted wires in their landscapes. While Jones's telegraph line is a winged messenger flying across the continent, Turnbull's line is the "noiseless" figure passing through the wilderness. In both cases, the metaphors imply that the telegraph does not stamp across the continent and hogtie the earth's surface. These iconic figures of scientific and industrial advancement swiftly dance through the nation, delivering honey-laced electric messages from the settled states into the American wilderness.

Framed by Wires

Imagining the calm, steady movement of the telegraph lines repeating into the distance was reinforced by some of the first artistic renderings of telegraph lines. Their depiction in Asher B. Durand's *Progress: The Advancement of Civilization* (1853) and Currier and Ives lithograph *Westward Ho: Across the Continent: Westward the Course of Empire Takes Its Way* (1868) suggest that Americans embraced the positive iconography of the telegraph line (thereby putting aside many of its racial, political, and economic implications).

Durand's *Progress* incorporates technological icons such as the wagon, log cabin, telegraph, canal, train, bridge, railroad, and steamboat in a scene of economic and political stability. These objects do not seem to conquer or control the scene as they glide up the canvas's right side. Instead, they are "tucked into the flexible armature of an imaginary landscape."[50] The machines pass from one to another in a curving progression. The telegraph line starts in the foreground, climbs up the right side of the frame, dips toward the midway point, and then disappears. The first telegraph pole is slightly aslant, tipping toward a dark cluster of trees. The next is perfectly upright, positioned directly across from a log cabin. As the line descends the hill and winds first to the right and then back to the left, the poles get increasingly smaller, and by the time they reach the canal and then move into valley (which is also the lowest point of the landscape), it is difficult to distinguish them from the fence posts that surround the cow pasture. The poles disappear as the road moves toward the town in the far-right corner. The procession of machine icons continues with the train tracks that start in the right corner. This line then draws the eye back to the left, where the railroad engine with its billowing smoke drives toward the lake. The series of industrial items concludes with steamboats docked next to factories or mills, which emit their own puffy clouds. This site of commercial activity seems to blend with a brilliant yellow sunset, and together they create a vanishing point.

Durand's depiction of machines in *Progress* contradicts his famous "Letters on Landscape Painting." The "Letters," published in *Crayon* magazine in 1855, contain his strongest statements about industry and other forms of civilization. Durand advises the aspiring landscape painter to "go first to Nature to learn to paint landscape."[51] Instead of learning how to paint natural forms in a studio or studying painting techniques in Europe (as many of Durand's contemporaries did), the young American artist should venture into his native wilderness and find the "many other forms of Nature yet spared from the pollution of civilization." By copying the details of rock fragments and tree trunks, the painter will discover the "humble poetry" of a landscape. Then, the artist can learn how to collect these smaller parts to create a whole scene that is "great in proportion as it declares the glory of God, by a representation of his works, and not of the works of man."[52]

One might expect that Durand's *Progress*, which was completed in 1853, only two years before his warning against the "pollution of civilization," would connect, however slightly, the idea of "civilization" and "pollution." Thomas Cole, Durand's closest friend, had done just that with his five-piece allegory, *The Course of the Empire* (1833–36). *The Course* suggests that, after reaching its high point, the empire would fall into ruins, and nature would reclaim the landscape. Cole's series is as much about the cycle of an empire as it is a warning about the ways that greed mixed with industry would dominate and desecrate the American landscape. After Cole died in 1848, Durand painted *Kindred Spirits* (1849). This landscape depicts Cole standing with the poet William Cullen Bryant amid a beautiful, rocky ravine. It is one of the most famous examples of the peaceful and idealized American pastoral. *Progress,* painted only a few years later, could have been another tribute to the beliefs that the three close friends shared by linking the wilderness's beauty with a warning about the dangers of civilization.

Durand could have portrayed the "pollution of civilization" by representing the industrial icons in such a way that they fractured or dominated the view of nature. Yet *Progress* never questions the technological conquest of nature. Instead, the combination of industrial objects and stunning vistas seems to support the widely accepted narrative about American progress. When the painting was first exhibited, one critic wrote in the *Knickerbocker* magazine, "[Durand's *Progress*] is purely AMERICAN. It tells an American story out of American facts, portrayed with true American feeling, by a devoted and earnest student of Nature."[53] Durand's role as a dedicated "student of nature" seems to be afterthought. The artist of this landscape was not merely a disciple of nature. The important thing about the painting, as the critic suggests, is that it is “AMERICAN.” Nature should be appreciated because it fuels the American ethos and gives its citizens pride in their country and its institutions.

One way to reconcile the smooth, curving progression of industrial icons in *Progress* with Durand’s statement about the “pollution of civilization” is to acknowledge that he believed some aspects of civilization were corrupt, polluted, and debased. The sophomoric landscape painter should focus on only representing nature, but, as an accomplished artist, Durand himself was prepared to present industrial items (man’s works) in a proper role and relationship with nature (God’s works). Durand felt he could, in Emerson’s terms, “consecrate” the machine. This reading of *Progress* is supported by the placement of the telegraph line, the forest, and the sunset.

In Durand’s landscape, the telegraph poles in the lower-right corner, the brilliant sunset in the center, and the rocky hillside in the middle left form a visual and conceptual triangle. We begin with the rocky hillside, where three Native Americans look out on the peaceful scene of industrial advancement. They stand behind trees, some of which have broken branches and others of which have been cut down entirely. These “native gazers” represent a former age looking out across a strange present and alien future. This corner of the triangle represents the past, inactivity, and the impending loss of nature. The stumps suggest that timber was cleared and possibly used for the telegraph poles depicted to the right. In the right corner, the dirt road, log cabin, horse-drawn wagon, and telegraph line represent the present, action, and, the beginning of progress. The present moves toward the future, following the line of industrial machines until it reaches the apex—a brilliant sunset. This conceptual triangle of past, present, and future seems to reflect Durand's dichotomy between nature and what he called "man's works" and "God's works."

A few further words about this landscape: by placing the telegraph poles in the foreground, Durand invites a close inspection the telegraph line, and, when compared to the other instruments of progress like the railroad or steamship, it seems to convey a more unflattering message about progress. Is this line the beginning of progress or a prelude to its gnarly conclusion? How might the slanted, uneven poles answer Morse's inaugural telegraph message: "WHAT HATH GOD WROUGHT." Durand's relationship with the inventor of the electromagnetic telegraph may have influenced *Progress*. In 1845, Morse, then the first and only president of the National Academy of Design until that time, decided to focus his attention on his telegraph interests. He turned his presidency over to Durand. To honor his close friend Morse and his invention, Durand might have presented the telegraph as one of the most familiar, pervasive, exciting aspects of *Progress*. As "The Letters" suggest, however, Durand was also sensitive to industrial advancements, and the icons of industry are not nearly as prominent in his other work.

Since their invention, railroad engines, cars, stations, and tracks have captivated the national imagination. Most current discourse concerning industrial icons and nineteenth-century landscape art focuses on the railroad. Railroad imagery made such an impact on nineteenth-century American landscape that Susan Danly and Leo Marx edited a book devoted to the subject: *The Railroad in American Art* (1998). Many paintings and drawings discussed in *The Railroad* show the machine as a mediator between the wilderness (represented by mountains, forests, and open plains) and civilization (represented by stations, houses, churches, mills, and factories). Often times, the tracks seem to glide effortlessly through the landscape, and composed at an age when much of the continent still seemed like “frontier,” these texts foreshadowed inevitable, powerful change.

It is not surprising that the change incurred by the railroad might be read as progressive or damming (depending on the artist’s skills and viewer’s mindset), but what seems interesting is that the telegraph line is rarely if ever acknowledged in discussions of nineteenth-century industrial iconography. In fact, the first two essays of Daly and Marx’s collection deal with Durand’s *Progress* and Inness’s *The Lackawanna Valley* (1855). Telegraph lines are visible in both paintings, but neither essayist pauses to consider how they might have influenced the artist’s composition or how they inform our reading of the text. Again, the telegraph line was one of the most prominent and easily recognizable features of the industrial landscape. Thus, in order to try to better understand how it influences the composition of American landscapes, a closer examination of a few of the more famous landscape images that include the telegraph is helpful.

The telegraph and the railroad were two of the most famous industrial icons of the nineteenth century. However, their depiction was markedly different. First, the telegraph line combined a rugged remnant of nature (stripped trees trunks) with a seemingly frail conductor of nature’s most brilliant and mysterious force (electricity). Telegraph poles were often tall and knotty and had an imperfect cylindrical shape, creating a sense that at least part of the telegraph was, until recently, a part of nature. In addition, the poles would (ideally) stand upright at a perpendicular angle from the earth’s surface. This positioning makes them resemble living trees—at least compared to other wood structures like the log cabin. The poles blend into the landscape more easily than stubby railroad ties or steel rails.

Some parts of telegraph iconography seem to intermingle with nature's icons such as trees, but depicting an entire telegraph line risks obscuring the rest of the landscape. The repetition of poles and a long, undulating wire does not offer the artist the smooth, curving lines of the railroad tracks. Certainly, both railroad tracks and telegraph lines have series of repeated geometric shapes. As Novak notes, train tracks "of course prompt fascinating speculations about the actual measurement of the landscape," and these measurements "actualized the painter's attempt at possessing the landscape." The steady, repetitive, geometric railroad track "reminds us of a whole culture's desire for certainty through measurement and statistics."[54] The equidistant poles may have satisfied the urge for measuring and possessing the landscape, but the rows of poles and thin stretched lines were more bothersome to the viewer. Wires required dark, painstakingly thin strokes. Making it more difficult was that, in the physical landscape, the wires seem to undulate in irregular patterns. With thin, erratic wires and bulky vertical poles, the telegraph line could easily create a cumbersome frame. Thus, many landscape artists (then and now) erase wires and poles because they seem to get in the way of the more beautiful aspects of the landscape.

Today, landscape artists face similar issues. Transmission towers and wires often seem to obfuscate the view of the landscape. The wooden or steel poles that support the overhead web of wires are eyesores. While power–lines can offer beautiful geometric and conceptual frames from which to dissect the landscape beyond, most painters and photographers, like Inness, seem annoyed by the wires and thus omit them from their landscape depictions.

Returning to the act of landscaping spaces in the nineteenth century, the Currier and Ives lithograph, *Across the Continent: Westward the Course of Empire Takes Its Way*, also depicts America's advancing empire in terms of industrial icons like the railroad and telegraph. While Durand's painting has at least a little room for ambiguity, the message of *Across the Continent* seems to be as clear as the tracks running down the center, and the boundary that divides the whites and the non-whites, the bustling town and the seemingly flat, vacant fields.

Currier and Ives shows the telegraph line and the railroad tracks following a parallel trajectory and marking the visual "course" of the empire. The telegraph's wooden poles rise up from the flat ground, creating perpendicular angles with the steel rails. In addition, the undulating motion of the swooping wire mimics the up-and-down motion of the engine's crankshafts. The railroad and the telegraph imagery combine regulated, fixed parts (poles and tracks) with parts that rise and fall (shafts and wires). However, an engine's crank shaft actually moves while the wires only seem to move.

In an essay titled "Recourse of Empire: Landscapes of Progress in Technological America" (1994), Michael Smith nicely summarizes the visual elements in the Currier and Ives image:

> Across a flat, green swath of open plains, a railroad crosses the landscape from the lower right to the vanishing point in the upper left. To the left of the rail line, in the foreground, settlers are busily constructing a town. A cluster of homes and a public school are visible, and the few remaining trees are being cleared. Beyond the tiny village, Conestoga wagons can be seen heading west into the empty expanse. On the other side of the tracks, Indians on horseback ponder the scene before them. A thick plume of

> smoke from the iron horse is about to engulf them. In the distance, another Indian canoes across a tree lined waterway, and a range of mountains scrape the clouds.[55]

Smith finds that this landscape adopts the popular nineteenth-century narrative concerning westward expansion and national progress: conquest over the land, nature, and the previous inhabitants creates a peaceful, orderly American existence.[56]

Smith juxtaposes the vision of progress presented by the Currier and Ives lithograph with an illustration that appeared in *Popular Mechanics* magazine in 1952 titled "Science on the March." Wires are clearly represented (though not dominant) in the lithograph, but they are completely absent from the latter image. The only hint of electricity is in the manmade bolts of lightning that spread out from an immense, windowless research laboratory. Wires are conspicuously absent. Smith acknowledges the presence of the telegraph line in the first image, but does not note the lack of wires in the second. The absence ignores the fact that wires had not, and still have not for that matter, been erased from real landscape. The vista in *Popular Mechanics* suggests that the Line was rubbed out of mainstream narratives about technology and progress. This may have been due to the advent of wireless technologies, but twentieth-century America required wires. The wires in our landscape still mark a clear path that shows their importance in the development of modern industry and culture. Yet these wires are often ignored as well. Therefore, it seems that between the age of the telegraph and that of telephone and power lines, the meaning and implications of the Line shifted. Wires on poles were still a crucial part of life, but the Line was no longer an uncontested symbol of progress.

Fast-ened Landscapes

A few nineteenth-century texts seem to predict the shift in line iconography. While a single telegraph line in a painted landscape represented commercial activity and the conquest of time and space, it could also signify the exploitation of natural resources and the occupation of the landscape.[57] Melville's writings offer a more ambiguous reading of the Line in Chapter 89 of *Moby-Dick* (1851). This chapter discusses the "universal, undisputed law" of "Fast Fish" and "Loose Fish." The distinction between a "Fast Fish" and a "Loose Fish" is crucial to fisherman of all nations because, if one crew hooks or harpoons a whale but is unable to bring it in right away, other fishermen might come along and stake claim to the prize. Ishmael explains that the first fisherman to make the fish "fast" is the owner and that to keep a fish "fast" the owner must maintain continuous contact with it through some kind of physical medium. A fish can be fast even if the animal is far out of sight or if the crew has been trying to reel it in for hours or days. Ishmael states in clear terms:

> Alive or dead a fish is technically fast, when it is connected with an occupied ship or boat, by any medium at all controllable by the occupant or occupants,—a mast, an oar, a nine inch cable, a telegraph wire, or a strand of cobweb, it is all the same.[58]

Technically—and legally—any object that extends from an occupied ship to a fish can suffice to make that fish "fast." The various "mediums" that Ishmael mentions as examples are not "all the same." The nine-inch cable is an especially strong physical medium, the strand of cobweb an especially fragile one, but the "telegraph wire" is neither physically strong nor weak. The power of this particular medium lies in its cultural context. For example, if Ishmael suggested that a fish could be made "fast" with a wooden cross or a ring of thorns instead of "an oar," then the analogy would have a biblical association.

Using a telegraph wire to make the fish fast is a far-fetched proposition. It would be unrealistic to catch whales with cobwebs or telegraph wires. The metaphor is effective because most of Melville's readers understand that spider webs and telegraph lines are used to connect one thing or place to another. Yet, historically, it will serve to recall that when *Moby-Dick* was first published, wires had not yet spanned the Atlantic. Some telegraph wires had been placed at the bottom of rivers such as the Hudson and bigger bodies of water such as the English Channel.[59] Thus, telegraph wires and cobwebs in the ocean are anachronistic metaphors: it was rare if not impossible to see electric wires or strands of cobweb on the open seas.

If a telegraph wire were used to make a fish fast, it would not only convey connection, but also ownership and control. We assume that the wire would not transmit electric messages. Rather, such a hypothetical line would show anyone within sight of the wire that "this fish is taken." The Line as a tag, brand of ownership, and indicator of control relates to the overall didactic function of the chapter, which concludes with Ishmael asking

> What was America in 1492 but a Loose-Fish, in which Columbus struck the Spanish standard by way of waifing it for his royal master and mistress? . . . What at last will Mexico be to the United States? . . . What are the Rights of Man and the Liberties of the World but Loose-Fish? What [are] all men's minds and opinions but Loose-Fish? What is the principle of religious belief in them but a Loose-Fish? What to the ostentatious smuggling verbalists are the thoughts of thinkers but Loose-Fish? What is the great globe itself but a Loose-Fish? And what are you, reader, but a Loose-Fish and a Fast-Fish, too?[60]

Ishmael views the Fast-Loose dichotomy governing language, politics, religion, and even "the great globe itself." Writers attempt to fasten thoughts to words and sentences, nations attempt to occupy and control other countries, politicians attempt to lasso support for their agendas, and the titans of industry attempt to harness the "loose" landscape. But these things (nations, voters, readers, landscapes) are Loose-Fish and Fast-Fish too because, even if they are already marked by certain attitudes, ideologies, or "lines," the hunters of the world (be they armies, ideas, or institutions) will continue their assault and try to fasten, or actually refasten them. Indeed, as Melville was writing *Moby-Dick*, telegraph lines were not only making the "loose" parts of the New World "fast," they were further entwining urban areas like New York, in which, even in 1855, gnarled nets and poles were already beginning to clutter its streets. Melville's metaphor suggests that, less than a decade after Morse's first line, the telegraph wire was already an industrial icon that sent a clear but sometimes troubling message about the conflict between industrial enterprises and any "loose" parts of the globe.

In addition to sending mixed messages, the wires connected to whales also seemed to conduct a strange concoction of "electric" and "magnetic" currents. Wires are conduits of force, intelligence, and affect. They may conduct electromagnetic currents on land, but the following metaphors display the overlaps between the telegraph's electric currents, lightning bolts, nerve impulses, and human emotion. Telegraph lines seemed to connect individual realities across time and space. These supple conduits linked each individual to all of humankind and promised to keep everyone "in touch."

Life and Death Throbs

The different connotations of the telegraph and magnetic wires in Melville's canonical novel clarify the distinction between viewing the line as an industrial icon and as a conduit for magnetic affects. In the Fast Fish–Loose-Fish binary, the telegraph wire signifies control and occupation. In a previous chapter, Ishmael's crew harpoons a whale, and the animal dives deep below the surface. The men wait in the boat until Starbuck cries, “Stand by, men; he stirs!” as

> the three lines suddenly vibrated in the water, distinctly conducting upwards to them, as by magnetic wires, the life and death throbs of the whale, so that every oarsman felt them in his seat.[61]

Three lines run underwater from the boat to the harpoon, which is stuck into the whale. The three physical strands are likened to “magnetic wires.” The slight jerks and vibrations become like “life and death throbs” sent up through the wires and into the boat. The men register the whale’s throbs, and this metaphorical circuit conducts messages or “throbs” between animal and man (batteries not required). The metaphor reminds the reader that magnetic wires transmit pulses of electric current or breaks in an electric circuit.

Here it helps to return to Halliday’s comments about electricity and electromagnetism in Melville’s novels. One major theme throughout Melville’s work is what the author calls in *Typee* (1846) “the power that a mind of deep passion has over feebler natures.”[62] According to Halliday, Melville often used the language of electricity to describe this mysterious human power. The mind of deep passion is like a strong magnet able to channel and redirect the “electricity” that flows between individual bodies and souls. Melville’s characters electrify and control one another through the laying-on of hands, staring into eyes, or simply being in the same environment. Ahab brings the entire crew together in the “Quarterdeck” chapter of *Moby-Dick* and attempts to shock his harpooners with “the same fiery emotion accumulated within the Leyden jar of his own magnetic life.”[63] Ahab’s energy is like the electricity stored in a battery.[64] In another scene, he puts “his magnet at Starbuck’s brain” in order to keep him committed to his own maniacal hunt for the white whale.[65] During his time at sea, Ahab uses his "electricity" to charge and coerce the crew of the *Pequod* and to draw himself closer to the white whale. Such a reading also suggests that Melville was aware of the utility of electric ideas, which, during his time, could be used to mark the indistinct and mysterious overlap between batteries and brains, electrified magnets and a magnetic soul. The telegraph provided a visible marker in the landscape as well as a metaphor for the ways humans connected to one another.

Ahab's "battery" and his "magnet" draw others to him and thus, without acknowledging it on the surface, the crew follows along with the fatal hunt. In another one of Melville's later novels, *Billy Budd* (1891; first published in 1924), the villain Claggart's position as the ship's "maritime chief of police" allows him to control "various converging wires of underground influence."[66] The corporals working beneath him are not exactly like telegraph operators, but they all report to him, and he uses them to gather information that will help him to destroy Billy Budd. This metaphor may have given readers a reason to be suspicious of the wires they saw converging in cities like New York or Washington, D.C., where other types of "underground influence" were suspected to control the fate of all Americans.

My readings of the telegraph wire and magnetic wire concur with Halliday's notion of electricity in Melville's texts. When Melville uses the language of electricity to describe the powers of "deep passion," he does not present collective electric technologies, or the individual's magnetic powers, in a clearly positive or negative light. The novel neither blindly celebrates technology, nor ignores the machine's increasing importance to American culture. Instead, Melville acknowledges technology's almost godlike pervasiveness and electricity's ability to symbolize hidden, mysterious, and metaphysical forces. Of course, both technology and electricity also contribute to the sense of impending apocalypse and social collapse that flows throughout Melville's writing.

Melville's "wires" provide further proof that he was very much attuned to the currents of his culture. The telegraph wire attached to a whale implies the line's metaphorical occupation and control. The magnetic wire that "throbs" suggests that, as a conduit for affect, the line can make one feel another's struggle for life and death. In both cases, the wire seems to be an ambiguous instrument that transmits vague, mysterious messages. While such metaphors may not demand as much intellectual investment or offer as much aesthetic enjoyment as say, Melville's use of biblical imagery or the Shakespearian devices, the wire metaphors should remind modern readers that, for all of its timeless themes, *Moby-Dick* was also a timely critique, and in this particular case, the critique becomes richer through a fuller understanding of the ways Americans were thinking about—and with—the Line.

Touching the Wires

In 1858, the *Atlantic Monthly* published an anonymous short story titled "An Evening with the Telegraph Wires" that tells the story of a young man who, after being partially hypnotized, touches a telegraph wire and discovers that he can listen to messages being sent through the lines and feel the sender's emotions.[67] Linda Simon notes that the tale speaks to the questions concerning "one's responsibility to people who were voiceless and nameless" and "the risks of insularity" in a world "teeming with news."[68] Indeed, it concludes by stating: "No man lives for himself alone. He is related not only to the silent stars and the singing-birds and the sunny landscape, but to every other human soul." This exciting new mode for human connection comes with a caveat: connections might become too tight, and then, as the narrator recognizes, they might "interfere with our freedom and our happiness." [69]

In addition to laying out some of the consequences of this thrilling (and imaginary) affective network, the story is of also of interest to this dissertation because it entwines a mystical view of technology with an equally mystical view of landscape. For instance, in the introduction, the narrator explains that his cousin, Moses, has recently "come into possession of a small tract in those mysterious, outlying, unexplored wildernesses of nature." The narrator is not surprised that, upon securing this property, Moses is "eager to commence operations" and "exploit and farm [the land] a little."[70]

Moses's "small tract" is actually a metaphor for mesmerism, which in this story becomes closely related to electrical technologies. Moses, as the narrator states, has been endowed with a "scientific turn of mind," and he plans to work this wild land like "a newly-armed knight errant, bounding off on his steed at sunrise, in search of adventures."[71] But Moses is not cultivating a physical piece of property. Instead, he is exploring the new pseudoscientific field charged by a mysterious, invisible force that sweeps through all minds, bodies, and wires. Here we should recall Margaret Fuller's *Summer on the Lakes*, in 1843. Fuller refers to the "human phase of electricity," which is a valuable "field in which to wander vagrant."[72] Whether wandering vagrantly or bounding boldly, one enters nature just as one might enter the "unexplored" regions of science. None of these areas seemed more wild and untamed than the overlapping fields of electricity and magnetism.

The action of "An Evening" begins one autumn afternoon when the narrator agrees to be hypnotized by Moses. The narrator doubts that it will work but "relinquished . . . to his passes with the docility of a man about to be shaved."[73] Moses sweeps his hands over the narrator's body for about a half an hour. The narrator feels something, but not enough to claim he has been hypnotized. Both men are satisfied with the experiment, and "both concluded it had better end here." In an attempt to break the spell, Moses makes the proper "reverse passes," and the narrator leaves feeling "strangely excited."[74]

Further proof that Moses's "newly acquired tract" is a metaphor for mesmerism is suggested by the fact that, after the narrator leaves Moses's residence, he says he must pass through street after street until he reaches "the outskirts of the city." It is possible that Moses acquired a second piece of uncultivated property outside the city, but he is certainly not residing in a "mysterious" or "unexplored" location.

The narrator leaves Moses's house and walks leisurely toward the suburbs. When he arrives on the edge of the city, he decides to rest in a tree nearby the road. He settles on a branch overhanging the road when he feels "conscious of something approaching semi-clairvoyance." He looks out from the tree and sees that "the landscape was pervaded with a deeper repose, the glowing clouds with a diviner splendor than that which filled the eye." Amid this dreamlike scene he looks through the tree branches and sees "two or three telegraph-wires, which [he] had observed skirting the road, ran directly through the tree in which [he] was seated."[75] The wires foreground the vista but do not break up his "semi-clairvoyant" view of the landscape.

Instead, looking at the wires streaming into the distance causes "a gigantic fancy" to flash into the narrator's mind:

> This State of New York is a great guitar; yonder, at Albany, are the legislative pegs and screws; down there in Manhattan Island is the great sounding-board; these iron wires are the strings! The spirits are singing, perhaps, with their heads up there in the sweet heavens and the rosy clouds,—and this vibration of the wires is a sort of loose jangling accompaniment of their unpracticed hands on earth. The voice is always above the strings.[76]

The setting is between Albany and New York, likely within the Hudson River Valley, the namesake for America's most famous school of landscape painters. Positioned in the tree branch that is "above the strings," the narrator is also in a prime position to hear the angelic voices as they play on the "loose jangling" wires.

The narrator thinks it would be a great scientific breakthrough "to be able to hear or feel the purport of a telegraphic message, simply by touching the wire along which it runs!" and he decides to test his hypothesis. He grabs the wire, and after an initial shock, he begins to understand the message: it concerns the purchase of a certain amount of stock. This is not the shocking message he was expecting, and he waits for the next one to pass through the lines. In the meantime, his mind wanders:

> What a thing this discovery of mine would be for political conspirators,—to reverse the whispering-gallery of Dionysius, and, instead of the tyrant hearing the secrets of the people, the people hearing the secrets of the tyrant! Then I thought of Robespierre, and Marat, and Charlotte Corday, and Marie Antoinette,—then of Delaroche's and Müller's pictures of the unfortunate Queen,—then of pictures in general,—then of landscape-scenery, —till I almost fell into a doze, when I was startled by a faint sound along the wire, as of a sigh, like the first thrill of the Aeolian harp in the evening wind.[77]

The telegraph's ability to reverse political power is intriguing. Indeed, in recent years, technologies such as Twitter and Facebook have been directly related to toppling tyrants. Yet for this dissertation, it is important that his train of thought begins with the political ramifications of "this discovery," then touches on different political figures and what seem like violent moments of revolution, and finally ends with thoughts about "landscape scenery." Again, the landscape provides a counterbalance to his musings about magnetism and the telegraph, making it seem as if electricity and landscape are either sides of a battery between which the narrative alternates.

The narrator's thoughts rest in the relatively safe and calming subject of "landscape scenery" until he is jolted by a sound like "the first thrill of the Aeolian harp."[78] He grabs the wire, and this time he intercepts a flurry of different messages: a daughter is on her deathbed, a young couple has been engaged, a train has wrecked, and a manuscript needs editing. Each time the narrator grabs the wire, he decodes the message and feels the sender's emotions. Without knowing Morse code, he can somehow translate the electric currents. The narrator fancies something like an internal transformer that can convert the electric currents in the wire into brain currents that can then be decoded into English. He admits that readers will think that his experience is incredible and far-fetched, but he points out that science has shown that the electricity controlling the mind and body is similar to that sent through telegraph wires. Something in the wires seems to have directly transfused through his body and been translated by his brain. In this peculiar, pseudo-hypnotized state, he is able to listen to electric currents and feel the emotions sent across the wires.

The landscape theme resurfaces later in the story when, after hearing a particularly unsettling message pass through the wires, the narrator gets ready to climb down from the tree, and "just then" a "musical note" comes across the wire from a landscape painter, "babbling of green fields":

> I shall leave town to-morrow. Meet me at Bullshornville at ten A.M. Don't forget to bring my field-easel, canvases, and the other traps.[79]

The message sent from one landscape painter to another is the most playful of the story, and a rather dull point in the narrative. The interlude does effectively convey the sense that the surrounding forests, fields, mountains, and valleys are picturesque and deserve to be painted.

Finally, the narrator realizes that he has "expended enough sympathy, for one night" and climbs down from the tree. With the wire's help, he has become a medium. His mind and body can work together to become a living conductor of intelligence and affect. Once others began to use this new discovery, it makes them feel connected or too wired, but he knows that this is far less dangerous than cutting off the rest of the world:

> A man who lives for himself alone sits on a sort of insulated glass stool, with a *noli-me-tangere* look at his fellow-men, and a shivering dread of some electric shock from contact with them. He is a non-conductor in relation to the great magnetic currents which run pulsing along the invisible wires that connect one heart with another.[80]

The narrator's contact with the physical wires teaches him about the "invisible wires." And, in addition to affecting the way individuals thought about their relationship to others around the world, the idea of these "invisible wires" may have also inspired individuals to take another look at the lines that were visible in their immediate environment. This sense of the visible wires in the landscape as a starting point for thinking about invisible or "phantom wires" is revisited in Chapter 4.

Telegraph technology, electrical science, and landscape imagery converge in "An Evening." Scientific knowledge supported a technological network represented by physical lines while pseudoscientific knowledge supported the idea of hypnotism through certain invisible fluids and also an invisible network of affective conduits. Together, both the real and the imaginary networks or technologies promised to bring the human race into a more sympathetic relationship. Faith in this promise seemed to sanctify the lines stretched through the American landscape.

Vibrating Love Lines and Static Barbed Wires

The climactic ending of Nathaniel Hawthorne's *The House of Seven Gables* (1851) speaks directly to the conflicting views of the telegraph as pragmatic tool for social cohesion, a symbol of a spiritual transmission, and a trap lurking in the landscape.

The action begins to climax when Clifford and Hepzibah Pyncheon find the corpse of their cousin, Judge Jaffrey Pyncheon. Due to entrenched family feuds, the brother and sister fear they will be held responsible for Jaffrey's mysterious death and decide to flee the scene of the crime. Prior to their flight, Clifford and Hepzibah had kept themselves insulated within the House of Seven Gables, and thus, when they emerge into the street of this small New England town, they feel, "the wretched consciousness of being adrift."[81] They walk through town, board a train, are suddenly "drawn into the great current of human life," and "swept away with it."[82]

Earlier in the novel, one of Hepzibah's manic spells is used to suggest "all strong feeling is electric."[83] Therefore, after the siblings embark on the ride of their lives, it is not surprising that the emotionally charged Clifford strikes up a conversation with a fellow passenger about the wonders of electricity: "the demon, the angel, the mighty physical power, the all-pervading intelligence!"[84] Clifford proclaims:

> Is it a fact—or have I dreamt it—that, by means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time? Rather, the round globe is a vast head, a brain, instinct with intelligence! Or, shall we say, it is itself a thought, nothing but thought, and no longer the substance which we deemed it?[85]

The fellow passenger assumes that Clifford is speaking of the telegraph, and "glancing his eye towards its wire, alongside the rail track," the man replies:

> It is an excellent thing; that is of course, if the speculators in cotton and politics don't get possession of it. A great thing indeed, Sir; particularly as regards the detection of bank-robbers and murders![86]

On the one hand, the fellow passenger is worried that the lines will be used to send secret and scandalous information. Indeed, until the advent of the telegraph, communication was often contingent on a physical text (book, letter, newspaper) or immediate presence (communicating with speech or body language). With connections to the still mysterious science of electricity, a massive infrastructure, and operators' ability to use special codes, the telegraph seemed to promote immoral and occult behavior. On the other hand, the passenger likes the telegraph line because it keeps the police from various locations in contact and thus aids in the hunt for criminals, a view supported by newspaper stories of the time. About a year after Baltimore was first wired for the telegraph, one paper published the following blotter-type item:

> Lama Chaney lately ran away from Baltimore with a considerable sum of money, & c. [cash], but forgot to cut the telegraph wires, and was consequently headed and arrested. The Yankee rogues understand these things better.[87]

In addition to generating news stories, the telegraph was also a tool for both upholding and breaking the law. Police used it to detect criminals who tried to flee. Criminals had to abuse it (or destroy it) to gain a better chance of escape. The passenger's glance at the wires alongside the tracks is a reminder that the line is maintaining social order and keeping him, and everyone within sight of the wire, safe.

Clifford responds to the man's appraisal of the "great nerve" by saying, "I don't quite like it, in that point of view." Clifford is enamored by thoughts of the "great nerve" but unsettled by the fact that the telegraph line is the embodiment of the "all pervading intelligence." He excitedly explains that "an almost spiritual medium" like the telegraph should be "consecrated to high, deep, joyful, and holy missions. Lovers, day by day—hour by hour, if so often moved to do it—might send their heart throbs from Maine to Florida." The lines should operate outside the "world of matter" and be reserved for "holy missions."[88] The telegraph seems to exhibit a power that, in a former age, was exclusively religious.

This brief exchange embodies the conflicting responses to the telegraph as an industrial icon and an affective conduit. Emerson said that machines in the landscape "are not yet consecrated in their reading."[89] Clifford echoes this call when he says that "great nerve" should be "*consecrated* to high, deep, joyful, and holy missions" (emphasis mine).[90] In Clifford's case, consecration is possible because "electricity" seems to operate outside or beyond the "world of matter." He believes that electricity will change the material world until it is "no longer the substance which we deemed it."[91] Clifford soon realizes that the telegraph line outside the train window signifies the visible, substantive application of electricity to the material world.

The passenger's statement about using the line to detect murderers brings Clifford to his senses, reminding him that he is trapped in a very real, bloody situation. Therefore, while Clifford would admit that bank-robbery and murder deserve to be punished, he goes on the defensive and exclaims, "I really cannot applaud the enlistment of an immaterial and miraculous power in the universal world-hunt at their heels!" Such a tool "puts them [murderers and bank robbers] too miserably at a disadvantage."[92] Clifford then summarizes his predicament in veiled terms, raising the fellow passenger's suspicion. The overriding point seems to be that, in Clifford's mind, the wonderful powers of electricity should be used to bring lovers into a tight, cosmic frequency. He overlooks the passenger's worries about the telegraph concerning "speculators" in cotton and politics. He is simply worried about the telegraph as a tool for law enforcement. When Clifford discovers that electricity will be used to track down those who want to escape (like him), his tone changes, and he sees the electric lines in a different light. His critique of the telegraph line as a conspirator in the "universal world hunt" and a tool that hinders those seeking a "city of refuge" seems to be one of earliest instances in American literature where a character criticizes an electric technology for its ability to monitor citizens.

This proleptic passage subtly critiques what we would now call "Big Brother." From such a standpoint, the wire is not only a warning for those who have committed a crime; it is also a threat to the idea that an individual could move toward the frontier and get a fresh start. Frederick Jackson Turner would argue in 1893 (as discussed more fully in Chapter 3) that the idea of moving west on foot or by stagecoach or train and clearing away the past was crucial to American politics, industry, art, and culture. Hawthorne may have believed that spiritual feelings are like electricity, but "consecrating" the telegraph is dangerous. It is overly idealistic, if not totally ridiculous to do as Clifford suggests and use the telegraph for "holy missions" like saying "I love you" each and every hour. Hawthorne shows the rickety foundations beneath the perceived correspondence between the deity and technological progress. The popular thinking was that if God granted humanity with the ability to use his seemingly divine electric fluid—Morse's "What Hath God Wrought"—then the telegraph was inherently benevolent and divine. The idea that a "great nerve" with all-pervading intelligence would unequivocally improve the quality of life ignored the historical consequences of capitalism, industrialism, and American expansion.

The scene also indicates that in a nation linked by telegraph lines there is little to no chance of escape. A train might seem to fly through the landscape, but the wires keep the pace, not only controlling the perception of the speed with which the train seems to move, but also the speed with which information can be sent and received.[93] Hawthorne's text brings the idealistic and the skeptical views of the telegraph into direct dialogue: The lines may transmit "throbs" around the world, but they can also ensnare individuals and make them the subject of a "universal world hunt."

Thoreau Part One: The Telegraph as a Mode of Transmission

Thoreau moved to a cabin on the outskirts of Concord "to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived."[94] He spent days and weeks by himself exploring, learning, and living in the wilderness; his writing came from a place of distance and removal. In the opening paragraph of *Walden*, Thoreau says that his account will be like a letter that one might "send to his kindred from a distant land."[95] The "distant" land may have only been a few miles from Concord, but the implicit argument is that one must live outside or beyond a traditional society in order to engage the "essential facts."

With this distance established, Thoreau cast a cold stare back on the world he left behind. It is possible that at no time in American literature has an artist been more critical of what the landscape painter Durand called the "pollution of civilization." For Thoreau, Durand, and other disciples of nature, so-called "modern improvements" like the railroad, metropolis, factory system, and fancy clothes tethered the human spirit and hindered the pursuit of happiness.

At first glance, it seems that the telegraph was a prime example of such superfluous "improvements." It reflected the public's thirst for the latest news and acceptance of weak facts. According to Thoreau, this machine would be used "as if the main object were to talk fast and not to talk sensibly."[96] The lines cluttered minds with the latest gossip rather than more lasting and accurate truths. Electric media would lead Americans to sensationalize information, water down reality, and fetishize the machine. In his most famous rebuke of the telegraph, Thoreau declared: "We are in great haste to construct a magnetic telegraph from Maine to Texas; but Maine and Texas, it may be, having nothing important to communicate."[97]

Between 1846, when the United States went to war with Mexico, and 1854, when the Nebraska-Kansas Act was passed, the furthest parts of the nation did, in fact, have important things to communicate. Although most Americans agreed that lines from north to south and east to west created useful, even necessary national bonds, Thoreau worried that "construct[ing] a magnetic telegraph [line]" and using it to "talk fast" would have harsh, unintended consequences. His argument against the telegraph was founded on what he perceived as the unfortunate lack of self-reflection in American society:

> Men think that it is essential that the *Nation* have commerce, and export ice, and talk through a telegraph, and ride thirty miles an hour, without a doubt, whether *they* do or not; but whether we should live like baboons or like men, is a little uncertain.[98]

Elsewhere in *Walden*, Thoreau argues, "we do not ride on the railroad; it rides upon us."[99] The same seems to be true of the telegraph wires. The telegraph wires are a faster but not better means of communication, according to Thoreau. If the railroad "rides upon us," the telegraph entangles society in misguided and needless conversations.

Thoreau did not, however, advocate getting rid of the lines, nor did he fully embrace a "back to nature" movement. Instead, he speculated, "We might possibly live in a cave or a wigwam or wear skins today," but it will be "better to accept the advantages, though so dearly bought, which the invention and industry of mankind offer."[100] Rather than getting rid of "invention and industry," we should reexamine the price that must be paid for their products and then decide if it is to our advantage to use them. The railroad and the telegraph are wonderful machines that evoke sublime thoughts, but it is better to live without such "dearly bought" machines and live consciously, truthfully, and deliberately.

These remarks about the telegraph seem to contradict Thoreau's celebration of "telegraphing" the fleeting, subjective experience of nature. In fact, the first mention of the invention in *Walden* is overwhelmingly positive. Thoreau recounts:

> So many autumn, ay, and wintery days, spent outside the town, trying to hear what was in the wind, to hear and carry it express! . . . At other times watching from the observatory of some cliff or tree, *to telegraph* any new arrival; or waiting at the evening on the hill-tops for the sky to fall, that I might catch something, though I never caught much, and that, manna-wise, would dissolve again in the sun (emphasis mine).[101]

In this passage, the verb "to telegraph" likely refers to an older form of communication—the semaphore, or optical telegraph. Semaphore telegraphs transmit messages through a series of towers that resemble windmills. Each tower is fitted with wooden blades or shutters that can be arranged to connote a certain letter or word. The first arrangement is seen and copied by the signalman at the next tower and so on until the message reaches its final destination or the end of the line. In the 1790s, the French central government began operating a semaphore telegraph between Paris, Strasbourg, and Lille. In the 1830s, the U.S. government considered building an optical telegraph along the East Coast, but plans never materialized and Morse's invention soon made the semaphore telegraph obsolete. Even after the introduction of the electromagnetic telegraph, American ports still used semaphore telegraphs to signal to ships at sea.

In 1851, about nine miles from Boston, Thoreau inspected a semaphore telegraph and noted that it featured "movable signs on a pole."[102] This experience likely inspired Thoreau's portrayal of himself as someone waiting on a cliff, an observatory, or a treetop ready to "telegraph any new arrival." Watching messages sent back and forth across the landscape offered Thoreau a new way to describe his fleeting experiences to others, even those in a distant land.

Whether the electromagnetic or the semaphoric version inspired Thoreau's attempt "to telegraph" seems less important than the fact that he wanted to telegraph "new arrivals." Thoreau wanted to send out instant signals to his fellow citizens, as if to convey the sense of nature arriving to meet him, and his sense of approaching nature. He realized it would be impossible to catch or frame the facts underlying his erasures in nature or these fleeting, commingling moods. His objective was to "anticipate" the sunrise, the sunset, even "Nature herself!"[103] Thus, "telegraphing" suggests a dematerialization, a blending of body and soul, self and landscape. Thoreau found useful analogies and models in his idealized readings of semaphore and electromagnetic telegraphs. His understanding of what it meant "to telegraph" helped him imagine how one could transmit a sudden, animated experience.

Elsewhere in *Walden*, Thoreau refers to the telegraph to argue that each individual should own his or her modes of communication. After his two-year experiment in the woods, Thoreau says he acquired “strict business habits” and learned that “good ventures” require direct, personal oversight:

> oversee all the details yourself in person . . . buy and sell and keep the accounts . . . read every letter received, and write or read every letter sent . . . to be upon many parts of the coast almost at the same time . . . to be your own telegraph, unweariedly sweeping the horizon, speaking all passing vessels bound coastwise.[104]

Here, the forms of personal oversight begin on the personal level: keep records and manage your correspondence. By the end of this long sentence, the scope has expanded to include being on “many parts of the coast” and communicating with the ships approaching shore. The metaphor links an individual “overseer” to a telegraph “sweeping the horizon.” Thoreau’s thinking was likely based on the kind of semaphore device that he witnessed “speaking” to ships passing to and from Boston harbor. Nevertheless, Thoreau also approached the electromagnetic telegraph as an owner and overseer. He notes in his journal that he should be able to sit on the railroad ties and lean against the telegraph poles, just like the birds that sit on the wires and “make [their] own use of the telegraph, without consulting the directors.”[105] The messages sent and received through telegraph keys may keep society connected, but the poles and wires that pass through the wilderness resist accepted forms of ownership. The poles and wires represent Thoreau’s broader thoughts about ownership and relate to his belief that the Native Americans who first named and knew the landscape around Concord had proprietary rights because they understood and belonged to the land. Later, we see that for Thoreau, the telegraph was one of the few tools inserted into nature by the white man that had the same sort of spiritual significance as artifacts like arrowheads or totem poles.

Note that Thoreau challenges his readers to "be your own telegraph." The implied meaning is that, whether written or uttered, telegraphed or transcribed, people should have control and ownership over themselves, their labor, and their modes of communication. Yet, conducting personal business as if "upon many parts," "at the same time," requires an advanced form of communication: one that has only recently been invented. Therefore, the telegraph is instrumental to Thoreau's ideas about what it means to be an informed and effective writer. Yet, with regard to his self-operating instrument, at least one question remains: to whom shall the message be sent?

Thoreau's telegraph does not send messages *to* specific recipients. He does not refer to a semaphore telegraph tower that speaks *to* all passing vessels or an electromagnetic telegraph key sending messages *to* a distant station. The preposition is absent. Thoreau's telegraph is "speaking all ships," not "to" all ships. The telegraph sweeps outward like a lighthouse beacon, but the message is not directed to anyone (or anything) in particular. That the message is received and decoded is less important than the fact that it has been generated and sent. Nature and language, when properly conducted, ripple through the surrounding landscape like a bolt of lightning through an electrostatic field.

Thoreau's implied theory of ownership and communication not only seems to predict open-source publishing platforms like blogs and Twitter, it also offers a practical view of the relationship between individual and environment. Thoreau, before settling on his location for a cabin at Walden Pond, declares, "Wherever I sat, there I might live, and the landscape radiated from me accordingly."[106] The communicator's goal is to tap into the currents flowing throughout the earth's atmosphere. Emerson stated that the poet should be a "conductor of the whole river of electricity."[107] Electric and organic forms of communication began to rely on one another. Thoreau telegraphs, radiates, and conducts, but he also sees himself as a chanticleer "bragging loudly" enough to "wake up" the neighbors. In each case, whatever Thoreau writes, sings, or telegraphs is meant to startle those within range and make them see the world anew.

