**Recovering John Trowbridge: A Master of Electricity, Education, and Sentimentality**

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**Introduction: Recovering John Trowbridge**

DURING the turn of the twentieth century, electricity was the life force and death spark of the day. It signified sympathy and cutting-edge science. It rewired how Americans understood their own bodies and their status as “moderns”. Although electricity was studied and celebrated in previous centuries, the social meanings of this energy changed appreciably in the latter half of the nineteenth century. The electricity of this era was no longer the static energy Benjamin Franklin had studied. The “imponderable fluid” that the founding father identified in lightning and in Leyden jars had since been “tamed” by industry and discovered everywhere in nature—from the crackling atmosphere surrounding Yellowstone Park’s “Electric Peak” through the electro-chemical reactions of human neurons. The old social meanings of electricity were not overturned by these discoveries and applications. They were overwritten, like a palimpsest, with new and sometimes incommensurate connotations.¹ As the cultural meanings of this energy accumulated, one luminary adopted electricity as his primary object of study and as his guiding metaphor. As a professor of physics at Harvard University and a novelist, John Trowbridge examined electricity from multiple angles throughout his kaleidoscopic career. By recovering Trowbridge, this paper examines the capaciousness of electricity as a cognitive metaphor at the turn of the twentieth century.

Trowbridge represents a salient case study because he was prolific as both an author and a physicist. According to the National Academy of the Sciences biography of the professor, he published *The Electrical Boy* (1891), *Three Boys on an Electric Boat* (1894) and *The Resolute Mr. Pansy* (1897), along with popular science books about his field of study, *The New Physics* (1884), *What is Electricity?* (1896), and *Philip’s Experiments in Electrical Science* (1898).² He wrote these books during the prime of his academic career.³ In fact, he published at least seven articles—six in the *American Journal of Science*—in the years between the release of his first and last novel. He simultaneously undertook his literary and technical experiments, and the trace of his concurrent writing practices remains apparent today. His technical know-how suffused his novels, and his literary proclivities inflected his scientific writing.

In this respect, John Trowbridge’s fascinating body of work demonstrated the permeable boundaries between art, literature, and science during the turn of the twentieth century. His catalogue of fiction and non-fiction works likely fell between the literary-historical cracks for precisely this reason: studies of this era typically emphasize specialization rather than cross-disciplinary play.⁴ Although art and science were seen as mutually enriching modes of cultural production during the early nineteenth century,⁵ scholarly accounts of the *fin de siècle* have examined how the formation of disciplines like electrical engineering, changes in the American university system, and the rise of objectivity as a value in science all worked together to sever art from science in the American cultural imagination