Ironically, the Line seemed to undermine the romantic, wirelessly charged landscape. The first electric telegraph line reached Concord in September 1851, long after Thoreau had completed his off-and-on two-year experiment at Walden Pond (1845–47), but around the time he was preparing *Walden* for publication. He notes the event in his journal: "In a day or two the first message will be conveyed or transmitted over the magnetic telegraph through this town, as a thought traverses space, and no citizen of the town shall be aware of it. The atmosphere is full of telegraphs equally unobserved. We are not confined to Morse's or House's or Bain's line."[108] Thoreau realizes that anyone who is not at the telegraph stations on either end of the line will not notice when the first message is sent. It will be as "invisible" as a thought that traverses space. (Similarly, we often do not notice radio waves and other wireless signals that are transmitted around and through our bodies every day.) The construction of the telegraph line drew awareness toward electricity's invisible currents, but Thoreau wanted to redirect the attention given to this material, technological infrastructure toward the "invisible" telegraphs that spread throughout "the atmosphere" and conducted the more subtle forces of nature.

Taken together, the different telegraph references and metaphors in *Walden* reflect Thoreau's uneasiness about living in a nation controlled by machines instead of a group of individuals committed to nature. He believed that the construction and maintenance of vast telegraph networks was "too expensive." Yet, "telegraphing" seemed an effective way to communicate the facts of nature and to act as if "in many parts" at the same time. Until now, with the exception of Laura Dassow Walls, most scholars of the American Renaissance and the history of technology have focused on the ambivalent and seemingly anti-technological stance that *Walden* wonderfully and sharply displays. Yet Walls argues that, in 1851, Thoreau was trying to invent a kind of rhetorical technology: "a new technology of inscription—what became, in fact, his journal."[109] A few under examined entries in Thoreau's journals from this period show that, not long after the first telegraph line was strung through Concord, Thoreau discovered one of the most sublime and unintended consequences of wiring the nation—the telegraph harp.

Thoreau Part Two: "This Wire Is My Redeemer"

Partridge depicted telegraph lines as "strings on the fiddle of Animal Magnetism" that would soon play a song so great that it would "rock all the earth into a slumber." The fictional narrator of "An Evening with the Telegraph Wires" saw them as the strings of a great guitar stretching from New York to Albany. Thoreau also imagined that the telegraph poles and wires were a massive string instrument, but he went into the wilderness and actually listened to the wires. After reading Thoreau's attacks on the telegraph and celebration of telegraphing, it is amazing to learn that he discovered "the telegraph harp" and was the first American to document its notes and chords.

Only weeks after the first line was strung through the forest nearby Concord, Thoreau writes in his journal:

> As I went under the new telegraph-wire, I heard it vibrating like a harp high over head. It was as the sound of a far-off glorious life, a supernal life, which came down to us, and vibrated the lattice-work of this life of ours.[110]

The wire's sounds vibrating in the wind struck Thoreau as one of the most remarkable and unintended consequences of the new infrastructure. In 1851, telegraph messages were not sent and received in Concord. With his aversion to "talking fast" instead of "talking sensibly," Thoreau may have been relieved that Concord did not yet have a station. Still, he admits, "It is no small gain to have *this wire* stretched through Concord" (emphasis mine).[111] Less than a week later, Thoreau went back to listen to the wires. Again, he was astonished when they began "vibrating like an Aeolian harp" and emitted discordant sounds. The music made by the telegraph wires

> reminded me suddenly,—reservedly, with a beautiful paucity of communication, even silently, such was its effect on my thoughts,—it reminded me, I say, with a certain pathetic moderation, of what finer and deeper stirrings I was susceptible, which grandly set all argument and dispute aside, a triumphant though transient exhibition of the truth. It told me by the faintest imaginable strain, it told me by the finest strain that a human ear can hear, yet conclusively and past all refutation, that there were higher, infinitely higher, planes of life which, it behooved me never to forget.[112]

The telegraph harp echoes and exemplifies the "beautiful paucity of communication." Like his attempts "to telegraph" the sense of arrival, the telegraph harp communicates a "triumphant though transient exhibition of truth." Nature's truths, like electric currents, are constantly in flux, but when the truth bursts forth, it lifts the individual self into cohort with a higher, interconnected system. More often, nature's fleeting facts and truths take the form of the "finest strains" of music, even finer than the breaks in the electric current that are translated into dots and dashes at the telegraph stations.

Walls notes the importance of the whistling wind to Thoreau's idea of technology: "The inscriptions of Thoreau's pen were the writings of the wind at one remove."[113] As far as I can tell, the telegraph harp's influence on Thoreau at this critical juncture in his development has not yet been examined. After first stirring audiences with the singing Line, Thoreau attuned himself to the harp's notes and tunes. He noticed that the chords responded to heat and cold. He placed his ear near the wooden posts, "where the vibration is apparently more rapid."[114] He also observed that the telegraph harp "does not require a strong wind to wake its strings; it depends more on its direction and the tension of the wire."[115] He spent the fall of 1851 inspecting the harp and trying to attune his mind and body to the music. During the following summer the harp fell quiet. Thoreau lamented:

> I have scarcely heard one strain from the telegraph harp this season. Its string is rusted and slackened, relaxed, and now no more encourages the walker. I miss it much. So it is with all sublunary things. Every poet's lyre loses its tension.[116]

The harp was not immune to the forces of nature. This material infrastructure, strung above and through the landscape as well as constantly exposed to the elements, could fall into disrepair. In the above passage, we learn that Thoreau viewed the harp as his muse. This is important to consider in light of the fact that, in summer 1851, Thoreau was working furiously on another version of *Walden* (he wrote at least six) by adding a mythological tone and organizing the text to correspond with the four seasons. During these two years of his life, he ached to hear the harp play. In winter 1853, he heard it and was moved by the sounds as never before:

> The telegraph harp again. Always the same unrememberable revelation it

> is to me. It is something as enduring as the worm that never dies. . . . I never heard it without thinking of Greece. How the Greeks harped upon the words, immortal ambrosial! They are what it says. It stings my ear with everlasting truth. It allies Concord to Athens, and both to Elysium. It always intoxicates me, makes me sane, reverses my view of things. I am pledged to it. I get down the railroad till I hear that which makes all the world a lie. When the zephyr, or west wind, sweeps this wire, I rise to the height of my being. A period—a semicolon, at least—is put to my previous and habitual ways of viewing things. This wire is my redeemer.[117]

Thoreau's connection from Concord to Athens to Elysium reflects the general attempt to create a distinctly "American" renaissance in art and culture. In addition, it shows how an instrument invented and developed in the "New World" was connected, in time, to the ancient world, and, in space, to the entire globe. While this seems to be the conceptual effect, the sounds also initiate a bodily process. While intoxicating, they "make [Thoreau] sane" and act as his "redeemer."

In the same January 9 journal entry, Thoreau says that hearing the telegraph harp saved him from the "foul mood" he had been placed in the "day before yesterday" when he "looked at the mangled and black bodies of men which had been blown up by powder." The explosion reminded him of the "avenging power in nature": After hearing "this immortal melody," he wonders, "Are there not two powers?"[118]

The two powers seem to stand clearly before his eyes: Nature's "avenging powers," symbolized by gunpowder and evinced by the bodies blown apart, and nature's "redeeming powers," symbolized by the telegraph harp that raises Thoreau "to the height of . . . being."[119] Hearing the telegraph harp forces him to pause and recognize the invisible powers of nature and the higher planes of existence.[120] We can imagine him standing beneath the wire, turning his head toward the sky, closing his eyes, dissolving like Emerson's eyeball and feeling "intoxicated." When the sound faded away, he might have opened his eyes, felt as if the world around him had paused. His body was detoxified, all humanity redeemed. Thoreau, a figure who often railed against new technologies, stood awed and humbled by this strange and unintended effect of its infrastructure.

Thoreau made over thirty references to the telegraph harp in his journals. A specific mention of the instrument does not appear in *Walden*, but, based on his biographical timeline, it is clear that he was listening to the telegraph harp while preparing the final version, which was published in August 1854. The telegraph harp seems to have influenced Thoreau's understanding of the experience of nature, the relationship between individual and social technologies, and the notion of writer as telegrapher.

The telegraph harp seems responsible for the passages in *Walden* where Thoreau describes the idea of transmitting a single, universal message around the world. On September 22, 1851, he listened to the harp and envisioned

> A harp on so great a scale, girdling the very earth, and played on by the winds of every latitude and longitude, and that harp were, as it were, the manifest blessing of heaven on a work of man's! Shall we not add a tenth Muse to the immortal Nine? And that the invention thus divinely honored and distinguished—on which the Muse has condescended to smile— is this magic medium of communication for mankind![121]

The "winds of every latitude and longitude" bring the strings stretched around the world to life, and, through this "magic medium" the Muse sings everywhere at once as if offering a real-time, simulcast performance. The ecstatic tone of the journal's prose reflects the high-pitched whistling of the wires. In *Walden,* a similar note is struck in the chapter "Higher Laws." In trying to contextualize such laws, Thoreau often refers back to Greek and Roman civilization. At one point, he imagines a worldwide harp that plays a universal tune:

> In the music of the harp which trembles round the world it is the insisting on this which thrills us. The harp is the traveling patterer for the Universe's Insurance Company, recommending its laws, and our little goodness is all the assessment that we pay. Though the youth at last grows indifferent, the laws of the universe are not indifferent, but are forever on the side of the most sensitive.[122]

Just as the dots and dashes of the Morse code pitter-patter in telegraph stations, the telegraph wires which "tremble around the world" are like a "traveling patterer," who reminds us to be sensitive to the sounds of nature as well as the laws of the universe. While attention to such laws offers recourse to a finer life, Thoreau has just warned his readers, "even music can be intoxicating."[123]

The potentially intoxicating effects of this "magic medium" may have been the reason why Thoreau did not reference the telegraph harp in *Walden*. We should remember that, as a whole, the text is dedicated to a stern, honest, and detailed examination of self, truth, and nature. The sounds of the telegraph harp seemed to carry Thoreau's thoughts into the clouds, so to speak. Further proof of this wonderful and magical effect is revealed by the fact that the telegraph harp lines the margins of *Walden*'s most climatic passage.

On March 9, 1852, Thoreau took a walk through the Deep Cut, a manmade ravine built by the Fitchburg Railroad company between Walden Pond and Concord. A telegraph line was strung on poles alongside the railroad tracks. In his journal, Thoreau describes what he sees as proof that spring has arrived. He notices the thawing soil on the banks of the Deep Cut and then calls the railroad "perhaps our pleasantest and wildest road." From the rails below and banks on either side, Thoreau's scope of the landscape rises to include the telegraph harp in the sky:

> When I hear the telegraph harp, I think I must read the Greek poets. This sound is like a brighter color, red, or blue, or green, where all was dull white or black. It prophesies finer senses, a finer life, a golden age. It is the poetry of the railroad, the heroic and poetic thoughts which the Irish laborers had at their toil now got expression,—that which has made the world mad so long. Or is it the gods expressing their delight at this invention?[124]

Thoreau thinks of the telegraph harp as proof of the benevolence of the gods. The sounds seem to spread colors, where "all was dull white or black," and thus animate the rocks, trees, and sky. In addition, like Jones's depiction of electricity as "the poetry of science," Thoreau sees telegraph wire as "the poetry of the railroad." The sound of the telegraph harp awakens this poetic spirit and guides his attention back to the eroding soil, which he now describes in greater detail:

> The flowing sand bursts out through the snow and overflows it where no sand was to be seen. I see whether the banks have deposited great heaps, many cartloads, of clayey sand, as if they had relieved themselves of their winter's indigestions, and it is not easy to see whether they came from.[125]

As a whole, the journal entry intertwines a description of the harps' songs with the sights of thawing banks discharging thick goo from somewhere deep in the soil.

Thoreau used this journal entry to fashion a corresponding passage in *Walden*. In the second to last chapter, "Spring," Thoreau writes:

> Few phenomena gave me more delight than to observe the forms which thawing sand and clay assume in flowing down the sides of a deep cut on the railroad through which I passed on my way to the village, a phenomenon not very common on so large a scale, though the number of freshly exposed banks of the right material must have been greatly multiplied since railroads were invented.[126]

There are many similarities between the March 9 entry and the published text. For example, in his journal, Thoreau wrote that the telegraph harp's "finer sounds" were "like a brighter color." In *Walden*, he says he watched the banks bursting with "sand of every degree of fineness and of various rich colors."[127] The journal entry and the corresponding passage in *Walden* also begin with the image of eroding walls, but in *Walden* Thoreau embellishes the scene with a series of archetypal associations. He refers to the banks as oozing with lava-like, "pulpy sprays" and the "laciniated lobed and imbricated thalluses" of lichens. He sees "coral, or leopards' paws or birds' feet, of brains or lungs or bowels, and excrements of all kinds." The sandy rivulets that pour through the banks overlap and interlace, and Thoreau's description seems to verge on hallucination when he notices that "this sandy overflow is something such a foliaceous mass as the vitals of the animal body."[128] He both sees and feels the parts of the external "globe" as a series of internal "lobes": the object and its speech symbol are conjoined, supple, and whole.

Returning to the journal, the sounds of the telegraph harp give Thoreau visions of "a finer life, a golden age." The sound made by the wire seems to reverberate through the atmosphere, charming everything in its wake. In *Walden*, it is not the telegraph harp but the pulpy streams of sand and mud that prove the perpetual "creation of Cosmos out of Chaos and the realization of a Golden Age."[129] Both the sounds of the wire and the image of eroding soil push Thoreau to a creative edge, a brink between human perceptions and divine creation. The additional weight given to the description of the eroding banks in *Walden* seems due to the rhetorical importance of the moment. This would be the culminating image in his life's work, and Thoreau crafted the notes he composed while standing within the Deep Cut into a rich and multilayered text.

Thoreau heard the telegraph harp on the same day and in the same location that he investigated the multicolored banks of the Deep Cut. Like the telegraph harp, the thawed spring landscape was his "redeemer." For instance, in *Walden*, Thoreau recalls standing still, watching the soil seemingly come alive and feeling as if he "stood in the laboratory of the Artist who made the world and me."[130] Recall that when Thoreau hears the harp, he says he "always" thinks he must read the Greek poets and thereby return to those words and phrases that embody Classical acts of language and creation. The eroding banks and the whistling wire resemble those sacred texts, embody nature's spontaneous creation, and are talismans that signify "the principle of all the operations of Nature."[131]

This specific site and the momentary cohesion of railroad tracks, eroding banks, and telegraph had a profound effect on Thoreau. While situating the telegraph harp within the wider body of his philosophy, it is important to remember that he often viewed the telegraph line and the railroad tracks as part of a widespread, dangerous infrastructure. He worried that these new machines would dominate human life and dissect the landscape. On rare occasions like March 9, 1852, however, the railroad, wire, and thawing banks allowed Thoreau to feel as if he had transcended the material world and risen to the height of his artistic powers, both as a disciple of nature and connoisseur of landscape.

Knowing what we do about Thoreau and his discovery of the telegraph harp makes it difficult to reach a general conclusion about his view of the telegraph. While he was clearly skeptical of telegraphic networks, the fact that the wires and poles produced such sublime sounds is reason to believe that Thoreau, as much than any other American (and I might include myself in this category), was moved by the sights—and sounds—of the Line in the American landscape.

Conclusion: The Wired Nation

Literary and visual representations of the electromagnetic telegraph are ambiguous. In landscape painting and landscape prose, “the line” is often a sign of progress—wires and poles are icons of industry, connectivity, and national pride. The telegraph lines also accentuate what Leo Marx refers to as the “middle landscape,” an ideal environment where technology and nature blend in a pastoral equipoise. Other positive renderings of the telegraph show the lines as conduits for romantic affects and wire networks as models for the exchange of spiritual beliefs. At the same time, a small group of artists and scholars seem anxious about wiring the landscape. For them, the telegraph wire represents industrialization and mechanization: it webs the natural environment, fastens the landscape, and aids in what one of Hawthorne’s characters call the “universal world hunt” that threatens individual privacy.

Through poetic histories, anonymous visions, and one of the greatest novels in American literature, the Line weaves its way into many seemingly disparate areas of nineteenth-century culture. It influences ideas about science, nature, spirituality, communication, and industrialization. A recognizable symbol that suggested everything around it is changing, it is also a flexible metaphor, one that refers to mysterious, diffuse, and unintended phenomena as well as material, powerful, and direct effects. Most depictions of the telegraph line imply that it is a tool of progress—a prime model for connection, a machine that both enhanced and diffused thoughts and feelings. At the same time, the Line can be a symbol of control over human thoughts and feelings as well as the forces of nature. The Line in the landscape has the exhilarating ability to unite the nation into one cohesive body and the anxiety-inspiring ability to keep track of everyone living within sight of the wires.

After the Civil War, the Line became a regular feature of the landscape and notions of progress relied more heavily on the widespread telegraphic infrastructure. Thus, late-nineteenth-century technology and culture increasingly depended on new types of electric lines, and with increased necessity came an amplified skepticism and derision.

[1] Wolfgang Schivelbush, *The Railway Journey: Industrialization of Time and Space in the Nineteenth Century* (Berkeley: University of California Press, 1986), p. 29.
[2] Sam Halliday, *Science and Technology in the Age of Hawthorne, Melville, Twain, and James: Thinking and Writing Electricity* (New York: Palgrave Macmillan, 2007), p. 3.
[3] Daniel J. Czitrom, *Media and the American Mind: From Morse to McLuhan* (Chapel Hill: University of North Carolina Press, 1983), p. 10.
[4] Henry David Thoreau, *The Journal of Henry David Thoreau*, ed. Bradford Torrey and Francis H. Allen (Boston: Houghton Mifflin, 1906), 4:458.
[5] Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1967), p. 25.
[6] Ralph Waldo Emerson, "The Poet," *Essays and Poems*, ed. Joel Porte (New York: Literary Classics of the United States, 1983), p. 455.
[7] Leo Marx does not comment on Emerson's use of the spider web as a metaphor for the "great Order." A web's geometrical shapes may reflect order, but the same metaphor could also be a predictive critique of the negative, controlling influence of monopolies like Western Union or Union Pacific. Indeed, by the end of the nineteenth century, the "web" connoted both the positive and negative effects of large corporate infrastructures such as the telegraph as well as the railroad. For more information on "web" metaphors see Robert MacDougall, "The Wire Devils: Pulp Thrillers, the Telephone, and Action at a Distance in the Wiring of a Nation," *American Quarterly* 58, no. 3 (September 2006): 71–74.
[8] Stanley Cavell, *The Senses of Walden* (Chicago: University of Chicago Press, 1992), p. 97.
[9] A prime example of such an eco-criticism is William Cronon's *Changes in the Land: Indians, Colonists, and the Ecology of New England* (1983).
[10] Robert Luther Thompson, *Wiring a Continent: The History of the Telegraph Industry in* the United States, 1832–1866 (Princeton: Princeton University Press, 1947), pp. 32–34.
[11] Cave Johnson, quoted in Thompson, *Wiring a Continent*, p. 33.
[12] Other reactions to the telegraph followed a similar trajectory from anxiousness and mockery to gushing displays of hope, amazement, and fear. For example, when Ezra Cornell (who had helped Morse build the line between Baltimore and Washington) arrived in New York in 1845 to set up a new line, public officials were worried about the threat to public safety and demanded Cornell to pay Benjamin Silliman (Morse's former science professor at Yale) to inspect the apparatus. They were especially worried that it would cause a fire to break out across the city. In 1858, fourteen years later, upon completion of the first Atlantic cable, New York funded the biggest celebration the city had ever seen.
[13] Samuel Morse to Levi Woodbury, September 27, 1837, quoted in Laurence Turnbull, *The Electro Magnetic Telegraph: With an Historical Account of Its Rise, Progress, and Present Condition* (Philadelphia: A. Hart, 1853), pp. 64–65.

[14] For more on Morse's wishes for the government to own the telegraph see Kenneth Silverman, *Lightning Man: The Accursed Life of Samuel F.B. Morse* (New York: Da Capo Press, 2004), p. 250.
[15] David Walker Howe, *What Hath God Wrought: The Transformation of America, 1815–1848* (New York: Oxford University Press, 2007), p. 694.
[16] The phrase "Morse lines" often referred to lines built based on Morse's patented devices—as opposed to the "House lines" and "Bain lines." Yet Morse's system was so pervasive that at times "Morse lines" were used in such a way as to suggest they were synonymous with all telegraph lines. For example see Taliaferro Preston Shaffner's *Telegraph Companion: Devoted to the Science and Art of the Morse American Telegraph*, vols. 1–2 (New York: Pudney and Russell, 1854–55).
[17] Thompson, *Wiring a Continent*, p. 43.
[18] Ibid., p. 50.
[19] Ibid., p. 92.
[20] *New York Evangelist* 17, no. 41, October 8, 1846, pp. 17, 41,
[21] *Scientific American* 1, no. 50 (September 3, 1846).
[22] Historian Lewis Coe relates that the first message sent between Lancaster and Harrisburg, Pennsylvania, in 1846 read "Why don't you write, you rascals?" Coe states: "The sender probably didn't expect to get a reply. He just wanted to be able to tell his friends that he had sent a message over the new telegraph machine." *The Telegraph: A History of Morse's Invention and Its Predecessors in the United States* (Jefferson, N.C.: McFarland, 2003), p. 87. In addition, with its mysterious ability to send and receive instant, invisible intelligence, religious figures were leery of the telegraph. Boston preachers warned against the dangers of playing God. Vail suggested to his partner, Morse, that religious interests in Baltimore were skeptical of the new technology and that they should proceed cautiously with their plans to build another telegraph station.
[23] Thompson, *Wiring a Continent*, p. 440.
[24] Henry David Thoreau, *A Week on the Concord and Merrimack Rivers, Walden, The Maine Woods, Cape Cod*, ed. Robert Sayre (New York: Library of America, 1989), p. 364.
[25] Czitrom, *Media and the American Mind*, p. 11.
[26] Schivelbush, *Railway Journey*, p. 29.
[27] "Curiosities of Railway Travel," *Harper's Magazine* 4, no. 30, April 12, 1851, American Periodical Series Online.
[28] Schivelbush, *Railway Journey*, p. 31.
[29] Emerson, "The Poet," p. 467.
[30] Laura Otis, ed., *Literature and Science in the Nineteenth Century: An Anthology* (Oxford: Oxford University Press, 2002), p. 7.
[31] Paul Gilmore, "The Telegraph in Black and White," *ELH* 69, no. 3 (2002): 810.
[32] Ibid.
[33] Halliday, *Science and Technology*, p. 107.
[34] S. M. Partridge, "The Magnetic Age," *Knickerbocker* (*New York Monthly Magazine*) 28, no. 6, December 1846, American Periodical Series Online.

[35] David S. Reynolds, *Beneath the American Renaissance: The Subversive Imagination in the Age of Emerson and Melville* (Cambridge, Mass.: Harvard University Press, 1989), p. 261.
[36] Walt Whitman, *Complete Poetry and Collected Prose* (New York: Literary Classics of the United States, 1982), p. 55.
[37] Ibid., p. 56.
[38] John Bovee Dods, *The Philosophy of Electrical Psychology: In a Course of Twelve Lectures* (New York: Fowler and Wells, 1888), p. 188.
[39] Ibid., p. 54.
[40] Ibid., p. 51.
[41] Whitman, *Complete Poetry and Collected Prose*, p. 531.
[42] Electricity and landscape are both primary and secondary subjects in poems by Whitman and Emily Dickinson. Scholars have shown that the telegraph transformed Dickinson's poetic practice and how animal magnetism—a supposed emanation that could lead to hypnotism or sexual attraction—influenced Whitman's famous "Body Electric." Scholarly attention has not, however, been offered to how Whitman's and Dickinson's language of electricity ("circuits," "currents," "shocks") corresponds to his and her depictions of landscape ("fields," "scenes," "vistas"). The frequent dashes in Dickinson's poems stitch together visual fragments such as those offered by repeated glances out a window—much like a telegram is composed of short bits of text. Whitman's poems are an attempt to replicate the vast, interconnected sense of the network while attending to the messages sent and received by each individual communication. Teasing the notion of power–lines, I plan to someday examine Dickinson's poems "Angel of Landscape," "Ropes Above Our Heads," and "Truth in Circuit Lies," as well as various passages from Whitman's *Leaves of Grass*. Each poet's distinct, powerful lines transmit an elusive energy, bringing readers into a charged environment.
[43] Alexander Jones, *Historical Sketch of the Electric Telegraph: Including Its Rise and Progress in the United States* (New York: George P. Putnam, 1852), p. 82.
[44] Thoreau, *Journal*, 2:450.
[45] Alexander Jones, *Historical Sketch of the Electric Telegraph*, p. vi.
[46] Ibid.
[47] Turnbull, *Electro Magnetic Telegraph*, p. v.
[48] Ibid., p. 147.
[49] Ibid., p. 148.
[50] Linda Ferber, ed., *Kindred Spirits: Asher B. Durand and the American Landscape* (New York: Brooklyn Museum of Art in association with D. Giles, London, 2007), p. 165.
[51] Asher B. Durand, "Letters on Landscape Painting," *The Crayon: A Journal Devoted to Graphic Arts, and the Literature Related to Them* (1855), repr. in Ferber, *Kindred Spirits*, p. 236.
[52] Ibid.
[53] "Editor's Table: Exhibition of the National Academy of Design," *Knickerbocker* (*New York Monthly Magazine*) 42, no. 1, July 1853, p. 95.
[54] Novak, *Nature and Culture*, p. 180.

[55] Michael Smith, "Recourse of Empire: Landscapes of Progress in Technological America," *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx (Cambridge, Mass.: MIT Press, 1994), p. 42.
[56] The positive iconography of the telegraph and the railroad would eventually turn the other way. The independent rise of Western Union and Union Pacific followed by their agreements with one another as well as the Associated Press, the U.S. Government, and almost every other major industry (land speculation, gold, coal and steel mining, livestock) meant that telegraph lines and railroad tracks would soon become symbols of big business and a sign that massive monopolies could exploit labor.
[57] A single wire crossing a few telegraph poles signified broader commercial systems. Even if the telegraph line or electric transmission structures were designed to be aesthetically pleasing, their presence still implied that, somewhere nearby, "communication" was being bought and sold. In other words, even the most architecturally beautiful and ecologically friendly McDonald's restaurant would create uproar if situated on the rim of the Grand Canyon. Thus, industrial icons were also used in subversive critiques about how technology and industry occupied and controlled the landscape.
[58] Herman Melville, *Moby-Dick, or, The Whale*, ed. Hershel Parker and Harrison Hayford (1851; repr., New York: W.W. Norton, 1967), p. 394.
[59] At the time Melville was writing *Moby-Dick*, crossing large bodies of water with telegraph wires was not yet possible. In 1869, Whitman refers to "the seas inlaid with eloquent gentle wires" in his poem "Passage to India." The first transatlantic cable was completed in 1858, and the second, permanent connection was made in 1865.
[60] Melville, *Moby-Dick*, p. 310.
[61] Ibid., p. 281.
[62] Herman Melville, *Typee* (1854), (New York: Harcourt, 1920), p. 70.
[63] Melville, *Moby-Dick*, p. 141.
[64] Four or eight Leyden jars storing static electricity could also be bound together to form what Benjamin Franklin first called a "battery," borrowing from the eighteenth-century phrase "battery of cannon."
[65] Ibid., p. 176.
[66] Herman Melville, *Billy Budd* (1891; repr., New York: Washington Square Press, 1973), p. 30.
[67] "An Evening with the Telegraph Wires," *Atlantic Monthly* 2, no. 11, September 1858, pp. 489–95.
[68] Linda Simon, *Dark Light: Electricity and Anxiety from the Telegraph to the X-Ray* (Orlando: Harcourt, 2004), p. 42.
[69] "An Evening," p. 495.
[70] Ibid., p. 489.
[71] Ibid.
[72] Margaret Fuller, *Summer on the Lakes in 1843* (Urbana: University of Illinois Press, 1990), p. 81.
[73] "An Evening," p. 489.
[74] Ibid., p. 490.
[75] Ibid.

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[76] Ibid., p. 491.
[77] Ibid., p. 492.
[78] Ibid.
[79] Ibid.
[80] Ibid., p. 495.
[81] Nathaniel Hawthorne, *The House of Seven Gables*, ed. Robert S. Levine. (1851; repr., New York: W.W. Norton, 2005), p. 253.
[82] Ibid., p. 256.
[83] Ibid., p. 96.
[84] Ibid., p. 264.
[85] Ibid., p. 254.
[86] Ibid., p. 264.
[87] *Scientific American* 1 no. 50 (September 3, 1846).
[88] Hawthorne, *House of Seven Gables*, p. 264.
[89] Emerson, "The Poet," p. 455.
[90] Hawthorne, *House of Seven Gables*, p. 264.
[91] Ibid., p. 254.
[92] Ibid., p. 264.
[93] Looking out the train window, the impressionable Clifford thinks the world is falling apart:

> At one moment, they were rattling through a solitude;—the next, a village had grown up around them;—a few breaths more, and it had vanished, as if swallowed by an earthquake. The spires of the meeting-houses seemed set adrift from their foundations, the broad-based hills glided away. Everything was unfixed from its age-long rest. Ibid., p. 256.

In contrast, the telegraph wire running parallel to the railroad tracks appears to be a steady, parallel fixture. The fellow passenger does not need to point or even directly look outside, but a mere "glance" toward the window is enough to refer to this rhythmic object running along the train tracks. The focus quickly shifts from the passenger's glance toward the wires outside the window to discourse about the telegraph's proper function in society. However, it is important to note that, during this time period, looking or glancing at poles and wires as they passed by alongside a moving railroad car created a new and unique visual experience. Hawthorne uses this new feature of railway travel to juxtapose the "great vibrating nerve" with the "detection" of criminals.
[94] Thoreau, *Walden*, p. 394.
[95] Ibid., p. 325.
[96] Ibid., p. 364.
[97] Ibid.
[98] Ibid., p. 395.
[99] Ibid., p. 396.
[100] Ibid., p. 354.
[101] Ibid.
[102] Thoreau, *Journal*, 2:344.

[103] Thoreau, *Walden*, p. 336.
[104] Ibid., p. 338.
[105] Thoreau, *Journal*, 2:498.
[106] Thoreau, *Walden*, p. 387.
[107] Ibid., p. 467.
[108] Thoreau, *Journal*, 3:442.
[109] Laura Dassow Walls, "Thoreau's Technology of Inscription," in *A Historical Guide to Henry David Thoreau*, ed. William E. Cain (New York: Oxford University Press, 2000), p. 132.
[110] Thoreau, *Journal*, 2:450.
[111] Ibid.
[112] Thoreau, *Journal*, 2:496–97.
[113] Walls, "Thoreau's Technology of Inscription," p. 131.
[114] Thoreau, *Journal*, 3:11.
[115] Ibid., 3:71.
[116] Ibid., 4:206.
[117] Ibid., 4:458–59.
[118] Ibid.
[119] Ibid., 4:459.
[120] This specific journal entry seems to have been the inspiration for Terrence Malick's *The Thin Red Line* (1998), which begins with a shot of the jungle and a voiceover that says: "What's this war in the heart of nature? Why does nature vie with itself? The land contend with the sea? Is there an avenging power in nature? Not one power, but two?"
[121] Thoreau, *Journal*, 3:11.
[122] Thoreau, *Walden*, p. 497.
[123] Ibid., p. 495.
[124] Thoreau, *Journal*, 4:342.
[125] Ibid.
[126] Thoreau, *Walden*, p. 565.
[127] Ibid.
[128] Ibid., p. 566.
[129] Ibid., p. 568.
[130] Ibid., p. 566.
[131] Ibid., p. 568.

Chapter Three

Wireless Transmissions: Nikola Tesla, Frederick Jackson Turner, and William James (1882–1904)

Toward the end of the nineteenth century, the application of electricity to technology influenced the history of ideas and the ways in which ideas were transmitted between various discourses. Between 1882, when Thomas Edison opened up his Pearl Street power station in lower Manhattan, and 1904, when the International Electrical Congress in Saint Louis set out to create universal standards for electric currents and electronics, Americans living in the "Electrical Age" were introduced to electric lighting, electric motors, electric trains, and wireless communication. Examining the use of electrical terms, metaphors, and analogies from this same period shows how the proliferation of electric technologies affected the intellectual framework of the American mind.

In this chapter, I argue that, as the nation was becoming wired for electric power and a few individuals predicted a future without wires, a set of scientific and technical terminology involving "power transmission," "waves of force," "renewable energy," "attuned frequencies," and "currents" seeped into popular discourse. More specifically, the language used to describe wired and wireless technologies influenced the way individuals perceived and evaluated themselves and their environment.

To focus my argument, I show how electrical phenomena saturated the thinking of one of this period's greatest scientists, Nikola Tesla, the inventor of the alternating–current (AC) system for generating and transmitting electricity, innovator in the field of radio, and dreamer of various fantastic weapons and machines. In addition, I show how that the language of electricity swept into academia and lined the margins of two of this period's most important texts: Frederick Jackson Turner's 1893 speech "The Significance of the Frontier in American History" and William James's *The Principles of Psychology*, which began to appear in pieces in 1878 but was published in full in 1890.

In the last decade of the century, Tesla, Turner, and James helped define their respective disciplines. In his introduction to *The Principles*, Robert Wozniak says that James's text "is widely considered to be the most important text in the history of modern psychology."[1] Turner's Frontier Thesis, which was presented during a meeting of the American Historical Society at the Chicago Columbian Exposition, has been referred to as "the most famous address ever delivered by an American historian"[2] and "the single most influential piece of writing in the history of American history."[3] Riding on the achievement of these soon-to-be canonical texts, James and Turner went on to enjoy successful academic careers. Their influence was palpable far into the twentieth century, and they remain crucial to our understanding of history, psychology, and philosophy. Tesla's career path followed a different trajectory.

Tesla was never employed by a university and initially distanced himself from business and manufacturing. He filed patents for the polyphase system of power transmission and AC induction motors in 1887 and 1888, and by 1893 he was one of the most recognized inventors and electrical engineers in the world. One pundit claimed that he was one of the few living persons who could impact the fate of the entire human race.[4] Tesla did pioneering work with fluorescent lighting, wireless telegraphy, radio, sonar, and lasers. Renowned scientists like Herman von Helmholtz and Lord Kelvin praised Tesla, and American celebrities like Robert Underwood Johnson and Mark Twain wanted to be near him. A young scientist catapulted into fame and fortune, just after the turn of the century, he was financially ruined and publicly disgraced. A series of events starting in 1901 left Tesla bankrupt and mired by accusations that he was, and had always been, a mere visionary. Looking back at his entire career, we might say that Tesla was blessed with brilliant ideas and visions, but other men made them practical. In the early twentieth century, Tesla went too far too fast, and many feared that his ideas were impractical at best, and at the very least, would create social unrest.[5]

Recently, historians, scientists, and engineers have begun to reexamine Tesla's influence on modern science and technology. Compared to those of Turner and James, Tesla's writings and lectures have received relatively little critical attention in the humanities and American studies though he has inspired sci-fi literature, films, and even a car company. I hope that the following juxtaposition helps show that Tesla was not only an important inventor with fantastic dreams but a vital thinker who embraced his times. My concern here is not so much with Tesla's tragic entrepreneurial career or the details of his patents as it is with his influence the popular mind. His lectures and writings provide a valuable supplement to the works of Turner and James because they further illuminate the possibilities and the anxieties surrounding technology, the wiring of the landscape, and the body electric. In other words, rather than try to revise the history of science or technology to give Tesla his due, I want to show how he contributed to the history of ideas, especially those about the relationships between the electric environment and our electric minds.

This chapter flows from the external to the internal, from overwhelming, global shocks to minute, charged particles. I begin with Tesla's "On Electricity" (1897), a bombastic display of the electrical sublime offered to celebrate the completion of the nation's first major power plant and its groundbreaking AC transmission line. I then turn to Turner's Frontier Thesis, a momentous idea that was inspired by the historical loss of a magnetically "attractive" frontier line. I read Turner's work in the context of electrification as displayed at the same Chicago World's Fair, where he first presented his seminal address. Returning to Tesla, I show how his development of wireless technologies and his belief in "all-pervasive energy" aligned with his beliefs about nature and call for the preservation of natural resources. I then move to James to discuss how electricity was understood to operate in the "body electric" and argue that the "stream of consciousness" should be reconsidered as the "currents of consciousness." In the last section, I examine how Tesla's plans to create humanlike robots, or what he called "automatons," relate to James's discussions of automatism and provide historical insight into current issues with consciousness studies and ethical debates about artificial intelligence.

Wireless Transmission and Parallel Instances of Illumination

While I am convinced of the importance of wireless and wired technologies, in this chapter I stress the wireless and illuminating aspects of the popular ideas that influenced each of these three thinkers. I do this for two reasons. First, there is no direct line of influence among these three figures. Tesla may have never read James or Turner, and Tesla's inventions, articles, and speeches did not seem to especially influence the two professors. In addition, when Turner uses words like "wave" and "attraction," it seems he was conscious that these words were similar to "frontier," a term he argues was essentially "elastic." He may have not been thinking of the scientific meaning, but he knew that such words were powerful and their connotations could be shaped to suit the occasion. James, as we will see, was deeply influenced by his readings of Helmholtz from whom he learned about waves, electric fields, and the vibratory nature of heat and light. Tesla, Turner, and James did not directly respond to one another, but they all worked in similar fields of discourse and prided themselves for using approaches and terms that display fascinating, interdisciplinary thinking.

Secondly, while my project argues that the transmission of electric currents offer a valuable schema for thinking about the transmission of language, these three thinkers were concerned with physical, historical, and psychological transmissions or, more specifically movements. For example, Tesla begins “On the Problem of Increasing Human Energy” (1900) — originally titled “The Problem of Energy Transmission”—by addressing “the inconceivably complex movement which, in its entirety, we designate as human life.”[6] He observes that “every movement in nature must be rhythmical. . . . Birth, growth, old age, and death of an individual, family, race, or nation, what is it all but a rhythm?”[7] Meanwhile, Turner’s work addresses the movement of Anglo-European settlers across the North American continent. He argues, “Movement has been [the American character’s] dominant fact, and, unless this training has no effect upon a people, the American energy will continually demand a wider field for its exercise.”[8] Finally, in the chapter titled “The Stream of Thought” from *The Principles*, James observes: “Out of the infinite chaos of movements, of which physics teaches us that the outer world consists, each sense-organ picks out those which fall within certain limits of velocity.” From this “undistinguishable, swarming *continuum,* devoid of distinction or emphasis,” our senses “accentuate particular movements” (emphasis in original). [9] By accentuating these swarming sense perceptions and blending them with the stream of consciousness, we become ourselves.

Calling attention to the affinities and rhythms between the movement of electrostatic fields, waves of settlers, and currents of consciousness, I show that the ideas and facts directly concerning electricity influenced the development of the American mind. For instance, electricity blurred the boundaries between the natural and mechanical forces acting on the landscape as well as the separation between electric bodies and electric machines. In addition, during this "electrical age," nature's most powerful force was harnessed and made to be the foundation for some of humankind's most powerful tools.

Tesla: Thinking "On" and "With" Electricity

In January 1897, on a cold winter night in Buffalo, approximately four hundred scientists, engineers, and politicians gathered to celebrate the transmission of alternating current through upstate New York. The power that helped illuminate the room in Buffalo was generated twenty-seven miles away at Niagara Falls, where engineers had completed the nation's first hydroelectric power plant in 1895. A local newspaper heralded the event as the "Only Electrical Banquet the World has Ever Seen."[10] As part of the evening's events, the Serbian-born scientist and inventor Tesla offered a speech entitled "On Electricity."

Tesla was crucial to the successful harnessing of Niagara Falls. In 1895, an article in the *New York Times* stated: "To Tesla belongs the undisputed honor of being the man whose work made this Niagara enterprise possible."[11] Tesla's name was listed thirteen times on the bronze patent plaque that was attached to the Niagara Falls Power House.

The audience in Buffalo recognized his contribution and greeted him with thunderous applause. A witness reported, “The introduction of Nikola Tesla, the greatest electrician on earth, produced a monstrous ovation. The guests sprang to their feet and wildly waved napkins and cheered for the famous scientist. It was three or four minutes before quiet prevailed.”[12]

Tesla seemed overwhelmed. He began by admitting that he felt so “full of the subject” that he could not “dwell in adequate terms of this fascinating science.”[13] He continued, in an embarrassed, self-deprecating tone:

> as I shall attempt expression, the fugitive conceptions will vanish, and I shall experience certain well known sensations of abandonment, chill and silence. I can see already your disappointed countenances and can read in them the painful regret of the mistake in your choice.[14]

Tesla was humbled by the achievement at Niagara, but the idea that he lacked “the fire of eloquence” was offered as more as of a rhetorical gesture. He continued by citing some of the late-nineteenth-century intellectual developments—the exactness of knowledge, increased understanding of invisible forces, and widespread “influence of the artist,” who can perceive a single truth and be “consumed by the sacred fire.”[15] Just as the Internet seems to have become an exceptionally strong force in the modern mind, in Tesla’s view, all of the intellectual developments that defined the late nineteenth century had been charged by breakthroughs in the science of electricity:

> Electrical science has revealed to us the true nature of light, has provided us with innumerable appliances and instruments of precision, and has thereby vastly added to the exactness of our knowledge. Electrical science has disclosed to us the more intimate relation existing between widely different forces and phenomena and has thus led us to a more complete comprehension of Nature and its many manifestations to our senses. Electrical science, too, by its fascination, by its promises of immense realizations, of wonderful possibilities chiefly in humanitarian respects, has attracted the attention and enlisted the energies of the artist; for where

> is there a field in which his God-given powers would be of a greater benefit to his fellow-men than this unexplored, almost virgin, region, where, like in a silent forest, a thousand voices respond to every call?[16]

A few years earlier, Turner had claimed that the frontier and especially the West shaped ideas of progress during the nineteenth century. For Tesla, the "unexplored, almost virgin, region" of electricity would be a driving force for the scientist, the philosopher, and the artist in the twentieth century. Electrification promised to erase ideological boundaries and spark new lines of inquiry. Thus, Tesla concluded, "In all these enjoyable and elevating features which characterize modern intellectual development, electricity, and the expansion of the science of electricity, has been a most potent factor."[17]

For the remainder of his talk, Tesla meditated not just "on" electricity, but with it. Electricity was not just a potent factor of intellectual discourse or even a tool of progress; it was the characterizing feature of the mind and the gauge for progress. The future, according to Tesla, would thrive on electric power, the transmission of which the audience had gathered to celebrate. He grandly stated: "The greatest significance for the comfort and welfare, not to say for the existence, of mankind . . . is the electrical *transmission of power*" (emphasis mine).[18]

Tesla saw transmission of electricity as a panacea: it would cure health problems, eradicate poverty, end military conflicts, and make everyday life more comfortable. The lines of electrical transmission—today commonly called "power lines"—promised to cross national boundaries. Steel towers draped with wires would spread peace and prosperity across the globe. The connectedness of electric power grids would inspire individuals to see the connectedness of nature and humanity. Lawmakers, economists, and philanthropists, according to Tesla, could only provide "temporary" relief for struggling masses: “If we want to reduce poverty and misery, if we want to give to every deserving individual what is needed for a safe existence of an intelligent being, we want to provide more machinery, more power.”[19]

In the last quarter of the nineteenth century, technological advances like light bulbs, induction motors, and electric trains and subways changed the way people worked, communicated, and thought about the world. Electric power promised to accelerate those changes and transform almost every aspect of existence. Not all Americans had the language or metaphors with which to understand these recent developments or see how “electricity” would shape the future. Tesla, among others, was opening the conversation to a wider audience. As we will see, he not only tried to popularize the science of electric transmission, he viewed the transmission of electric power as a revolutionary political tool.

The rest of this chapter seeks to ground and explore some of the “potent factors” resulting from advances in electrical science and the explosion of electric power transmission at the turn of the century. As scientific advancements helped electricity be created, transmitted, and distributed in new and spectacular forms, the language of electricity was created, transmitted, and distributed as a new and potent rhetorical force; as electric-powered gadgets and machines began to dot the nation’s physical landscape, ideas couched in electrical metaphors permeated through the intellectual landscape.

Tesla’s grandiose response to the America’s first transmission line—for which he thanked “those intrepid pioneers who have joined their efforts and means to bring it about”—provocatively resonates with another powerful idea, one inspired by a greater wave of pioneers and their collective advance of a frontier line.[20]

Turner: Uppermost Conditions, Frontier Utility, and Waves of Force

Since 1893, Turner's "Significance of the Frontier in American History" has been evaluated and analyzed through a number of critical lenses. I suggest we read his famous essay through one of his less famous works, "The Significance of History" (1892). If we use the historical methodology laid out in this earlier text to examine this particular moment in American history, it seems that, around the same time that frontier lines disappeared, electric transmission lines began to sweep across the landscape.

Turner published "The Significance of History," during his first year as an assistant professor at the University of Wisconsin. For him, historical studies in the United States should follow in the footsteps of other nineteenth-century historians like Wilhelm Roscher who were determined "to rewrite history from the economic point of view."[21] Roscher and others of the German School of History developed a cross-disciplinary approach in which economic laws were studied through historical facts and social forces. Such an approach seems to underlie Turner's claim: "*Each age writes the history of the past anew with reference to the conditions uppermost in its own time*" (emphasis in original).[22]

The economic, geographic, political, and social conditions "uppermost" in the present influence our collective view of the past, and for Turner, this accounts for the "continuity" of historical research (the present is constantly rereading the past, and the past is constantly informing the present). In addition, Turner argues that a historical analysis should exhibit what he calls "unity." He explains, "Local history can only be understood in the light of the history of the world." As historians draw links between historical facts and contemporary conditions, local histories and world histories, they begin to rewrite "history as politics, history as art, history as economics, history as religions—all are truly parts of society's endeavor to understand itself by understanding its past." In short, historical analysis must account for temporal, geographic, philosophical, and disciplinary conditions.[23]

For Turner, this relatively new, multidisciplinary approach gave historians a greater role in modern society: these professionals must not be resigned to collect facts, but must reveal the "utility of history" to their fellow citizens. Historical research must not be confined to the collection of dates and names, and findings must not be restricted to books. History is a process, and, at some point, the available history of the past must be used to enhance our understanding of the present. For Turner, the clearest example of this "utility of historical research" is its function as "training for good citizenship." The study of history provides the foundation for a healthy, ethically responsible, and well-educated society. For example, if properly used, U.S. history would help Americans "realize the richness of our inheritance, the possibility of our lives, the grandeur of the present."[24]

Turner acknowledged that present conditions shape views of the past, and that history should have "utility," thus providing the parameters for our reading of his subsequent text, "The Significance of the Frontier in American History." In the following pages, I situate Turner's Frontier Thesis within some of the premier scientific and technological contexts of 1893 and show some of the ways Turner's essay was utilized in academic discourse and popular culture.

Conditions Uppermost: Geographic and Economic Conditions of 1893

"The Significance of the Frontier" opens with a quotation from the U.S. Census Report for 1890, in which Turner read "these significant words":

> Up to and including 1880 the country had a frontier of settlement, but at present the unsettled area has been so broken into by isolated bodies of settlement that there can hardly be said to be a frontier line. In the discussion of its extent, its westward movement, etc. [the frontier line] can not, therefore, any longer have a place in the census reports.[25]

The omission of the frontier line from the U.S. Census reports signals a geographical condition and a cartographic fact. Together, they prompted Turner to conclude that since Christopher Columbus's discovery of America—and, I might add, especially since the first permanent settlement, in what became the United States, in 1607—a continually advancing frontier had generated a distinct set of values and recurring set of experiences. The processes that occurred on the frontier demanded and cultivated "this perennial rebirth, this fluidity of American life, this expansion westward with its new opportunities, its continuous touch with the simplicity of primitive society."[26] The rugged frontier had shaped America's past and continued to show itself in the institutions, laws, habits, and beliefs informing the present. Turner's claim is broad and ambitious. He argued that the frontier had had more influence on America's military pursuits, economic systems, legislative platforms, and intellectual character than European traditions or the institution of slavery, one of the primary causes for the Civil War. Turner made the case for American exceptionalism by focusing on what he saw as the natural processes of western advance. America, for better or worse, was a nation driven by frontiers.

Turner's address was delivered at an opportune time. The social, cultural, and political utility of his ideas shaped discourse in American history well into the twentieth century. If one reads the 1893 address in the context of his first published essay, one sees that Turner's goal was to address the nation's immediate concerns by drawing attention to the significance of advancing social forces and the retreating frontier spaces. Such transitions raised at least one important question: If the distinctly "American" products and institutions had been conditioned on the frontier, then what American products and institutions would be created after the frontier closed?

In looking for an answer, scholars have situated Turner's ideas in the context of contemporaneous economic conditions. For example, John Faragher explains:

> [Turner's] brilliance was to speak directly to the sense of crisis enveloping the intellectual discourse of the nation in 1893. The stock market had crashed shortly before the Chicago meeting, and that year some six hundred banks closed, more than fifteen thousand commercial houses failed, and seventy-four railroad corporations went into the hands of receivers. Unemployment rose to levels greater than any time in living memory. The Jackson Turner thesis about the closing of the continental frontier offered an explanation for the crisis—the United States had reached a critical watershed in its history—and to many it also seemed to suggest a way out.[27]

In the post-frontier era, average Americans would have to confront new economic frontiers and working conditions. They had to retool. The frontier men and women who had worked on an advancing geographical boundary would have to become workers and managers operating in increasingly populated and relatively "closed" urban spaces. Instead of the Indian trader, independent farmer, and cowboy, the representative American was now the tycoon, inventor, and factory worker. Yet, Faragher's comment also suggests that the nation's intellectual discourse did not range beyond economics and politics.

Faragher's reading is not without warrant, as Turner was also quick to underscore the political and economic transitions that accompanied the closing of the frontier. In his speech to commemorate his election as president of the American Historical Society in 1910, he stated that the three most dominant social forces at work between 1893 and 1910 were "the closing of the period of the colonization of the West," "the age of steam," and "large scale industry."[28] Conglomerates such as the U.S. Steel Corporation and factory systems such as the one built by Henry Ford created "wealth and organization and concentration of industrial power in the East."[29] Turner explained the relationship between the closing frontier and the development of large-scale industry in terms of a general migration of American energy and attention. During the nineteenth century, they were focused towards moving west, but in the early twentieth century, the national focus was shifting back east. Opportunities for the small farmer, artisan, or financier were quickly drying up. Waves of immigrants continued to arrive, but instead of going west like former pioneers, they stayed in the east and worked for the large-scale industries.

The closing of the frontier and general industrial transition were "conditions uppermost" during this period, curiously Turner chose the "Steam" as one the defining power source for the era. In scholarly discourse and popular culture, the age of steam had already given way to the age of electricity. Indeed, it seems that electricity was one of the most startling and widespread conditions of this time. The steam engine was crucial to the development of the railroads. The combustion motor helped pave the way for the automobile industry. The production of iron and steel provided the materials necessary to build ships, factories, and skyscrapers. By 1910, however, electricity and electric technologies were the backbone of most of the industries Turner saw burgeoning in the east, and the connective tissue for the entire nation. The evolution of electric technologies and electric power seemed to define the period before and after the frontier closed.

The transition from steam to electricity began in 1880s with inventions such as Thomas Edison's incandescent-lighting systems, Alexander Graham Bell's telephone, and Tesla's systems for AC. The spread of these technologies changed life in the United States. Artificial lights made it possible to extend working hours, which in turn affected wages and labor. Electric motors were used in subways and elevators, which in turn changed the design of buildings and the layout of cities and towns.

Communications theorist James Carey says that a progressive and "sublime" rhetoric supported this transition from steam to electricity. In his book *The Unity of Law* (1872), Henry Charles Carey identified "the physical laws of electricity and magnetism, then being discovered, with the laws of society" and projected "electricity as the new bond between nature and society."[30] For James Carey, proclamations made by politicians, engineers, and pundits during the late nineteenth century convey a single overarching message about the power of electricity to redeem past mistakes

> as the dream of a mechanical utopia gave way to the realities of industrialization, there arose a new school of thought dedicated to the notion that there was a qualitative difference between mechanics and electronics, between machines and electricity, between mechanization and electrification. In electricity was suddenly seen the power to redeem all the dreams betrayed by the machine.[31]

The increasingly familiar and ambiguous effects of steam-driven machinery meant that, as a force, "steam" began to lose its luster. Electric technologies, on the other hand, were still new and mysterious enough to spark visions of utopia. Of course, Tesla fully embraced what Carey cites as the "redemptive" powers of electricity. "For more than half a century the steam engine has served the innumerable wants of man," Tesla said, but the current challenge facing scientists and engineers was "to perfect one kind of engine—the best; the universal, the engine of the immediate future; namely, the one which is best suitable for the generation of electricity."[32] Tesla seemed confident that engineers were on the verge of producing the "best" and most "universal" machine in the history of humankind. The prospect is sublime because its "universality" seemed to overwhelm and even elide the present.

World's Fairs and other public exhibitions provide another clear view of this transition from steam to electricity in popular culture. The Philadelphia Centennial Exposition of 1876, according to David Nye, was "the last great exposition based upon steam power, and its central symbol was the huge Corliss steam engine."[33] Subsequent expositions and fairs at Chicago in 1893, Buffalo in 1901, and San Francisco in 1915 not only relied on electric power but also featured increasingly complex electric technologies. Each exposition was charged with the task of topping its predecessor and offering electrical spectacles that would draw visitors from around the world and send them home amazed. For many Americans, the "Electrical Age" began around the same time, and, pointedly, in the same place that Turner first declared that the frontier had closed. Returning to Turner's thesis about the effect of the frontier on the American past, and attempting to contextualize that idea within the uppermost conditions of present, it seems important to note that, a few blocks from the place Turner first addressed the significance of the frontier in American history, Chicago's "City of Light" was providing glimpses of the nation's future.

As Turner declared that "American energy will continually demand a wider field for its exercise," the most powerful dynamos in the world were humming in the distance, sending an unprecedented amount of electric current through the streets of Chicago. The dynamos and transformers, designed from Tesla's AC patents and built by the

Westinghouse Company, delivered electricity from Machinery Hall throughout the fairgrounds. Westinghouse also supplied ninety thousand Sawyer-Mann incandescent bulbs to help illuminate the White City. General Electric and Edison contributed five thousand lamps of their own. Ten percent of the artificial light bulbs in the United States were concentrated into a little more than two square miles.[34]

Electricity may have even influenced Turner's immediate concerns and conditions. Years later, Turner remembered that his paper received a weak response and no follow-up questions from the approximately two hundred historians in attendance. Faragher attributes this to the fact that "most of his audience had spent the day touring the 'White City'—the exposition ground on Chicago's South side—and many had accepted Buffalo Bill Cody's invitation for a special performance of his Wild West show."[35] While those who were actually present that evening may have seemed exhausted by the day's activities, it seems possible that at least a few members of the American Historical Society passed on the final paper of the day in order to enjoy the "illuminating" amusements nearby. This would not be the first nor the last time that scholars skipped out on a conference paper to visit more exciting attractions.

These absent historians would have found themselves bombarded by a vast array of electric rides, electric gadgets, and displays of the electrical sublime.[36] Electric trains, escalators, boats, and moving walkways transported visitors through the fair grounds. The Ferris wheel, at 264 feet high, towered over the Midway Plaisance. This visually dominating structure was "the most popular attraction of the entire exposition."[37] The rim of the wheel was studded with electric light bulbs. The wheel turned on the largest single piece of steel ever forged; the cars attached could seat over two thousand passengers at a time.

The Chicago Columbian Exposition effectively exposed millions of people from around the world to electric technologies and suggested that the United States was exceptional in its generation, transmission, and consumption of electricity.[38] The two electric fountains placed at the edge of the Great Basin provided some of the fair's most dazzling and exciting visual displays. Each night, lights with 250,000-candle power illuminated the water shooting from more than a dozen jets. Streams of water shot over one hundred and fifty feet into the air. The light-display operator used searchlights with differently colored lenses to make the liquid plumes turn red, yellow, green, or blue. Nye explains: "Water could be forced through different kinds of nozzles and made to pulsate or to shoot suddenly higher, projecting kaleidoscopic variations of color and line, reflected in the surrounding basin."[39] If Buffalo Bill's Wild West show predicted America's love affair with the Western, these fountains foreshadowed our craving for special effects. The electric fountains were "indescribable by language" because the combination of lights and geysers were "so bewildering no eye can find the loveliest, their vagaries of motion so entrancing no heart can keep its steady beating."[40]

Visitors to the exposition's Electricity Building saw the latest in electrical technology. Edison displayed his kinetoscope and phonograph. General Electric, which had lost the bid to provide power for the entire exposition, erected a massive Tower of Light in the center of the hall. The seventy-two-foot tower featured ten thousand light bulbs, and one report said it was topped by a "mammoth incandescent lamp built up of about 30,000 cut glass prisms."[41] Against the back wall Westinghouse built a forty-five-foot-tall mural of Columbus and wrote out the dates 1492–1892 using various colored lights.

Juxtaposing Turner's thesis about the physical, geographic frontier with the emerging frontier of electric technologies offers a fresh way to understand some of the newly forming channels for the old frontier energy. Up until 1890, according to Turner, the primary site of American triumphs over nature occurred on a continually advancing physical landscape. After this moment, the tools used to occupy, parcel, and dominate this physical space like the axe, plow, and rifle became icons of a past era. A new set of images and symbols appeared, such as the motor, microscope, and turbine. Instead of reflecting the past, these images were used to suggest that the present was approaching the future. The electric technologies on display in Chicago offered immediate, almost blinding proof that the conquest of nature and landscape would no longer be undertaken by direct labor with the land but with a new set of scientific laws and electric technologies, almost all of which were, for the time being, attached to either end of a wire.

The Utility of Turner's Frontier Thesis: Ideal Landscapes and Waves of Force

While previous readings of Turner's address have either downplayed or ignored the surrounding, transformative effects of electricity, the Frontier Thesis has remained a powerful force in various academic departments and political arenas. First and foremost, his ideas have been used to support notions of American exceptionalism. Turner explains: "The fact is, that here is a new product that is American."[42] Such statements inspired Americans to see their institutions as unique, constantly expanding, and exceptionally powerful. The frontier cycle transformed our forefathers: the end result was not the

European immigrant worked over by New World circumstances, but a new type of individual. Thus, the Frontier Thesis seemed to fulfill Turner's goal of helping fellow citizens to "realize the richness of our inheritance."[43] His ideas about the frontier were also used (albeit not in a way that Turner intended) to shape foreign policy. If "American energy," the thinking went, "will continually demand a wider field for its exercise," then it was almost natural to expect enterprising and athletic American frontiersmen to venture into the seemingly "open" and "free" fields of Southeast Asia, Central America, or Eastern Europe. Turner intended his thesis to warn Americans about their inherited traits. Without physical frontiers to overcome, Americans should strengthen their intraregional ties and, as a country, the United States should make a concentrated effort to develop technology and science. Turner believed that continuing the process of imperialism and expansion was not the answer. Despite his admonitions, the habitual need for physical fluidity and movement—also key components to the doctrine of Manifest Destiny—did not seem to wane, and the United States soon found new frontiers in parts of South America, Africa, and Asia.

Popular culture embraced the utility of Turner's ideas with the development of the "Western" genre. For Richard Slotkin, Turner's version of American history provided the ideological underpinnings for the various version of the Western: films, novels, and images. Slotkin suggests that 1893 marked the beginning of a new era in the Myth of the American Frontier. Turner argued that frontier spaces had allowed Americans to keep in "continuous touch with the simplicity of primitive society."[44] Meanwhile, William Cody's Wild West show began to re-create those real-life experiences for urban audiences. Indeed, both Turner's thesis and Cody's show offered a basic set of symbols (horses, guns, wagons, Indian guides, Indian wars) and celebrated a basic set of ideals (rugged individualism, love of wilderness, entrepreneurship) that would be reused and rehearsed in various forms of American art, politics, and media throughout the twentieth century.

Turner's use of scientific metaphor is useful for understanding a general shift in how American scholars perceived physical forces like electricity and the ways that the broader public thought about shared spaces like the "American landscape." In other words, "The Significance of the Frontier" supports the relationships among electricity, landscape, and what I call metaphorical utility.

To review: during the nineteenth century, depictions of electricity and landscape were useful because they helped artists, thinkers, and scientists to reconcile and convey experiences of nature with scientific facts about nature. For example, referring to a landscape as "shocking" might supply an affective, aesthetic, or scientific fact and transcribing a quiet, smooth nature scene might conduct the buzz one received from sitting in the woods or along the seashore. Meanwhile, the metaphorical utility of "electricity" and "landscape" resided in the fact that they were simultaneously powerful and plastic. The same terms used to describe electric forces (currents, fields, waves) could be used to describe the forces acting on a landscape.

Turner seems to have adopted social theories about primitivism, evolution, and the stages of human development to contextualize a range of historical facts. More specifically, he tapped into the metaphorical utility of scientific terminology to give his ideas weight in an expanding academic profession. For example, Bogue argues that "Turner's use of the organismic metaphors seems to be an endorsement of the

Lamarckian position that acquired traits could be inherited."[45] The following passage provides a few examples of such "organismic" metaphors:

> Thus civilization in America has followed the arteries made by geology, pouring an even richer tide through them, until at last the slender paths of aboriginal intercourse have been broadened and interwoven into the complex mazes of modern commercial lines; the wilderness has been interpenetrated by the lines of civilization growing ever more numerous. It is like the steady growth of a complex nervous system for the originally simple, inert continent.[46]

Turner's essay links America's "complex . . . commercial lines" to the bodies' "complex nervous system," but keeps such comparisons vague and relatively sterile. Bogue says that such metaphors in the Frontier Thesis "create the aura of science without recourse to deniable detail."[47] The aura or cloud surrounding the landscape is also political cover for the prejudices of American exceptionalism.

For this study, the focus is on the term *waves*, a word that refers to the periodic disturbance of particles—as a "wave" moves through an electromagnetic field or through an ocean—as well as the repeated occurrence of specific phenomena—as a "wave of protests" can change public policy. The second connotation of "wave" is implied in Turner's use of the term. He begins his address by referring to the advancing "line" of frontier in American history. Shortly thereafter, struggling to define the boundaries of the line and present a fixed definition of frontier, Turner takes a safer route and says, "The term [*frontier*] is an elastic one, and for our purposes does not need sharp definition." He says his aim is to simply "call attention to the frontier as a fertile field for investigation, and to suggest some of the problems which arise in connection with it." [48] One way that Turner avoids the lack of definition for the frontier is by referring to the progressing "line" as a "wave." Trading "wave" for "line" suggests a movement that is fluid, powerful, and loosely structured by scientific laws. “Waves” appear throughout the address:

> In this advance, the frontier is the outer edge of the wave—the meeting point between savagery and civilization.
>
> Each passed in successive waves across the continent. Stand at Cumberland Gap and watch the procession of civilization, marching single file—the buffalo following the trail to the salt springs, the Indian, the fur-trader and the hunter, the cattle-raiser, the pioneer farmer—and the frontier has passed by.
>
> The farmer’s advance came in a distinct series of waves.
>
> Generally, in all the western settlement, three classes [the pioneer, emigrant farmers, men of capital and enterprise], like the waves of the ocean, have rolled one after another.
>
> Thus wave after wave is rolling westward; the real Eldorado is still farther on.[49]

These quotations link the movement of Anglo-European settlers to waves. Like “the waves of the ocean,” the settlers kept coming, one set after another. Turner could have just as easily described the same process with a term like “march,” which would still make sense: “The farmer’s advance came in a distinct series of *marches*.” The term “march” more accurately describes the way many settlers entered the frontier. Turner avoids the political implications of “marching” or even “migrating,” though, by using the much more organic “wave” phenomena.

Much more than this, Turner’s use of “waves” suggests we situate his essay within the emerging wave theory of the nineteenth century, which, as Gillian Beer reveals, “seems to make a single process a sufficient explanation of all phenomena.”[50] One of Beer’s objectives is to show how the wave theory surcharged the work of modernist poets and authors. For Beer, scientists like Clerk Maxwell and John Tyndall represent the late-nineteenth-century "insistence on relativizing, the relativizing both of our knowledge and of possible descriptions." This scientific process was reflected in modernist works by authors such as T. S. Eliot and Virginia Woolf.[51] As a forerunner of New Historicism, Turner might also been seen as a part of this "relativizing" movement. his argument about the elasticity of the term *frontier* can also be read alongside contemporaneous thinkers from social theory, evolutionary biology, physics, and mathematics, who, for Beer, displayed a "heightened awareness of the instability of language, certainly, and also—more strikingly—of the insufficiency of symbol and algebra."[52] Just as Maxwell's use of "heat" and "ether" in his writings "allows for a limber play of attention across even those concepts most necessary to his projects,"[53] Turner's use of the "line of frontier" and the "outer edge of the wave" allows his investigation of the frontier's importance to be flexible while retaining a certain rhetorical influence.

On the surface, nothing is especially electric about Turner's waves, but as he describes the forces pulling those waves across the continent, we see that, in his mind, the "American energy demanding a wider field" is akin to the electric energy created by an electromagnetic field. The first settlers, Turner explains, were pulled toward the frontier, "impelled by an irresistible attraction."[54] After these individuals were settled, another wave of "attraction" drew industry westward. Furthermore, the waves of people and capital did not always line up perfectly from north to south as they moved toward the Pacific. The "unequal force of the centers of frontier *attraction*," caused "indentations into the wilderness," and "among the important centers of *attraction* may be mentioned the following: fertile and favorably situated soils, salt springs, mines, and army posts" (emphasis mine).[55] Certain attractive places like the fertile fields of Nebraska, the salt-rich hills of Utah, or the California gold mines amplified the waves of settlers ranging across the continent. Again, the use of the word *waves* offers a scientific inflection on a narrative filled with political, economic, and historical repercussions. Americans were not a violent, colonizing, greedy people by their own volition but because of the irresistible and timeless forces of nature constantly pulling on their bodies and minds. The processes of the frontier, much like those of Manifest Destiny, evoked a sense of the electrical, both in spirit and material technologies.

Therefore, referring to the frontier as a "wave" instead of "line" reflects a subtle change in the way "American landscapes" operated in the popular imagination. Like earlier artists and writers such as Cole and Thoreau, Turner seems to romanticize the landscape dominated by "primitive conditions"—the places that forced the frontiersmen to adapt and "accept the conditions which [the frontier] furnishes, or perish."[56] Pioneers and adventurers were attracted by such an environment because the "demand for land and the love of wilderness freedom drew the frontier ever onward."[57] By noting that the frontier had closed, however, Turner suggests an impending shift in the way Americans valued their wilderness and thus the frames with which they viewed the landscape.

In *Wilderness and the American Mind* (1967), Roderick Nash says that after 1890, the "qualities of solitude and hardship that had intimidated many pioneers were likely to be magnetically attractive to their city-dwelling grand-children."[58] Of course, it is ironic that Americans view the wilderness as a repository of curative electric forces to which we try "get away" or move beyond the civilized spaces, which today seem to stretch as far as its electric technologies. The nature-tourist leaves the grid, so to speak, and enters into the wilderness to feel the earth's electric powers and recharge. Americans using electricity in urban settings were lured by its promise of comfort and increased individual agency. They were simultaneously attracted by the electrical potential in technology and the idea of being alone in the wilderness and enduring hardships. In Turner's view, the formerly "stubborn American environment" cultivated the "freshness" and "confidence" of American character.[59] The frontier was foreign and strange and shocked the newcomers until they could adjust. After it closed, landscapes that retained wilderness qualities were not as novel, but they still provided an electromagnetic therapy for the collective body politic. Beginning around the 1890s, the rugged, wild, shocking American landscape was no longer seen as an adversary that needed to be conquered; it was a collection of magnetic forces that needed to be preserved.

Tesla: Nature's "Inexhaustible Energies" and a Wirelessly Electrified World

Turner's thesis contributed to the preservation movement started around the turn of the century. Preservationists argued that certain American landscapes such as the Grand Canyon, Yellowstone, and the Great Smoky Mountains had certain magnetic qualities and, therefore, should be celebrated and protected. Tesla poeticized nature and called for the protection of natural resources, but he approached the issue from a more global perspective. Tesla was especially quick to praise nature's electric qualities. He believed that there was "no subject more captivating, more worthy of study, than nature" in large part because "nature has stored up infinite energy in the universe."[60] Discovering the secrets of nature's electrical laws was akin to a spiritual revelation. In later years, Tesla said his studies of electricity and the atmosphere made it seem as if "the Creator himself had electrically designed this planet."[61]

Tesla's belief in conserving natural resources was not about a sentimental connection to America's past, but about preserving the planet's limited resources for the future. His ultimate goal was to generate and transmit electric power in such a way as to reduce pollution and minimize humanity's strain on the environment. His attempts in this direction make Tesla a proto-environmentalist and one the first "green" engineers. Tesla's fascination with nature's energy and concerns for the environment are embodied by his pioneering work with wireless technologies. In his mind, the best way to use and preserve our "electrically designed planet" was "to evolve means for obtaining energy from stores which are forever inexhaustible" and then transmit wirelessly that renewable energy.[62]

Tesla invented an AC system that helped bring streets lights and electric cars to much of the nation, and he also helped with the construction of the generators, transformers, and transmitters established at Niagara Falls, which became the template for power stations and power lines throughout the twentieth century. Tesla's sweeping vision involved lights and vehicles powered without the use of connecting wires. Wireless phones and droids are becoming more popular; wireless cars, lights, and televisions have not yet been realized. Still, Tesla's ideas enhance our understanding of the historical relationship between industrial progress and nature preservation and show how electricity influences our concepts of space and landscape.

Wireless Beginnings

Tesla's work with wireless technologies began in 1891 with light bulbs illuminated by electrostatic radiation, and peaked between 1901 and 1904 with the construction of Wardenclyffe Tower, a wireless communication system positioned in about sixty miles from Manhattan, on Long Island.[63] During this thirteen-year period, dozens of engineers, electricians, and scientists around the world offered patents and proposals for wireless technologies, and especially wireless telegraphy. Tesla's inventions and ideas seem to have been central to these developments. When his plans to send voice, image, and electric power through a worldwide network of wireless transmission towers failed, he was quickly pushed to the margins of the "wireless" narrative.

In 1896 the Italian inventor Guglielmo Marconi was awarded a patent for a wireless communication device in England, and shortly thereafter, he earned another patent in the United States. Many scholars suggest Marconi's idea for wireless communication came from an article published by William Crookes in the February 1892 issue of the *Fortnightly Review*.[64] Crookes predicted there would soon be "telegraphy without wires, posts, cables, or any of the present costly appliances." Once the system was perfected,

> any two friends living within the radius of sensibility of their receiving instruments, having first decided on their special wavelength and attuned their respective instruments to mutual receptivity, could thus communicate as long as often as they pleased by timing the impulses to produce long and short intervals in the ordinary Morse code.[65]

Crookes's article inspired Marconi to turn this "possibility" into a reality. Tesla was likely influenced, if not directly inspired, their notions of wireless communication. On February 3, 1892, the same month that Crookes published the "first" description of wireless communication, the older visionary heard Tesla speak at Institution of Electrical Engineers in London. Tesla had been invited to display his new induction coil (later called the Tesla coil) and talk about his experiments with high frequency currents. Tesla's research gave him the confidence that soon "intelligence—transmitted without wires—will throb through the earth like a pulse through a living organism." Tesla was surprised that "with the present state of knowledge and the experiences gained, no attempt is being made to disturb the electrostatic or magnetic condition of the earth." Such disturbances would make it easy to "transmit, if nothing else, intelligence."[66]

One reason that Tesla has been left out of the wireless narrative is because the word "wireless" is often attributed to "wireless telegraphy": Tesla cited the possibilities for wireless communication and his patents were crucial to its success. His broader vision, however, went far beyond the wireless transmission of Morse code. For instance, after Tesla's lecture at the Royal Academy, Crookes invited the inventor to visit his personal laboratory where the two discussed transmitting electric power without wires, controlling the weather with electrostatic fields, and telepathy.[67] Tesla's public discussion of electrostatic and electromagnetic impulses, invention of the Tesla coil, and development of electrical and mechanical oscillators between 1891 and 1893 produced shockwaves throughout the scientific world and suggested possibilities for electromagnetic and electrostatic transmissions that Crookes had only dreamt of and far surpassed Marconi's later designs.[68]

Again, my concern here is less with the history of physics or the priority to wireless telegraphy and more with Tesla's contribution to cultural and intellectual history. Thus, it seems important to note that, almost a year before he met Crookes, Tesla delivered a lecture at Columbia College that helped the word "wireless" enter into circulation in the United States. After the lecture was delivered on May 21, 1891, the

New York Times published an article titled "Wireless Electric Lamps: Mr. Tesla's Experiments with High Frequency Alternations."[69]

This article marks one of the first times that an American newspaper used "wireless" to describe an electrical device. In addition to pushing the word *wireless* into circulation, Tesla's 1891 lecture, "Experiments with Alternate Currents of Very High Frequency, and Their Application to Methods of Artificial Illumination," (which, in fact, does not mention the word "wireless") also suggests that he was seen as the key figure in the development of wireless technologies.

Tesla's lecture on Alternating Current remained important into the twentieth century. Robert Millikan, who heard Tesla's speech as a graduate student at Columbia and went on to win a Nobel Prize for giving the first accurate figure for an electron's charge, later recalled, "I have done no small fraction of my research work with the aid of the principles I learned that night."[70] Meanwhile, Tesla's speech presented the public with ways to understand the principles underlying the electrical illumination of businesses and homes. The *New York Times* praised Tesla for combining "the most occult branches of theoretical electricity" with "layman's descriptions" of how electric currents were used in lighting systems. *Harper's Weekly* congratulated him for describing his theories in "pure, nervous English" and delivering a three-hour "rhetorical performance."[71] As an immigrant and a nonnative English speaker struggling to distinguish the complex and sometimes competing interests of scientific research, practical invention, and American finance, such reviews influenced Tesla's self-image. The tall, dapperly dressed foreigner with dark, piercing eyes was neither a businessman like George Westinghouse nor an entrepreneurial inventor like Edison—the great Tesla was a performer, enlightened scientist, and humanitarian working to discover the secrets of electric phenomenon that would forever change the world.

Tesla supported his mysterious, dazzling persona with his rhetorical flourishes. In his Columbia lecture, he said that the "infinite energy" sweeping through the universe was beyond the grasp of human perception because "the coarseness of our senses prevents us from recognizing the ulterior construction of matter."[72] Tesla argues, nonetheless, that the collective understanding of electrical phenomena would move forward because "far beyond the limit of perception of our senses the spirit still can guide us." He continues: "Instinctively we feel that the understanding is dawning on us." The "immeasurable, all-pervading energy" is like "a soul" that "animates the inert universe."[73] This mysterious, evasive, animated "soul" guides the "spirit" of scientific investigation. As previous studies by Beer, Halliday, Otis, and Simon suggest, Tesla was only one member in a group of nineteenth-century scientists, artists, and thinkers who were inclined to present electric phenomena in terms of spiritual phenomena. Electricity seemed as powerful and as effervescent as God or the human soul: it seemed to permeate all matter and orchestrate the movements of living and nonliving things.

Tesla connects the belief in electricity to the belief in a soul that animates the universe. Both views are informed by observations of subjects that resist fixed definition. The terms and substances with which he proposes to electrify the planet are not fixed. Tesla admits, "There is a thing which we have been in the *habit* of calling electricity," but with all the unknowns concerning electrical phenomena, scientists could not make definitive claims to know the causes behind electrical effects because "a theory which better explains the facts is not necessarily true."[74] Tesla specifically refers to the arguments about whether electricity was one single fluid with two different charges or two separate fluids. He does not fully embrace either theory but offers that it is best to think of electricity as “ether associated with matter, or bound ether . . . ether associated in some way with the molecule.”[75] Tesla’s discussion of the competing theories of electricity might also be viewed as an implicit argument about the merits of alternating current and direct current (DC): neither is the more “true” form of electricity; they simply cause different “associations” in the ether.

Tesla’s distinction was of great importance. At the time, his challenge was not only to explain alternating current, but also to defend it. Americans exhibited widespread fears that electricity in general and alternating currents in particular were too dangerous to be brought into the home or used in public spaces.[76] Popular anxieties about electrification were brought to center stage in the “War of the Currents” that was waged between 1887 and 1893. Adversaries in this publicity battle gathered around Edison, who designed and supported a system for lighting and power using Direct Current, and Westinghouse, who had bought the patent rights to Tesla’s Alternating Current system for lighting and power. Both Edison and Westinghouse tried to remain in the background and let others fight in public, but each knew the victor stood to earn a windfall for their patents.

During his lecture at Columbia, Tesla used mathematical equations to show that AC was more economical and more versatile than DC. Tesla did not intend to prove AC was “better.” His system (and our current systems) relies on both AC and DC. He did, however, claim that his system was superior and with so much publicity and rumor surrounding the debate, Tesla knew that scientific facts or mathematical equations would not win the battle. He had to give the audience an electrifying display. In fact, proponents of DC made brazen and violent attacks against the AC system, warning the public that alternating current could lead to disease, fires, and instant death. The argument went both ways, but it seems that DC-supporters backed up their claims by using AC to electrocute cats, dogs, horses, cows, and even an elephant. On July 31, 1888, Harold Brown, Arthur Kennelly, and Frederick Peterson gathered a crowd of journalists and electrical engineers at a hall in Columbia College (possibly the same hall where Tesla lectured about alternating currents) to watch a seventy-six-pound dog electrocuted, first by "successive jolts of 300, 400, 500, 700 volts of direct current" before being killed by 500 volts of alternating current.[77] In 1890, Edison went to great lengths to make sure the first electric chair used in the United States was outfitted with AC.[78]

Tesla was inclined to take matters into his own hands, literally. At one point during his lecture, he held two copper balls in either hand and sent over 250,000 volts of alternating current through his body. He let sparks shoot from his fingertips. Witness said that Tesla's body seemed to glow, and he challenged the awestruck audience: "See, I am unharmed." After transmitting currents through his fingertips, Tesla took hold of elongated, vacuum-sealed glass tubes. The tubes blazed from the electrostatic charge generated by the induction coil, one of the first "wireless" devices ever displayed. In Tesla's hand, the buzzing glass tube "appeared like a luminous sword in the hand of an archangel representing justice." Tesla, standing at the front of a hushed auditorium, a space not yet cluttered by computers, electric sockets, ceiling fans, or central air, and waving back of forth a fluorescent light bulb, had initiated the wireless age.[79]

The performance helped Tesla compete with Edison for the unofficial title of world's greatest inventor. Tesla began to strike a deep chord in the popular imagination. One reporter said that through his experiments, "we have discerned the shores of discoveries in electricity which will go far towards the realization of results that the most advanced prophet of the Bellamy school has not yet ventured to predict." Edward Bellamy's utopian novel *Looking Backward: 2000–1887* was published in 1888, the same year Tesla began to patent his AC generators, motors, transmitters, and transformers. The novel quickly became one of the bestselling novels in the United States.[80]

In the story, Dr. Leete explains: "Electricity, of course, takes the place of all fires and lighting. We choose our houses no larger than we need, and furnish them so as to involve the minimum of trouble to keep them in order."[81] During his lecture, Tesla seemed to support Bellamy's vision of the future and to stretch the imagination even further by suggesting that electric lighting would not only be part of every home, but that interior and exterior lighting would be achieved without wires.[82] The *New York Times* reported that with Tesla's new system

> wires from a station leading to the building to be lighted will still be employed . . . but with the difference that the lamps may be carried about in the hand, that the walls and ceilings will not be defaced by wires and pipes, and that the light be very much stronger than that now in use.

Others wondered if Tesla's work would make all of their machines and wires obsolete. His first wireless device seemed to predict the day when the electric power for light and motors might be transmitted through electrostatic fields and magnetic pulses, when we could literally cut the cord and use electric gadgets in any point within an charged, electrostatic field not too much different from the way cell phones make and receive calls within certain service areas.

Ultimately, Tesla's visions went beyond the wiring of lights and buildings. At the end of his address, he returned to the wide-eyed tone of wonder: "We are whirling through endless space with an inconceivable speed, all around us everything is spinning, everything is moving, everywhere is energy." Indeed, Tesla was taken aback by superabundance of electrical energy he saw in nature, and over the next decade, he would dedicate himself to finding the means of "availing ourselves of this energy more directly."[83] Tapping that energy was his dream.

Worldwide Wireless

As early as 1892 Tesla began to think about how induction coils and electrical oscillators could turn the entire planet into one massive wireless network. His plans first appeared in a lecture delivered before the Franklin Institute in Philadelphia in February 1893.[84] "The transmission of intelligible signals or perhaps even power to any distance without the use of wires," he told the audience, was not a "theoretical possibility" but a "serious problem in electrical engineering."[85]

Tesla also voiced concerns about the environment. He admitted that "electricity" had not yet been accurately defined, but it was clearly becoming more and more important to human existence:

> The day when we shall know exactly what "electricity" is, will chronicle an event probably greater, more important than any other recorded in the history of the human race. The time will come when the comfort, the very existence, perhaps, of man will depend upon that wonderful agent.[86]

Today, our comfort, and, possibly, our existence, is tied to electricity. In the late nineteenth century, heat, light, and mechanic power were more readily derived from gas lamps, wood fires, or coal engines. Thus, Tesla presciently asked his audience: "What will man do when the forests disappear, when the coalfields are exhausted?"[87]

Tesla felt he had the answer. The depletion of natural resources would make it necessary for scientists and engineers to find ways to create heat, light, and mechanic power from electric currents, which clean, natural process would have generate. In 1893, he argued that harnessing ocean tides and waterfalls—"the stores of an infinitesimal part of Nature's immeasurable energy"—would offer ample power for all of humankind's needs.[88] Once harnessed, this energy would be transmitted over great distances "to their settlements, to warm their homes by, to give them light, and to keep their obedient slaves, the machines, toiling."[89]

Four years later, after the completion of the nation's first hydroelectric power plant at Niagara Falls, Tesla stood before his audience in Buffalo and seemed to state the obvious: "a waterfall affords us the most advantageous means of getting power from the sun sufficient for all our wants."[90] He added that it was important to harness waterfalls like Niagara Falls "not so much because of [their] commercial value, though it may be very great, but chiefly because of [their] bearing upon our safety and welfare." It might have been difficult, in the late nineteenth century, to see how "safety and welfare" related to hydroelectric power, but Tesla was convinced that engineers and scientists' primary responsibility was "to evolve means for obtaining energy from stores which are forever inexhaustible, to perfect methods which do not imply consumption and waste of any material whatever."[91]

Tesla thought that electric power should come from renewable sources and be sent wirelessly (and free of charge) around the world. Tesla told the audience that had gathered to celebrate the nation's first long-range transmission line that he was prepared to transmit significant amounts of electric power "without the employment of any connecting wire."[92] This statement was months before Marconi shocked the world by sending a simple series of Morse code signals across the English Channel (over distances of six to sixteen kilometers). Thus, it is understandable that even the most advanced scientists and engineers had a hard time grasping Tesla's plan. If his claims were accurate, the financial repercussions would be severe. First, sending power through wireless networks would make the transmission lines from Niagara to Buffalo—which had required major investments of time and money—obsolete. Secondly, despite the harnessing of Niagara, coal was becoming more and more critical to the emerging electric-power industry and remains the source for one half of all electric power generated in the United States today.[93] Tesla's system seemed to pose a direct threat to the fortunes based on the supply and demand of resources like coal, copper, and steel.

Despite skepticism and anxiety, Tesla firmly believed he could build these new technologies. In 1899, Tesla traveled to Colorado Springs and built a special laboratory in the shadow of Pikes Peak to test massive induction coils and electrical oscillators. Tesla later explained: "The perfect purity of the air, the unequaled beauty of the sky, the imposing sight of a high mountain range, the quiet and restfulness of the place—all around contributed to make the conditions for scientific observation ideal."[94] On top of the laboratory was an eighty-foot wooden tower from which extended a 142-foot metal rod supporting a large copper sphere meant to shoot electrical impulses into the atmosphere. Inside the lab, technicians built a massive Tesla coil to send electrical vibrations through the earth.

During his time in Colorado, Tesla felt, "the earth . . . to be, literally, alive with electrical vibrations."[95] In addition to his heightened awareness, he claimed to have built a device capable of detecting far off lightning storms to such an extent that he could "feel the pulse of the globe, as it were, noting every electrical change that occurred within a radius of eleven hundred miles." While using this device late one night alone in his laboratory, Tesla said he received messages from another planet. Naturally, this invited a fresh round of criticism that Tesla was no longer a scientist but a mere crackpot and mystic.[96]

Tesla returned to New York sometime around the turn of the century and began to write his most lengthy and ambitious article, "On the Problem of Increasing Human Energy: With Special References to the Harnessing of the Sun's Energy" (1900). The press was aware that Tesla was in Colorado Springs working on a secret invention, and a considerable amount of public and scholarly interest led up to his publication. The final draft appeared in Johnson's *Century* magazine in June 1900. Readers seem puzzled by the widely divergent subjects as the importance of vegetarianism, the process of producing iron, and the possible effects of electric power systems on the atmosphere of Mars. Yet "The Problem of Increasing Human Energy" brings together Tesla's unique understanding of the universe's all-pervading electricity with his special ability to transmit that electricity through technologies and poetic text.

For example, about one third of the way through this approximately 22,000-word manifesto, Tesla presents his romantic thesis: to increase human energy (which, he says, others call "progress"), humanity must find better means of harnessing the sun's energy:

> We see the ocean rise and fall, the rivers flow, the wind, rain, hail and snow beat on our windows, the trains and steamers come and go; we hear the rattling noise of carriages, the voices from the street; we fell, smell, and taste; and we think of all this. And all this movement, from the surging of the mighty ocean to that subtle movement concerned in our thought, has but one common cause. All this energy emanates from one

> single center, one single source—the sun. The sun is the spring that drives all![97]

According to Tesla, everything from the synapses helping you read this sentence to the electricity pulsing through the walls to forces carrying water over Niagara is related to the sun's energy.

Tesla's view of the sun as the primary and seemingly endless source of energy supports his call for the preservation of forests and coal deposits—"our duty to coming generations to leave this store of energy [coal] intact for them, or at least not to touch it until we shall have perfected processes for burning coal more efficiently. Those who are coming after us will need fuel more than we do."[98] Tesla discusses the possibility of using sunlight, ocean tides, and wind power to create electric power, but he finds the same problem in his attempts to carry out these plans—storing the energy derived. (In fact, this problem continues to be one of the biggest issues facing engineers trying to create solar, wind, and thermoelectric power systems.)

Tesla concludes that the most feasible and effective method is to begin harnessing the world's waterfalls and then transmit the electric power generated around the world without the use of wires. In addition to saving natural resources like coal, this plan would eliminate the need for transmission lines. According the Tesla, "the cable is not only an easily damaged and costly instrument, but it limits us in the speed of transmission by reason of a certain electricity property inseparable from its construction."[99] Using the atmosphere to transmit power would be cheaper and faster than sending it through wires.

Once this system of electric power generation and transmission is adopted throughout the world:

> Export of power would then become the chief source of income for many happily situated countries, as the United States, Canada, Central and South America, and Switzerland, and Sweden. Men could settle down everywhere, fertilize and irrigate the soil with little effort, and convert barren deserts into gardens, and thus the entire globe could be transformed and made a fitter abode for mankind.[100]

It is hard to imagine what the world would have looked like if Tesla's plan had been adopted and carried out, if the nations of the world had come together to build towers that used sunlight and hydropower and offered free energy. We get a glimpse with Wardenclyffe, a laboratory and transmission tower constructed between 1901 and 1903 about sixty miles from Manhattan near the town of Shoreham. The famous architect Stanford White designed the lab and towers.

J. Pierpont Morgan provided $150,000 in initial funding for Worldwide Wireless, but a few years later, when Tesla ran out of cash and the Wardenclyffe tower was still not complete, Morgan refused either to invest more money or give up his interest in the company, essentially dooming the project to failure.[101] Part of the rift between Tesla and Morgan seems to be the fact that Tesla told Morgan the tower was going to be used for wireless telegraphy. Such a system would have competed with Marconi's wireless telegraph, the same one he had used to report on yacht races in the late nineteenth century. Morgan had an interest in these races, and he would have likely been satisfied with his investment if Tesla's device could report to him such information. Tesla had bigger plans, however, and the scope of his worldwide voice, power, and image network unstitched the entire project. Morgan did not learn that Tesla wanted to send massive amounts of information and energy back and forth across the Atlantic Ocean until the tower was almost complete. The investor was understandably upset.

Wardenclyffe Tower never became fully operational, and development stopped in 1903. A few weeks before the heavy electrical equipment was repossessed, Tesla and his team booted up the tower. The *New York Sun* reported, "All sorts of lightning were flashed from the tall tower and poles," and "the air was filled with blinding streaks of electricity which seemed to shoot off into the darkness on some mysterious errand."[102] In 1916, Tesla declared bankruptcy. A year later, citing worries that the dormant tower might be opened back up to help Communists working secretly in the United States, the U.S. Army demolished the structure. While the tower itself is no longer standing, the lab remains intact, and the New York Tesla Society and supporters of the Wardenclyffe Project are campaigning to have it turned into a museum.

With the publication of "The Problem of Increasing Human Energy" and the attempt to start a "wireless" revolution with Wardenclyffe Tower, it seems Tesla was the archetypal "mad scientist," ready to control powers nearly beyond comprehension. At the same time, Tesla was truly committed to nature and preserving the planet. Thus, it seems fitting to conclude this section by noting Tesla's relationship with America's most famous preservationist, John Muir. Around 1897, Tesla met Muir and extended an invitation to view his personal laboratory in lower Manhattan. Tesla later wrote to a friend: "I am always grateful to [Muir] for his magnificent description of Yosemite Valley which I have read through at one breath."[103] Tesla may have been struck by Muir's descriptions of how "from the margin of these glorious forests the first general view of the Valley used to be gained—a revelation in landscape affairs that enriches one's life forever."[104] Throughout his life and writings, Muir celebrated the sublimity of the American landscape. The mad scientist and the man seemingly mad for the outdoors shared a fascination with nature's invisible forces and a firm belief that measures must be taken to preserve the lands and resources that were vanishing before their eyes.

Biographer Steven Holmes writes, "Muir has profoundly shaped the very categories through which Americans understand and envision their relationships with the natural world."[105] I believe that Tesla's work offers a similarly profound understanding and vision of the natural world. His plans for a wireless telegraph and power network hinged on the idea that the earth would be used as one conductor and the atmosphere, or ionosphere, would act as the other. Stressing the physical design of the planet and nature's immeasurable energies would have made an indelible mark on how we relate to one another and our environment.

We might say that when Tesla went to Colorado Springs, he looked far beyond the "frontier" that had attracted former pioneers to the ore deposits contained in the nearby mountains. Instead of a landscape filled with treasures waiting to be reaped, Tesla saw the Rocky Mountain meadows, streams, and vast skies as part of a delicate and unified conductor that could be harnessed by combining the most advanced science and engineering in the history of humankind. Therefore, if we see that landscapes like the Rocky Mountains or Yellowstone National Park took on added value once Americans realized that the geographical frontier had closed, it seems the atmosphere, the sun; even the entire planet might have taken on a completely new significance if Tesla's plan for a worldwide wireless system had succeeded.

Neither the frontiersmen in Turner's thesis nor the twentieth-century American scientist can be isolated from their political and industrial contexts. They lived within a broader system of ambiguous advance and exploitation of nature (albeit sometimes unintended). Thus, we might challenge Tesla with being as hopelessly romantic or as hypocritical as other pioneering or imperializing and freedom-loving or slave-owning figures such as Thomas Jefferson. Yet Tesla's role in this historical moment (when the frontier spirit was transferred into the scientific sphere) remains important. He thought of the energy produced by the universe and harnessed by the sun as the portal through which to push human civilization beyond what we normally consider frontiers. Before the grid was in place, he was already thinking about ways to get rid of it. His utopian vision suggested a planet that was not divided by frontier lines or political divisions. He wanted to use science and technology to create a revolutionary transformation of the human species and the planet. If his plans had been actualized, it may have completely transformed the processes of settling a frontiering, imperialization, and globalization—processes which continue to define the relations between our race and the cosmos. Thus, Tesla serves as both a testament to the possibilities of science and a warning about the limits of technology and understanding.

James: The Body Electric and the Currents of Consciousness

> The whole world is the flux of matter over the wires of thought to the poles or points where it would build.[106]
> —Ralph Waldo Emerson

> The only images intrinsically important are the halting-places, the substantive conclusions, provisional or final, of the thought. Through all the rest of the stream, the feelings of relation are everything, and the terms related almost naught. These feelings of relation, these psychic overtones, halos, suffusions, or fringes about the terms may be the same in very different systems of imagery.[107]
> —William James

During the turn of the twentieth century, wired and wireless systems introduced new objects into human experience. Artificial illumination allowed lighting specialists to edit and revise the night skyline and draw attention to certain buildings or signs, and their combined efforts bestowed the urban landscape with a distinct glow. New architectural structures were built to house dynamos, generators, and turbines. Specialized tools were invented to work on them. Motors, electrodes, and phones became centerpieces in factories, doctors' offices, and homes: to provide power, new electric lines overlaid or replaced telegraph lines. Webs of wires blanketed the skies and were embedded into walls, while wireless towers and antennas shot invisible messages through the atmosphere. The widespread turn-of-the-century transformation of urban space exemplified by places such as New York, Pittsburgh, Chicago, and San Francisco, says Thomas Hughes, can teach modern Americans about the "ways in which the human-built environment has shaped character."[108] Electricity has been a vital force in that constructed environment, and for those of us who have spent our entire lives surrounded by manmade electricity, our collective experience of progress, simultaneity, and connection are intimately wrapped up in the stuff that generates, transmits, and uses this force.

At the same time, the transmission of wired currents and invisible electric waves has shaped our mental environment—especially thoughts about thought. Indeed, electricity has molded American character by introducing us to new modes of experience. The epigraph from Emerson hints at how, in the nineteenth century, the study of electromagnetism set the stage on which philosophers could view thoughts as part of that "the flux of matter" underlying everything from the pulses in the nervous system to the light emitted by the sun. Other forms of flux (heat, light, and electromagnetism) could not be viewed with the naked eye. Wires became the most common prop in this electrical drama, a way for language to show these forces being transmitted (not only their effects).

As we further investigate this particular metaphor, we see that, in Emerson's mind, the thought as wire fluxes across the globe and condenses at certain points or poles where "it [thought] would build." The content of the thought is not explicit, and Emerson seems to sidestep the material implications of this dominant infrastructure by refusing to say what will be built. Instead, this particular sentence moves toward the metaphysical and provides a way of thinking about how thoughts might be transmitted through space and among individuals. The mode of transmission—in this case, wires—links the visible, external electrical systems in the landscape to the subtler, more diffusive electrical systems operating in the mind.

James, one of Emerson's strongest intellectual and spiritual heirs, also attended to thought's fluctuations and transmission. Emerson's "points and poles" are, for James, "halting-places," and the "flux of matter" in what James refers to as the "psychic overtones, halos, suffusions, or fringes" and, elsewhere in his work, "the vague." These wavelike margins on various "systems of imagery," the edges of feelings, link into a web of relations. In this quotation, James does not connect thoughts or feelings to electricity or electrical infrastructure; however, in his philosophy, thoughts and the "feelings of relation" had important electric qualities.

Recent historians and scholars have shown James's work as representative of electricity's influence on the American mind as expressed in physiological, psychological, philosophical, and even literary discourse. Halliday quotes James from

The Principles of Psychology—"When an idea stings us in a certain way, makes as it were a certain electrical connection with our self, we believe that it *is* a reality"[109]—and he suggests that James's statement reflects the "connections" between ideas and selves expressed in the novels of Herman Melville and Henry James.[110] Simon refers to James as the inspiration for her study of turn-of-the-century electrification and "the anxieties generated by technological innovation."[111] Simon, who has also written a biography of James, points to his interest in "wild facts" such as apparitions, occult powers, and telepathy, and comments that "the language describing these wild facts borrowed significantly from the language used to describe electrical phenomena."[112] The terminology shared by electrical science, psychical research, and paranormal theories supports Simon's argument that, before light bulbs, telephones, or electric trams became everyday devices, "electricity was a force stronger in the imagination than in reality."[113] While this may be historically accurate for the nation as a whole, James was acutely aware of electricity's force in the imagination and the immediate environment.

James read works by Michael Faraday and also Oliver Lodge's *Modern Views of Electricity*, published in 1889. He experimented with batteries and electric currents as a young man, and later in life he self-administered electricity for a range of ailments. He had firsthand experience with what it felt like to be "stung" by an electric idea and shocked by an electric current. Electricity presented a fascinating subject of empirical study, therapeutic device, and conceptual and metaphorical tool that could be used to understand feelings and consciousness. As Joan Richardson observes, some of the "terms chosen by James to elucidate the reality of *as if* . . . belong to the language of electromagnetism, a language he had begun to learn even before beginning his studies at the Lawrence [Scientific] School."[114] The forces of electricity not only reflected an imagination of (or even an apperception of) *as if* but the reality of *as if*.

Specific terms like *electric* stimulation, nerve *currents*, and brain *waves* offer kernels that, when cracked, germinate the overlaps among the physical sciences dedicated to empirical facts and disciplines like psychology and philosophy that often deal with "wild facts." In this section, I hope to contribute to the work of Halliday, Simon, and Richardson by further exploring electricity's role in James's thought and especially in his understanding of sensations, habits, and consciousness. After covering this ground, I argue that a close reading of James's theories added to current knowledge about the relationship between conscious states and the corresponding electrical firing of millions of brain cells suggests we should revisit the notion of the "stream of consciousness" and begin to reconsider it as the "currents of consciousness."

Sensations in the Body Electric

Ideas about how electricity related to the body emerged well before Whitman sang its praises in what became one of his most famous poems, "I Sing the Body Electric" (1891). In the late eighteenth century, the Italian physicists Luigi Galvani and Alessandro Volta engaged in highly publicized debates concerning animal magnetism and vitalism. Galvani believed that electricity was a vital, inherent force in all living beings and that transmitted through circuits in the body. The debates led Volta to build the first battery—the Voltaic pile—and helped to forward new theories of mesmerism, telepathy, and other "occult forces" that promised (or threatened) to occupy and control minds and bodies. Such theories spread throughout Europe and the Americas and remained part of popular and scientific culture throughout the nineteenth century.

Although the basic paradigm of the "body electric" persisted, after decades of further scientific study and the development of electric technologies, a more modern and, based on recent research, more accurate view of the body and its electrical processes began to emerge.

James uses the body-as-electric metaphor in *The Principles of Psychology* in a manner that recalls Galvani and the "circuits" passing between the nerves and the muscles. James explains: "If we liken the nervous currents to electric currents we can compare the nervous system . . . below the hemispheres to a direct circuit from sense-organ to muscle."[115] A current in the "direct circuit" passes from the sense-organ into the lower hemispheres of the brain (labeled "C" in Fig. 14) and then discharges into the muscles. The following analogy helps explain the model. If your finger touches a hot stove, the nerves nearby the skin's surface shoot a message signifying "PAIN!" on a direct line to section C of your brain. After quickly decoding the message, the current is discharged back into the hand muscle with a message telling the hand "pull back." Your reflex is almost immediate and does not require a conscious decision.

The nerve-current may also be diverted from the direct lines and made to pass through the "loop lines" of the brain's upper hemispheres (labeled "H" in the above figure). These "loop-lines" scatter into more complex areas, which James refers to as the "reservoir of reminiscences."[116] The brain's upper hemispheres allow one to "deliberate, pause, postpone, nicely weigh one motive against another, or compare."[117] When the current traverses through the loop-lines, it becomes more difficult to trace. James explains: "Whilst the path by which it runs out [to the muscles] is determined in the lower centers by reflections few and fixed amongst the cell arrangements, in the upper hemispheres the reflections are many and unstable."[118] The current that leaves the direct circuit and gets directed into the loop-lines may emerge bearing the affect of diverse memories and/or nutritional conditions. The command to pull back the hand from the burning stove might be delayed for a split second: the lines might be tangled or too busy so to speak. The message "PAIN!" may get momentarily crossed with a memory of a previous painful experience or a simultaneous sensation such as the sound of a baby crying in the next room.

We might see traces of Galvani's and Volta's work in James's description of "direct circuits" and "loop lines" of sensation, but the American psychologist's thorough readings of Helmholtz provided further grounding. Helmholtz was one of the first European scientists to research the physiological implications of electromagnetism. These results led Helmholtz to explain the nervous system in terms of physical laws. As Otis adeptly reveals, mid-nineteenth-century scientists such as Helmholtz, Alexander von Humboldt, and Emil du Bois-Reymond viewed the messages sent and received over telegraph wires as analogues for those traversing the body. More specifically, using short and long breaks in an electric circuit to transmit dots and dashes through telegraph wires brought Helmholtz to the realization that "one could use the language of the nerves to construct a reasonably faithful representation of the outside world."[119] The correspondence between the telegraph network and the nervous system remains thought-provoking and useful—up to a point. The nervous system may offer a "representation" of the communication technologies used in the outside world, but its messages are vastly more complex than Morse code. The telegraph operator translates dots and dashes, with a clear and relatively simple correspondence between letters and numerals and a corresponding dot or dash symbol. There is no cipher sophisticated enough to consistently translate nerve currents or follow these messages through the brain's "loop lines."

This may be why James did not adopt the nervous-system-as-telegraph analogy for his textbook. For him, the nerve currents are like the electric currents that run through telegraph circuits, power the telegraph keys, and signify dots and dashes to the operator. Yet, they are not the same. Our neuronal networks do not emit a series of dots and dashes; rather, images of brain scans are more like flashes and glows that suddenly fade. Our brains do not read binary like a computer. The currents that flow through the nervous system never take on a specific code; they remain *currents*. James clearly states, "*The brain is essentially a place of currents, which run in organized paths*" (emphasis in original).[120] Unlike the electric currents in an electromagnetic telegraph, however, the brain's currents not only run in organized paths. Those paths are not permanently fixed or predetermined. When the currents reach the reservoir in the brain's upper hemispheres, they diffuse into such fine strands and have such iridescent effects that they create something more akin to an electromagnetic field than a cohesive or fixed circuit.

Another difference between what happens in the brain and what happens in a telegraph circuit is that the currents pass through a charged "reservoir" or a field of forces. The currents do not pass through distinct metallic circuits. This view of the electric body coheres with James's other comments about brain activity: "The pulses of change are doubtless more violent in one place than in another, their rhythm more rapid at this time than at that. . . . It shoots with magical rapidity."[121] Again, this seems to describe the types of images that appear on a brain-scan monitor, not the buzz and click of the telegraph. When the brain is hooked up to the machine, neuroscientists see small pockets or clouds of color light up. These flashes of light often represent activity in a certain region.

The idea of the brain as a place of magnetic fields that light up with rhythmical pulses also coheres to James's disciplinary approach. In his preface, James says psychology should aim to discover "the empirical correlation of the various sorts of thought or feeling with definite conditions of the brain."[122] However, the correlation between thoughts and feelings with specific brain conditions does not produce a closed system. Rather, James aims to present readers with "a mass of descriptive details, running out into queries which only metaphysics alive to the weight of her task can hope successfully to deal with."[123] There is no a fixed schematic or code sheet with which to translate directly between nerve currents and emotions. A diagram of these "direct circuits" and "loop lines" is useful for understanding the transmission that occurs when a sense-organ is stimulated and causes a reaction, but adopting any strict correspondence or mechanistic views of feeling and thought, as we will see shortly, often leads us afield of James's broader argument—which is that our brains are plastic.

Currents Groove Through Our Vast, Plastic Organ

James's discussion of habit attempts to reconcile the seemingly fixed circuitry of sensation with the plasticity of the nervous system. The brain is the central feature of habit formation, and James says that it abides by the "mechanical" laws of nature: "the philosophy of habit is thus, in the first instance, a chapter in physics rather than in physiology or psychology."[124] Nerve currents might be subject to the same physical laws as the electric currents in a wire, but even the slightest change in the force or flow of currents in the brain has a physiological effect. In contrast, the current in a metal wire produces a magnetic field and may affect the wire's magnetic charge, but it does not permanently affect the wire's atomic structure. In a brain, the effect of the current lingers, making it easier or more difficult for further currents to pass. Thus, each thought and action has everlasting effects. Again, unlike the electrical systems that have developed over the past one hundred and sixty years, our nervous system is comprised of living tissues that are constantly changing.

Over time, habits develop into ingrained behaviors. We can be grossly unaware of their strength. The groove can form involuntarily. James observes that an "infinitely attenuated current" discharged through the brain either "deepens old paths" or "makes new ones."[125] Deepened paths become habits. The currents "scoop out" a path consonant with a specific action or thought until the path becomes a "natural drainage-channel."[126] For James, "the whole plasticity of the brain sums itself up in two words when we call it an organ in which currents pouring in from the sense-organs make with extreme facility paths which do not easily disappear."[127] The notion of "pouring currents" that form distinct and natural drainage channels offers a clear way to understand the formation of habits: brains are like a hillside, and each moment, brain activity produces a steady downpour. Neither the final destination—the resting place of a thought—nor the contours of the hillside—the brain's landscape—are predetermined, but the shape of thoughts and the thinking mind are molded by grooves of habit that tend to follow the paths of least resistance. The brain might be biased due to certain genetic features, but its final form is not strictly predetermined: it is codetermined or even pluri-determined.

The hillside analogy suggests that habits are like rivulets in a landscape, but we must remember that James is speaking symbolically when he refers to brain's pathways being "scooped out" and when he equates ingrained habits to deep "drainage channels." The human brain is not filled with liquid streams or tiny canals like our bones and veins, nor is it subject to the same forces of erosion that transform the earth's landscape. Its parts are not scooped out, split apart, and swept downstream by the forces of gravity and friction. Thus, James makes an important distinction concerning the liquid-based and wave-based view of habit-formation:

> This is what happens where either solids or liquids pass over a path; there seems no reason why [it] should not happen where the thing that passes is a mere wave of rearrangement in matter that does not displace itself, but merely changes chemically or turns itself round in place, or vibrates across the line. The most plausible views of the nerve-current make it out to be the passage of some such wave of rearrangement as this. . . If we call the path itself the "organ," and the wave of rearrangement the "function," then it is obviously a case for repeating the celebrated French formula of "*La fonction fait l'organe*."[128]

This "wave of rearrangement" is markedly different than a flowing stream or a drainage-channel. Each wave that passes through your body "rearranges" the parts of your nervous system. It does not displace the parts. Like an electric current that changes the valence of each atom's electrons in steady succession, this wave changes the potential in a series of neurotransmitters. The wave is the "function," which creates the "organ." In other words, we know about the brain by using it to analyze how it works. Such a formulation privileges the organ's process over neural contents. A brainwave's speed, direction, and frequency make up an important part of the habit-formation process. As this wave of rearrangement passes through the nervous system, it is not pouring but percolating, not flowing like water but vibrating “across the line” like a current through an electromagnetic field.

Knowing a bit about the process of the wave (it rearranges), we can now ask about its causes and effects. Again, the brain is not filled with currents that literally “scoop” out pathways. A synaptic force results from the influx of ions across a potential gradient. Ions are the “parts,” which are rearranged into a state of equalization across the neuronal membrane. Each synaptic pulse sends a “wave of rearrangement” through a series of neurons. During the process, some synapses or neural pathways grow stronger and similar effects are more likely to be repeated. Meanwhile, other paths that are not used as often become weaker and may even seem to disappear. Recent findings in the fields of neuroscience, especially Gerald Edelman’s theory that “cells that fire together wire together” further suggest that, as our neuronal networks get rearranged, distinct paths begin to develop.[129] The brain cells “wired” together are actually chemically and structurally disposed to facilitate certain synapses, which, when fired, act like waves of rearrangement. If we think of our brains as “wired,” then we might say that habits magnetize those wires in such a way that, in the future, they will respond to a certain frequency and make it easier for particular thoughts and actions to reoccur.

The study of electromagnetism also influenced James’s view of the nervous system and the flux between “tension” and “equalization” in observable mental states. James says that the brain is “a mass of matter whose parts, constantly kept in states of different tension, are as constantly tending to equalize their states.”[130] Again, recent science shows that potential difference, or the “equalization of tension,” is what drives the action potential of a nerve impulse to pass through a series of neural membranes.

Thus, the neurons woven throughout our bodies might be considered like the copper and aluminum rods stretched into wires and then stranded together to form electrical conductors. (It seems the pervasiveness of electrical systems in our environment is responsible for the widespread tendency of modern neuroscientists to summarize their research as view of how our brains are "wired.") The cellular and atomic structures of these neurons or wires make them excellent conductors of difference in electrical potential. When a current is introduced into a copper wire, for example, the resolution or "equalization" of this charged gradient propels the current onward. When a current or vibration is introduced into a neuron, the equalization of potential at the cellular level propels it through the nerves and creates an effect in the brain that may lead to a thought or an action.

Based on the correlation between nerve and electric currents, we might think of the nervous system as a power grid that is kept in alternating states of tension and equalization. Habits are like a group of electrical engineers that use a series of switches and transformers to increase or decrease voltage and to create or release tension into the system. Habits fuse wires, reinforce behaviors, and propel or impede the current in relatively predetermined paths. Yet, like the analogous relationship between sensations like touch and the telegraph, the power-grid-as-habit analogy falls short of fully describing how habits influence the nervous system. The paths in an electrical circuit or a power grid are, as James says of the direct circuits, "fixed and few." Electrical engineers design systems in such a way that the generated electricity will, with little margin for error, follow a predetermined circuit. Each nerve-current in the body makes slight chemical changes, thereby transforming, cell-by-cell, synapse-by-synapse, the entire system.

The constantly pouring currents and turning tides explain the basic operations of consciousness. Indeed, James does not explicitly link the "waves of rearrangement" that shape the brain to electric currents or wire circuits. The nervous system, as James points out repeatedly, is plastic. Through selective attention and acts of free will, we mold our nervous system. For this reason, liquid metaphors such as "pouring" and "channeling" used to describe habit formation may appear to sync with the "stream" of consciousness, but James's discussion of consciousness proves that that it "flows" like water currents but behaves like electric currents.

The (Electric) Currents of Thought

Electric phenomena and devices provide useful ways to think about sensations and our seemingly instantaneous reactions to external stimuli, but personal consciousness seems too natural, complex, and subjective to be anything "mechanical." Simon argues that, although James subscribed to the "electrical nature of will, and more generally of consciousness," he also "wholeheartedly rejected the idea that consciousness was produced solely by current in the brain and nerves, governed by mechanical laws."[131] To understand Simon's point, it seems necessary to investigate what James viewed as the electrical aspects of consciousness. His famous chapter on "The Stream of Thought" presents three correspondences between electricity and consciousness. First, electric currents and consciousness flow along continuous, albeit unpredictable paths; second, consciousness propagates "waves" that outline the margins of consciousness and reflect its constant fluctuations; and finally, consciousness and the brain, like an electrical conductor, alternate between states of equalization and tension.

In the 1884 article "On Some Omissions," James is liberal with his use of "stream" to make his argument about this new way to view consciousness. Here are just three examples that suggest how deeply this term influenced his views:

> we take a rapid general view of the wonderful stream of our consciousness, what pace of its different portions. . . .
>
> The worst consequence of this vicious mode of mangling thought's stream is yet to come. From the continuously flowing thing it is it is changed into a manifold broken into bits called discrete . . .
>
> A difference of intimacy, of warmth, of continuity, similar to the difference between a sense-perception and something merely imagined—which seems to point to a special content in each several stream of consciousness, for which Ego is perhaps the best specific name.
>
> So I hasten to say that, by the continuity of the mental stream, all I here contend for the absence of separate parts in it.[132]

Thought creates a wonderful, continuously flowing "several" stream. By acknowledging the "several stream," James suggests how one might consider thought in terms of the multiple things that create a stream—currents. Yet in the same paragraph where he argues for a view of consciousness that has "absence of separate parts," he also criticizes the "fluid-theories of electricity" because they break down a complex phenomenon into parts.

Making the change from "stream" to "currents" may have, in James's moment, made thought appear too structured. He may have worried that currents would be associated with electricity, and like contemporaneous theories of electricity, consciousness may again be broken into bits. However, switching "stream" for "currents" does seem valid, just as we sometimes prefer to swap the forest for the trees. Indeed, the study of the "stream of consciousness" in science and literature takes on new significance when the stream is not segmented into parts but observed as a collection of converging liquid and electrical currents.

Returning to *The Principles*, James argues that the "continuous" nature of thought is adequately explained in terms of a current passing between two electrodes. During "unconscious" or subconscious states like sleep, consciousness remains active. We know this because, at the moment of awakening, the conscious present is immediately bound to the conscious past. James describes the binding of the present to the past in the following terms:

> As the current of an electrode buried in the ground unerringly finds its own way to its own similarly buried mate, across no matter how much intervening earth; so Peter's present [when he wakes up] instantly finds out Peter's past, and never by mistake knits itself on to that of Paul.[133]

The current is so quick that we almost instantly know that we are the same person that fell asleep: when we wake up, our present immediately seeks out our past. Note that the current James describes in this analogy is not traveling along a wire. Like a bolt of lightning that rises from the earth and moves toward a thundercloud or the purple shocks leaping from a Tesla coil, the currents "buried" deep within our reservoir of reminiscences follow a sporadic path. The brain current's path, like the trace of lightning bolts in the desert, is difficult to follow and nearly impossible to predict.

The current that stems from both electrodes plays an active role. The conscious present and the conscious past move closer to one another until each finds "its own . . . similarly buried mate." Consciousness, James goes on to explain, is not delivered to the self or vice versa. The past and present meet each other and blend like the electrostatic charge between anode and diode. The conscious present fluctuates and almost seems to dance as it changes and "moves" toward the conscious past. The past also fluctuates as it "moves" toward the present. As the couple draws closer together on the dance floor of consciousness, they make a "certain electrical connection," and finally, their embrace is "suffused with a warmth and intimacy."[134] The song and dance, so to speak, never stops. James observes: "If consciousness corresponds to the fact of rearrangement itself, why, if the rearrangement stop not, should the consciousness ever cease?"[135]

Consciousness and electric currents are continuous, and they propagate as waves. Our analysis of the *waves* in Turner's address suggests how, in the late nineteenth century, wave-theory encouraged scholars from various disciplines to use this term as a container for various shifting, somewhat unpredictable forces. The broad and often nondescript term *wave* could be used to describe a group of forces acting in a form and scope secure enough for scholarly study while simultaneously implying a natural, repetitive, and powerful phenomenon. Waves had a much more drastic influence on James. We have already seen that nerve impulses cause "waves of rearrangement" to pass through the nervous system. In a footnote to his discussion of consciousness and brain tracts waxing and waning, James makes another observation about how waves relate to operations in the brain:

> It need of course not follow, because a total brain-state does not recur, that no point of the brain can ever be twice in the same condition. That would be as improbable a consequence as that in the sea a wave-crest should never come twice at the same point of space. What can hardly come twice is an identical combination of wave-forms all with their crests and hollows reoccupying identical places.[136]

After years of surfing at various breaks in the Atlantic and Pacific oceans, I appreciate the analogy. Wave-crests sometimes seem to reach "the same point in space." Over the past few years I have regularly accessed surf reports that gather various oceanographic data and present findings in terms of swell direction, tide times, and wave heights. The last is often the most important bit of information as it predicts the "point of space" at which the waves are going to regularly break: "waist high," "chest high," "over head," or, during a massive swell, "double overhead." Surfers that paddle into the water will often sit just beyond the area where the waves are tending to break and watch the horizon. They are making calculations concerning the next set and how it might be organized. A good surfer can see ripples in the distance and predict the force, height, and direction of the incoming waves. The surfer predicts where and how they will tend to break. If there is no point to the wave and a long section of it breaks all at once, then the wave is "closed out." Close outs can be hard to identify until after the surfer is already paddling for the wave he or she wants to ride. How the surfer adjusts if and when he or she realizes it is actually going to close out can make a huge difference. If the surfer stops paddling, he or she will simply be pushed around. If not, one can be thrown down toward the reef like a rag doll and possibly held under water. The board often goes flying and can suddenly become the angry wave's weapon ready to strike with pointed edges or sharp fins.

The surfer's adjustment to a breaking wave in the water and our individual adjustment to the waves in our brains become even clearer in a later essay where James observes: "We live, as it were, upon the front edge of an advancing wave-crest, and our sense of determinate direction in falling forward is all we cover of the future of our path."[137]

The perfect waves for surfing peel from left to right or right to left and thus offer a large section upon which to ride. Yet, despite even the most professional skills and scientific predictions, on entering the water one instantly realizes the impossibility of engaging the same wave twice. James's analogy helps him prove that the same thought or feeling never enters the brain twice. The shape of the wave or thought may seem similar, but factors as pervasive as a different nutritional balance and the changing tides and influences as subtle as a ship in the distance or a hidden ripple in the reservoir of reminiscences make it impossible to have an "identical combination of wave-forms." The slightest change in a conscious state or a wave is not often noticed through analysis of a single wave crest or the snapshot of an idea, let alone an entire set of waves or series of conscious states. To fully understand the factors making a difference in the entire combination, it is sometimes necessary to enter the water, as it were, and float in the currents of consciousness with attention turned to the horizon and the rippling overtones of thought.

Like the ocean's tides, the nervous system alternates between states of tension and equalization. James says the alternating states of consciousness are caused by the "pulses" of the thought, transitive and substantive nature of language, and "perpetual rearrangement" of the brain at the molecular level.[138] The back and forth between physical and psychic states is like the shifting from "one relative state of equilibrium to another, like the gyrations of a kaleidoscope, now rapid and now slow."[139] There is constant change between mind and body, the chemical brain-states and the "feelings" created by those states. The alternating or rocking motion of consciousness suggests how it molds the nervous system, and in turn, how the nervous system (subject to nutritional or pathogenic states) shapes consciousness: "for to every brain-modification, however, small, must correspond a change of equal amount in the feeling which the brain subserves."[140] In the ensuing pages, James presents the case for the transitive, shifting, and alternating qualities of consciousness that perpetually modify the brain and the feelings it works with and from.

The feeling of consciousness is suffused with a "warmth and intimacy," and in James's mind, the feeling of consciousness appears in the shape of "the vague." The epigraph to this section suggests that "overtones" and "halos" of feelings and their relations individualize consciousness and give it personal warmth and a certain twinge—an electrical connection. The relations of feelings in consciousness cannot readily be described objectively or from without (such as measuring a wave from shore). The conscious being is instead "aware of them from within, and must be described as in very large measure constituted of *feelings* of *tendency*, often so vague that we are unable to name them at all."[141] There are not adequate objective terms to correspond with all the different relations of feelings, which are why James argues: "We ought to say a feeling of *and*, a feeling of *if*, a feeling of *but*, and a feeling of *by*, quite as readily as we say a feeling of blue or a feeling of *cold*."[142]

To give attention to such transitive constructs of feeling is to focus on the "vague." James explains this as one of his textbook's boldest claims: "[The purpose of *The Principles of Psychology*] is in short, the re-instatement of the vague to its proper place in our mental life which I am so anxious to press on the attention."[143] Richardson shows that James was acutely aware that the word "vague" means "wave" in French and thus the vague is another example of James "following Faraday's work and, of course, reflecting Newton's major contribution, concerning the behavior of waves in the propagation of light, sound, electricity, and magnetism."[144] The "reinstatement" of the vague gives rhetorical value and demands fluency with the "waves" we use to understand and describe consciousness.

Electrical Systems of Imagery

The edge of consciousness might be thought of as a halo, outline, or horizon, but, whatever term we apply to that vague spot in our minds, it is a place of vibrations. The vibratory quality of thought is supported by James's argument about the basic, "primordial condition" of observing objects in trance states. After taking anesthetics like ether or when caught in the somnambulant stages of sleep, we see the objects in our minds and our environment as completely detached from any sense of being or self. Thus, James argues, "I may have acquaintance-with, or knowledge-about, an object O without thinking about myself at all."[145] In the following passage the *feeling* of that acquaintance not only fluctuates like the waves and lines of electromagnetic force, but also this particular "object O" extends from a similar system of imagery. James cites this example in support of the primordial condition:

> Dr. Shoemaker of Philadelphia describes during the deepest conscious stage of ether-intoxication a vision of
>
> > "two endless parallel lines in swift longitudinal motion. . . . On a uniform misty background . . . together with a constant sound or whirr, not loud but distinct, . . . which seemed to be connected with the parallel lines. . . . These phenomena occupied the whole field. There were present no dreams or visions in any way connected with human affairs, no ideas or impressions akin to anything in past experience, no emotions, of course no idea of personality. There was no concept as to what being it was that was regarding the two lines, or that there existed any such thing as such a being; the lines and waves were all."[146]

Shoemaker can recall two parallel lines rising and falling in a wavelike pattern accompanied by a distinct "whirr." What might have caused this particular vision? In an era without much access to motion-picture technology, the sight of telegraph wires seems to be the most plausible association for "two parallel lines" that are set in motion. It seems likely that Dr. Shoemaker and many other nineteenth-century Americans living on the Eastern seaboard spent time traveling alongside "parallel lines" as they rose and fell from the window of a carriage or a train. Watching telegraph, telephone, or power lines undulate makes them look like a "swift longitudinal wave." The "whirring" noise that he hears in his trance-state may have also been caused by a memory (personal or collective) of something like Thoreau's "telegraph harp." This is another hint that "lines and waves" bridge between the "wires of thought" and the physical landscape. In other words, like the waves in the ocean, power–lines can vibrate "across the line" between the vague sensation of an object and experience that has become quite common in the modern world. The wires in the landscape rising and falling in a wavelike motion seem to run "parallel" to our flowing consciousness.

One final example suggests that consciousness is like electricity. The following appeared in an article entitled "On Some Omissions of Introspective Psychology," which was published in the journal *Mind* in 1884. One who has read closely the chapter "The Stream of Thought" will recognize many analogies in this earlier piece. The first part of the passage reads as follows:

> The whole drift of recent brain-inquiry sets towards the notion that the brain always acts as a whole, and that no part of it can be discharging without altering the tensions of all the other parts. The best symbol for it seems to be an electric conductor, the amount of whose charge at any one point is a function of the total charge elsewhere. Some tracts are always waning in tension, some waxing, whilst others actively discharge.[147]

James continues later in the same paragraph:

> But as the distribution of brain-tension shifts from one relative state of equilibrium to another, like the aurora borealis or the gyrations of a kaleidoscope, now rapid and now slow, is it likely that the brain's faithful psychic concomitant is heavier-footed than itself, that its rate of change is coarser-grained, that it cannot match each one of the organ's irradiations by a shifting inward iridescence of its own? But if it can do this, its inward iridescences must be infinite, for the brain-redistributions are in infinite

> variety. If so coarse a thing as a telephone-plate can be made to thrill for years and never reduplicate its inward condition, how much more must this be the case with the infinitely delicate brain?[148]

The aurora borealis, the kaleidoscope, and the telephone plate reappear in *The Principles*. This entire paragraph is copied almost verbatim into the textbook—that is, all but the first two sentences of including "the best symbol for it seems to be an electric conductor," and the phrase "like the aurora borealis" (which appears in a separate section of "The Stream of Thought"). Why did the reference to "an electrical conductor" as the "best symbol" for the thinking brain disappear? James might have come to think of it as a mechanical symbol. He may have also felt that "an electrical conductor" was not actually the best metaphor, and rather than trying to qualify his statement, he omitted it entirely.

The electrical conductor is, I argue, at least a valid symbol for consciousness. The amount of energy in the brain at any one time is a product of all the tracts waxing and waning in its system. In this case, the conductor not only transmits energy but also adapts as a result of the energy it receives, creates, and transmits. Our bodies are therefore the conductors of the shared currents that pass through all things. James realized, notes Richardson, that in the electromagnetic environment revealed by the works of Faraday and Helmholtz, the human being is "literally, a 'transformer,' a receiving instrument."[149] Transformers increase and decrease voltage of alternating current and, like an electrical conductor, are designed to harmonize various electromagnetic "tracts." The human-as-transformer metaphor implicit in James's text seems to have inspired Alfred North Whitehead to conceive of the human body as a "complex amplifier" in which "feelings are 'vectors'; for they feel what is *there* and transform it into what is *here*."[150] In such models, consciousness is an especially designed and delicate instrument that transforms the incoming electromagnetic waves into signals: attention and free will amplify the signals accordingly.

In “The Stream of Thought,” James does not specifically refer to an electrical conductor, transformer (which combines a primary and secondary conductor), or coherer (a detecting device used in early wireless technologies and a term coined by Oliver Lodge in the 1880s). The amplifier, a version of which Tesla was designing around the same time, did not appear until the 1920s in a form close to the one that we know today. The electrical device most readily at James’s disposal for metaphor was the conductor, in which “the amount of whose charge at any one point is a function of the total charge elsewhere.” While the conductor seems even more general and natural than any other technological analogies just mentioned, James may have realized that to limit his brain analogies to an animate object, or reduce its animation to the sum total of the energy it receives or transmits without regard for the fact that the brain itself is never static, never constant, oversimplifies and possibly confounds the issue. Similarly, to neglect the change created by the transmission of consciousness in favor of that created by the absorption and redirection of energy from the environment denies the power of free will, capacity for change, and magical evolution of language.

In *The Principles*, the three paragraphs after the inquiry “How much more must this be the case with the infinitely delicate brain?” suggest another possible reason why the reference to the electrical conductor may have been omitted. Following the question, James explores the philosophical implications of his claim that “no two ‘ideas’ are ever exactly the same.”[151] He dismisses the Lockian and Humian notions that consciousness is composed of “unchanging simple ideas” or “separate independent parts.”[152] Adhering to these philosophers, psychologists have compartmentalized "mental facts in an atomistic sort of way" because it is a "convenient" approach.[153] Atomistic perspectives may describe the "separate parts" of thought, but they overlook the constantly changing relations between them. By dissecting the parts of thought, they risk killing the "process" of thought. Consciousness, James says, is not only a collection of parts. It does not start and stop. It is.

The "is"-ness of consciousness resists verbal expression. Thus, the structure of language—and English in particular—posits roadblocks. Arriving at a clear understanding of consciousness through language is similar to flipping on a light switch to better see the darkness. Therefore, just like theories that, for clarity's sake, divide consciousness into similar and "unchanging simple ideas," the language used to describe consciousness seems tethered to substantive meaning and symbols. In the section under consideration, James clarifies his critique of "atomistic" models of consciousness:

> It is convenient often to treat curves as if they were composed of small straight lines, and electricity and nerve-force as if they were fluids. But in the one case as in the other we must never forget that we are talking symbolically, and that there is nothing in nature to answer to our words. *A permanently existing 'idea' or 'Vorstellung' which makes its appearance before the footlights of consciousness at periodical intervals is as mythological an entity as the Jack of Spades* (emphasis in original).[154]

On one hand, this passage seems to undermine our use of any symbols or metaphors to describe phenomena that appear "at periodic intervals." One may have "consciousness" this very second, but that consciousness will not feel or even be the same in a week, a day, or even a minute from now. Will that still be "consciousness"? We are inclined to answer "Yes, do not be silly; if we adopt some epistemological relativism and meanings change like the wind, then it will be almost impossible to learn about subjects like consciousness." Yet the question does clarify our desire to separate the act of "speaking symbolically" with that of communicating empirical sensations and accurately relaying the "answers" that nature provides. As a result of the "whole organization of speech," using "mythological" entities and formulas to describe consciousness (and electricity) is convenient, even necessary.[155] James might agree that the electrical conductor seems like the best symbol for consciousness, but that if we use such a symbol we might be more inclined to forget that it is merely symbolic. The conductor is a good symbol but it does not say exactly what electricity or consciousness conducts. It seems we can only study the effects of such conductions and may never know the conductor itself.

Implicit in James's argument is that fluid theories of electricity and consciousness naturally evolve over time based on new scientific findings as well as aesthetic tendencies. In the first part of the nineteenth century, treating electricity as a "fluid" was aesthetically and scientifically accurate. As time passed, new observations undermined the idea that electricity was literally a fine, etheric substance. In light of this information, scientists and scholars like James and Tesla began to acknowledge that referring to electricity as a fluid was only a symbolic way of speaking. Scientists are still resigned to using metaphoric language, but, historically speaking, such recognition has inspired scientists to seek more useful symbolic systems.

In the end, James suggests we define consciousness in such a way that allows us to gain meaning from the "halting-places." This seems to corroborate Tesla's definition of electricity offered in his 1891 speech at Columbia University, a year after *The Principles* was first published. Tesla says that "the theory of the two electricities is generally accepted, as it apparently explains electric phenomena in a more satisfactory manner."[156] He notes that just because scientists are "in the habit" of referring to a certain force as "electricity" does not mean that they have a true grasp of what electricity actually is:

> We have no evidence of electricity, nor can we hope to get it, unless gross matter is present. Electricity, therefore, cannot be called ether in the broad sense of the term; but nothing would seem to stand in the way of calling electricity ether associated with matter, or bound other.[157]

The "associations" that binds ether to matter in a particular point are, for James, the resting places of thought, which reveal the relations between feeling and fact. As electricity and consciousness can only be studied while they seem at rest (they never are), it is not surprising that the "habits" of speech that illuminate and define electricity and consciousness will be challenged, even broken.

Transforming "Streams" into "Currents"

With this groundwork in place, we should rethink the terms of consciousness. Over one hundred and twenty years ago, James initiated the habit of referring to human consciousness as "a stream." This habit has become popular and widespread but is not ingrained. It can be gutted and guided into a new groove or wave pattern. Scholars such as Beer and Richardson remind us that words and terms are subject to selection, provide informed users with conceptual tools, and can act as catalysts that transform ideas between scientific fact and religious experience.[158] My interest in the terms and metaphors of consciousness is also inspired by James's critique of "convenient" language.

James acknowledges that electricity and nerve currents have been referred to in a symbolic way that suggests they are "fluids." They undoubtedly are not. For James, our empirical understanding of the difference between liquid force and waves of rearrangement clarifies the difference between concepts supported by empirical observations and merely symbolic speech. Nerve impulses and the flow of charged particles can be symbolically conceived "as if they were fluids" because they behave like them. Such conceptualizations are made, however, because they are convenient.

We can apply the same thinking to consciousness. Clearly, consciousness flows. It is expedient, therefore, to consider consciousness in terms of something else that flows. James concludes that "a 'river' or a 'stream' are the metaphors by which [consciousness] is most naturally described."[159] Our sense of this sinuous movement both in our consciousness and in natural bodies of water gives "stream" and "river" a certain metaphorical utility. But in coining this phrase, James has not said this is the best or most accurate metaphor. In fact, our metaphors must account for the shift between the "most convenient" and "natural" symbol and the one's which support empirical evidence and "answer" nature. I believe that the move from consciousness's "flowing" qualities to its conceptualization as a "stream" has begun to dry out.

One way to refresh our thinking about consciousness is to insert *currents* for *stream*. The metaphorical system surrounding the "stream of consciousness" does not produce the same utility and aesthetic satisfaction in the face of all the facts about the brain and its electrical currents. We cannot deny that *currents* is a more attractive replacement: it refers to the flow of liquids and the flow of electric charge. Indeed, the "stream of consciousness" is merely a symbolic representation that does not convey the observable qualities of the brain during consciousness. It is not as scientifically accurate.

Again, the association between "consciousness" and "stream" creates an effective theory and metaphor. According to Jill Kress, James uses natural imagery like "snowflakes" and observable behaviors such as the alternating "flights and perchings" of birds because these images register a certain feeling in the reader that "provokes continual reconstruction of his ideas of human subjectivity." James uses "stream" because he wants to suggest that consciousness is "organic, natural, uncontrived."[160] I do not believe, however, that the move to *currents* would suggest consciousness is inorganic, unnatural, or contrived. The word offers even greater metaphorical utility than "stream": the current reflects consciousness's flowing, cohesive, waxing, and waning qualities.

Streams and currents are adequate metaphors for consciousness, but, based on James's own observation, the models and theories that have the most utility are those that aesthetic demands and empirical facts support. In a late chapter of *The Principles*, he describes how we choose the specific system to carry our beliefs:

> It is conceivable that several rival theories should equally well include the actual order of our sensations in their scheme, much as the one-fluid and two-fluid theories of electricity formulated all the common electrical phenomena equally well. The sciences are full of these alternatives. Which theory is then to be believed? The theory will be most generally believed which, besides bring[ing] us objects able to account satisfactorily to our sensible experience, also offers those which are most interesting, those [that] appeal most urgently to aesthetic, emotional, and active needs.[161]

Certainly, electricity and consciousness could be treated as streams because they seem to flow. Treating electric currents like fluids may also be a suitable form with which to analyze the forces they exert. While making our empirical investigations, however, nothing in nature answers for such a metaphor. Studies show that electricity and the nerve currents that empower consciousness do not flow like streams but more like "waves of rearrangement." Thus, referring to the "currents of consciousness" might be harder to grasp at first but is indeed truer to observation than its rival: the stream of consciousness.

Unpacking James's theory about theories presents a clear way to see the combined effect of a metaphor's accuracy and aesthetic value. First, the "sensible-experience" of consciousness has been explained in terms of both liquid and electric currents. The waves seem rooted in factual evidence and are thus "satisfactory to our experience." In addition, the phrase *currents of consciousness* satisfies active needs: electricity, in its broadest definition, is the "alternating action of attraction and repulsion." *Currents* also satisfies emotional needs—an alternate connotation of electricity is an emotional state of intense thrill, tension, shock, and excitement. The electric language James uses in his articles and books is meant to register on various levels of affect, suggesting that *currents of consciousness* also satisfies aesthetic needs. I take aesthetic needs to mean that we generally demand terms for consciousness and other personal phenomena that are at once touching, flexible, and powerful. *Currents* still allows us to construct material models of the "body electric" and corresponding theories of flowing consciousness. It transmits empirical data and still piques our interest. The phrase *currents of consciousness* implies that our thoughts flow like water or any other naturally moving liquid. It is not, however, as limiting as the "stream." Our empirical observations of the body electric do not answer for the stream conditions.

Based on James's arguments about how theories become true and which metaphors we should use to describe scientific facts, it is both more accurate and aesthetically satisfying to consider human consciousness as "currents," because it allows us to view consciousness as simultaneously natural, flowing, and electric.

For James, electricity challenged the boundaries between literal and figurative, metaphysical theory and empirical fact. He used electrical metaphors like circuits, electrodes, and wave to explain the observable conditions of the nervous system and human behavior while maintaining the sense of suddenness, uncertainty, and buoyancy displayed by consciousness. Recent neuroscientists and linguists are discovering that our metaphors might have as much impact on our decisions as our literal statements. We know that thinking of consciousness as an effortlessly flowing "stream" instead of a collection of charged "currents" affects our understanding of James's view of consciousness and our more recent findings about this captivating phenomenon. Replacing *stream* with *currents* can enrich consciousness studies and offer a fresh view into the electrical sensitivities and subjectivities at work in modernist literature. The remainder of this chapter, however, employs this new view of the electric currents of consciousness in order to juxtapose the two sides of a debate that remains prevalent today: Does our developed understanding of the electric qualities of consciousness reinforce the argument that humans are highly specialized robots?

Tesla and James: Shared Vibrations, Opposing Views

During the second half of the nineteenth century, James Clerk Maxwell's equations revealed the vibratory quality of the universe by proving that light, heat, and magnetism were manifestations of electromagnetic fields. Later, Heinrich Hertz used Maxwell's equations to prove the existence of electromagnetic waves and also supported the idea that sensations could be described in terms of the "mechanical laws" that controlled such waves. Previous models began to shift, and in particular, there was a shift from a "fluid" understanding of external forces to theories that accounted for electromagnetic waves and etheric vibrations. These waves and vibrations influenced the critical understanding of "the body electric" as well as the physiological process of consciousness.

Tesla and James understood that vibrations in the mind and body were crucial to the process of perception. Tesla said there were times when he felt "the earth . . . to be, literally, alive with electrical vibrations," and like many of his contemporaries, he believed these cosmic vibrations to be the cause of all thoughts and sensations in the human nervous system.[162] In "The Problem of Increasing Human Energy," Tesla used the model of the vibrating body electric to support his plans for building a "telautomaton" or an "automaton" (or a robot in today's terms) that would respond to finely tuned electrical vibrations. The ideal remote-controlled automaton would be, according to Tesla, "a machine embodying a higher principle, which will enable it to perform its duties as though it had intelligence, experience, judgment, a mind!"[163] Tesla's claim that he could create a humanlike machine that would be "tuned" to respond to electrical vibrations seems to ground modernist visions of action at a distance and artificial intelligence in something more akin to scientific fact. James, however, was interested in what today would be called New Age ideas about psychic energy as well as scientific discoveries about how vibrations influenced the process of sensation and perception. In his discussion of the "automaton-theory," James admits that when vibrations of heat, light, or sound stimulate sense organs, they initiate an "autonomous chain of occurrences" that animate brain-cells, which "awaken each other in rational and orderly sequence" until "the last brain-vibration . . . discharge[s] downward into the motor tracts."[164] In addition, he says it is difficult to discount the idea that impulses, thoughts, and feelings correlate to a "nerve-movement whose cause lay *wholly* in a previous nerve-movement" (emphasis in original).[165] For James, it is narrow to study impulses, thoughts, and especially feelings as solely the results of a nerve movement. To limit the scope of psychology to "mechanical conditions" discounts the power of free will and nondeterministic evolutionary information espoused by Darwin. James repeatedly argues that "feelings and ideas are causes."[166] Individuals and groups play active roles in evolution through the selection and direction of attention and attendance upon feeling with facts. James's article "Are We Automata?" provides a more specific argument of how feelings and conscious states can cause specific neurological states or conditions. Tesla's "The Problem of Increasing Human Energy," as I will discuss, seems to reach an opposite conclusion even though his thinking was influenced by some of the same men who challenged and inspired James.

Tesla and James were two of the most prominent nineteenth-century American thinkers to discuss the problem of automatons. Their shared contacts and professional links provide an exceptionally inviting context. Both men spent time in Prague, where they both met and conversed with Ernst Mach and Carl Stumpf. Tesla stayed in Prague as a student between 1880 and 1881 and James visited as a colleague in 1882. Tesla seems to have lost touch with his former teachers, but James maintained correspondence with Stumpf and Mach for the rest of his life.[167] These shared influences are important because there are traces of Mach's Principle and Stumpf's work with sensation in Tesla's and James's arguments about automatons.

Tesla and James were also thoroughly acquainted with Helmholtz and his physiological and optical studies of waves and vibrations. They each met this man whom Tesla felt had "probably thought more on life than any modern scientist."[168] James visited Helmholtz in Germany in 1882 and heard him lecture on gravity. Tesla paid a visit to

Helmholtz and his protégé, Heinrich Hertz, in 1892 and hosted Helmholtz during the Chicago World's Fair of 1893. After Helmholtz listened to Tesla's speech, the famous scientist was given a private tour of the electrician's exhibition at Electricity Hall. Finally, both men read Herbert Spencer, author of another book titled *The Principles of Psychology* (1855). Spencer inspired some of the most personal and powerful beliefs espoused by Tesla and James. Spencer's influence hovers over James's reconceptualization of psychology's principles, and Tesla makes frequent references to Spencer in his speeches and articles. It does not seem that Tesla and James ever met, but their respective ties to these four figures, their interdisciplinary reading habits, and their knowledge of current events makes it likely that they were on one another's radar. In the following pages, I trace some lines of influence and the "vibrations" felt by both Tesla and James in order to more fully examine their respective views of automata and automatism.

Adjustment and Correspondence with the Environment

Spencer was a central figure in nineteenth-century philosophy, science, and politics in Europe and North America. In the opening to "The Problem of Increasing Human Energy," Tesla refers to the "simple truth . . . clearly pointed out by Herbert Spencer" that any force manifested anywhere in the universe "produces and equivalent opposing force."[169] For Tesla, "every movement in nature" from the ocean tides to the stages of life "must be rhythmical."[170] While a number of contemporaneous scientists such as Mach and religious doctrines such as Buddhism (as Tesla also suggests) posited this particularly broad view of the universe, Tesla gave first credit to Spencer. Tesla was also struck by Spencer's study of the nervous system, explaining in a later article that

"Spencer's clear and suggestive exposition of the human nerve mechanism" opened the possibility of transmitting "thousands of simultaneous telegraphic and telephonic messages, through one single conducting channel natural or artificial."[171]

Spencer's view of the human nerve mechanism equally impressed James , and early in *The Principles*, he applauds Spencer for developing a novel formula that does a "real service of a rough sort in psychology" by presupposing "that the essence of mental life and of bodily life are one, namely, 'the adjustment of inner to outer relations.'"[172] James is warm to Spencer's disciplinary approach because "it takes into account the fact that minds inhabit environments which act on them and on which they in turn react; because, in short, it takes mind in the midst of all its concrete relations." James praises Spencer's approach, but he also judges the latter's conclusions to be "vagueness incarnate."[173] This critique offers another provocative use of vague/wave and points to James's deeper issue with the Spencerian method. It is useful, thinks James, to study minds in correspondence with environments because they both evolve together, but if we assume the "relations" between the mind and external reality are concrete, then we risk viewing life as a passive and mechanical process controlled by external influences rather than a plastic and evolving process guided by chance and selection.

The split between James and Spencer was severe. During his polymath career, Spencer coined the phrase "survival of the fittest" and suggested that evolution was a physiological and mechanical process that helped to adjust and align the mind and body with the external environment. He also understood speciation as hierarchical and argued that cultures had inherently fixed stages. For James, evolution, and especially the evolution of consciousness, could not be considered merely a process of survival in an environment. He argued that a higher power, notably the will to believe, might actually direct consciousness, which therefore cannot be reduced to "the powers of cognition, discrimination and comparison."[174] Mind relates humans to their external environment, but according to James, they "exist only for the sake of something beyond themselves, namely, Selection."[175]

This bold statement illuminates the alluring qualities of this scientific formula and the damaging implications. In the opening paragraph of his essay "Are We Automata?" James lists the proponents of the automaton-theory: Thomas Henry Huxley (also known as "Darwin's Bulldog"), Shadworth Hodgson (a forerunner of Pragmatism), Douglas Spalding (who connected learning and instinct in development of behavior), and C. K. Clifford (coiner of the term "mind stuff").[176]

When James describes the tenets of the automaton-theory, however, Spencer comes to the forefront of his thinking:

> The [automaton] theory maintains that in everything outward we are pure material machines. Feeling is a mere collateral product of our nervous processes, unable to react upon them any more than a shadow reacts on the steps of the traveler whom it accompanies.[177]

The theory places a chasm between feeling and act and then sets them in lock step in the advancement of nervous processes. External stimuli lead; feeling follows. This implies that consciousness is a passive and receptive organ, pulled along by the sensations, driven by physiological tendencies such as habit. James's purpose in the article is to discover the active, selective aspects or what he calls the "utility of consciousness" and thus to overthrow the automaton theory.

The following passage from "Are We Automata?" picks up from the above quotation about the role of selection in consciousness. As a way of introduction and apology for quoting such a large excerpt, I believe it remarkably highlights the influence of Stumpf, Mach, and Spencer on James's and Tesla's thinking and helps clarify the opposing views of the automata-theory. James writes:

> The powers of cognition, discrimination and comparison which [consciousness] possesses, exist only for the sake of something beyond themselves, namely, Selection. Whoever studies consciousness, from any point of view whatever, is ultimately brought up against the mystery of *interest* and *selective attention*. There are a great many things which consciousness *is* in a passive and receptive way by its cognitive and registrative powers. But there is one thing which it does, *suâ sponte*, and which seems an original peculiarity of its own; and that is, always to choose out of the manifold experiences present to it at a given time some one for particular accentuation, and to ignore the rest. And I shall now show how, from its simplest to its most complicated forms; it exerts this function with unremitting industry.
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> To begin at the bottom, even in the infra-conscious region which Mr. Spencer says is the lowest stage of mentality. What are our senses themselves but organs of selection? Out of the infinite chaos of movements, of which physics teaches us that the outer world consists, each sense-organ picks out those which fall within certain limits of velocity. To these it responds, but ignores the rest as completely as if they did not exist. It thus accentuates particular movements in a manner for which objectively there seems no valid ground; for, as Lange says, there is no reason whatever to think that the gap in nature between the highest sound-waves and the lowest heat-waves is an abrupt break like that of our sensations, or that the difference between violet and ultra-violet rays has anything like the objective importance subjectively represented by that between light and darkness. Out of what is in itself an undistinguishable, swarming *continuum*, devoid of distinction or emphasis, our senses make for us, by attending to this motion and ignoring that, a world full of contrasts, of sharp accents, of abrupt changes, in a word, of picturesque light and shade.[178]

Conscious brains constantly send and receive an almost boundless amount of data. The data is collected into information that might register as memories, sensations, or feelings. James's focus on the "interest and selective attention" of consciousness borrows heavily from the work of Stumpf and Mach. To see their influence, we must turn to the specific references James makes to these men in his chapter on "Attention" in *The Principles*. Our sensory organs pick up and focus on particular movements as we practice what James calls the "mystery of interest and selective attention."[179] Thus, when we pay attention to a certain thought or stimulus, our feelings about it change but we still perceive and conceive the object as the same. If this was not the case and the feelings were separate from the perception and conception, then, James explains, "weak impressions would, as Stumpf says, become stronger by the very fact of being observed."[180]

Stumpf and Mach helped James explain how objects or perceptions on the fringe of our consciousness—such as a conversation at a crowded party—suddenly come to the center of our attention—because you overhead someone say your name. In this crowded-party analogy, the fact that someone across the room spoke your name is not what caused you to listen to the conversation. You were listening, just not hearing the conversation. For James, consciousness is the first cause. We can attend to things without having our attention "fixed" on them. Mach's theory of attention supports this fact. Mach argues that attention can be split between two objects "one of which consumes most of it."[181] For further support, James refers to Mach's study of the ear and the way it "searches" through a broad range of sounds and finds certain frequencies or markers that have particular meaning. James quotes Mach's observation: "This hearkening search is very observably a bodily activity, just like attentive looking in the case of the eye." The act of "attending" to an object "reduces itself mainly to accommodating and setting of the optic axes." Mach's reached the following conclusion: "Attention has its seat in the mechanism of the body. If nervous work is being done through certain channels, that by itself is a mechanical ground for other channels being closed."[182]

Mach and James agreed on the basic precepts of phenomenalism and gave sensations and feelings a primary role in the development of knowledge. They also understood consciousness as something that could be pictured in psychic space. The study of sensations through theory and experimentation "facilitated the unity of science" and made physics and psychology "more compatible with each other."[183] Yet this "unity" could not be forced on consciousness unless one chose to overlook certain unfixable and spontaneous qualities. James was concerned that consciousness studies might rely too heavily on "mechanical models." In the chapter "Attention," the automata dilemma resurfaces. James inquires if attention is guided solely by brain activity or if some "spiritual activity" plays a part. This difference is "the very hinge on which our picture of the world shall swing from materialism, fatalism, monism, towards spiritualism, freedom, pluralism, or else the other way."[184] For James, this decision between privileging brain activity over spiritual activity "goes back to the automaton theory":

> If feeling is an inert accompaniment, then of course the brain-cell can be played upon only by other brain-cells, and the attention which we give at any time to any subject, whether in the form of sensory adaptation or of "preperception," is the fatally predetermined *effect* of exclusively material laws. If, on the other hand, the feeling which coexists with the brain-cells' activity reacts dynamically upon that activity, furthering or checking it, then the attention is in part, at least, a *cause*.[185]

Throughout his work, James vigorously supports the second option, saying that feeling is not "inert accompaniment" but active agent. Attention is not just the effect of exclusively material laws but also a dynamic, possibly spiritually or metaphysically inspired selection. Tesla embraces a more materialistic approach to brain activity and human consciousness. He believes that external vibrations cause internal vibration and "brain-cell plays upon brain-cell.” Physical laws determine the process of perception. Again, for Tesla, the human species is remarkable because it obeys every external influence.

James’s essay “Are We Automata?” also references Spencer. The elder theorist argued that as sensory organs evolve in different species, they are gradually aligned and adjusted into balance with the species’ external environment. James’s important addition to Spencer’s ideas (as well as those of Mach and Stumpf) is to argue that organ development specifically relates to both attention and consciousness. The mind does not always adjust. It may remain in a maladjusted state or remain unfixed; yet, despite this seemingly negative, detrimental trait, some such characteristics continued to be “selected” for reproduction. In other words, humans continue to be born with what society often looks on as physical and psychological disorders despite the fact that these traits do not seem to have any direct purpose for the species’ development. These “disorders” are actually part of the order. The disorder to mutation is nature’s way of preserving variety and keeping open the possibility for further evolution or mutation.

James takes this Darwinian approach and applies it to consciousness. The variation of conscious states may also be part of evolution: alertness, a strong memory, and the capacity for sustained attention might improve one’s chances for survival, but dreaming, imagination, and meditation have their own benefits. No single reality, order, or “adjustment” propels consciousness. To prove such a statement, one must agree that feelings are also tools of alignment. Nature offers the human an almost infinite variation of thoughts and feelings—not unlike the hundreds or thousands of variations in beak sizes or brain stems that other species. Our feelings affect the processes by which our sense-organs select specific information. Our senses do not always choose by themselves. Feelings instruct and sometimes even initiate selection.

From the process of attention and selection, the long quotation above turns to wave-theories of heat and sound. Both Mach and Stumpf studied the psychology of music, and from their studies James seems reminded that nature does not offer objective and abrupt gaps or breaks: it is often more continuous and cyclical. The "line" between what registers as lightness and darkness is actually not a line at all but a wave vibrating in the "undistinguishable, swarming *continuum*, devoid of distinction or emphasis." The waves that make up the forces of the universe and make our sense-organs quiver seem to spark James's imagination: "The utility of not having a sense for magnetism when we have one for heat, is not obvious. We may at most suspect a possible aesthetic brightness and clearness to result, from the wide intervals."[186] These flights of fancy into the possibilities for new types of sensory organs and new forms of sense perception, however, should not obscure the fact that the senses and feelings are conductors and transmitters of consciousness. Like the currents of consciousness, elusive feelings and content on the edges of our perception are actively involved in this mysterious process.

Light Waves and Organs of a Higher Order

In addition to Stumpf, Mach, and Spencer, James posits his thinking about heat and light waves directly into the context of what he calls "Helmholtz's immortal work on *Physiological Optics*." Visual sensations have their causes picked out by the structure of the organ, but attention selects some vibrations in the field of vision "as worthy" and "suppresses" the rest. Helmholtz's work on "blind spots," "after-images," "marginal changes of colour," and "more besides" suggests that what has been "suppressed" remains at the margins of attention. In *The Principles*, James cites Helmholtz's study of vision to draw a parallel between "sensorial attention" and sustained intellectual engagement. If we want to focus on an object before our eyes or a topic of thought, "we should roll it over and over incessantly and consider different aspects and relations of it in turn."[187]

Previous scholars such as Beer and Richardson have touched on the influence of Helmholtz and other European thinkers on James. What has not yet been noted is that the same "immortal works" influenced Tesla. His 1893 address "On Light and Other High Frequency Phenomena," which also discusses the preservation of coal and forests, signals his debt to Helmholtz. Tesla revels in the wonder of "one of the most remarkable experiments recorded in the history of science." The experiment seems rather simple: sitting in a room completely devoid of light. Yet, Tesla claims Helmholtz "was able to see in total darkness the movement of his arm by the light of his own eyes."[188] This proves that "the fundi of the eye are themselves luminous." This is just one of the miraculous features of the human eye, which Tesla calls the "most wonderful" "material or tangible [part] of our being," and an "organ of a higher order."[189] He says there is a remarkable association between "luminosity of the eyes" and "great imaginative power." Tesla predicts that when humans have the power to "analyze the condition of the retina when disturbed by thought," then each of us will be able to read thoughts of others with precision, "like the character of an open book."[190]

The possibility of reading thoughts by analyzing the eye's movements aids Tesla's general theory that the eye has an "intimate relation" with "that which we call intellect."[191] According to Tesla, external stimuli make impressions on the retina. The visual nerves that convey this impression from the eye to the mind are kept “under a particular stress or in a vibratory state.”[192] The eyes are not only the gateways to the soul, but also an instrument that transforms the vibrations of light and color into currents that pass through the nervous system. The atmosphere’s vibrations caused by the light waves and particles are retranslated into the mind’s “vibratory state.” The works of Helmholtz, Spencer, Mach, and Stumpf together support a model of the nervous system in which external vibrations stimulate sensory organs like the ear and the eye. The impressed organ begins to decode the vibrations and transforms them into electrical impulses. These currents are then directed to a particular area of the brain, and that central conductor of electricity and currents responds accordingly.

Electrical systems and technologies certainly informed Tesla’s mechanistic view of the universe and all life forms. Tesla says that any organism “in the eternal process of evolution, or more philosophically speaking, adaptation to Nature” might have developed a sense of touch “to a fine degree of sensitiveness.”[193] Yet even the most evolved and highly sensitive organ of another species cannot “begin to compare with that of the eye,” which is “capable of distinguishing and conveying to the mind in a single instant innumerable peculiarities.”[194] For Tesla, just as the eye adjusts to the frequencies of light as they enter into it from the environment, what he calls “*adaptation* to Nature” is the primary force in the process of evolution. This correspondence between material adjustment to the environment and the adaptation or evolution of a species is directly in line with Spencer’s approach to psychological phenomena as the adjustment between inner relations and the external environment.

For Tesla, the functions of the eye and the mind are based on vibrations, which electricity, light, and heat also display: “There is no death of matter, for throughout the infinite universe, all has to move, to vibrate, that is, to live.” To vibrate is to live. The scientific laws controlling these vibrations lead Tesla to conclude: “Just as I am convinced of any physical truth I am convinced that the motive impulse must come from the outside.”[195] Amid the “infinite ocean of the medium which pervades all,” Tesla says, certain external vibrations initiate a chain of interrelated, internal processes: “knowledge involves consciousness; consciousness involves ideas, conceptions; conceptions involve pictures or images, and images the sense of vision, and therefore the organ of sight.”[196] Tesla draws a line from the vibrations of light in the ether to the eye to the mind and knowledge and back again. The vibrations that stimulate our highly evolved, delicate, and receptive organ prompt everything from the tiniest flicker of the finger to the grandest ideas to ever enter a human mind. For the next decade, Tesla would attempt to re-create something akin to this most fascinating and delicate of instruments and use special electrical vibrations to control it from any distance.

Tesla’s Automaton

Tesla envisioned a world where wired and wireless gadgets maintained a symbiotic relationship with the external environment. He also envisioned the electricity sweeping through the universe seeping into his body and mind. His powerful and sometimes overwhelmingly “visual” imagination helped him cultivate a keen understanding of electricity’s physical and physiological effects. Tesla claimed that when as a child growing up in Smiljan, a small town near Gospic, he developed a strange mental illness. He says that whenever he heard a word spoken to him, “the image of the object which it designated would appear vividly before [his] eyes." He adds, "Many times it was impossible for me to tell whether the object I saw was real or not."[197] Tesla's sensitivity to sounds, light, and other external stimuli could be debilitating. In his autobiography, he recalls certain instances when "the sun's ray's when periodically intercepted, would cause blows of such force on my brain that they would stun me." He continues, "In the dark I had the sense of a bat and could detect the presence of an object . . . by a peculiar creepy sensation on the forehead."[198]

Today, Tesla would be diagnosed with synesthesia, "a curious condition in which an otherwise normal person experiences sensations in one sensory modality when a second modality is stimulated."[199] Eventually, he learned to control this peculiar psycho-neurological condition and "find out, every time, what caused the images to appear." After years of linking the images to a sound, word, or thought, Tesla claimed, the search for the original visual impression became "second nature."[200]

As an adult, Tesla became so attuned to the correspondence between visual impressions and his ideas and physical sensations that he boasted: "I remember only one or two cases in all my life in which I was unable to locate the first impression which prompted a movement or a thought or even a dream."[201] Tesla's unique mind coupled the stimulus-response model for explaining consciousness with his habit for connecting impressions, sensations, and thoughts. These mergers were instrumental to Tesla's powers of invention. Before he began to work on a new motor or oscillator, he would construct the entire apparatus mentally. He then visualized each component, arranged them accordingly, and set them in motion. With the machine running in his mind, he would assess the performance of the individual parts and the effect of different electrical forces. Tesla could then make the necessary adjustments, and when he was finished, he felt certain that after the pieces were put together, the device would perform exactly as it had in his mind. Before arriving at this point, however, Tesla's inventive process required great patience. He said that the patient, think-first-act-second approach might help other inventors: "That is the trouble with many inventors. They lack patience. They lack the willingness to work a thing out in their mind, so that they can actually 'feel it work.'" Of course, there was an implied criticism of Edison in this statement. The man the press called the "Wizard of Menlo Park" was famous for his constant tinkering and experimentation with devices he thought he could patent and sell.[202]

Some of the greatest minds of Western civilization have endured and exploited synesthesia. For example, in "The Stream of Thought," James quotes Wolfgang Amadeus Mozart speaking about his creative process and ability to visualize individual notes in relation to an entire symphony. The Austrian prodigy noted that his compositions always begin with "bits and crumbs of the piece," and as the soul warms up, the piece gets larger. He said, "I spread it out broader and clearer, and at last it gets almost finished in my head, even when it is a long piece, so that I can see the whole of it at a single glance in my mind, as if it were a beautiful painting or a handsome human being."[203] Mozart's ability to see a symphony at a single glace helped him compose timeless music, while Tesla's synesthesia gave him an advantage in the arena of invention.

Tesla also believes that visual stimuli and their corresponding thoughts rely on the vibration of charged particles. This accounts for his predominantly materialist view of the universe. Coupled with his synesthetic tendencies, he came to believe he was the prototype for an evolved, machinelike human being. In 1901 he boldly declared: "I am an automaton endowed with the power of movement, which merely responds to external stimuli beating upon my sense organs, and thinks and acts and moves accordingly."[204] Tesla felt he was exceptional because he could trace the activities performed by his brain to a visual stimulus. The fact that he could connect his thoughts and actions to the electromagnetic vibrations pulsing through the universe made him confident that he could reproduce similar vibrations and use them to control a "thinking" machine.

Tesla's Attempts to Materialize the Currents of Consciousness

Tesla's studies of the human eye suggested that the waves and particles of light that strike the retina are suddenly "transformed" into nerve currents and then transmitted to the brain.[205] His peculiar perceptions and understanding of physics inspired him to try to use artificial "organs" and electrical vibrations to control what he called a "telautomaton." Tesla says his humanlike robots or "automatons" would be endowed with "borrowed minds." The thinking behind his desire to create artificial intelligence seems based on the following premises: 1) the mind is composed of a series of law-abiding, cause-and-effect relationships; 2) the brain and its thoughts are composed of electrical vibrations. Thus, it seems possible that he might create a device that would act like a mind. The teleautomaton's mind could be "tuned" and "adjusted" to respond to certain electric vibrations and initiate a specific set of simple commands.

Tesla wanted to build a single automaton, but it seems that it would have two different roles. On the one hand, the robot would, in his words, "mechanically represent me, and . . . would respond, as I do myself, but, of course, in a much more primitive manner."[206] It would be built with "an element corresponding to the mind, which would affect the control of all its movements and operations, and cause it to act, in any unforeseen case that might present itself."[207] Such visions extend into present-day research on artificial intelligence. Ideally, Tesla explained, automatons will have more than a "borrowed mind"; they will have their "own mind." The self-regulating automaton would be capable of "making experiences, or, otherwise stated, recording impressions which will definitely affect its subsequent actions."[208]

On the other hand, Tesla wanted his automaton to be a fighting machine. He did not build anything that could think and reason with intelligence, but he did succeed in building a bathtub-sized submarine. This submarine was tuned to a certain frequency and made to only respond to vibrations sent from a distant oscillator (or what we would refer to as a remote control). Tesla's submarine could move left and right, dive and surface. He displayed the device at Madison Square Garden in 1897, and soon after approached the United States Navy about purchasing the patent rights. They declined his offer, saying what he claimed to have built was impossible, but other inventors who lobbied Washington had more success.[209]

Tesla envisioned his submarine and other automaton fighting machines would be more than "mere mechanical contrivance, comprising levels, screws, wheels, clutches . . . but a machine embodying a higher principle, which will enable it to perform its duties as though it had intelligence, experience, judgment, a mind!"[210] His statements seem to anticipate remote-controlled planes and tanks that began to appear around the Second World War. Yet, Tesla thought that these automatons would improve peaceful relations. If no human life needed to be sacrificed, then the country with bigger, stronger robots would most likely win, meaning smaller countries with weaker fleets of robots would be less likely to engage in hostile behavior. Tesla was wrong about the influence of robots in war, and his vision of humanlike robots and has not been realized. Popular science-fiction films like *The Terminator* (1984) suggest that if we were to realize his dream, it might induce a worldwide nightmare.

Tesla's thoughts on the relationship between external stimuli and electrical vibrations abundantly illustrate one of the most polarizing philosophical issues of the age: the automaton-theory, and, by extension, materialism. Tesla's vision of the self-thinking and operating automaton was likely influenced by his exposure to Helmholtz, Spencer, Stumpf, and Mach. These four thinkers generally agreed that each action, sensation, or thought could be traced to a specific arrangement of nerve cells and synapses. From this model, the fields of physiology and psychology have developed as the process of decoding the body's complex machinery. Tesla, heavily inspired by this line of thinking, concluded that, if he could decipher and then re-create the electric vibrations and currents that initiated thought and sensation in the nervous system, he could use "attuned frequencies" to produce the same thoughts and sensations in an external mind. In brief, Tesla vouches for the automaton theory that James discounts, "Are We Automata?" and in *The Principles of Psychology*.

The infinitely rearranging states of consciousness and the infinite conditions of the environment constantly impress their conditions on one another. Parting ways with Spencer, Stumpf, and Tesla, James says that the mind is not simply a device for recording and responding to external stimuli but is a quality with interest that actively selects. Thus, James might have reminded Tesla-the-automaton that, while he had a strong and seemingly foolproof correspondence between external stimuli and thought, there were a few occasions when Tesla-the-human was unable to locate the first impression. James, I argue, might ask Tesla: "What occurred on those occasions when your mind initiated thoughts or actions *without* a first impression? If these thoughts or actions were instigated by a material cause, then we might assume it was not external but rather internal. Might these one or two moment[s] be classed with the original and possibly divinely inspired thoughts that lead you to new principles of light, new systems for alternating current, and never-before conceptualized inventions?"

Tesla would have been unable to give James a satisfactory answer. While the inventor undoubtedly had a powerful mind, which he used to synthesize cutting-edge theories of electricity with an ability to imagine and build electrical devices, he contradicted himself. He never accounted for the fact that he displays original thinking and conceived of vastly advanced technologies: a robot cannot be programmed to have such "original" thoughts. Indeed, the automaton theory as James describes and Tesla put into action assumes the human mind only responds to material causes. Thus, the theory presents a rather limited and mechanistic model of human life. I agree that the mind and body sometimes behave *like* a machine.

In 1893, James told a group of educators: "Your pupils, whatever else they are, are at any rate little pieces of associating machinery," and elsewhere he seems to suggest the mind is only a "sorting machine."[211] Our study of associations must account for what James calls "the mechanical conditions" of thought without eliminating the possibility for experience that is beyond mechanical explanation.[212] I have suggested that observations about these "mechanical conditions" are linked to electrical transmissions. The study of how such transmissions produce experience, however, is an obscure metaphysical field.

Consciousness is too magical and complex to be formatted, packaged, and decoded like a machine.

Despite Tesla's seemingly mystical ideas about artificial intelligence and interplanetary communication, he was truly committed to the idea that the entire universe, from the motion of the planets to the vibrations of our thought, followed strict laws of cause and effect. James, for all of his commitment to scientific facts, rejected a strictly materialist approach to the body electric. Indeed, while James's pluralism allowed for the possibility of telepathy and spiritualism, Tesla felt such phenomena to be unsupported by evidence and too metaphysical to be of great value.

Both thinkers' rich and powerful ideas have been traveled by waves of scientists, philosophers, and visionaries, yet their ideas seem to resist reductive formulas and continue to inspire. Like James, I am opposed to the materialistic notion that "matter shall hold all the power."[213] Our internal web of feelings, ideas, and spiritual beliefs is just as capable of initiating a thought or movement as an outside stimulus. The commands sent to the brain from the swarming continuum of the cosmos does not account for every single piece of a conscious state. While parts of consciousness are beyond the limits of knowledge, thoughts and feelings are related to the electrical currents in our brains. Yet, learning more about both James and Tesla and their respective ideas can bring us to an even firmer realization about the importance of pluralistic thinking, the role of free will in the evolutionary process, and possibilities for using electric technologies to create more symbiotic relationships between the miraculous gift of consciousness and the infinitely complex and abundant forms of energy in the universe.

Wireless Frontiers

The connections between Tesla, Turner, and James suggest a novel way to think about some of our most exciting frontiers. Every day, new findings about the human brain open the new, vast, and magical landscape that is the gift of human consciousness. It is fascinating to think that someday we might understand more about how and why our brains generate and transmit electric nerve currents while still supporting those vague, spiritual, electric experiences. Equally exciting is the wireless frontier. The island from which I write this dissertation, Manhattan, is, in many ways, the center of a web, the source of a massive amount of instant information concerning global politics, culture, and finance. Wireless transmissions will continue to be a dominant feature of our internal and external landscapes as electric experiences and depictions of the digital environment are associated with linear progress. The forces of electricity will keep creating new, space-and-time-defying technologies. Natural resources contained within landscapes will also be harnessed, with new forms of agriculture and industry continually taming a planet that once seemed wild and boundless. Metaphors involving landscape and electricity will continue to cross various epistemological boundaries and frame natural phenomena that seem in constant flux. Finally, the various uses and forms of electricity and landscape facilitate the circulation of thoughts and ideas as modern-day utility companies circulate electric power through a grid. Our story now turns back to that grid and continued wiring of the American landscape.

[1] Robert Wozniak, introduction to *The Principles of Psychology*, p. 1.
[2] Allan G. Bogue, *Frederick Jackson Turner: Strange Roads Going Down* (Norman: University of Oklahoma Press, 1998), p. 91.
[3] John Mack Faragher, introduction to *Rereading Frederick Jackson Turner: "The Significance of the Frontier in American History," and Other Essays* (New Haven: Yale University Press, 1998), p. 1.
[4] Charles Anderson Dana writes: "The men living at this time who are more important to the human race than this young gentleman can be counted on the fingers of one hand; perhaps on the thumb of one hand." *New York Sun*, March 14, 1895, p. 6.
[5] Despite Tesla's reputable scientific work, Carolyn Marvin says Morse "was frequently criticized for making the science sensate rather than cerebral. He was often extravagant in predicting fabulous inventions that he never delivered. Even the popular press treated him by turns as a visionary and a fraud." *When Old Technologies Were New: Thinking about Electric Communication in the Late Nineteenth Century* (New York: Oxford University Press, 1988), p. 137. On the other hand, Bernard Behran, president of the American Institute of Electrical Engineers, said in 1917: "Suffice it to say that, were we to seize and to eliminate from our industrial world the results of Mr. Tesla's work, the wheels of industry would cease to turn, our electric cars and trains would stop, our towns would be dark, our mills would be dead and idle. Yes, so far reaching is this work, that it has become the warp and woof of industry." Quoted in John J. O'Neill, *Prodigal Genius: The Life of Nikola Tesla* (New York: Cosimo, 2006), p. 236.
[6] Nikola Tesla, "On the Problem of Increasing Human Energy" (1900), *Century Magazine*, repr., *The Problem of Increasing Human Energy* (Belgrade, Serbia: Nikola Tesla Museum, 2000), p. 11.
[7] Ibid., p. 12.
[8] Frederick Jackson Turner, "The Significance of the Frontier in American History" (1893), in *Rereading Frederick Jackson Turner: "The Significance of the Frontier in American History," and Other Essays*, ed. John Mack Faragher (New Haven: Yale University Press, 1998), p. 59.
[9] William James, *The Complete Works of William James: The Principles of Psychology* (Cambridge, Mass.: Harvard University Press, 1981), pp. 273–74.
[10] "History Making Celebration of the Only Electrical Banquet the World Has Ever Seen," *Buffalo Evening News*, January 13, 1897, 1:1–2; 4:2–5.
[11] *New York Times*, July 16, 1895, 10:5.
[12] "History Making Celebration," 1:1–2; 4:2–5.
[13] I quote from the copy of Tesla's speech "On Electricity" printed in *Nikola Tesla: Lectures, Patents, Articles* (Belgrade, Yugoslavia: Nikola Tesla Museum, 1956), pp. 101–8. A transcript of the speech appeared in the *Electrical Review*, January 27, 1897.
[14] Tesla, "On Electricity," p. 101.
[15] Ibid., p. 103.
[16] Ibid.
[17] Ibid.

[18] Ibid., p. 106.
[19] Ibid.
[20] Ibid., p. 107.
[21] Frederick Jackson Turner, “The Significance of History” (1892), in *Rereading Frederick Jackson Turner*, p. 13.
[22] Ibid., p. 18.
[23] Ibid., pp. 22, 19.
[24] Ibid., pp. 22, 23.
[25] Turner, “Significance of the Frontier,” p. 31.
[26] Ibid., p. 32.
[27] Faragher, introduction, p. 3.
[28] Frederick Jackson Turner, “Social Forces in the History of the United States” (1910), in *Rereading Frederick Jackson Turner*, p. 119.
[29] Ibid., p. 120.
[30] Henry Carey, quoted in James W. Carey, *Communication as Culture: Essays on Media and Society* (Boston: Unwin Hyman, 1989), p. 122.
[31] Ibid., p. 121.
[32] Tesla, “On Electricity,” p. 107.
[33] David E. Nye, *Electrifying America: Social Meanings of a New Technology, 1880–1940* (Cambridge, Mass.: MIT Press, 1992), p. 37.
[34] For more on the Electricity Building at the Columbian Exposition of 1893 see also Rossiter Johnson, ed., *A History of the World’s Columbian Exposition Held in Chicago in 1893* (New York: D. Appleton, 1897–98), pp. 297–99; Murat Halsted, “Electricity and the Fair,” *The Cosmopolitan*, May 1893, pp. 577–82; and J. P. Barrett, *Electricity at the Columbian Exposition* (Chicago: R.R. Donnelly and Sons, 1894), pp. 16–19. Another excellent resource about the World’s Fair has been created by the UCLA History Department and can be found at http://uclawce.ats.ucla.edu/about.
[35] Faragher, introduction, p. 2.
[36] William James did not attend the fair but wrote to his brother Henry: “*every one* says one ought to sell all one has and mortgage one’s soul to go there, it is esteemed such a revelation of beauty. . . . People cast away all sin and baseness, burst into tears and grow religious under the influence!” William James to Henry James, September 22, 1893, *The Correspondence of William James*, ed. Ignas K. Skrupskelis and Elizabeth M. Berkeley, vol. 2. (Charlottesville: University Press of Virginia, 1993), p. 280.
[37] Reid Badger, *The Great American Fair: The World’s Columbian Exposition and American Culture* (Chicago: Nelson-Hall, 1979), p. 108.
[38] With over 21.5 million paid admissions, somewhere between 5 and 10 percent of the population of the United States visited the fair. For more on attendance see Badger, *Great American Fair*, p. 109.
[39] Nye, *Electrifying America*, p. 39.
[40] William Cameron, *The World’s Fair: A Pictorial History of the Columbian Exposition* (New Haven: James Brennan, 1894), quoted in Marc Seifer, *Wizard: The Life and Times of Nikola Tesla; Biography of a Genius* (New York: Citadel Press, 1998), p. 117.
[41] Quoted in Nye, *Electrifying America*, p. 40.
[42] Turner, “Significance of the Frontier,” p. 34.

[43] Turner, “Significance of History,” p. 23.
[44] Turner, “Significance of the Frontier,” p. 32.
[45] Bogue, *Frederick Jackson Turner*, p. 114.
[46] Turner, “Significance of the Frontier,” p. 41.
[47] Bogue, *Frederick Jackson Turner*, p. 114.
[48] Turner, “Significance of the Frontier,” p. 33.
[49] Ibid., pp. 32, 39, 44, 44, 46.
[50] Gillian Beer, *Open Fields: Science in Cultural Encounter* (Oxford: Clarendon Press; New York: Oxford University Press, 1999), p. 296.
[51] Ibid.
[52] Ibid., p. 302.
[53] Ibid., p. 309.
[54] Turner, “Significance of the Frontier,” p. 39.
[55] Ibid., p. 42.
[56] Ibid., p. 33.
[57] Ibid., p. 47.
[58] Roderick Nash, *Wilderness and the American Mind*, 4th ed. (1967; repr., New Haven: Yale University Press, 2001), p. 143.
[59] Turner, “Significance of the Frontier,” p. 59.
[60] Nikola Tesla, *The Inventions, Research, and Writings of Nikola Tesla* (1893; repr., New York: Barnes and Noble Books, 1992), p. 145.
[61] Tesla was specifically referring to his studies of the Schumann Resonance (7.8 Hz). Nikola Tesla, “The Transmission of Electrical Energy Without Wires As a Means of Furthering World Peace,” *Electrical World and Engineer*, January 7, 1905, pp. 21–24.
[62] *Lectures, Patents, and Articles*, p. 107.
[63] Tesla was not the first to experiment with the transmission of electromagnetic or electrostatic waves. Joseph Henry and Samuel Morse had some success communicating without wires in the mid-nineteenth century. Thomas Edison patented a “grasshopper telegraph” in 1885, which allowed passing trains to send messages to and from a train station through the use of a metal strip attached to the rails. In 1872, Mahlon Loomis patented a wireless device that used kites and a ground connection to send telegraph messages. Seifer, *Wizard*, p. 107. However, in my research of these technologies and the responses to them, I have yet to see them referred to as “wireless.”
[64] Crookes was an English chemist, physicist, and member of the Society of Psychical Research. Alvin F. Harlow states: “Sir William Crookes was the first to see the point, and the suggestion, this in an article in the Fortnightly Review in 1892.” *Old Wires and New Waves: The History of the Telegraph, Telephone, and Wireless* (New York: D. Appleton-Century, 1936), p. 438. Harlow goes on the say that this article “plainly pointed the way” for Guglielmo Marconi. Ibid., p. 439. He makes no mention of Tesla anywhere in his book. Daniel J. Czitrom states that Crookes’s article “inspired the young Anglo-Italian Guglielmo Marconi to develop a truly practical wireless telegraphy based on Hertzian waves.” *Media and the American Mind: From Morse to McLuhan* (Chapel Hill: University of North Carolina Press, 1983), p. 63.
[65] Quoted in William Crookes, “Some Possibilities of Electricity,” *Fortnightly Review* (London), February 1892, pp. 174–75.

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[66] *Inventions, Researches, and Writings*, p. 292.
[67] For a description of the meetings and letters between Crookes and Tesla see Seifer, *Wizard*, p. 91.
[68] In support of the claim that Tesla is the true “Father of Wireless,” Seifer writes: [Tesla’s] system of wireless transmission was outlined in detail in highly visible articles which appeared in 1891, during the first public demonstrations of wireless Geissler tubes at Columbia College, in 1892 in Europe, and were explicitly delineated in 1893. *Wizard*, p. 109. Tesla’s ideas and inventions profited men like Edison, George Westinghouse, and J. Pierpont Morgan, but he himself was never able to achieve financial success. He died in debt and relative obscurity in room 3327 of the New Yorker Hotel in 1943. A few months after Tesla’s death, the Supreme Court reversed an earlier decision and made Tesla the post-facto inventor of radio in the United States. The conflict with Marconi about the invention of wireless technologies was only one of many injustices that Tesla suffered during his lifetime.
[69] “Wireless Electric Lamps: Mr. Tesla’s Experiments with High Frequency Alternations,” *New York Times*, May 21, 1891.
[70] Robert Millikan to Nikola Tesla, 1931. Letters, LS-30, quoted in Seifer, *Wizard*, p. 71.
[71] Joseph Wetzler, “Electric Lamps Fed From Space, and Flames that Do Not Consume,” *Harper’s Weekly*, July 11, 1891, p. 524.
[72] Nikola Tesla, “Experiments with Alternate Currents,” *Inventions, Researches, and Writings*, p. 145.
[73] Ibid., pp. 145–46.
[74] Ibid., p. 147.
[75] Ibid., p. 148.
[76] For more on the public’s fears about electricity and technology see Linda Simon’s *Dark Light: Electricity and Anxiety from the Telegraph to the X-Ray* (2004) and Jeffery Sconce’s *Haunted Media: Electronic Presence from Telegraphy to Television* (2000).
[77] Mark Essig, *Edison and the Electric Chair: A Story of Light and Death* (New York: Walker, 2003), p. 146.
[78] For more a thorough discussion of Edison, the battle of the currents, and the use of animals for electrical experiments see Essig, *Edison and the Electric Chair*, pp. 134–62. In 1890, Edison arranged to have the first electric chair designed to use alternating current. The chair eventually worked, but only after a group of journalists witnessed the condemned man cooked to death. Even in 1902, long after the battle was finished and AC was accepted as more fit for long-range distribution, Edison and his film crew recorded the electrocution of a circus elephant with alternating current.
[79] E. Raverot, “Tesla’s Experiments in High Frequency,” *Electrical World*, March 26, 1892.
[80] Wetzler, “Electric Lamps Fed From Space,” p. 524. Edward Bellamy’s *Looking Backward* tells the story of a young man from Boston who wakes up one day to find himself living in the future. The future America features a new social and economic structure: “the nation” assumes the functions of a single, gigantic corporation, all individual property is abolished, and every citizen contributes his or her “quota of industrial or intellectual services.” *Looking Backward: 2000–1887* (1888; repr., New York: Signet Classic, 2000), p. 23. While Marxists, Progressives, and other Socialist

groups embraced such ideas, readers seemed most impressed by the futuristic gadgets and machines. Vast networks of pneumatic tubes connected buildings, and every home was connected to music halls via telephone and could access programs twenty-four hours a day.
[81] Bellamy, *Looking Backward*, p. 43.
[82] Tesla may have inspired at least two other "wireless" narratives. Tesla met Rudyard Kipling in New York in the 1890s. Kipling published "Wireless" in 1902 (collected in *Traffics and Discoveries*, 1904), but the story only mentions Marconi, not Tesla. Mark Twain visited Tesla's laboratory in New York on March 4, 1894, and April 26, 1894. Twain had already published "Mental Telegraphy, A Manuscript with a History." (*Harper's Monthly Magazine*, December 1891). Shortly after his visit to Tesla, Twain published "Mental Telegraphy Again." (*Harper's Monthly Magazine*, September 1895.) Both stories feature telepathy or mind reading, phenomena that Tesla rejected.
[83] Tesla, "Experiments with Alternate Currents," p. 197.
[84] Tesla repeated this lecture one month later in Saint Louis before an estimated crowd of 4,000.
[85] Nikola Tesla, "On Light and Other High Frequency Phenomena," *Inventions, Researches, and Writings*, p. 346.
[86] Ibid., p. 301.
[87] Ibid.
[88] Ibid.
[89] Ibid.
[90] Tesla, "On Electricity," p. 101.
[91] Ibid., p. 103.
[92] Ibid., p. 104.
[93] "Half of American power plants burn coal, a fossil fuel with many of the same constraints as oil: it's polluting, it's finite, and its increasingly costly to burn and extract." Amanda Little, *Power Trip: From Oil Wells to Solar Cells—Our Ride to the Renewable Future* (New York: Harper, 2009), p. 207.
[94] Nikola Tesla, "Colorado Springs," *Lectures, Patents, and Articles*, p. 153.
[95] Ibid.
[96] Nikola Tesla, "Talking with the Planets," *Collier's Weekly*, February 9, 1901.
[97] Tesla, "Problem of Increasing Human Energy," p. 34.
[98] Ibid., p. 37.
[99] Ibid., pp. 68–69.
[100] Ibid., p. 72.
[101] Morgan's decision to cut Tesla off may have been due to the hit that Morgan took during the 1901 stock-market crash. He may have feared that Tesla would offer the world free access to energy and thus deplete the value of natural resources such as coal and oil, consequently depleting Morgan's wealth, but this seems very much like a conspiracy theory.
[102] *New York Sun*, quoted in Seifer, *Wizard*, p. 292.
[103] These two visionaries were brought together in the late 1890s through their mutual friend Robert Underwood Johnson, editor of *Century Magazine*. He and his wife, Katherine, were Tesla's closest friends in New York. In 1889, Muir provided Johnson

with a personal tour of the Yosemite Valley. Afterward, Johnson pressed Muir to start a campaign that would provide federal protection for Yosemite by making it a national park. Their goal was achieved in 1890, and Muir later dedicated his collection of essays, *The Yosemite*, to Johnson. It seems likely that Muir and Tesla knew about each other's work before they crossed paths at the Johnson household in the Gramercy neighborhood in New York City sometime in 1897. Nikola Tesla to Katherine Johnson, November 3, 1898. Robert U. Johnson papers, Manuscript Division, Butler Library, Columbia University, New York. For more on the relationship between Tesla and Muir see Seifer, *Wizard*, p. 181.

[104] John Muir, "Yosemite," repr. in *Journeys in the Wilderness: A John Muir Reader*, ed. Graham White (Edinburgh: Birlinn, 2009), p. 434. Another interesting note is that Muir's prose often combines the exact language of a botanist or geography with transcendental flights of fancy. In one essay, Muir, clearly channeling Emerson, wrote that in the wilderness, "You bathe in these spirit-beams, turning round and round, as if warming at a camp-fire. Presently you lose your consciousness of your own separate existence: you blend with the landscape, and become part and parcel of nature." *A Thousand-Mile Walk to the Gulf* (New York: Houghton Mifflin, 1916), p. 212.

[105] Steven Holmes, *The Young John Muir: An Environmental Biography* (Madison: University of Wisconsin Press, 1999), p. 178.

[106] Emerson, *Essays and Poems*, p. 965.

[107] James, *Principles of Psychology*, p. 260.

[108] Thomas P. Hughes, *The Human Built World: How to Think about Technology and Culture* (Chicago: University of Chicago Press, 2005), p. 8.

[109] James, *Complete Works*, p. 1172.

[110] Sam Halliday, *Science and Technology in the Age of Hawthorne, Melville, Twain, and James: Thinking and Writing Electricity* (New York: Palgrave Macmillan, 2007), p. 3.

[111] Linda Simon, *Dark Light*, p. 2.

[112] Ibid., p. 3.

[113] Ibid.

[114] Joan Richardson, *A Natural History of Pragmatism: The Fact of Feeling from Jonathan* Edwards to Gertrude Stein (New York: Cambridge University Press, 2007), p. 117.

[115] James, *Complete Works*, p. 33.

[116] Ibid.

[117] Ibid.

[118] Ibid., p. 35.

[119] Laura Otis, ed., *Literature and Science in the Nineteenth Century: An Anthology* (Oxford: Oxford University Press, 2002), p. 29.

[120] James, *Complete Works*, p. 78.

[121] Ibid., p. 239.

[122] Ibid., p. 6.

[123] Ibid., pp. 6–7.

[124] Ibid., p. 110.

[125] Ibid., p. 112.

[126] Ibid., p. 113.

[127] Ibid., p. 112.
[128] Ibid., p. 103.
[129] Ibid., p. 29.
[130] Ibid., p. 113.
[131] Ibid., p. 192.
[132] William James, "On Some Omissions of Introspective Psychology" (1884), *Mind* 9, no. 33: 3, 4, 6.
[133] James, *Complete Works*, p. 232.
[134] Ibid.
[135] Ibid., p. 239.
[136] Ibid., note on p. 229.
[137] William James, *Essays on Radical Empiricism* (1912; repr., Mineola, N.Y.: Dover, 2003), p. 36.
[138] James, *Complete Works*, p. 239.
[139] Ibid., p. 229.
[140] Ibid., p. 227.
[141] Ibid., p. 246.
[142] Ibid., p. 238.
[143] Ibid., p. 246.
[144] Ibid., p. 109.
[145] Ibid., p. 263.
[146] Ibid., pp. 263–64.
[147] William James, "On Some Omissions of Introspective Psychology" (1884), pp. 11–12.
[148] Ibid.
[149] Richardson, *Natural History of Pragmatism*, p. 126.
[150] Alfred North Whitehead, quoted in ibid.
[151] James, *Complete Works*, p. 229.
[152] Ibid., pp. 229–30.
[153] Ibid., p. 229.
[154] Ibid., pp. 229–30.
[155] Ibid., p. 230.
[156] Tesla, "Experiments with Alternate Currents," p. 147.
[157] Ibid., p. 148.
[158] The following passages suggest the power and malleability of scientific terms: "In our own time writers on discourse have emphasized the heterogeneity of dialects within the apparently common tongue, the way in which we never can quite securely translate from one professional or social group to another the intensity, of vacuity, of terms. Terms may be precise and full in one domain, meager in another, transformed in yet another: 'matter' would be a simple example, or 'select.' Words are also subject to ontological decay: what starts precise and bounded may become neutralized, or soggy." Beer, *Open Fields*, p. 176. For Joan Richardson, these scientific terms can become sources for religious experience: "James, experiencing his spiritual wavering and finding salvation, balance, through his conversion, his exchange, of religious for secular terms informed by his growing understanding of natural and scientific professes, began to practice a premonition, as it were, a hunch, hypothesizing that currents operate no

different in the mind than they do in matter, and that these currents are charged by words." Richardson, *Natural History of Pragmatism*, p. 119.
[159] James, *Complete Works*, p. 233.
[160] Jill M. Kress, "Contesting Metaphors and the Discourse of Consciousness in William James," *Journal of the History of Ideas* 61 (2000): 264, 265.
[161] James, *Complete Works*, p. 939.
[162] Tesla, "Colorado Springs," p. 153.
[163] Tesla, "Problem of Increasing Human Energy," p. 23.
[164] James, *Complete Works*, p. 133.
[165] Ibid., p. 137.
[166] Ibid., p. 140.
[167] After 1882, "Mach and James corresponded and remained friends for the next twenty-eight years until the latter's death. Mach even dedicated a book to [James]." John T. Blackmore, *Ernst Mach: His Work, Life, and Influence* (Berkeley: University of California Press, 1972), p. 77.
[168] Tesla, "On Light," p. 299.
[169] Tesla, "Problem of Increasing Human Energy," p. 12.
[170] Ibid., p. 12.
[171] *Lectures, Patents, Articles*, p. 158.
[172] James, *Complete Works*, p. 19.
[173] Ibid.
[174] William James, "Are We Automata?" p. 8.
[175] Ibid., p. 8.
[176] More on this history of the automata-theory and summaries of these thinkers can be found in Phillip Gray, "Prerequisite to an Analysis of Behaviorism: The Conscious Automaton Theory from Spalding to William James," *Journal of the History of the Behavioral Sciences* 4, no. 4 (1968): 365–76.
[177] James, "Are We Automata?" p. 1.
[178] Ibid., pp. 8–9.
[179] James, *Complete Works*, p. 402.
[180] Ibid., p. 403.
[181] Ernst Mach, quoted in ibid., p. 597.
[182] Mach, quoted in ibid., p. 413.
[183] Blackmore, *Ernst Mach*, p. 229.
[184] James, *Complete Works*, p. 424.
[185] Ibid.
[186] James, "Are We Automata?" p. 19.
[187] James, *Complete Works*, p. 400.
[188] Tesla, "On Light," p. 295.
[189] Ibid., pp. 294, 296.
[190] Ibid., p. 295.
[191] Ibid.
[192] Ibid.
[193] Ibid., p. 297.
[194] Ibid.

[195] *Inventions, Researches, and Writings*, p. 300.
[196] Ibid., p. 298.
[197] Tesla, "Problem of Increasing Human Energy," p. 27.
[198] Nikola Tesla, *My Inventions: The Autobiography of Nikola Tesla* (La Jolla, Calif.: Stefan University Press, 2008), pp. 59–60.
[199] V. S. Ramachadran and E. M. Hubbard, "Synaesthesia: A Window into Perception, Thought and Language," *Journal of Consciousness Studies* 8, no. 12 (2001).
[200] Tesla, "Problem of Increasing Human Energy," p. 27.
[201] Ibid., pp. 27–28.
[202] "Tesla, Man and Inventor." *New York Times*, March 31, 1895.
[203] Wolfgang Amadeus Mozart, quoted in James, *Complete Works*, note on p. 247. (This quotation has sometimes been regarded as spurious. Further review is necessary).
[204] Tesla, "Problem of Increasing Human Energy," p. 27.
[205] In his 1893 lecture at Philadelphia, Tesla claimed: "No matter what one's views on nature and life may be, he must stand amazed when, for the first time in his thoughts, he realizes the importance of the eye in the physical processes and mental performances of the human organism. And how could it be otherwise, when he realizes, that the eye is the means through which the human race has acquired the entire knowledge it possesses, that it controls all our motions, more still, and our actions." "On Light," p. 301.
[206] Tesla, "Problem of Increasing Human Energy," p. 29.
[207] Ibid.
[208] Ibid., pp. 26, 30.
[209] At one point Tesla worked with submarine designer John Holland, who built the first submarine to the commissioned by the U.S. Navy.
[210] Tesla, "Problem of Increasing Human Energy," p. 23.
[211] James, quoted in Robert D. Richardson, *William James: In the Maelstrom of American Modernism; A Biography* (Boston: Houghton Mifflin, 2006), p. 342.
[212] James, *Complete Works*, p. 558.
[213] Ibid., p. 139.

Chapter Four

Empowered and Lined Landscapes (1876–1912)

> Those parts of the world that are not subject to a system's control, but that influence the system, are called the environment. A sector of the environment can be incorporated into the system by bringing it under system control. An open system is one that is subject to influences from the environment; a closed system is its own sweet beast, and the final state can be predicted from the initial condition and the internal dynamic. . . . All of the systems, it is important to stress, share the characteristic of interconnectedness—i.e., a change in one component impacts on the other components of the system.[1]
>
> —Thomas Hughes, *Networks of Power*

Toward the end of the nineteenth century, Americans found themselves in an increasingly electric environment: they talked through telephones, gazed at illuminated streets and monuments, and felt enthralled by massive electrical dynamos.[2] Although electricity still evoked the mysterious, the threatening, and the sublime, individuals living in the so-called Electrical Age often took electricity into their bodies, used it to communicate, and saw electric power as the omen of a potent, comfortable, and exciting future. Technological icons like electric trains, electric motors, and street lighting offered stunning examples of the ways Americans embraced what Thomas Hughes calls the "Human-Built World."[3] Access to electric power, faster and more widespread communication via telegraph and telephone, and bigger, stronger lights and motors opened the industrial and cultural frontiers of the twentieth century.

The social history of electricity technologies shows our common machines have not developed in a closed system—they drew from and drew on the environments outside the circuits, businesses, and populations they served. The electrical systems that spread throughout the United States required a massive (and unavoidable) fleet of overhead lines. Electricity has permeated American culture, including the poles, wires, and other infrastructure framed the landscape. During the period under review, even the individuals who did not own a telephone or lived outside the urban-centered power grids could readily see the changes taking place in the spaces alongside roads and between buildings. At the start of the First World War, the majority of Americans did not have electric power, but most of them worked and lived near part of one of the nation's expanding electrical grids and communication networks. Even technologically disconnected, rural, and hermetic individuals came across poles and wires in their daily lives. It was generally understood that wires strung around town and alongside roads provided the power for lights, communication, and motors.

This chapter examines the impact of cables, poles, and wires that connected electric technologies and interfaced with the environment during the long turn of the twentieth century. It is especially concerned with the ways these lines influenced the American mind. The overhead infrastructure supporting telegraphs, telephones, and power grids—particularly the swaths of wires streaming across the sky and viewed from a distance—began to imply more than communication: this image became a literal and a figurative instrument of power. A series of fixed, upright wooden poles supporting undulating, parallel lines (whether transmitting Morse code or alternating current) was a site of social, political, communicative, and aesthetic conflicts. Inventors, engineers, mass media, corporations, and utility companies often gave the lines in the landscape a positive spin: these were the veins of national industry, the keys that opened up economic possibilities, and the threads that connected everyone and improved the quality of life for all. Meanwhile, some users and politicians thought the complex and dangerous-looking lines threatened the aesthetics of urban space. Electricity was wonderful, but electric wires defiled nature, invaded privacy, and created a web that obscured the functions of democracy and the free market. Popular attitudes about the Line ranged from the glinting promise of a utopian future to the dangers of an increasingly centralized and uncontrollable network of power.

Wiring the nation with electric lines inspired enthusiastic visions and unsettling worries, and both responses were published in newspapers, histories, popular fiction, and film. The proliferation of telephone networks and electric power suggested that society increasingly relied on wires and those individuals who owned and controlled them. Electrical connections created a general dependence on electric machines, while the wires and poles seemed to taint the landscape. The tenuousness of the metallic threads along with the general clutter of infrastructure introduced a new form of terror into the environment. During the colonial, Jacksonian, antebellum, and Reconstruction periods in American history, vast parts of the nation were considered organic, howling wildernesses. In conjunction with worries that those untamed landscapes would totally disappear, a manmade, wired wilderness spread across the continent.

This chapter moves forward to the end of that century and widens the scope to include the lines for multiplex telegraphy, telephony, and electric power. These three different systems developed along different lines and presented their own set of challenges to inventors, financers, and engineers. Technically, the currents pulsing through the millions of miles of copper, iron, or aluminum wires served a broad range of purposes that went well beyond the transmission of dots and dashes. In addition, each electric technology had a unique impact on thoughts about work and communication. For example, the telephone spurred the notion that feelings could be projected across long distances. The telegraph also transmitted emotional messages, but listening to a voice instead of decoding a series of dots and dashes increased the sense that emotions could be sent and received through wires. In one novel discussed in this chapter, a man hears his lover's voice in a telephone and "could feel the intimate warmth of her arms across the million-peopled cities that separated them; and he projected himself, in fancy, to the heart of the far-off turbulence where she stood."[4] In this case, talking through the telephone and along the wires seems to stretch the outreaching arms of two lovers and bring them together.

The arc lights, incandescent bulbs, and neon signs that began to reshape those "million-peopled cities" reinforced this sense of warmth and suffusion. As David Nye explains, outdoor lighting in shopping districts and at fairs "permitted the landscape to be edited, simplified, and dramatized."[5] The introduction of artificial light forever changed the human experience of darkness and the development of urban space. Yet living in what Nye calls the "electrical landscape" meant encountering more than just long distance conversations and artificial light—this landscape was also lined with wires. The millions of new electrical machines Americans invented, produced, purchased, and used had thousands of different functions and effects.

The infrastructure was vast and united various groups and their devices. Seemingly endless miles of required wires ranged over the land and flowed in and out of buildings. To the untrained eye, the telegraph, telephone, and electrical power cables looked similar when strung on tall wooden poles. The overhead wires made a collective impact on the landscape. From the 1890s to the 1910s, electric transmission lines were, for the most part, taller and thicker than telegraph and telephone poles and wires, but these wires often ran along the same routes and entered cities and buildings through conduits placed next to one another. In general, the electrical infrastructure has been pushed to margins and kept out of sight.

Rather than pull each different thread from the margins and distinguish the impact of telegraph wires versus telephone lines, transmission lines versus fiber optic cables, I propose we pull the entire fleet of overhead wires from the shadows and study how the Line, in all its functions and voltages, made an impact on the American landscape. Again, what I call "the Line" encompasses all of the visible, normative machinery that appear in the landscape and are used to transmit electric power as well as signals for telephones and telegraphs.

Thus, the first half of this chapter recounts the development of two wire systems and their effect on the American landscape. In the late 1890s, long-range power transmission lines connected the Niagara Falls Power Plant to nearby factories and then ran through surrounding parts of upstate New York and Canada. The electrical power supported a boomtown that recalled mining camps and land bonanzas that typified the Old West. The "Niagara Line" that stretched between Niagara Falls and Buffalo was a source of pride and achievement, and the nation's first power grid quickly became a symbol of the technological sublime. Secondly, and in juxtaposition to Niagara's frontier transmission Line, is the wilderness of telegraph and telephone wires that were spreading through American cities. In New York, for example, telegraph and telephone wires were often seen as a dangerous eyesore, and if it had not been for digging of subway tunnels, which still house a good portion of Manhattan's wire infrastructure, Gotham's famous cityscape might still be markedly cluttered with what a columnist in 1876 referred to as a "telegraph forest" filled with "wiry foliage."[6]

Creative renderings of the Line offer further insight to the ways that electrical infrastructures intersected with daily life, both in the metropolis and in the Western landscape. The second half of this chapter examines the Line in American fiction and film. More specifically, we will look at the important role of electric wires in the Canadian-born novelist Arthur Stringer's crime and suspense novels, *The Wire Tappers* (1906) and *Phantom Wires* (1907), and pioneering filmmaker D. W. Griffith's early Westerns, *The Lonedale Operator* (1911) and *The Girl and Her Trust* (1912). On the positive side, the Line in these texts represents the metaphorical bonds among lovers, communicators, and workers. The symbolic gestures of wired connection reinforce narrative threads and offer audiences a sense of electricity's grand promise to unify the nation and spread the values of its hard-working, technologically savvy protagonists. In its shimmering glory, the Line mirrors a world increasingly defined by instant communication, economic expansion, and cultural mobility.

Early-twentieth-century narratives also cast the Line in a negative light. Stringer's cosmopolitan tales of technology, espionage, and corporate greed present the Line as the site of illegal taps, sudden breaks, and the erasure of self. The protagonists, Jim Durkin and Francis Candler, are former telegraph operators who unwittingly fall into a New York–based crime syndicate and become "wire slingers": they splice wires, break codes, and steal messages and money first for corrupt gamblers and businessmen and finally from them. As Jim and Frances move through cosmopolitan settings such as New York, Monte Carlo, and Rome, their knowledge of technical systems and Morse code helps them survive, but they soon realize that they are too embedded in the grid and cannot elude the universal and “phantom” wires of providence and fate.

Griffith’s black-and-white western landscapes feature crude poles connected by thin wires. Through the editing technique referred to as cross-cutting, the audience understands that a single snip by bandits isolates a pretty, solitary female who is under attack. Adding to the tension is that she is in charge of a large sum of cash. The situation is resolved with an exciting race to the rescue. As the cinematic arts developed, the wire-cutting sequence became an effective way to create suspense. Cutting wires is now a convention of horror films: at the worst possible moment, the viewer sees or hears the line go “dead.”

While these stories about the Line reveal a central ambivalence in pervasive, complicated, and unruly infrastructures, this chapter offers those living in the twenty-first century a glimpse of those years when the first lights began to flicker across the great dark expanse of the American night, a time when the nation was enthralled by electricity but far from reliant on it, an age when electricity was not yet something that structured our everyday lives but was increasingly structuring our landscape.

The Niagara Frontier

The first hydroelectric power plant in the United States was completed at Niagara Falls in 1896. The system included a seven thousand–foot tunnel bored through solid rock, a series of colossal black, steel generators each with a capacity of five thousand horsepower, and an elegant granite powerhouse positioned within sight of the cataract. Tapping just a fraction of Niagara Falls’ force produced an unprecedented fifty thousand horsepower. To put this achievement in perspective, consider that in 1893, the various power plants supporting the Chicago World's Fair had a capacity of twenty-four thousand horsepower. At Chicago, this was sufficient for all the lights and machines in an area of six hundred acres.[7]

By 1903, the Niagara Falls Power Company had built a second powerhouse and was prepared to double its output to 100,000 horsepower. One reporter was astonished at how the marvelous attraction of "cheap Niagara Power" had brought dozens of "industrial concerns to the Niagara frontier." With the completion of the second powerhouse, further development was close at hand. "Within a few months," the author wrote, "the full capacity of the Niagara Falls, N.Y. plant will be at the service of the Niagara frontier." The pace of development was astonishing. Some predicted that Niagara would soon generate 1,000,000 horsepower of cheap, clean energy.[8]

At the turn of the century, no other location in Western hemisphere signified the quick, potent, and exciting attributes of technology and culture like Niagara Falls. It combined sheer power and captivating beauty with an impressive system of canals, tunnels, powerhouses, and factories. The power of Niagara, however, expanded well beyond the awe-inspiring deluge and the factories surrounding the power plant. A series of transmission lines carried polyphase alternating current from the powerhouses into the landscape. These transmission lines marked another important boundary in the Niagara frontier.

The fact that Niagara power was transmitted across long distances seemed as miraculous as the site of the half-mile wide waterfall that made it possible. One Niagara guidebook explained that the conversion of falling liquid currents into electric power was a wonderful feat, but "the play of Niagara power on a wire and delivery of it to every conceivable market within a two hundred mile radius is the second wonder; one greater than the first, for Niagara has entered the transmission era."[9] The cables leaving the powerhouse and spreading into the surrounding area and through upstate New York were more than cables or utility lines, which until this point were astonishing in their own right. The Niagara lines were (and are) power–lines, objects that represent the intersection between the sublimity of long-distance electrical transmission and the powerful effect of connecting and framing the landscape with poles and lines.

Before taking a closer look at the groundbreaking power–lines that emerged from Niagara after the 1890s, it is helpful to offer an overview of how Niagara Falls was generating aesthetic and cultural power during the early nineteenth century. Indeed, Niagara was transformed from a tourist destination and a mill town into a symbol of the twentieth century's technological frontiers, but the Anglo ancestors settlers were drawn to there because it provided a symbol of nature's power. In 1836, Thomas Cole boasted "Niagara! That wonder of the world!—where the sublime and beautiful are bound together in an indissoluble chain. In gazing on it we feel as though a great void had been filled in our minds—our conceptions expand—we become part of what we behold!"[10] Niagara was revered as a place where the American landscape's overwhelming magnificence was constantly on display. Writers, artists, and nature lovers celebrated the falls, rapids, and sharp cliffs, and together this place became one of the nation's most treasured landmarks. Postcards, tour books, and landscape paintings spread from this spot on the border of New York and Canada to points across the world. One could behold Niagara in landscape painting or poems, but individuals were encouraged by guidebooks, poets, and promoters to see the falls with their own eyes. Visitors stuck around for days and beheld the site from various angles—the Canadian side, the American side, the rapids below, or on a boat traveling into the Cave of Winds. Niagara was a multidimensional experience, something like an amusement park that gave visitors feelings of patriotism, aesthetic bliss, and moral catharsis.

In fact, one year before the power project was proposed, supporters of Niagara Falls created a plan to preserve a one-and-a-half-mile stretch of land along the banks of the Niagara River and return a sense of wilderness to the area. Their efforts were successful, and in 1885, the New York State legislature passed a law protecting the "Niagara Falls Reservation." Previous tenants along Niagara's shores had built cheap mills and a chaotic collection of factories. Removing some of these structures was part of a general effort to counteract reckless industrialization as well as gaudy tourist traps. The legislation helped to clear out the eyesores and, with the help of Frederick Law Olmsted, who had designed New York's Central Park, construction began on a park overlooking the cataract. Rocky paths, gardens, and forests would give way to a wide grassy knoll from which one could enjoy the view. The collective, progressive aim was to return the site to its former, pristine state. When the Niagara Reservation was officially opened, one newspaper rejoiced: "The spirit of the wilderness has come back to Niagara."[11]

And yet, one year later, in 1886, Thomas Evershed published his plan to harness the power of the falls on a large scale. What ensued was not unlike the process that supported Frederick Jackson Turner's frontier thesis, even if the context was markedly different. Niagara Falls was not the unsettled and wild landscape of the West. Every year thousands of visitors were drawn to Niagara because it provided a symbol of nature's sublimity. Its late-nineteenth-century "pioneers" did not arrive unaware of what lay ahead. They were not forced to wage violence against natives or overcome a particularly strange or hostile environment for the sake of survival. Instead, as the Niagara Falls power plant prepared to open in 1895, aluminum and chemical companies such as the Pittsburg Reduction Company, American Cyanamid, Union Carbide, International Acheson Graphite, and the Carborundum Company began moving their operations into the area.[12] More businesses followed these chemical and manufacturing companies, and the town of Niagara Falls soon offered all of the amenities of industrial life. Industrial development also drew a work force, and the town's population more than doubled between 1890 and 1900. It saw another burst in the following decade, and in the twenty years between 1890 and 1910 the population of Niagara Falls grew from 9,000 to 30,000. Similar increases were seen in the nearby cities of Buffalo and Rochester.

Businesses and corporations transformed the areas abutting the Niagara Reservation's "spirit of wilderness" into an electric power frontier. The transformation of Niagara and Niagara's role in broader American culture is outlined in William Irwin's book, *The New Niagara: Tourism, Technology, and the Landscape of Niagara Falls 1776–1917* (1996). As Irwin points out, just before the turn of the century, Niagara became an innovative center of electricity and industrial productivity, and this "New Niagara" quickly "overwhelmed the older, natural Niagara."[13] It was anointed the "electrical Mecca of the world."[14] The aura of technology and progress extended to Buffalo, where electric lights, electric trams, and a host of new machines created a rather un-frontier-like metropolis. In the 1890s, Buffalo—along with other industrial centers such as New York, San Francisco, and Chicago—seemed a model for the American city of the future.

Americans had long extolled the natural sublimity of Niagara Falls, and after the power plant was completed, “Niagara” became synonymous with massive power that could be transmitted to any point in the country. Jim Durkin, the protagonist of Stringer’s novels, tells his partner, Frances: “Right at the back of this house is a wire, a power-circuit, alive with more than two hundred times that voltage, with power in plenty—a little condensed Niagara of power—asking to be taken off and made use of!”[15] The fact that the power was condensed into a dull and lifeless wire did not seem to overcome the fact that these lines seemed alive and practically begged to be used (and even, as in Durkin’s case, manipulated for devious plans).

The transmission line has not, in previous scholarship, been seen as an object of the sublime. Instead, scholars have defined the “technological sublime” by pointing to the powerful machines like the transcontinental railroad and colossal projects like the Brooklyn Bridge. As Leo Marx explains, “the awe and reverence once reserved for the Deity and later bestowed upon the visible landscape was directed toward technology, or rather, the technological conquest of matter.”[16] The natural and the technological sublime have since developed, and yet they rarely seem to coexist. Finding the sublime in manmade structures produces a different sense of pride and fear for what humankind can achieve and how quickly and horribly it can destroy. The sublimity of a waterfall or a lightning storm seems rooted in nature’s mysterious and pervasive powers. The process of the mind grasping and even shattering out of absolute amazement builds moral fiber, resiliency, and respect for nature. A dam, a bridge, or a bomb might elicit the same feelings and spark the same process of sudden amazement and post-sublime humility and regeneration, but at the core, the perceiver knows that the technological sublime was not designed to extol nature but to harness and display human power.

One of the most glaring differences between locating sublimity in the cataract versus the turbines generating electricity is the fact that the former evokes vast geographical processes, while the latter serves as a testament to industrial development and man's ability to overcome geographic and engineering constraints. Towering Redwoods, wide rivers, or a petrified forest may evoke thoughts of the past and the astonishing field of geology, but massive machines moving through the landscape and great feats of engineering provide a visible "record of more or less continuous progress" in the last two centuries.[17] They do not evoke thoughts of ancient times as much as they display what has happened in the present, which is sublime in contrast to the past. Thus, it is truly amazing to think that Niagara Falls has been gushing since before humans graced this planet, let alone the time they arrived in what we now call North America. The Niagara Falls power plant, on the other hand, seems amazing because it shows how much was accomplished since Americans first arrived on the banks of the Niagara.

Nye, a former student of Marx and another important scholar of the technological sublime, adds to his mentor's definition: "Kant's sublime made the individual humble in the face of nature, the technological sublime exacted the conquest of nature."[18] Niagara Falls, according to Nye, became the prime example of how, in the United States, the natural and the technological sublime could complement one another. Touring the facilities of the Niagara Falls Power Company increased the sense of wonder for the falls. Science-fiction author H. G. Wells felt that a tour of the Niagara Falls Power Company was “more sublime” than entering into the famously tumultuous Cave of Winds.[19] For some, the wide, thick cascade and the deafening roar of the slapping water paled in comparison with the vaulted ceilings of the powerhouse, the hum of the spinning turbines and the fact that overwhelming forces were generated from controlling the river’s rushing currents.

In addition to providing an example of the technological sublime, Nye suggests another inflection of the sublime that was literally projected onto the falls of Niagara. The electrical sublime, according to Nye “dissolve[s] the distinction between natural and artificial sites.”[20] To lessen the contrast between Niagara’s long-standing natural sublimity and its recent technological achievements, in the early twentieth century technicians began to illuminate the sheets of water and the billowing mists with searchlights of varying colors. For some, the nightly lighting displays made the falls seem more spectacular than they were during the day. Audiences gathered along the shores and traffic stopped on the bridges. “The illumination was at once a marvelous tourist attraction, an advertisement for electrification, and a new form of the technological sublime, one in which a technology did not displace or conquer nature but rather intensified it.”[21] Whereas the power plant seemed to harness and tame (even conquer nature), the electricity generated from the falling water brought power to the floodlights, which in turn charged nature with a new sublimity. The lights bathed the gushing waters and billowing mists in various colors and effectively refocused attention on the waterfall: the dark wheel pits churning out thousands of horsepower seemed an afterthought.

The most startling contrast at Niagara seemed to be between the natural beauty and the manmade conquest that the power plant represented, but there were certainly wires between the electric lights and the massive generators. Sections of these wires and the transformers may have been tucked underground or hidden from view, but the fact remains that on the margins and in the gaps of this astonishing display of the natural, technological, and electrical sublime was the startling figure of the Line.

The Frontier (Power) Line

The idea of the "Niagara Frontier" as a site of sublimity and great historical importance was supported by the excitement surrounding its electrical, financial, and engineering pioneers: Edward Dean Adams, J. P. Morgan, George Westinghouse, Nikola Tesla, Lord Kelvin, and George Forbes (the chief electrical advisor to Niagara Falls Power Company). Their involvement added to the enterprise's mystique and prestige, but the final product was made possible through massive capital and a collective effort of manual labor.

The first major undertaking was digging a horseshoe-shaped, 1.5-mile tunnel that rechanneled the Niagara River through a series of canals and chutes. The *New York Times* reported, "Over 1,000 men were engaged continuously for over three years in the construction of this tunnel, which called for the removal of over 300,000 tons of rock and the use of over 16,000,000 bricks for lining." Twenty-eight men were killed during construction.[22]

The final product was a seventeen-by-fourteen-foot tunnel buried almost one hundred and fifty feet underground. The tunnel passed right beneath the town of Niagara Falls. About a quarter of the way through the chutes and locks that comprised the tunnel, the water was channeled into a 178-foot-long wheel pit where it turned giant paddles. The paddles were connected to three thick rotating shafts that stretched up to the surface and spun the steel generators located in the first powerhouse. The first set of generators, which were installed in 1895, used magnets and dense copper-wire coils to convert the mechanical energy produced in the wheel pit into electrical power that was then sent through a series of transformers. The alternating current was transformed into two-phase or three-phase current and stepped up to a voltage suitable for long-distance transmission.

The long-range electric power transmission line made it possible to convey the power generated at Niagara Falls into the surrounding area, but this was one of the last additions to the Niagara frontier. The use of electricity and the corresponding power line could have easily been absent. In 1890, as teams of workers began building the canal and the horseshoe tunnel, the International Niagara Commission began a worldwide search to decide how to convert the strong currents flowing through the wheel pit into a form suitable for transmission. The goal was to transmit the power generated by the turbines from Niagara Falls to Buffalo, almost twenty miles to the southeast. In Buffalo, business and manufacturing were already on the rise, and access to cheap electric power promised to create a boom. Lord Kelvin, the British physicist, was put in charge of the commission, which solicited proposals from around the world by offering $20,000 in prizes. Twenty different plans for harnessing Niagara were submitted. Only six featured electricity. Other proposals included ropes and pulleys, gigantic steel drive shafts, and hydraulic tubes that would “pump” the power. Eventually, the choice came down to tubes filled with compressed air or wires carrying electric currents. The former method would convert the horsepower into air, as if blowing up a balloon. That air pressure could then be blown through tubes to Buffalo and possibly beyond to places like Rochester or Albany.

Both compressed air and electricity were still under heavy consideration when the Niagara Commission began awarding prizes. In 1891, Ebin Hill of Norwalk, Connecticut received a $1,000 prize for his proposal involving long pneumatic tubes that would shoot air pressure from the powerhouse towards Buffalo.[23] Adopting a pneumatic system would have required a second set of transformer-like machines at the terminal point to convert the air pressure into electricity for lighting and other devices. Implementing a hydraulic, mechanical, or pneumatic system on such a broad scale would have a drastic effect on public spaces, the ways that individuals consume power, and the interface between power systems and the environment.

Electrical transmission was seen as a risk. Experience showed that direct current could only be effectively transmitted for a few miles and alternating current was still relatively untested. Tesla's system for AC was appealing, as the voltages could be "stepped up" and "stepped down." According to Adams, in 1890, Tesla's plan was "still a prophecy rather than a completely demonstrated reality."[24] Adams, the first president of the Cataract Construction Company, later recalled that compressed air seemed the only viable option.

Edison and other electricians also predicted that neither DC nor AC could be sent across distances more than a few miles without major losses. In 1891, however, a large hydroelectric power plant was built in Lauffen, Germany. Michael Dolivo-Dobrowolsky designed an AC system (which was seemingly inspired by, if not stolen from, Tesla's patented system[25]). The AC generators were then joined to a series of chutes, spinning paddles, and generators embedded into a plant along the Neckar River. The Lauffen plant included a three hundred–horsepower turbine and oil-insulated transformers that could transmit currents at forty thousand volts. Many engineers were surprised at the relative efficiency of the transmission, as 74.5 percent of the voltages generated by the turbines in Lauffen registered in the low-voltage transformers at the other end in Frankfurt. Eventually, 190 horsepower could be transmitted approximately 112 miles.[26]

The Niagara Falls Power Company sent an agent to investigate the success of the Lauffen-Frankfurt line and, based on his report, decided on alternating current. In 1892 the power company and its engineers began soliciting proposals for the construction of generators and transformers vastly bigger than those used in Germany or any else in the world for that matter. The Westinghouse Company and General Electric, the two most prominent electrical companies in the United States, both submitted bids to convert the mechanical energy created by the falling water into alternating currents suitable for long-distance transmission. With the support of Tesla's patents for an AC system for generation and distribution, on May 5, 1893, a few months before the opening of the Chicago World's Fair, Westinghouse signed the much-sought-after contract. Two days later, news reports suggested that competition for the Niagara Falls Power Company contract had turned criminal, and three Westinghouse employees in Pittsburgh were arrested on charges of stealing blueprints and selling them to General Electric.[27]

In 1895, the Westinghouse Company installed three generators along with the auxiliary powerhouse equipment. The heavy, yurt-shaped machines converted the torque generated by the shafts extended into the wheel pit into two-phase alternating current. In what seems like an attempt to placate powerful interests, the Niagara Power Company awarded General Electric with a contract to build the transformers, the transmission lines extending approximately twenty-two miles to Buffalo, and the substation at the receiving end.[28]

The water wheels, generators, and transformers (which converted the two-phase current into a three-phase current more suitable for long-distance transmission) attached to the new transmission lines to create one of the biggest and most powerful technologies built by human hands. By autumn 1896, electricity was being transmitted to Buffalo, leading to Tesla's January 1897 speech "On Electricity." For the next two decades, the Niagara-Buffalo area was the site of the one of the most massive power plants and electric grids in the world.

One of the most fascinating aspects of this new Niagara system was the concentration of abundant, raw power into a small, fragile line in the landscape. For instance, the title of an 1893 newspaper article—"20,000 Horse Power Over One Wire"—reflects the seemingly incredible feat of putting so much power into "one" wire.[29] Frank K. Hawley, director of the Cataract General Electric Company, reported that "20,000 horse power would be brought into Buffalo," and after reaching Buffalo, the company planned to build lines to the east in order "to reach Rochester with its power line, which will parallel the Falls Branch of the New York Central Railroad."[30]

Meanwhile, articles such as "The Niagara Falls Electric Line" debated the extent to which Niagara's power could be effectively transmitted over a wire. In May1894, Edwin J. Houston and A. E. Kennelly argued that electricity transmitted to Albany from Niagara would be considerably cheaper than the use of steam. Based on their calculations, once the output of the Niagara plant had increased (plans were already underway to build more tunnels and powerhouses), 150,000 horsepower could be sent to the state's capital across power lines and at a lesser cost to the consumer than building power plants that utilized coal and steam. Drawing power from Niagara past the boundaries of Rochester and Buffalo seemed imminent.[31] Not surprisingly, Tesla made some of the most sensational claims concerning long-distance transmission.

Tesla offered a "daring promise" to "place 100,000 horsepower on a wire and send it 450 miles in one direction to New York, the metropolis of the East, and 500 miles in the other direction to Chicago, the metropolis of the West, and serve the purposes and supply the wants of these greatest urban communities."[32] In 1900, as he prepared to launch his Worldwide Wireless project at his Wardenclyffe Laboratory, Tesla claimed that Niagara Falls will "some day supply New York City, giving it all the electric power it can consume without the use of wires."[33] Of course, we know that Tesla's wireless visions were not realized. The line that stretched out from the Niagara frontier became a staple of long-distance power transmission and cables raised on wooden poles are still a regular feature in our landscape. However, we almost take it for granted that power generated at one point in the nation can be transferred to between distant places like New York and Chicago. Distant regions not only share information as they did with the telegraph and telephone; they also share power.

Considering how close the Niagara Commission came to transferring the power from Niagara to Buffalo through a series of pneumatic tubes, it seems unlikely that they could have predicted that, in less than a hundred years, transmission lines would replace the railroad as one of the most ubiquitous signs of power and domination in the American landscape. This groundbreaking power plant and electrical grid charged the national psyche and marked an important transition in the ways that Americans viewed electricity and landscape. Niagara Falls symbolized not only a "frontier," but also a taming of natural forces, as suggested by the following headlines:

> "Niagara in Harness" (*Cosmopolitan*, 1894)
> "Niagara Put in Harness" (*New York Times*, July 7, 1895)
> "Niagara is Finally Harnessed" (*New York Times*. August 27, 1895)
> "The Harnessing of Niagara" (*Blackwood's Magazine,* September 1895)[34]

If the great beast of Niagara Falls had been harnessed, then it seems fitting to think of the spinning steels caps of the five thousand horsepower dynamo as the bit in the mouth of a mythical steed. The transmission lines carrying the alternating current into the landscape are like reins charging toward new bold and powerful frontiers.[35]

Indeed, transmission lines quickly proliferated. In 1905, electricity accounted for only ten percent of the motive power generated in the United States. By 1930, electricity made up 80 percent.[36] The increase of electric power corresponded with the growth in the number of American homes that were electrified. Just ten percent of Americans had electricity in 1910, but by 1930, the percentage had risen to seventy.[37] In the context of this rapid development, the Line was, for a time, another icon of technological progress. It symbolized the process whereby individuals joined a region-spanning, nation-building, all-powerful network. Like steamboats, railroad tracks, and other widespread communication and transportation infrastructures built during the nineteenth century, electrical grids "annihilated space and time," generated a collective respect for science and technology, and made an indelible mark on the material landscape. Thomas P. Hughes opens his landmark history of electric power systems, *Networks of Power: 1880–1930* (2005), with the following statements:

> Of the great construction projects of the last century, none has been more impressive in its technical, economic, and scientific aspects, none has been more influential in its social effects, and none has engaged more thoroughly our constructive instincts and capabilities than the electric power system. A great network of power lines which will forever order the way in which we live is now superimposed on the industrial world. Inventors, engineers, managers, and entrepreneurs have ordered the man-made world with this energy network.[38]

It is presumptuous to say that power lines will order human life "forever," but it is clear that a massive network has been superimposed on our landscape. The initial (and, for some, everlasting) sense of disorder caused by these networks is the subject of the next section.

Wired Wilderness

> *How little do the most wonderful inventions of modern times detain us. They insult nature. Every machine or particular application seems a slight outrage against universal laws. How many fine inventions are there which do not clutter the ground?*
> —Henry David Thoreau, "Paradise (to be) Regained" (1843)

> *A. A violent order is disorder; and*
> *B. A great disorder is an order. These*
> *Two things are one. (Pages of illustrations.)*
> —Wallace Stevens, "Connoisseur of Chaos" (1942)

The process of generating and transmitting the electric power needed to fuel American industry and light American cities was marked by some of the same constraints and disconnects that accompanied the development of other massive systems like the railroad and the telegraph. Although Thoreau loved to listen to the telegraph harp, he was also skeptical about the "clutter" that machines left in the landscape.

To understand the difference between technology and clutter, order and disorder, we turn to *Electrifying America* (1992), where Nye both maps out and debunks the myths surrounding electrification and its effect on average American “consumers, workers, reformers, housewives, and farmers.”[39] Nye argues:

> In daily experience, adopting electricity changed the appearance and multiplied the meanings of the landscapes of life, making possible the street-car suburb, the department store, the amusement park, the assembly-line factory, the electrified home, the modernized farm, and the utopian extension of all of these, the world’s fair.[40]

Nye’s main focus is the sense of “making possible” that the general public embraced. Electrification created widespread opportunities and improved quality of life. Electrifying the nation, however, seemed to be disconnected from the act of putting electric lines into the landscape. To be sure, electricity’s “multiplied meanings” created wonderful, awe-inspiring images. Lights were scattered throughout a new electrified landscape, but that landscape also featured new and pervasive Lines, some of which had been embedded by telegraph and telephone companies earlier in the nineteenth century. During the process of electrification, the Line was subject to disorder, tension, even rupture.

The Line delivered a sublime power to the area around Niagara Falls, but the abundance of wires in more urban locations seemed to reverse the gains made by civilization. For instance, Nye notes that “as the use of electricity multiplied, so did the electric lines, and photographs from 1897 show Muncie’s major streets cluttered by five-tiered electric poles, with a maze of telephone, telegraph, and electric wires overhead.”[41] Nye also refers to the “tangle of wires and poles” erected in New York. In 1888, the New York Board of Electrical Control reported that because of all of the various telegraph and telephone poles differing in height, “the wires upon them form a complete network, rendering the efficient use of the hooks and ladders and life saving apparatus of the fire department almost impossible.”[42] Attempts to create increasingly “complete” networks for communication and power created a wiry Babel that directly threatened to the aesthetic enjoyment of the landscape as well as the effectiveness of the city's emergency-response systems. The dividing line between dangerous clutter and miraculous connectivity is not always clear, but this disconnect comes into sharper focus by juxtaposing Niagara's historic transmission lines with the history of wires in the world's most famously connected island—Manhattan.

In 1910, historian Herbert Newton Casson recalled the challenge facing the first telephone companies in New York. He reported that "wires had swollen from hundreds to thousands. . . . Some streets in the larger cities had become black with wires." The West Side was the site of the greatest mess: ninety-foot poles carrying thirty cross arms and three hundred wires. The problem swept over to the rooftops where wires were often illegally strung so that anyone trying to repair a facade or chimney first had to deal with a mess of wires. Casson explains: "What with sleet and corrosion and the cost of roof repairing and the lack of room for more wires the telephone men were between the devil and the deep sea—between the urgent necessity of burying their wires, and the inexorable fact that they did not know how to do it."[43] The real problem was that the companies did not know how to bury their lines without significant investments of time and money. Yet that may be getting too far ahead. For now, suffice to say, as Casson suggests, the Line made extensive and, forgive the pun, shocking impositions on New York's limited public space.

On August 3, 1876, a rotten telegraph pole on the corner of Suffolk and Grand in the neighborhood referred to as the Lower East Side fell and crushed an Irish immigrant named Ann McGuire. The death and the ensuing trial stoked the public outrage for these unregulated structures.[44] If the pole accident reveals an unintended danger of living in the vicinity of the Line, the trial reflects the unregulated business of wiring in New York. On the one hand, representatives from Western Union and the Manhattan Telegraph Company denied responsibility for this particular pole, suggesting it was not included in maps of their existing systems and they had not been contracted to remove it. On the other, Police Headquarters, the Board of Health, and the Department of Public Works testified that they were unaware of the pole and its potential danger.

Further complicating matters, a person identified as "Officer Judson" testified that he had seen the pole, and believing it a threat, he sent a report to his superior at police headquarters on July 17, almost two weeks before the pole toppled over and crushed Anne McGuire. The jury found that the "parties owning the pole are censurable for allowing a pole in that condition to stand." An owning party could not, however, be identified. Then, the jury "recommended" that poles throughout the city be examined by the authorities to ensure that they were in working order and to have those in bad condition immediately removed. The court recognized that faulty and decrepit lines and wires were a major problem, but it seems that no single company or city agency took responsibility for the accident nor did any group take measures to ensure this kind of tragedy would not reoccur.[45]

In response, the *New York Times* published a ripping satire titled "The Telegraph Forest." Any "intelligent foreigner," the op-ed author observed, will know that the United States is filled with "vast tracts of woodland" that "await the axe of the pioneer." This visitor would be appalled to arrive in America and see that the forest has not yet been cleared in the "principal city of the Union." "All over the city," the article states, "the towering telegraph poles and wiry foliage show that the work of reclaiming the island from its pristine barbarism is far from being complete." In the name of safety and aesthetics, this dense and obstructive forest must be cleared. Unlike other American forests, the telegraph forest offers no shade, its trees bear no fruit, and it is inhabited by "savages" with "sharp spurs implanted on their feet" and "armed with hatches and heavy glass cylinders." [46]

The satire then takes aim at specific parties, the writer claiming that "so rich and powerful a corporation as the Western Union Telegraph Company" would never dream of investing money in telegraph trees. Such an investment would be foolish considering that it could easily place wires underground where they would be safe from harsh weather and vandals. It would be equally absurd to imagine that "the City would permit any corporation" to occupy acres of public real estate in order to "plant ugly and dangerous poles" without paying for this privilege. A corporation would never pay to build such a wasteful thing; the city would never allow it. Although the poles are "certainly not a work of art," they are "ugly enough" to have been designed by a number of leading American architects. The author concludes that the telegraph forest "must be the work of nature." The course of action seems clear: "Let us then, rouse us up our energies and clear the poles away" so as to "challenge the admiration instead of the wondering scorn of the intelligent foreigner."[47]

Neither McGuire's death nor the satirical "Telegraph Forest" editorial effected immediate change. New York's wire problem continued into the 1880s. In June 1884, in an attempt to control and possibly clear the telegraph forest, State Senator Daly, Democrat of New York City, presented lawmakers at the capital in Albany with a plan for the Underground Wire Commission. This commission would uphold a law requiring telegraph, telephone, and electric light companies in cities of more than 500,000 inhabitants to bury their wires. While the law covered the entire state, the specific target was the mess of wires thought to be disfiguring the streets of Gotham. The same month the Daly bill was signed into law, the New York and New Jersey Telephone Company began erecting new poles on Fulton Street in Brooklyn. This meant obstructing and even tearing down awnings in their path. The owner of one broken awning and other persons who owned businesses on Fulton Street confronted the men digging up their sidewalk. A heated argument ensued. A *New York Times* reporter at the scene said that amid the scuffle a man who “looked not unlike a retired prize fighter” barged into the crowd and identified himself as “Prescott L. Watson, Superintendant of the Fire Alarm Telegraph.” Watson claimed the work was legit because it had been supported by the New York City Fire Department. The reporter questioned whether these private employees were actually on the city’s payroll, but the man responded that the Fire Department could contract with any party it pleased. As the Daly bill allowed exceptions for overhead lines used by the Fire Department, construction on Fulton Street moved forward. The reporter was skeptical of Watson’s story and implied to readers that the Daly law had merely resulted in telephone companies forging a “friendly alliance” with “some of the officers of the Fire Department.”[48] When Western Union was ordered to bury some of its hundreds of thousands of miles of wire in Manhattan, it claimed that, when the city used its wires for Fire Department business, it sealed its contract and relieved the company of the responsibility to remove any of its lines.[49]

Later that summer, other New Yorkers charged telegraph and telephone companies with infringing on their rights. On July 31, 1884, the case of H. Clausen and Sons' Brewing Company against the Baltimore and Ohio Telegraph Company was heard in the New York State Supreme Court in lower Manhattan. By September, Judge Van Brunt had made a "sweeping decision," which supported the plaintiff's right to enjoy the space adjoining its building, which was located on Second Avenue between Forty-Seventh and Forty-Eight Streets. The judge said that the poles and wires must not "do injury whatever to the land of the plaintiff in that it does not obstruct the light, air, or access to any portion of the building now erected upon it." Defending the rights of property owners throughout the city, Van Brunt finally declared that, in his opinion, the Daly law must be upheld and the telegraph and telephone companies must bury their lines. In his decision he added, "large cities should be freed from the nuisance of having their streets encumbered and disfigured by numerous poles crowded with wires and cables."[50]

The following year, Senator Daly introduced a supplementary measure to the Underground Wire Law in order to appoint three persons in Manhattan and Brooklyn as wire commissioners. These persons would be paid to review individual cases and decide which wires must be buried, a reasonable timeline for laying them underground, and how to deal with infractions. Daly admitted the logistical hurdle involved in burying the lines: wires for electric power and those serving the telegraph and telephone required separate conduits and tubes. (The utility lines were of a higher voltage, and if placed too close to the telegraph or telephone wires, they would disrupt their transmissions). Daly was confident, however, that burying the lines would save the telephone and telegraph companies on costly repairs. A blizzard in 1881 set Western Union back $100,000—setting lines underground would make its networks more secure. Yet again, the ultimate concern seemed to be the aesthetic blight caused by the wires. Daly observed that only by burying the telegraph, telephone, and electric utility lines could New York have "some chance of becoming a beautiful city as well as commercial metropolis."[51]

The battle between New Yorkers and the companies who built and maintained wire infrastructures dragged into the 1880s and 1890s. In 1886, officers arrested five Western Union workers stringing wires on poles along Third Avenue and One Hundred and Twenty-Ninth Street. The workers, however, were later released, as the laws were unclear about what constituted illegal behavior when it came to wiring.[52] A delicate balance developed, as telegraph, telephone, and utility companies tried to both serve their customers and also ignore the public's desire for fewer wires in the streets. It seems many companies disobeyed the laws requiring lines to be laid underground or stalled the transition to going underground so as not to disrupt business or risk losing profits.

The turning point in this "Battle of the Wire" occurred in 1892, when Mayor Hugh Grant—who was just thirty-one years old when elected in 1889—ordered that "dead telegraph poles" be chopped down and their wires to be removed. Grant marked specific sections of Manhattan for demolition: "Third Avenue, Railroad Avenue and One Hundred and Thirty-ninth, Wooster, West Seventy-third, Park, Centre, Leonard, Bayard, Hester, Broome, Mercer, and Spring Streets, Bowery, Fourth Avenue, and Park Place."[53] At the end of the year, Public Works Commissioner Thomas Gilroy reported that, during 1892, "the Bureau of Incumbrances made 2,918 seizures and removals of street obstructions, and removed from the streets 1,142 cartloads of abandoned material, 705 decayed shade trees, 731 telegraph poles, and 1,194 miles of telegraph wire." [54] The public supported the mayor's clearing of the telegraph forest and crowds gathered to cheer on workers as they chopped down the poles.

Such a transformation could not have been lost on inventors such as Tesla (who was busy working on eliminating the need for wires) or authors such as Henry James. The glut of wires was likely part of the inspiration for the following critiques in James's *The American Scene* (1905–7). After a visit to New York in 1904, James said of the view from the Hudson Bay:

> This appearance of the bold lacing-together, across the waters, of the scattered members of the monstrous organism—lacing as by the ceaseless play of an enormous system of steam-shuttles or electric bobbins (I scarce know what to call them), commensurate in form with their infinite work—does perhaps more than anything else to give the pitch of the vision of energy. One has the sense that the monster grows and grows . . . that the binding stitches must forever fly further and faster and draw harder stronger; the future complexity of the web, all under the sky and over the sea.[55]

This vision was based on viewing the bay and New York's "pin-cushion" skyline but may have also been inflected by the tall telegraph poles and wiry looms streaming up and down the West Side Highway, perpendicular to the ships passing back and forth across the Hudson River. The poles, wires, and foamy wake in the Hudson River comprise a network of visible lines. Together this web on the West Side reflects the bustling chaos and various trajectories seen throughout the city. In a separate passage, he uses another wire metaphor to describe the constraints that New York's social structures set forward:

> Free existence and good manners, in New York, are too much brought down to a bare rigour of marginal relation to the endless electric coil, the monstrous chain that winds round the general neck and body, the general middle and legs, very much as the boa-constrictor winds round the group of the Laocoon.[56]

By making such a bold influence on the way New Yorkers viewed their environment, it is not surprising that the wire infrastructure became a battleground between the general public and a few private companies. The issues at stake included property rights, private services, and the importance of widespread infrastructure. Private companies and even public utilities arranged their cables, poles, and other structures with a mind for efficiency and profit. The Daly law, Van Brunt's decision, and Mayor Grant's actions reflected the public's distaste for "dead" poles and the disfiguration of public space. The Line seemed like more than a regrettable nuisance. One decision said that the authorities must clear the telegraph poles in order to "remedy an evil known to exist in defiance of the will of the people."[57] Some of the same persons who embraced the wonders of electricity pointed to the "evil" wires infringing on public space. Starting in New York in the later part of the nineteenth century, utility poles and other wire structures seemed more damaging to landscape.

In New York, subway tunnel construction seemed to finally solve the wire problem. After effectively burying railways, it seemed logical to require that wires be buried as well. In the other boroughs (most notably Staten Island and Queens) and across the rest of the nation, however, more and more wires began to hang in the public space and obscure views. Between 1902 and 1907, the mileage of telegraph and telephone wires in the United States nearly doubled, and of the fifteen million miles of wire operating in 1907, almost 80 percent of these wires were strung from poles, rooftops, or other overhead structures.[58] Expanding networks for electric lighting and power exacerbated the wire problem in many American cities. Telegraph, telephone, and power companies built their networks with similar-looking wires and sometimes used the same increasingly overburdened poles. A few municipal authorities began to require telegraph, telephone, and utility companies to bury their lines, but in the rural landscape, the Line continued to proliferate.

The Wire Tappers and *Phantom Wires*: Vulnerable Modes and Embedded Codes

> He tested and felt carefully up among the slovenly tangle of wires running out past the overhanging eave. It was a silly and careless way of doing things, he inwardly decided, this lazy stringing of wires from house-top to house-top, instead of keeping them in the tunnels where they belonged. It was not only violating regulations, but it was putting a premium on "lightning-slinging." And he remembered what Frances had once said to him about criminals in a city like New York, how the careless riot of wealth seemed to breed them as any uncleanness breeds bacteria, how, in a way, each was only a natural and inevitable agent, taking advantage of organic waste, seizing on the unguarded and the disorderly.[59]
>
> —Arthur Stringer, *The Wire Tappers*

The tangled web of telegraph, telephone, and electric power wires that hung over urban areas like New York produced at least two unintended effects. First, the expansive infrastructure was unsafe, disorderly, and vulnerable to criminals involved in wire-cutting, wire-splicing, and especially wiretapping. The channels of communication and power on which businesses and the public increasingly relied could be compromised (and sometimes erased). In the scene quoted above, Jim Durkin is literally dropping his wiretapping lines over his building's eave in order to eavesdrop on a powerful commodities broker and uncover insider information about his next move. The information will help Durkin siphon a relatively small sliver of the wealth represented by the Cotton Exchange.

The second unintended effect of a wired America was the spread of electrical metaphors through popular culture and everyday language. Like the nineteenth-century representations discussed in Chapter 2, the Line continued to unite individuals in time and space and allow for relations between individuals and distant groups, cultures, and races; but by the turn of the century, the meanings and possibilities for electricity had evolved. Electrical devices and the Lines that brought them power proliferated through the landscape with greater magnitude and density, and around 1900, wireless devices came onto the American scene. This inspired a general awareness that electric technologies reshaped the processes of thought and construction of self as viewed in the internal landscape of the mind.

Stringer's *The Wire Tappers* and *Phantom Wires* are excellent sources that can teach modern thinkers about wiretapping and the development of a wired and wireless mindset. More specifically, his texts support the three following claims: First, the Line was sometimes signified by the tangle of wires that infested the immediate landscape. Secondly, wiretapping reflected the vulnerability of open markets and communication. Finally, wire metaphors were embedded into definitions of communication and consciousness around the same time as the advent of wireless technologies.

Stringer's tales of action and adventure are often overlooked in discussions of technology, the telegraph, and turn-of-the-century literature. Henry James's *In the Cage* (1898) and Frank Norris's *The Octopus*: *A Story of California* (1901) are the two most commonly referenced "telegraph" texts. Both James's and Norris's novels reflect the tensions between public and private communication and the telegraph's influence on modes of communication and networks of power. *The Wire Tappers* and *Phantom Wires* include the themes of romance, secrecy, and coding (or decoding) that scholars such Paul Gilmore, Sam Halliday, and Richard Menke have found prevalent in James's novella.[60] They also display popular anxieties about the merger of massive transportation and communication networks, corporate greed, and the "tentacles" of capitalism that are prevalent in Norris's work.[61] I hesitate to say that Stringer's texts consistently or successfully blend the themes and talents of James and Norris, but the fact that Stringer foregrounds his works as "Tales of Mystery" alleviates some pressure to make an exact comparison. These three contemporaries, to be sure, addressed different audiences with different literary genres.

The ethical dilemmas that technological and financial systems (as opposed to Jamesian aesthetics or Norris's politics) posed are central to these texts. Stringer's characters are morally ambiguous when compared to the main characters from *In the Cage* or *The Octopus*. Durkin and Frances Candler are intelligent and sensitive. They belong to the working class like many of Norris's heroes and heroines. They are also as cosmopolitan and as dramatic (though not as complex or articulate) as the characters in James's work. Jim and Frank are, nonetheless, criminals. They operate in an underworld filled with gamblers, thieves, spies, and wire tappers. Their technical background and social skills allow Stringer to alternate between chase scenes or action sequences with deep reflections and poetic conversations.

Durkin and Frank display technical, imaginative, and, dare I say, interdisciplinary skills while moving at a relatively fast pace throughout various social circles and communication networks. Alternatively, they often dream about settling down into an optimistic, law-abiding, middle-class existence. For example, in one of Jim's many interior monologues, he loathes the "ever-furtive under-world" into which he has fallen. His is "a life that rested on cynicism, and no man could be a cynic and live. That [Jim] knew."[62] The constant back and forth across this perceived moral abyss—when Jim cuts away a window pane to break into a hotel room, it marks his "transit across some narrow moral divide from lonely ascent to lonely decline"—may feel dramatic or heavy-handed to modern readers. Frances says her partner is "too thin-skinned and introspective . . . too much of a Hamlet" to be an effective criminal.[63] The characterization of a talented worker slipping into the underworld never to get away, however, rouses sympathy and makes the chase scenes, violent showdowns, and last-second escapes seem more substantial than they might be if Jim Durkin were merely a common and uncaring criminal. What concerns us for the moment is the fact that these fictional texts fairly accurately portray the challenges and opportunities facing telegraph operators beyond the cage as well as a closer look at the wiretapping bacteria that clung to the tentacles of the telegraphic octopus.

Stringer's background in journalism and success as a poet supports the lofty language and futuristic "tech gadgets" found in these tales of crime and adventure. After attending the University of Toronto and spending two years studying at Oxford, Stringer worked for the *Montreal Herald* and the Associated Press Association in New York. As a journalist, he published with "eleven different noms de plume."[64] Around 1900, Stringer quit his job at the Associated Press to become a full-time freelancer. He continued to write poetry, publishing the collections *Watchers of the Twilight* in 1894, *Lonely O'Malley* in 1905, and *The Woman in the Rain* in 1907. One poetry review praised Stringer for offering "modern-noted philosophy to his readers" in a "medium that is peculiarly eloquent and Keats-like in its movement." Stringer continued to publish poems (in English and later in Gaelic) even as he turned to fiction. "The Loom of Destiny" was first published as a magazine article about New York City youth, and it inspired his first novel, *The Silver Poppy* (1903). His debut was regarded as "a cleverly written romance of passion" that "brought him prominently into the limelight."[65]

Stringer followed up with tales of crime and adventure based in New York. As a journalist, he knew where and how to get information about the underworld, the American financial system, and security forces. For example, he once wrote to a manufacturer of burglar-proof vaults to learn more about their products—and likely how one might overcome them. Stringer made regular visits to New York's infamous Bellevue Hospital and to the beer halls around the Bowery.[66]

Stringer's imaginative forays into the world of crime were but a small chapter in a long and diverse career. In 1950, the author's obituary in the *New York Times* highlighted his role as a "Shakespearean scholar": Stringer's thesis at Oxford had criticized the anti-Stratfordian theory that Francis Bacon wrote Shakespeare's plays. The obituary also suggests Stringer composed "more than fifty novels, most of them dealing with Canadian wilds; twelve volumes of poetry, a large number of dramatic works and a biography of Rupert Brooke, the British poet. . . . He also wrote the script for scores of motion-picture serials during the period of silent films."[67] It seems Stringer deserved the nickname "Chameleon Arthur" that the film actress and fellow Canadian-born expatriate Mary Pickford (whom Griffith brought to fame) gave him.[68]

The Wire Tappers was Stringer's first crime or mystery story, and its publication "established him as a master in that field."[69] It opens with Jim Durkin—an inspiring electrical inventor who wants to use Tesla currents and selenium cylinders to create a "transmitting camera" (or what today would be called a fax machine). The young man is ready to "do the Edison act in a Third Avenue garret," but he is short on research funds and agrees to aid in a horseracing gambling scam.[70] He is caught, arrested, and blacklisted, meaning he cannot be hired as a legitimate telegraph operator. On being released from a New York City jail, Durkin is offered a job with a notorious wire tapper named McNutt, whose gang also includes Frances Candler, a dashing Englishwoman who goes by the name of "Frank." After spending a few weeks setting up a wiretapping scam, Jim and Frank fall in love and decide to double cross their boss. Their plan fails and McNutt shoots Frank in the arm before he and the rest of the gang scatter to avoid the police.

Jim and Frank separate for a time and, after reuniting in New York, they work together to steal the famous "Blue Pear" from a jeweler in the Diamond District (only to return it to its rightful owner in London for a modest reward). They then run another scam involving a horserace at the Aqueduct racetrack (this time getting inside information from a renowned handicapper named Sunset Bryan). Finally, they latch on to the private lines of a powerful cotton speculator known as the "Cotton King." A climactic showdown with McNutt leads to Jim being shot, and after a quick recovery, the couple sets sail for Europe, saying goodbye to the "Old-World," which they felt was dominated by "the business man's code of morals . . . the test, not of right, but of might, as it flowered in intelligence and craftiness."[71]

The sequel, *Phantom Wires*, opens with Jim, alone and destitute in Monte Carlo. The reader learns that, after leaving New York, Jim and Frances visited various vacation spots across Europe. Durkin had planned to return someday to finish work on his transmitting camera, but under financial constraints, the two were forced to split in Paris. Months later, Jim is sitting in a café overlooking the Mediterranean. On the table in front of him is the "Paris edition of The Herald" (likely the *New York Herald*). The newspaper is opened to an advertisement requesting "Presence of James L. Durkin, electrical expert." The rest of the ad implies that an American company wants to buy the patent rights to his transmitting camera, but Jim must appear in New York "before contracts can be culminated. Urgent."[72] Unfortunately, Durkin has no money to return, and the American consulate will not help him. He aches to "receive the gentle anesthesia" offered by the American dream: "obliterating and absolving years of honest labor."[73] Once again, "honest labor" seems distant from his position in the phantom, surreal networks organized by electricity. Jim's situation is "so Aeschylean in its torturing complications, so ironic in its refinement of cruelty."[74]

The next day Frances unexpectedly appears in Monte Carlo posing as rich and beautiful "Lady Boxspur." He and Frank reunite, and in an attempt to get the money needed to return to New York, they return to a life of scamming, wiretapping, and other criminal behavior. First they break into the hotel room of a Russian spy named Pobloff and rob him of the blueprints that he has stolen from the British military base at Gibraltar. Next they go after Keenan, a New York lawyer on the run from the Federal Bureau of Investigation. Their adventures take them to Genoa, Venice, and Rome, and after each episode they state their desire to find a place to settle down and lead a clean and decent life. Of course, the phantom wires of fate pull them back to Gotham, where they become entangled in a final, deadly conflict with McNutt.

The Underworld of Overhead Wires: Infection and Infiltration

The wiretapping scenes in Stringer's novels seem to blur the lines between fiction and reality. Nonetheless, they effectively expose the vulnerability of all communication networks. Newspaper stories and police reports about wiretapping directly enhanced fears that the Line had "ears." Some unknown person or persons tried to intercept important messages and eavesdrop on private correspondence. Any unguarded wire, which was most wires in the network, and average users were vulnerable to attack. Wiretapping seems like a precursor to computer hacking or identity theft. The public realizes that certain pervasive units of hardware (telegraph key, telephone, laptop) are kept in view while parts of the infrastructure (wires, transformers, routers) are kept in mysterious or undisclosed locations (rooftops, tunnels, basements). Thus, we get the sense that tappers and hackers might be lurking somewhere in the system, thus making the entire Line, and anything sent across it, vulnerable.

While verifiable reports and conspiracy theories about hackers and wiretapping have been reshaped to suit modern technologies and ideologies, the wiretapping schemes in Stringer's novels seem to have been pulled straight from contemporaneous headlines. For example, like McNutt's gang, the most famous wire tappers targeted horse tracks and poolrooms that relied on the telegraph to get racing results. The wire tappers would compromise the line transmitting the winners and then either delay the information or fabricate new winners. Then, the scam artist(s) would visit one or more locations and make a large wager on a horse with the low odds so as to reap a grand payout.[75]

An exposé published in the *National Police Gazette* in 1902 said that criminals in the United States had "systematized the art [of wiretapping] to such [a] basis that they never are arrested, travel from place to place where poolrooms exist, live in the best hotels . . . and do no business other than tap wires."[76] In New York, most wiretapping occurred in and around the illegal gambling halls located in the Tenderloin and Harlem.

In the 1890s, members of one Harlem outfit "took money from a poolroom every day for months before they were detected."[77] In the early twentieth century, most gambling establishments around the country had taken precautions against wiretaps either by prohibiting last-minute wagers or delaying payouts until they could be confirmed through another line.

Wiretapping was complicated business, requiring "not only a thorough knowledge of telegraphy as an operator . . . but that of a lineman as well."[78] The wire tapper's fluency with Morse code and electrician skills are on display throughout Stringer's text. At one point, Durkin climbs onto the roof of a poolroom in Greenwich Village, where he suspects Frank is being held hostage by their nemesis, McNutt. He takes out "a Bunnell sounder, and then a Wheatstone bridge, of the post-office pattern, a coil of KK wire, and pair of lineman's pliers, and a handful or two of other tools."[79] He goes to the "tangle of insulated wires issuing from the roof," then "skillfully relax[es] the metallic cable strands," and "carefully graduate[s] his current and attached his sounder, first to one wire and then to another."[80] Durkin may be engaging in criminal activity, but Stringer sets the stage in such a way that Durkin's wiretapping seems scientific and sexy. Throughout the first half of the twentieth century, American audiences were attracted to the tough, lonesome cowboy with a dead aim as well as the rogue spy or criminal who had the ability to use complicated systems to his advantage.

In general, wire tappers were dangerous because they could wreak havoc on social networks (Stringer sometimes refers to them as "lightning slingers" and "overhead guerillas"). Durkin, however, is presented as a professional. For example, he describes wiretapping as "not unlike the difficult and dangerous operation of a surgeon."[81]

Furthermore, he says that the tapper cuts into the system and tries to leave nothing more than an "incision made by a skilled and artful surgeon."[82] Such metaphors blend nicely with notions of electricity as the lifeblood of commerce and the telegraph and telephone as the nation's circulatory system. Extending the analogues between tapper or surgeon and the Line or body, it seems that Frank and Jim cut into wires and bleed the body electric for the sake of its economic health.

In addition to their technical and professional skills, Jim and Frank use their social skills to gain insider positions in various networks. Jim is versed in classical poetry and the operations of financial markets, while Frances is multilingual and can alter her dress and appearance to suit different situations. Together they pretend to be a wealthy couple and visit gambling dens throughout New York City so that, when the moment is ripe, they can make the rounds and place large bets without arousing any suspicion. Unlike petty thieves or violent criminals, these educated scam artists can operate both in the shadowy syndicates filled with convicts and in the wealthier circles of royalty and millionaires.

The couple frets over what they see as morally deplorable acts like gunplay and burglary, but cheating in the horseracing business is acceptable. That does not mean that Frances is any less appalled by the system surrounding the sport. The more socially aware of the pair, Frances declares to Durkin, "More unhappiness, more wrecked lives and characters, more thieves and criminals, really come from the race-track than from all the other evils in your country." The problem is not "the spectacular way of your idle rich wasting their money." Instead, it is those without proper funds being drawn in by the dream of getting rich after a single race. The masses are infected, she explains, with a "diseased lust for gain without toil."[83] Her concern is for the plight of the poor and desperate, and her criticism of gambling and the pain it can inflict reveals her empathy for those less fortunate. In contrast, her system-oriented partner is not inclined to think in terms of other individuals. Durkin hears her critique and imagines "the four great Circuits, Eastern, Southern, Western, and Pacific slope, of the huge and complicated and mysteriously half-hidden gambling machinery close beside each great centre of American population."[84] The exchange shows how the complexity and sheer massiveness of communication and financial systems (in this case supported by horseracing and the telegraph) leads Stringer's characters to empathize with those who put themselves at risk for the chance of a quick profit and, at the same time, feel overwhelmed by the intricacy of the "half-hidden" machinery of the "great circuits" and the increasingly concentrated riot of wealth.

In Stringer's novels, corruption and complexity are so widespread as to excuse the illegality of the protagonists' behavior. "The criminal," Frances explains, "lay[s] claim to a distinct economic value, enjoining, as he did, continual alertness of attention and cleanliness of commercial method."[85] She also describes Keenan, a disbarred lawyer who finds employment in Penfield's gang, as "a criminal, low and debased enough," but "a criminal of such apparent largeness of mind and such openness of spirit that his very life of crime . . . seemed to take on the dignity of a Nietzsche-like abrogation of all civic and social ties."[86] Even the mastermind Penfield is idolized for his "Napoleonic comprehensiveness," which "stands for something that is active and enduring in our American life."[87] The reader gets a sense that wiretapping and the racetrack are naturally joined within a disorderly and unprotected telegraph system, like bacteria drawn to an unclean body or a weak immune system. The troubling thing, according to Jim and Frances, is that the system is supported by unrelenting greed, and those with power often choose to ignore chronic disease. When McNutt kidnaps Frances, Jim goes to the district attorney and asks him to arrest this well-known gambling boss and wire tapper, but the lawyer says there is nothing to be done:

> "I can only refer you to the decision of the Court of Appeals in the McCord case, and the Appellate Division's reversal of the 'green-goods' conviction of 1900! In other words, sir, there is no law under which a wire tapper can be prosecuted."[88]

Durkin and the authorities seem to expect lying, cheating, and stealing to occur in gambling dens and other sites of ill repute. Resistance to such forces is futile. Yet the dangers and the horrors of wiretapping increase as the activity bleeds into more "respectable" areas of American business.

Tapping the Cotton Market

Similar to other Progressive-era novels such as Norris's *The Pit* (1903) and the silent film it inspired, Griffith's *A Corner in Wheat* (1909), *The Wire Tappers* suggests that the real villains are the telegraph and telephone corporations, a rigged economic system, and the wealthy brokers who manipulate them through financial markets. Midway through the novel, Durkin learns what "every respectable broker" already knows: someone is intercepting the monthly Cotton reports sent from New Orleans to Washington, D.C., in order to control the price of cotton. As the government and its agents are searching for this bigger, seemingly more powerful force, Durkin and Frances decide it is safe to intercept the communication being sent and received by the wire tappers (that is, to tap the lines of the other tappers). Frances goes to the little town of Leeksville (a fitting name place from which to leak the information) and taps the telegraph wires outside her hotel room window. This includes the government line between New Orleans and Washington and the one being used by an anonymous party to tap that line. She forwards the information to Durkin in New York with a coded message so that he can invest in a sure thing and make a quick profit.

The actions of Frances and Jim seem almost noble when compared to the idea that a few individual brokers and members of the government were manipulating the price of cotton and thereby affecting the lives of investors and farmers around the world. In fact, we later learn, one of the major figures in this conspiracy is Samuel Curry, also known as the "Cotton King." Curry is part of the gang getting insider information and using it to generate financial leverage at the New Orleans Exchange and the "Cotton Pit" in New York. In *The Wire Tappers*, Durkin taps the "Machiavellian operator's private wires" and learns that the Cotton King is planning to push the price of cotton exorbitantly high, near twenty cents a bushel, only to burst the bubble and ruin his competitors.[89]

Later in the story, Durkin intercepts a timely message and learns that Curry is ready to crash the cotton market. Durkin goes to a brokerage house in the financial district and invests $13,000 on a "short-order"—that means that Durkin is predicting that the price of cotton will fall. That day, Durkin wrestles his way into the gallery that looks over the Cotton Exchange, and he watches the action in the pit. Curry's men are buying shares of cotton to help lift the price of futures to thirty-year highs: "Eighty five million dollars' worth of cotton bales, on paper were deliriously exchanging hands."[90] When the price of cotton has been adequately overinflated, Curry elbows his way to the center of the crowd and announces his offer to sell at a much lower price. A wave of panic sweeps through the Exchange. Brokers fight one another for the chance to buy and sell at the lower price point, which drives the price of cotton down. The bubble bursts, and the selling frenzy spreads through the telegraph tickers in the corners of the pit to the exchanges around the world. Amid the panic, Curry "ostentatiously drew on his tan colored gloves, and took up his overcoat, as he announced laughingly, that he was out of the market, and that he was off to Florida for a holiday."[91] This sets off another wave of anxiety, and the price of cotton plummets. By the closing bell, the Cotton King has made millions, thousands of investors around the world are ruined, and Durkin slips away with $48,000. Durkin feels a bit guilty, as if "the stain of illegitimacy clung to his methods," but the Cotton King is overwhelming pleased.[92]

Stringer may have based the Cotton King on powerful brokers of the era such as J. P. Morgan (Tesla's part time investor) or Jay Gould.[93] In addition, there was an element of truth to this imaginary scene of wiretapping, wild speculation, and nearly instant collapse of the Cotton Market. On September 29, 1899, a group of wire tappers hacked into the telegraph line transmitting cotton prices from Liverpool to New Orleans. In a few hours the price of cotton futures rose so quickly that it caused "the wildest panic ever witnessed on the floor of the New Orleans Cotton Exchange."[94] Both the historical events of 1899 and Stringer's fictional re-creation support the idea that electronic technologies and the economic institutions they supported were vulnerable and that, in addition to threats posed by thugs and petty thieves, Americans now had to be on the lookout for white-collar criminals who rigged the markets in order to devalue honest investments and thereby ruin innocent lives. (And, of course, we might draw comparisons to recent developments in American finance: the advent of Internet trading platforms, increasingly interconnected markets, Ponzi schemes, and nefarious investment strategies were partially responsible for the 2008 financial collapse.)

According to Stringer's texts, the problems of such a system did not end with the greedy brokers and insider trading. Wire tappers, stockbrokers, and gamblers shared interests with the telegraph corporations as well. In *Phantom Wires*, Durkin is called to fix the electrical system on a yacht anchored off the coast of France. While on board, he overhears a meeting between agents from the Federal Bureau of Investigation, police from Scotland Yard, a U.S. judge, and a Pinkerton. Together, they are investigating the disappearance of Postal Union Telegraph bonds valued at over $100,000 (which Keenan is holding). The fact that these bonds disappeared during a police raid on one of Penfield's poolrooms in New York is regarded as significant because, as the Pinkerton explains, "it both obviously and inferably demonstrates that the telegraph company and the poolrooms are compelled to stand together!"[95] Of course, such conspiracies serve the narrative's purpose as they create a sense of intrigue and help bring the protagonists back, not only to the world of crime but also to the United States. These types of accusations also reflect some of the greatest concerns of this period: corporate corruption and the widespread manipulation of the financial system. These were causes of major distress, both for the United States and the rest of the increasingly interrelated global economy.[96]

In fact, Robert MacDougall's article "The Wire Devils: Pulp Thrillers, the Telephone, and Action at a Distance in the Wiring of a Nation" (2006) provides an original argument (and one of the only ones to address Stringer's fiction in decades) about the subgenre of pulp fiction called "wire thrillers." Wire-thrillers combined elements of mystery, crime, and technology in order to create "metaphors for controversial changes to America's political and economic order."[97] According to

MacDougall, linking the telegraph or telephone to spiders, webs, hydras, and octopi reflected popular fears and fascinations of region and nation-spanning technologies. In addition, "the wire thrillers were primers of a sort, on the operation of the telegraph and telephone, as well as the larger economy of which those devices were a part."[98]

Fictional views of futuristic technologies and warnings about technological control were almost as old as the telegraph itself. Recall that Nathaniel Hawthorne's character in *The House of Seven Gables* refers to the telegraph as "an excellent thing; that is of course, if the speculators in cotton and politics don't get possession of it."[99] They did indeed. Sleek businessman and gamblers learned how to intercept messages shortly after Morse released his invention. As corporate power took a firmer grip on the American economy around the turn of the century, skeptics became convinced that stock and commodities exchanges, major media corporations, and wire hackers worked together to lie, cheat, and steal for the sake of power and profit. As MacDougall successfully argues, "web" imagery both enhanced and calmed such anxieties and conspiracy theories.

Before discussing how these new networks and infrastructures were embedded into the American mind, I would like to touch on MacDougall's reading of the scene precluding Curry's run on the cotton market. Stringer's passage reads:

> Timid clerks and messenger boys and widows, even, were pouring their pennies and dollars into the narrowing trench which separated them from twenty cent cotton and fortune. . . . Even warier spirits, suburban toilers, sober-minded mechanics, humble store-traders, who had long regarded [the stock exchange] as a very Golgotha of extortion and disaster, had been tainted with the mysterious psychologic infection, which had raced from city to town and from town to hamlet.[100]

MacDougall offers the following interpretation:

> From city to town and from town to hamlet—this is the vision of action at a distance that haunted Gilded Age Americans. The wires are only the means of infection. The deeper fear is a collapse of section and of space, and the corrosive impact of the national corporate economy on the autonomy and morality of America's hometowns.[101]

While the material infrastructure had major political and economic effects, electrification also influenced the perception of space and landscape. Having acknowledged the overwhelmingly negative response to the glut of wires in urban areas, it seems limiting to say that the wires are only the means of infection. They wires, however, were its most visible sign. In the streets of New York, wires infested space and threatened to disfigure the landscape. The public's hatred of "unclean" wire systems stoked their fears about social and economic disintegration. The Line was another reminder of the anarchy or "wildness" inherent in free-market capitalism that could destroy the finances of millions around the world in a just a few days, hours, or minutes of trading.

The average telegraph or telephone user did not have the technical skills required either to plant an infection or understand the technical requirements for tapping a wire or hacking into a network, but hearing or reading about such crimes created an eerie sensation that, somewhere, somehow, any line or wire might be compromised. The fear of an invisible infection lurking within the Line was often transferred to image of the Line or metaphors about the monstrous network (such as spider webs or octopi). These metaphors were, in turn, used as political tools. Sensational new stories and pulp fiction suggested that the Line could be invasive, dangerous, and irritating.

The political function of the web (which is MacDougall's concern) cannot be overlooked. The information delivered through the webs and lines was a cause for more concern than the actual poles and wires cluttering the environment. The public initially embraced this flow of information that gave Americans of more regions, ages, races, and genders the opportunity to invest in financial markets. Nye explains that the late-nineteenth-century development of "national social and economic order" was contingent on "instantaneous communication of the telegraph and telephone, which linked newspapers, advertisers, business, and government."[102] In addition, as MacDougall suggests, this sense of free and ordered information soon turned to fear and anxiety that unruly forces could cause a sudden widespread collapse. New reports and stock quotes could suddenly improve the fortunes of individuals spread out across the world. The same channels that brought instant profits could also be tapped and manipulated. Wiretapping and other half-hidden activities did in fact threaten local and regional economies as well as the morality and autonomy of American hometowns.

The political causes and effects of the telecommunications are certainly important, but I suggest we might set them aside for a moment and try to understand how these conflicts encouraged different feelings and thoughts about the Line: How did the perception of the wires, poles, and other materials in the landscape shape political and cultural debates? Acknowledging MacDougall's argument about the political and economic repercussions of such a system, we can answer this question by locating the mental and emotional effects of creating the wired and later wireless networks. The Line not only threatened the morality and autonomy of the village, but also individual consciousness.

The Utility of Narrative Grids

It seems clear that the Line—a means of transmitting power and information—inspired metaphors of connection and entrapment. Again, most scholars of technology focus on the connective qualities and their political implications. For example, Nye says that "electrical lines created a permanent link between a producer and a consumer [that] . . . opened up so many new possibilities."[103] The potential displayed by technology inspired common metaphors about "connection and integration" as "new electric terms that permeated common speech . . . an effective organizer was 'plugged in' to a 'network.'"[104] Those who primarily profited from such analogies were the owners and producers of electricity and electric technologies. Spokespersons focused on the unifying aspects of the Line. They produced a narrative filled with utopian visions of instant information, embodied presence, and global synchronicity.

As we know, the meaning generated by electric technologies and their connecting Lines flowed in both directions. The Line was an ambiguous symbol of power and possible entrapment. Americans worried about the secret webs controlled by greedy corporate monopolies. They also worried that new technologies opened the door to immoral activities such as eavesdropping, gambling, and telephone (even telegraph) sex. Stringer, like other popular writers, capitalized on both turns of the electrical metaphor. The wires in his stories signify the dangers of being trapped by—and in—a system too massive and unruly to be understood by the average user or held accountable by elected officials. At the same time, the wires reflect the possibilities for affective, cultural, and economic bonds. During a long-distance phone conversation, Jim seems to "feel the intimate warmth of [Frank's] arms across the million-people cities that separated them; and he projected himself, in fancy, to the heart of the far-off turbulence where she stood."[105] The physical wires keep them connected and facilitate the exchange of emotions between senders and receivers. In this case, the wires are part of a technology that facilitates the transmission of affect.

In contrast to these physical grids, metaphorical and "phantom" wires provide an overarching metaphor for the entire story. When Jim realizes that Keenan is one of Penfield's operatives, he is eager to catch him. Frank warns him that any contact with Keenan (even in Europe) will only bring them closer to McNutt.[106] Jim is defiant. They are thousands of miles from New York, and Penfield has no reason to be connected to McNutt in New York (recall that McNutt tried to cheat Penfield in the first story). Frances persists: "We thought we were safe, just because the world was big and wide; because we had made our escape to Europe we thought that we were out of his circuit, that we were beyond [McNutt's] key-call."[107] They follow Keenan and, predictably, find themselves back in New York where McNutt (who is working with Penfield and giving orders to Keenan) is waiting with a trap. The implication is that "ghostly wires" bind them to an invisible circuitry that spans time and space.

While earlier writers, artists, and filmmakers used wires to create affective bonds and suggest the possibility of social and economic collapse, Stringer's stories seem unique in that his characters move beyond the wire as bond and as trap and begin to see themselves as embedded in wireless networks.

There Is No "Wireless" Without the "Wire"

In *The Wire-Tappers*, wires envelop Jim and Frances. As tappers, they navigate and manipulate the lines in New York's unruly infrastructure. They find vulnerable places in the system and cut, splice, and tap the lines that dominate their environment. For instance, Durkin's most incredible and possibly dangerous electrical feat involves tapping a power line to charge a drill, which he then uses to cut through a jeweler's safe.

Jim explains to Frances that the "little condensed Niagara of power" behind the building is "asking to be taken off and made use of!"[108] Just as the corporations were able to settle the Niagara power frontier, Jim seems compelled to "capture and tame and control that power . . . make it [his] slave and carry it along with [him] almost in [his] pocket, on a mere thread of copper."[109] Jim is able to enslave electric power and siphon information, but in the end, his skillful steering and precise tapping catches up with him. Along with Frances, Jim feels fatigued by his time in that half-hidden machinery of wires. They no longer feel safe living so deep in the grid, and they think the only way is fleeing "the Old World."

In the final scene of *The Wire Tappers*, as the couple is sailing away from New York, Jim says, "You know how I feel? I feel as if we were two ghosts, being transported into another life! I feel exactly as if you and I were disembodied spirits, traveling out through lonely space, to find a new star!" He then calls out "Good-bye, Old World!" with "challenging finality."[110] Jim thinks that by leaving New York, he can escape the messy infrastructures of experience and technology. In addition to separating from the past, he feels like he is separating from his body and all material constraints. His claim about leaving the old world and "travelling out through lonely space" should also be seen in the context of exploration in the Western hemisphere. For centuries, individuals left Europe for the "New World," an uncharted space that eventually became the United States. Now, at the beginning of the twentieth century, Durkin is disembarking from the new-world-turned-old to explore outer space, a region that is now popularly referred to as "the final frontier." Frances takes a more realistic view of the departure and "disembodied" existence. In the novel's final sentence, when she looks at the skyline of New York and calls "goodbye," it "was not a challenge. It was a prayer."[111]

The couple does not fully escape, become ghosts, or find a new star, as suggested by the title of the sequel, *Phantom Wires*. In the opening chapters, Jim recalls how, after leaving New York and arriving in Europe, the young couple attempted to "drug their first rising doubts with the tumult of incessant travel and change."[112] He then remembers a conversation that occurred in the resort town of Karlsbad (in the modern day Czech Republic). Amid an international gathering of "undecipherable strangers," Jim felt that he and his wife could finally relax and be alone. He had then explained to his wife, "Our wires are down, for a little while anyway."[113] Frances was silent at first, but then explained her theory of phantom wires:

> There are always some sort of ghostly wires connecting us with one another, holding us in touch with what we have been and done, with our past, and with our ancestors, with all our forsaken sins and misdoings. . . . There are always sounds and hints, little broken messages and whispers creeping in to us along those hidden circuits. We call them Institutions, and sometime we speak of them as Character, and sometimes as Heredity, and weakness of will—but they are there, just the same![114]

The ethereal, phantom wires threaten notions of linearity and personal agency. They allow the past to "haunt" the present. Seemingly stable institutions such as character and heredity have an electric quality that means they can be affected through "hidden circuits." This implies that humans, throughout time, are embedded within a sublime and complex machinery that entwines "Character" (or modern culture) and "Heredity" (or evolution). No single human can escape the infrastructure created by genetics, nor can sophisticated citizens like Frances and Jim escape the social networks and webs of communication supported by electricity. Phantom wires tether everyone throughout space and time in one vast, transcendent grid.

The idea of a phantom or invisible network underlying a physical, material network can be traced back to the mid-nineteenth century, when seers and pseudoscientists began to suggest the existence of a "spiritual telegraph." Such a basic idea persisted into the late nineteenth century and has often been associated with Mark Twain's famous explanation of "Mental Telegraphy."[115] The exciting thing about Stringer's texts is that, having been published in 1906 and 1907, they straddle the historical (and metaphysical) divide between "wired" and "wireless" communication and follow on the resurgence of paranormal investigations during the 1890s. One representative example is the Society for Psychical Research, which was formed in 1885 and of which William James was a prominent member.

James might have seen the similarities between his findings and these fictions. Midway through *Phantom Wires*, Jim feels "how like a half-articulate key, and the end of an impoverished circuit, consciousness really was . . . language, and language the most artful and finished, was after all, merely a sort of clumsy Morse."[116] In this case, consciousness is limited and impoverished by its wire circuits. It is a "clumsy Morse." Thoughts are not as clear as the dots and dashes that burst from the telegraph key—Durkin is better able to decode Morse than cipher his own thoughts. Yet, based on our earlier discussion of James, Tesla, and automatism, it seems clear that consciousness is not binary. Our neurons do not carry messages as simple as yes or no or as ones and zeroes. Durkin's metaphor, while not exactly accurate, is astonishing because of its historical context. In an age before computers, digital television, or the Internet, individuals were already thinking of how thoughts were delivered through seemingly instant, malleable codes. These limits of consciousness reflect Durkin's relative state of mind. In the latter part of this scene, his view of consciousness develops, and “phantom” wires are suffused with metaphors involving wireless technologies.

While James and other thinkers described consciousness in terms of wired devices, Stringer seems to have been one of the first to use “wireless” technologies to describe a metaphysical approach to self and communication. By the end of the second novel, Durkin sees the power and complexity of wireless technologies and their relationship to consciousness. The context for this revelation is as follows: After the couple returns to New York, Frances is kidnapped by McNutt. Durkin, unable to solicit help from the authorities, breaks into Penfield’s poolroom in Greenwich Village. He finds himself on one of the top floors in complete darkness. He does not know that Frances is being held in that room, gagged and tied to a chair. McNutt has placed her in an alcove that looks out over the empty space. Along one wall is a copper rail carrying what McNutt boasts is “2800 volts of alternatin’ current.”[117] According to McNutt’s plan, Durkin will break into the room and touch the charged rail, electrocuting himself and bringing the room alive with the blue sparks. Frances will sit above and watch, the lovers sharing one last, agonizing look at one another as they fall victim to the powerful and mysterious force that they had tapped, enslaved, and shared. Although Jim is standing in complete darkness without the aid of sight (or tools like a lantern flashlight) or of sound, he is suddenly compelled to stop. He considers the situation in the following terms:

> He had felt that call of Soul to Soul across space along channels less tangible than Hertzian waves themselves, yet bearing its broken message, which later events had authenticated and still later cross-questioning had doubly verified. He had felt, at such moments, that there were ghostly and phantasmal wires connecting mind with mind; that across these telepathic wires one anxious spirit could in some way hold dim converse with the other; that the Soul itself had its elusive wireless and forever carried and gave out and received its countless messages—if only the fellow Soul had

> learned to await the signal and disentangle the dark and runic Code. Yes he told himself as he stood there thoughtfully as though bound to the spot by some Power not himself. Yes consciousness was like that little glass tube which electricians called a coherer and all his vague impressions and mental gropings were those disorderly minute fragments of nickel and silver which only leaped into continuity and order under the shock and impact of those fleet and foreign electric waves which floated from some sister consciousness aching with its undelivered messages.[118]

These four long sentences reflect the final stage in Durkin's character development, his views of consciousness, and the evolution of electrical metaphors in Stringer's texts. Recall that, in the beginning, this electrician or operator found ways to tap and navigate the complex mess of wires that comprised the bundles streaming throughout Manhattan and into the outer boroughs. He then attempted to leave and go "off the grid," only to learn that phantom wires attach the features of the past (genetic material, actions, traditions) with the present. These phantom wires maintain Frances and Jim's connection with the "Old World" and draw them back to the underworld. The ghostly grid is not all bad. Phantom wires also allow spirits to "hold dim converse" across space and time. The messages that are received by consciousness can then be verified with further questioning (that is, through scientific investigation).

The major change appears as Durkin reexamines the operations of the consciousness and realizes that he is "bound to the spot by some Power not himself." Previously, he considered consciousness in terms of language and its "clumsy Morse." Now, he sees consciousness as informed by vague, elusive, fleet, and foreign waves. Consciousness is like a coherer, a device comprised of small metallic fragments that are directed by invisible waves. Consciousness is not part of a grid composed of phantom wires, though one could argue it is composed of our neuronal wires. This wireless network is supported by each individual with consciousness.[119] Consciousness occurs, not just in the currents that flow through the wires but by Hertzian waves that radiate through space. Moreover, consciousness has come into an intimate (albeit circular) relationship with the vague "Power" that held him in place and kept him from falling into McNutt's trap.

The concept of phantom wires that transmit hidden messages, remember behaviors, and store genetic information is contingent on a general understanding of wires: these objects are made of metals and transfer electricity. In other words, the fact that physical wires create communication networks helps support the idea of a phantom wire and, by extension, the idea of an omniscient wireless network. Such a concept was new, but relevant to the time. Tesla first introduced wireless technologies in the 1890s, and by 1907, Marconi's wireless devices were being reproduced throughout the world. Stringer's novels thus mark an important transition from wired to wireless. The grids and lines that had previously guided and framed the landscape were beginning to disappear. The power sources for home telephones, street lighting, and factory areas could still be seen rolling through the landscape. Basing a metaphysical belief or electrical metaphor on a wireless system does not offer the same tangible tenor, concrete association, or visible infrastructure. In the decades after Stringer, modernists took advantage of the possibilities offered by thinking in terms of wireless networks, universal waves, and certain frequencies (which today we might call "service areas"). The boundaries of these waves and fields are not marked by the physical wire in the landscape but by an invisible map showing where one can hope to pick up a signal.

Griffith: Crosscutting, Wire-cutting, and the Terrors of Technology

If Stringer's novels mark a general transition from wired to wireless metaphors in popular culture, then Griffith's films mark the development of the telegraph line as an icon of the past and especially the age marked by the "Old West." By 1909, the pace of telegraphic development in the United States had slowed, and AT&T's temporary takeover of Western Union spelled the demise of the telegraph and rise of the telephone. Just as the loss of the frontier initiated an age in which the frontier myth became the focus of the Western genre, so the phasing out of the telegraph enhanced its symbolic importance: to look at the telegraph, especially an uncured wooden pole holding a single wire, was to look into the past and see a tool that transformed the frontier and tamed the West. In this section, I examine the role of the telegraph and telegraph lines in Griffith's *The Lonedale Operator* and *The Girl and Her Trust*.

We shall come to Griffith's texts via a more recent prose poem. Sometime in the late 1940s, John Ashbery went to a screening of Griffith's black-and-white films at the Museum of Modern Art in New York. In the 1980s, Ashbery reflected on the experience in a prose poem titled "The Lonedale Operator." He first explains what it was like to go to the theater and see *The Three Little Pigs* and *Alice in Wonderland*. Then, he recalls being in his twenties and seeing Griffith's films. Finally, he suggests that act of remembering Griffith's films years later has induced different types of terror. Ashbery correctly recalls that in *The Lonedale Operator*, Blanche Sweet plays a heroic female telegraph operator, but then his recollection gets eerily fuzzy. He remembers Blanche Sweet alerting the "police" to foil "gangsters," when what actually happens is that the operator contacts the next depot about two intruders. In the next line, Ashbery admits he might have it all wrong: "though I also see this living room—small though it was supposed to be in a large house—with Mary Pickford running around, and this may have been a scene in *The Lonely Villa*"—which, it turns out, is an accurate memory. The poet continues:

> At that moment the memories stop, and terror, or tedium, sets in. It's hard to tell which is which in this memory, because the boredom of living in a lonely place or having a lonely job, and even of being so far in the past and having to wear those funny uncomfortable clothes and hairstyles is terrifying, more so than the intentional scariness of the plot, the criminals, whoever they were.
>
> Imagine that innocence (Lillian Harvey) encounters romance (Willy Fritsch) in the home of experience (Albert Basserman). From there it is only a step to terror, under the dripping boughs outside. Anything can change as fast as it wants to, and in doing so may pass through a more or less terrible phase, but true terror is in the swiftness of changing, forward or backward, slipping always just beyond our control.[120]

For Ashbery, the quaint, "intentional scariness" of Griffith's plot is overshadowed by the terrifying idea of the past—lonely, boring, and uncomfortable—and the even more terrifying entropy of the present—swift, terrible, and slippery. Not being able to remember correctly induces "true terror," the realization that "anything can change as fast as it wants to" and thus clothes styles, acting roles, popular technologies, even the idea of change is "slipping always just beyond our control." Griffith's films can indeed remind modern viewers of the terrifying swiftness of change; American cinema has come a long way since these short, silent black-and-white movies. It is important, however, to study films like *The Lonedale Operator* (and the less famous remake, *The Girl and Her Trust*) to understand how much has changed in American cinema in a hundred years, and because, somewhat more surprisingly, they reveal common threads in the ways Americans approach technology and the ways filmmakers create tension.

In this section, I argue that watching the operations of communication technologies on the big screen helped Griffith's audience understand the editing technique he developed and which is now referred to as crosscutting. In these two films, the ability to connect two seemingly disjointed scenes is reinforced by showing characters tapping on telegraph keys. The telegraph poles and wires that span through the diagetic landscape also add to this sense of simultaneity. The Line reflects cohesive action, social bonds, and affective connections, but the audience sees criminals cut the wires, and all those ties are suddenly erased. Wire cutting is a relatively small act, but it embodies the terrifying change of social order, which is central to the Western genre. Images of the Line in the landscape and the act of wire cutting have since become Western conventions. They reflect an impending arrival of "civilization," the corresponding loss of the frontier, and the ability for a seemingly settled, pastoral landscape to suddenly regress into a savage wilderness.

The Telegraph Key, Telegraph Line, and Crosscutting Techniques

Griffith began making films for Biograph Studios in 1908, and over the next five years he produced close to four hundred and fifty films and achieved a successful balance between spectacle and storytelling. He was soon the most famous (and then the most controversial) director in the United States. During his developmental stage, Griffith learned quickly and on the fly, sometimes churning out two or three one-reel films in a single week. Film critics such as Arthur Knight point to Griffith's Biograph years and claim that he was responsible for the invention of film language and a visual syntax. Griffith took film editing "from the crude assembly of unrelated shots into a conscious, artistic device."[121] The debate about the first filmmaker and the first film to "invent" parallel editing still continues, but it seems clear that Griffith had the keen eye of a cameraman, the skills of a director, and a creative disposition for editing.

The Lonedale Operator and *The Girl and Her Trust* have a similar setting and storyline. Both operators sit at their respective desks and receive telegraph messages about large sums of cash that are schedule to arrive on the next train. Griffith's audience would have realized that telegraph stations and telegraph lines brought distant peoples and places into what seemed like a single, worldwide network. This process had begun back in 1844, so by the 1910s, we might assume that, when a character is seen tapping on a telegraph key, that character is likely linked to peoples, places, and events in other towns, cities, or continents.

The telegraph messages the ladies receive—"The City Office of the Lonedale Mining Company Expressing the Money for the Payroll" and "National Bank sending $2000 on No. 7 for Simpson Construction Co."—foreshadow the robberies and suggest the operators are connected (someone else at the other end is sending her the information). After the operators come under attack, Griffith uses crosscuts to flash back and forth between the female operators and their male counterparts at distant locations. The telegraph, a technology that collapses time and space, suggests a certain synchronicity between events and characters. By portraying telegraphic communication in the first part of the film, Griffith creates a sense of correspondence throughout the entire text.

The attributes of the telegraph translated nicely to the art of film. Like the telegraph, a filmmaker could speed up time and also "jump" from one setting and place to another. Thus, showing characters engaging technologies like the telegraph made it easier for the audience to follow the narrative and connect different elements like a damsel in distress and the rescuer. Actions taking place in different locations happened at the same time. The film scholar Tom Gunning makes a similar argument concerning the telephone conversations in Griffith's 1908 film *The Lonely Villa* (the same film that Ashbery confuses with *The Lonedale Operator*). In this earlier film, the characters use a telephone to send and receive messages between seemingly distant locations, but only before the lines are cut. For Gunning, Griffith used the telephone and the telegraph as ways to "support and interrelate with new narrative devices such as parallel editing." Adapting communication technologies into the narrative helped Griffith and other filmmakers to "naturalize film's power to move through space and time."[122] Showing a character tapping on a telegraph key or speaking into a telephone created the illusion that the people on either end of the line, and their actions, were connected in "real time."

Watching characters send and receive messages through telegraph keys and telephones helped the public connect a sequence of visual images into a coherent narrative. As I have already suggested, these connections were reinforced by the site of the Line in the relatively vacant and undeveloped landscape. For years, Western studies have focused on iconography like horses, guns, railroads, hats, and coffee. Yet Western scholars often overlook the meaning transmitted by poles and electric lines. These props provide a visual reminder of the connection between the frontier and civilization. In these two films, the technology at the center of the narrative also lines the margins of the landscape, thus reinforcing the sense that the characters, even when they are apart, remain within the same grid.

It seems likely that Griffith made an effort to put the telegraph wires in the background of his shots, but he may have not been given the choice. Richard Schickel proposes that three years after making *The Lonely Villa*, Griffith's return to the chase film with *The Lonedale Operator* was inspired by a recognition of "the open spaces available to [Griffith] on the West Coast . . . for sweeping cinematic gestures that were denied him in the more cramped spaces of the East."[123] One result of such "sweeping cinematic gestures" is that, more often than not, the background of the shot is framed by telegraph poles, which frame and control the perception of this "former" landscape.

In fact, most early films involving the railroad have telegraph poles streaming by at common intervals. The Line in early motion pictures provided a visual rhythm for more rugged terrains. *From Leadville to Aspen: A Hold-Up in the Rockies* (1906) places the viewer at the front of an engine that is traveling through the Rockies (actually upstate New York) when robbers ride up in a handcar and rob the train. The telegraph wires were not a major part of the narrative or an exciting visual cue like puffs of smoke or gyrating crank shafts, but as the telegraph industry was so closely linked with the railroad, poles and wires provided a recognizable image in an otherwise unfamiliar landscape. The telegraph is visually and economically parallel to the railroad. While the railroad remained central to national commerce well into the twentieth century, the telegraph took on a distinct role in the development of a Western setting.

The Line, as it is displayed in most Westerns, is not an eyesore or a nuisance. It more of a seamless part of the landscape and provides a visual reminder of the connections between the frontier and more established stations and locations like Chicago, St. Louis, Kansas City, Santé Fe, or Denver. The lines also unite the characters. In the second shot of *The Lonedale Operator*, Blanche Sweet, who has been introduced as "the operator's daughter" emerges from screen left with a magazine cradled in her arm. Across the railroad tracks, screen right, a row of telegraph poles connected by two parallel wires repeats into the distance. A young boy rides his bicycle through the foreground as a horse-drawn wagon passes through the background. The wagon's movement momentarily draws attention away from Blanche Sweet to the row of telegraph poles. Her sweetheart, the engineer, enters from the right side, and the two exchange pleasantries (Fig.19). He begins teasing her and seems to want a kiss, which she refuses. During this first, flirtatious meeting, the railroad tracks and telegraph lines extend from the couple to the back of the frame, hinting at the fact that he will control the railroad, she the telegraph, and the two systems, like the two lovers, will remain close throughout.

The telegraph lines in *The Girl and Her Trust* (1912) imply an even stronger emotional connection. In fact, as this is the third film in which wires connect and disrupt lovers, we might assume that Griffith was conscious of the Line's symbolism. The girl is Grace (Dorothy Bernard), a telegraph operator. Jack (Wilfred Lucas) is an agent for Railway Express. As two tramps try to break down the door to the telegraph office, Grace sends a frantic S.O.S. As soon as the second operator decodes the message, he sends for reinforcements. Griffith then cuts to Jack. While Jack does not get the message directly, it seems that he receives the call for help through other channels. A shot of Grace tapping frantically at the key is followed by a shot of Jack standing in a field filled with telegraph poles. Jack then walks into his house beyond the poles (Fig. 20).

A few shots later, Jack emerges, wiping his hands on a handkerchief, which implies that he has just eaten lunch. Again, upon his exit, we see the poles in the background, reminding the audiences that at the same moment that Grace is sending her call for help through the real telegraph, she and Jack can are communicating to one another through an affective, phantomlike, primal network. Without a telegraph key at his hand, he is still able to get the message. This kind of telepathy is confirmed during his walk back to work when Jack sees Grace under attack and he leaps into action.

The Telegraph Operator and *The Girl and Her Trust* show telegraph wires and poles in the background as the young heroine meets her hero. Presumably, those same telegraph lines carry the cry for help sent from inside the telegraph office. After that call is received and the hero comes racing to the rescue, we see wires bobbing up and down in the background alongside the train tracks, reminding viewers that help is not only on the way but that the rescuer is traveling on a direct path. The couples may seem dangerously far apart, but the sight of the line assures the viewer that it is only a matter of time before the connection will be restored.

The Terror Inherent in the Line

The telegraph was a tool of correspondence and connection, but as telegraph companies like Western Union and railroads like Union Pacific expanded across the United States, telegraph operators and station agents were often forced to work alone in relatively distant and untamed environments. The solitary and vulnerable operator or railroad agent became a key figure in the Western genre. For example, the first shot of the 1903 film *The Great Train Robbery* shows two robbers "entering a telegraph office."[124] They beat the telegrapher and tie him up with ropes. Likewise, in the first scene in Sergio Leone's *Once Upon a Time in the West* (1968), the character played by Jack Elam enters a railroad station, pushes the telegraph operator into a closet, and then rips the wires out of a noisy telegraph ticker.

More recently, the telegraph was featured in David Milch's *Deadwood*. The second season, "A Lie Agreed Upon, Part 1" (2005) opens with Al Swearengen and his sidekick Dan standing on the porch at the Gem Saloon. They look on as a group of workers raise telegraph poles in the distance. Al laments, "Messages from invisible sources . . . or what some people think of as progress." Dan says he thinks the telegraph is a fine idea; it is simply a faster way of sending letters. Al then asks Dan about the last time he received a letter, and Dan sullenly replies, "Bad news about Pa." Of course, bad news! Al sarcastically spits: "So by all means, let's plant poles all across the country. . . . Festoon the cocksucker with wires to hurry the sorry word and blinker our judgments of motive. Ain't the state of things cloudy enough? Don't we face enough fuckin' imponderables?" Dan thinks for a moment, then replies, "Well, by god, Al, you give the word and dem poles'll be kindling."[125]

Most Americans did not share Al's sentiments about the telegraph, but the first scenes of *The Lonedale Operator* and *The Girl and Her Trust* do uphold the character types: the operators are weak, isolated, and vulnerable. First, the audience sees male characters doting over the single, white females. Before leaving, the head operator at Lonedale offers his daughter a tiny pistol. She politely refuses. Similarly, Jack seems eager to give Grace his gun (Figure 19 shows him loading it, to her annoyance, right in front of her face: this act is followed by the phallic poles that carry her cry for help. Together, these moments seem ripe further Freudian analysis). When Jack tries to hand his gun to Grace, she scoffs: "Danger? Nothing ever happens here!" Predictably, as soon as Jack leaves, she senses the two tramps leering at her through the window, and she flitters about the office in a state of total panic. The girl in the Lonedale office reacts similarly, even fainting under duress.

While initially overcome with terror, these female operators quickly recover their wits and devise methods for protecting the payroll and holding their attackers at bay. In fact, besides Annie Oakley's sharpshooting performance that was recorded at Thomas Edison's studio in 1894, the operator's daughter (who signs her telegrams M. D.) seems to be the first heroine to star in a Western. As the bandits are about to break down the door, she turns off the lights and holds a monkey wrench in such a way as to make it look like a gun. The bandits burst inside, and they are fooled by the wrench and keep their hands up until the men with real guns arrive. Finally, M. D. reveals her trick. The close-up shot of the wrench is unique to this film, and some film historians have suggested that it marks a groundbreaking moment in American cinema. After realizing the trick, everyone laughs at the bandits' ignorance. The bandits take off their hats and bow to M. D. to suggest that she has won. The bad men are taken away and the railroad engineer kisses the gushing operator—The End.

Grace seems even more determined to defend her trust. When the two bandits try to break down her door, she puts a bullet in the keyhole and fires it by hitting the primer with the tip of some scissors. (This provides another important close-up from Griffith's early career.) After the tramps run away with the safe containing the cash, she "risks her life for her Trust," by chasing after them, which leads to her being beaten, kidnapped, and finally saved by Jack.

Both operators defend themselves with improvised tools, but the telegraph is their most powerful weapon. When M. D. sees the bandits, she locks the door, lurches for the telegraph key, and begins tapping frantically. The operator at the receiving station is asleep, but when he wakes up, he decodes the message: "Thieves breaking in Lonedale Station. Am Alone. Send help quick." Grace responds in a similar manner, although her message is shorter and thus a bit more terrifying: "help . . . tramps . . . quick."

In each case, the image of the operator frantically tapping the key is infused with the threat of violence. Even after the messages are received and the heroes are on their way to the station, tension lingers because we can see the bandits trying to break down the door. In addition, the women do not know if their calls were received or if help is on the way. *The Girl and Her Trust* increases the tension by showing the bandits cutting the telegraph wire that extends from the Grace's office. In fact, this sequence occurs just before Grace's message is finally decoded and Griffith flashes to Jack standing in the field of telegraph poles (where he receives her "wireless" call for help). Here is a brief synopsis:

> -Grace sends out a call for help. **Shot 13.**
>
> -Second operator begins receiving Grace's message. **Shot 14**
>
> -Bandits standing outside the door seem to hear Grace tapping on the telegraph key. One gestures to the other, who leaves the room. **Shot 15**
>
> -Return to Grace in the office, who is again tapping at the key. **Shot 16**
>
> -Bandits at the window, starting to cut the telegraph wire. **Shot 17**
>
> - Grace in the office, holding her hands as if praying that her S.O.S. is received. She then looks out the window where the bandit is cutting the wire. **Shot 18**
>
> -The bandit at the window finishes cutting the wire and folds up his knife. **Shot 19**
>
> -Back to Grace who seems to mouth, "Damn it! Damn it!" as she clutches her hands. **Shot 20**

-Operator finishes decoding message and rushes to get help. **Shot 21**

-Shot of Jack standing in front of the poles. **Shot 22**

This is one of the original wire-cutting sequences captured on film. Wire-cutting quickly became a convention in twentieth-century horror movies: a scared, lonely protagonist makes a call for help, only to hear the line go "dead." Cutting wires enhances the threat of physical violence and uncovers our deep-rooted fears that, at the worst possible moment, technology will fail. Griffith was one of the first filmmakers to tap into this collective dread, but certainly not the last. American audiences have regularly flocked to see the latest trains, cars, guns, and tech gadgets on display, which means they expect to see trains jump the tracks, cars crash, guns backfire, machines jam, and wires get cut. Showing a new technology may produce awe, but watching a familiar technology break down or fail produces excitement, tension, and a sense of danger.

Griffith's heroines are at the mercy of the Line: it keeps them in touch with the rest of society and therefore ensures a certain level of safety. When that Line is cut, they find themselves in a wilderness in which the "half-hidden" dangers are suddenly brought into full view. Of course, in Griffith's films, the failure of technology is not total. The operator's message is received, help arrives, and the lovers' embrace is forever. The overall message seems to be that, even if our machines fail, good will and human ingenuity will save the day.

Although former audiences may have been pleased by the outcome, these films still speak directly to general attitudes about technology and its role in our everyday lives. Recall that Ashbery asks us to "imagine innocence . . . encounters romance . . . in the home of experience," and "from there, it is only a step to terror." I believe these films reflect such an encounter among innocence, romance, and terror, all bound within the context of wire technologies. Americans are generally attracted to tech-savvy characters like these operators as well as to the bold individual willing to fight back against thieves and criminals. While the "innocent" operators used to sit in front of the telegraph keys at lonely outposts, modern operators and users download new apps, buy iPhones, and sign up for the latest social network. In addition, like these characters who feel like "nothing ever happens here!" we often develop a feeling of ennui after being plugged in for too long: the boredom of sitting in front of a computer, clicking refresh, waiting for an e-mail or a new status update. Familiarity with technology and media can make the lack of romance stand in sharper relief against the backdrop of our daily routine. It is not long before individuals begin to dream of something beyond the wires.

Sometimes, as Ashbery reminds us, it seems that innocence meets romance. We pause to enjoy the latest YouTube video spreading like wildfire across the Web; we enter a social network and solicit a "friend" request from someone we thought might be lost forever. We momentarily ignore the fact that "anything can change as fast as it wants to," and this change is especially swift in a world organized by seemingly instant information. We combine our varying degrees of technological literacy with a romantic and sometimes naïve view of the freedom we might get by purchasing a new device. Some of us have another idea of freedom, one created before advent of Google, Facebook, even e-mail or cell phones. In fact, some Americans still believe that freedom means independence from technology and machines.

For the rest of us, it is important to realize that the rate of technological change can be as terrifying as the rate at which our memories fade. We have become increasingly dependent on electricity in our daily lives, and yet, like Griffith's early viewers, we know that technology can fail and, when it does, alienate us from society and our surroundings. In addition, the media and technologies we use today will be lost in the next one hundred years. Before then, these technologies will crash (with possibly catastrophic results) or become shocking obsolete like handwritten love letters or film projectors have become in the twenty-first century.

Staying current with the latest technology is a losing battle, but if we fail to adapt and conform adequately to social norms and networks, we risk being left behind and cut off from the world. The terrors of technological change may seem to be lurking in the electric devices on either end of the line, but the horror is also buried in the electrified lines themselves. In fact, these two films take us back to a period not too far from the nineteenth century, that hundred years of American history in which a line of the frontier swept across the continent. This sweeping wave of colonization seemed to stop around 1893, when the frontier was declared "closed." During the twentieth century, as the telephone replaced the telegraph, the Line in the Western landscape began to symbolize a period in American history when the first lonely wires made their way across the nation.

One might assume that as telegraph wires and electric transmission lines began to replace the frontier lines, they would erase the sense of terrifying isolation and vulnerability that had been attached to the American landscape. Yet the poles, wires, and power stations have not erased such dangers: in fact, they may have produced a more terrifying environment because, unlike our ancestors, most modern Americans cannot imagine surviving without the Line. In fact, anyone who experienced the blackout that crippled most of North America in 2003 will recall that any tool or machine that relies on a wire can suddenly stop working and, when it does, things can quickly, and sometimes irrevocably, change. All that separates a normally functioning modern society from chaos is a single snip, or, in the case of the blackouts, a computer that misinterprets the situation in the grid. Weather, computer error, or terrorism might suddenly cut the Line, and if then, we will be worse off than we were before we became hooked on the electricity it provides. Thus, knowing that wires can be cut, tapped, or simply go "dead" makes the Line a symbol of the swift and terrifying change of social order as well as a reflection of the frontier's freedom and openness.

Our electrical grid remains overburdened and underserviced. We continue to move toward a "wireless" age. These two factors should influence the ways we read the telegraph lines in the Western. These are the borders of an endless expanse, a simple structure signifying a time and a place not yet fully tethered by technology, nor entirely safe for its inhabitants. As our own environment has been increasingly bound by technology and American culture has become more reliant on wires, the flat plains and empty red desert beyond the telegraph poles and wires in the Western film seems like an area free from social and technological constraints. The wires and poles themselves appear closer to a ritual form of slavery and the electric shock of where unbounded frontier and civilization meet— the cut wire and the sudden confrontation with the abyss of isolation—is a reminder of a vulnerability and terror that, to viewers past and present, is never too far from home.

Conclusion: Power–lines from a Previous Century

Stringer's mystery stories and Griffith's short Westerns invite modern audiences to rethink our connections to electricity and landscape and the terrors of technology lurking beneath our sometimes abusive relationships with the Internet, cell phones, and the power grid. From the age of the first light bulbs, telephones, and electric motors, the general public has embraced more electricity and electrical devices but begrudgingly accepted the fact that more electricity requires more wires. Not only has it become more and more difficult to distinguish the various purposes or to predict the outlets of the electricity as it is conducted through the web of wires at the margins of all our movements, the Line's fragility and tenuousness has become a fact of the modern experience. Although electric wires and our stories about them have been retooled and repackaged to suit the technological revolutions as well as the changes to genres of novels and films, our responses to the Line remain connected to our dreams of wealth, freedom, and happiness as well as to some of our most deep-rooted modern anxieties: namely, over-industrialization and sudden, unpredictable collapse. We are entering a new and exciting electric landscape, which certainly frames the way we understand this historical period and its literature. (You may be reading this text on the electrically powered web). Yet these stories are able to teach us about our ambiguous relationship to wires: they get tangled, tapped, and cut—the current flowing through our veins can inexplicably fade away.

The proliferation of the Line has reshaped the social, political, and economic structures of the United States and the world beyond. In the late nineteenth century, advances in the generation, distribution, and consumption of electricity made a profound effect on everything from the transmission of affect to the imposition of a new world order. Like roads, tunnels, bridges, the Line began to imply physical, cultural, and psychological connections. One major difference is that one cannot traverse over or through the Line, and its owners and engineers constantly warned the public not to touch it: the Line, unlike a bridge or building, is only meant to be seen from a distance and is specifically designed to be overlooked. Therefore, while electrification evoked a progress and interconnections, it was not often experienced by first-hand. Thoreau seems to have been one of the few individuals to understand fully the harmful effects of being barraged by the latest news and the possibly grand reach of a universal harp that could spread across the earth's surface.

Transmission lines have remained a marginal and ambiguous figure both in the American landscape and the American mind. This seems to account for why, even today, transmission structures are generally overlooked or considered detrimental to the aesthetics of landscape. In fact, aesthetics is one of the most major concerns in studies of the perception of transmission lines, yet it remains difficult to examine scientifically aesthetic values and public perceptions of the environment.[126] As poles and overhead wires increasingly framed the continent, they have created a readily recognizable symbol that means a city, town, or home is "on the grid." As I have suggested, the social meaning of the Line extends beyond its electric terminals; it resonates throughout the entire technical systems and influences the metaphorical utility of both "electricity" and "landscape." The electrifying and terrifying qualities of invisible currents and the expansion or infestation of new wire networks created a series of conflicts that have been replaced by modern visions of a global, open-source, wireless network.

In addition, we should also think about the ways that wireless technologies will change the ways we read landscapes. In the last one hundred and sixty years, we have learned to understand the meaning of wires. If we were put down in a barren landscape, completely uncertain of our whereabouts, we might follow a line or a wire, knowing that it would lead us back to civilization. Yet how does one chart a course across an unfamiliar landscape without any wires? What kinds of markers or features might lead one toward a service area or a site with "coverage"? Of course, these questions cannot be fully answered, and yet one thing seems clear: once all of our electrical systems become wireless, then the word *wireless* may become obsolete.

Together, these power–lines from 1820 to the 1910s foreshadow our own cultural grids, wherein a majority of Americans are constantly surrounded by electric devices and consider their brains and thoughts in terms of how they are "wired." If we are inspired by the past and its imaginative appropriations of a seemingly intrusive physical infrastructure, we will change our own approaches to the transmission lines that glide through our skies and the phantom networks that continue to link the present with the past and each individual into a worldwide web.

[1] Thomas P. Hughes, *Networks of Power: Electrification in Western Society, 1880–1930*. Softshell Books Edition (Baltimore: Johns Hopkins University Press, 1993), p. 6.
[2] For more on the effect of electrification see David E. Nye's *Electrifying America: Social Meanings of a New Technology, 1880–1940* (1992), Linda Simon's *Dark Light: Electricity and Anxiety from the Telegraph to the X-Ray* (2004), and Carolyn Marvin's *When Old Technologies Were New: Thinking about Electric Communication in the Late Nineteenth Century* (1988).
[3] Thomas P. Hughes. *The Human Built World: How to Think about Technology and Culture* (Chicago: University of Chicago Press, 2005).
[4] Arthur Stringer, *The Wire Tappers* (1906), Supertales of Modern Mystery Series (New York: McKinlay, Stone and Mackenzie, 1922), p. 132.
[5] David E. Nye, *Electrifying America: Social Meanings of a New Technology, 1880–1940* (Cambridge, Mass.: MIT Press, 1992), p. 58.
[6] "The Telegraph Forest," *New York Times*, August 12, 1876.
[7] "The buildings and grounds of the Exposition are lighted by electricity. About 8,000 arc lamps of 2,000 candle power and about 130,000 incandescent lamps of sixteen candle power are required. Besides this from 3,000 to 3,500 horse power is required for the operation of the machinery of the exhibitors. To furnish and transmit this 24,000 horse power the Exposition Company has constructed a plant which, though a complete station itself, is composed of a number of smaller complete plants." Trumbell White and William Ingleheart, eds., *The World's Columbian Exposition, Chicago, 1893* (Chicago: J.K. Hastings, 1983), p. 476.
[8] "Electric Power at Niagara," *New York Times*, January 11, 1903. Special to the *New York Times*, originally published in Washington, January 10, 1903. In addition, *The World Almanac and Encyclopedia 1901* reported: "The Niagara Falls Power Company made a second large extension of its plant at Niagara Falls, NY during 1901 and is now the largest electric transmission company in the world. The General Electric Company whose extensive plant is at Schenectady, NY receives its power from a water power plant located at Mechanicville some miles away. The numerous electric transmission plants throughout the West are proving of tremendous benefit to the surrounding territory and have produced profitable returns for their stockholders." P. 189.
[9] *Industrial Niagara: Niagara Falls City Guide—The Falls and Scenery Illustrated* (Niagara Falls, N.Y., 1913), p. 20, quoted in William Irwin, *The New Niagara: Tourism, Technology, and the Landscape of Niagara Falls, 1776–1917* (University Park: Penn State University Press, 1996), pp. 125–26.
[10] Thomas Cole, "Essay on American Scenery" (1836), p. 12.
[11] *Niagara Falls Gazette*, July 15, 1885, quoted in Irwin, *New Niagara*, p. 79.
[12] David E. Nye, *American Technological Sublime* (Cambridge, Mass.: MIT Press, 1994), p. 135.
[13] Ibid., p. 98.
[14] Irwin, *New Niagara*, p. 110.
[15] Stringer, *Wire Tappers*, p. 105.
[16] Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1967), p. 197.

[17] Ibid.
[18] Ibid., p. 135.
[19] Nye, *American Technological Sublime*, p. 135.
[20] Ibid., p. 152.
[21] Ibid., p. 60.
[22] "Niagara Put In Harness," *New York Times*, July 7, 1895.
[23] "Mr. Hill Gets the Prize," *New York Times*, February 7, 1891.
[24] Irwin, *New Niagara*, p. 107.
[25] For more on Michael Dolivo-Dobrowolsky's AC system and Nikola Tesla's conflicts about the creator of the AC system see Marc Seifer, *Wizard: The Life and Times of Nikola Tesla; Biography of a Genius* (New York: Citadel Press, 1998), pp. 73–74, 80–81.
[26] Hughes, *Networks of Power*, p. 133; Seifer, *Wizard*, p. 73.
[27] In spring 1893, the Westinghouse Company accused some of its employees of stealing blueprints and data relating to its Niagara proposal and selling them to representatives of General Electric. For more on the accusations and legal battle involving the theft of these documents see "Electric Companies at War," *New York Times*, May 7, 1893.
[28] Hughes, *Networks of Power*, p. 139.
[29] "20,000 Horsepower over One Wire," *New York Times*, May 24, 1893.
[30] "The Niagara Falls Electric Line," *New York Times*, August 8, 1894.
[31] "Distribution of Niagara's Power," *New York Times*, May 6, 1894.
[32] "Niagara Put in Harness," *New York Times*.
[33] "Power at Niagara Falls," *New York Times*, February 11, 1900.
[34] Edison and General Electric, the obvious losers in the "Battle of the Currents," were given the contract to build transmission lines capable of transmitting 11,000 volts from Niagara to Buffalo. The lines built by General Electric carried an unprecedented amount of the Tesla- and Westinghouse-generated two-phase alternating current. When the electricity reached its destination, it was transformed into a lower voltage and used to power motors, electric rail cars, and streetlights.
[35] Electric power grids neither appeared overnight nor in sequence. In fact, many parts of this country were still without power up until the 1930s when Franklin Delano Roosevelt signed the Rural Electrification Act into law.
[36] Nye, *Electrifying America*, p. 13.
[37] Ibid., p. 16.
[38] Hughes, *Networks of Power*, p. 1.
[39] Nye, *Electrifying America*, p. xi.
[40] Ibid., p. x.
[41] Ibid., p. 8.
[42] New York Board of Electrical Control, quoted in Nye, *Electrifying America*, p. 48.
[43] Herbert Newton Casson, *The History of the Telephone* (Chicago: A.C. McClurg, 1910), pp. 127–28.
[44] "Street Dangers: The Rotten Telegraph-Pole—Conclusion of the Inquest in the Case of Ann M'Guire—Censures and Recommendation of the Jury," *New York Times*, August 12, 1876.
[45] Ibid.
[46] Telegraph Forest," *New York Times*.

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[47] Ibid.
[48] "The Pole and Wire Nuisance," *New York Times*, June 26, 1884.
[49] "Wires Illegally Strung," *New York Times*, September 18, 1886.
[50] "Telegraph Poles Must Go," *New York Times*. September 19, 1884.
[51] "The Underground Wire Bill," *New York Times*, June 14, 1885.
[52] "Wires Illegally Strung," *New York Times*.
[53] "City and Suburban News," *New York Times*, February 4, 1892.
[54] "Public Works Department; Mr. Gilroy's Report of its *Operations Last Year," New York Times*, January 1, 1893.
[55] Henry James, *The American Scene*, ed. John F. Sears (1905–7, repr., New York: Penguin, 1994), p. 76.
[56] Ibid., p. 89.
[57] "Wires Illegally Strung," *New York Times*.
[58] The data about telegraph-wire mileage and placement can be found in "Use 15,000,000 Miles of Message Wires," *New York Times*, August 9, 1909. Also note the following observation: "In 1902 the telegraph business was practically controlled by two companies yet in spite of the tendency of consolidation to reduce the number of lines and offices, the mileage of wire in operation was more than four times and the number of messages nearly three times greater than in 1880. The wire mileage in operation in 1902 exclusive of 16,677 nautical miles of cable was 1,027,137 miles greater than in 1880." U.S. Bureau of the Census, *Telephones and Telegraphs: 1902*, ed. Thomas Commerford Martin, Arthur Vaughan Abbott, and William Mayer (Washington, D.C.: Government Printing Office, 1906), p. 99.
[59] Stringer, *Wire Tappers*, pp. 139–40.
[60] The following represents some of the scholarship on the telegraph and Henry James's *In the Cage* (1898).
1) Paul Gilmore, *Aesthetic Materialism: Electricity and American Romanticism* (Stanford: Stanford University Press, 2008). Gilmore writes: "Where Shelley, Emerson, Douglass, and Whitman found in electricity a force for articulating the possibility and limitations of imaginative connection with others, James's novella moves in the direction of proto-modernist, solipsistic aestheticism, and formalism." P. 178. "In fact, as the telegraphist's pleasure in reading and creating the story of the lovers largely derives from her lack of contact with them, so our pleasure emerges out of our own arm's length relationship to the telegraphist. Her consciousness guides us through the story, and with her, we end up having to recognize our failures to read fully, correctly, a lesson that may work to train our (and her) imaginations to be more supple, nuanced, but does not gesture to the possibility of creating a different social order based on that imagination." Ibid., p. 183.
2) Richard Menke, "Telegraphic Realism: Henry James's *In the Cage*," *PMLA* (2000). For Menke, the unnamed telegraphist interfaces with the reader on "a level of mediation, a layer that intermingles the materiality of communication, the content of her subjectivity, and the social structures of bureaucracy, class, and gender. The narrator represents "telegraphy not just as a mode of communication but also as a social practice, a medium of discourse come to life, an information exchange rendered no longer transparent." P. 976.

3) Sam Halliday, *Science and Technology in the Age of Hawthorne, Melville, Twain and James: Thinking and Writing Electricity* (New York: Palgrave MacMillian, 2007), pp. 178–83.

[61] The following represents some of the scholarship on the telegraph and Frank Norris's *The Octopus* (1901).

1) Halliday, *Science and Technology in the Age of Hawthorne, Melville, Twain and James*, pp. 20–23.

2) MacDougall writes: "Norris and the authors of the wire thrillers looked upon the new networks of technology and commerce with the same mixed feelings. . . . One difference between Norris and his imitators is that in Norris's work, there are few convenient villains. A railroad crushes the California farmers and ruins their lands, but there is no 'Master Spider' behind the railroad company to be defeated and unmasked. There is only the complex interdependence of technology, agriculture, and national finance." Robert MacDougall, "The Wire Devils: Pulp Thrillers, the Telephone, and Action at a Distance in the Wiring of a Nation," *American Quarterly* 58, no. 3 (September 2006): 725.

3) Leigh Ann Litwiller Berte, "Mapping 'The Octopus': Frank Norris' Naturalist Geography," *American Literary Realism* 37, no. 3 (Spring 2005): 202–24. Berte's argument concerns the instances of map-making in *The Octopus*: "In our contemporary moment, the internet and global conditions of capitalism stress the necessity of understanding the linked layers of space that frame social relations in much the same way as rail travel and telegraph communication revised turn-of-the-twentieth-century notions about the relationship between locality, state, region, nation, and globe." Pp. 207–8.

[62] Stringer, *Wire Tappers*, p. 13.

[63] Arthur Stringer, *Phantom Wires* (1907), Supertales of Modern Mystery Series (New York: McKinlay, Stone and Mackenzie, 1923), pp. 41, 82.

[64] Victor Lauriston, *Arthur Stringer: Son of the North; Biography and Anthology* (Toronto: Ryerson, 1941), p. 8.

[65] "An Appreciation of Arthur Stringer's Poetry," *New York Times*, January 18, 1908; "Arthur Stringer (1874–1950)," in *Canadian Poets*, ed. John William Garvin (Toronto: McClelland, Goodchild and Stewart, 1916), pp. 313–14.

[66] Lauriston, *Arthur Stringer*, p. 11.

[67] "Arthur Stringer, Poet, Novelist, 76," *New York Times*, September 15, 1950.

[68] Lauriston, *Arthur Stringer*, p. 17.

[69] Ibid., p. 15.

[70] Stringer, *Wire Tappers*, pp. 5, 6.

[71] Ibid., p. 71.

[72] Stringer, *Phantom Wires*, p. 12.

[73] Ibid.

[74] Ibid., p. 13.

[75] After tapping the telegraph line and sending results from the racetrack, the con men would begin to drop into various poolrooms about town and frequently make bets at the last minute so that they would be recognized as "tardy" bettors. Once they secured a reputation, they moved in for the grand coup, placing a large "bet" on a horse race for which they already knew the winner. After the delayed or fabricated race results were

patched through, they would claim their winnings, abandon their post, and move out of town.

[76] "Scientific Wire Tappers Who Band Together and Work the Pool Rooms," *National Police Gazette* (New York), 80, no. 1284, March 29, 1902.

[77] "Cotton Brokers Rush to Buy," *New York Times,* September 29, 1899; "Cotton Men in a Panic; New Orleans Exchange Suspends on Receiving False Quotations. Wire Tapping Is Charged," *New York Times*, September 30, 1899.

[78] "Scientific Wire Tappers Who Band Together," *National Police Gazette*.

[79] Stringer, *Phantom Wires*, p. 149.

[80] Ibid.

[81] Ibid., p. 220.

[82] Ibid., p. 221.

[83] Stringer, *Wire Tappers*, p. 39.

[84] Ibid., pp. 39–40.

[85] Ibid., p. 40.

[86] Stringer, *Phantom Wires*, p. 115.

[87] Ibid., p. 116.

[88] Ibid., p. 131.

[89] Stringer, *Wire Tappers,* p. 237.

[90] Ibid., p. 234.

[91] Ibid., p. 236.

[92] Ibid., p. 223.

[93] For more on the impact of power brokers like Gould and Morgan as well as the impact of the telegraph and on finance see JoAnne Yates, "The Telegraph's Effect on Nineteenth Century Markets and Firms," *Business and Economic History* 15 (1986): 149–63.

[94] "Cotton Men in a Panic; New Orleans Exchange Suspends on Receiving False Quotations. Wire Tapping Is Charged," *New York Times,* September 30, 1899.

[95] Stringer, *Phantom Wires*, p. 29.

[96] The corruption of the cotton exchange and the telegraph are also a central component in William Faulkner's *The Sound and the Fury* (1929), and the corruption of the commodities exchange provides the climactic finish for the popular American film *Trading Places* (1983).

[97] MacDougall, "Wire Devils," p. 716.

[98] Ibid., p. 721.

[99] Nathaniel Hawthorne, *The House of Seven Gables*, ed. Robert S. Levine (1851; New York: W.W. Norton, 2005), p. 264.

[100] Stringer, *Wire Tappers,* p. 222.

[101] MacDougall, "Wire Devils," p. 728.

[102] Nye, *Electrifying America*, p. 169.

[103] Ibid., p. 19.

[104] Ibid.

[105] Stringer, *Wire Tappers*, p. 132.

[106] Stringer, *Phantom Wires,* p. 66.

[107] Ibid., p. 67.

[108] Stringer, *Wire Tappers*, p. 112.

[109] Ibid.
[110] Ibid., pp. 299, 300.
[111] Ibid., p. 300.
[112] Stringer, *Phantom Wires*, p. 25.
[113] Ibid.
[114] Ibid., p. 26.
[115] Mark Twain, “Mental Telegraphy” (1891), *The Complete Essays of Mark Twain*, ed. Charles Neider (Garden City, N.Y.: Doubleday, 1963).
[116] Stringer, *Phantom Wires*, p. 153.
[117] Ibid., p. 144.
[118] Ibid., p. 228.
[119] To develop this point, one might also see Henry James’s “Is There a Life after Death” (1910).
[120] John Ashbery, “The Lonedale Operator,” in *A Wave: Poems* (New York: Penguin Books, 1985), pp. 48–49.
[121] Arthur Knight, The Liveliest Art: A Panoramic History of the Movies (New York: New American Library, 1957) p. 32.
[122] Tom Gunning, “Heard Over the Phone: The Lonely Villa and the de Lorde Tradition of the Terrors of Technology,” *Screen* 32, no. 2 (Summer 1991): 187.
[123] Richard Schickel, *D.W. Griffith: An American Life* (New York: Simon and Schuster, 1984), pp. 160–61.
[124] David Lusted, The Western: Inside Film (New York: Longman, 2003) p. 74.
[125] “A Lie Agreed Upon, Part I,”’ *Deadwood: The Complete Second Season*, season 2, episodes 1–2, directed by Ed Bianchi, aired 6 March 2005 (HBO, 2006), DVD.
[126] For more on this see the fascinating tome of information published by The International Electric Transmission Perception Project and titled *Perception of Transmission Lines: Summary of Surveys and Framework for Further Research* (Washington, D.C.: Edison Electric Institute, 1996). Especially interesting is Chapter 2, “Previous Research on Transmission Perception,” pp. 23–108.

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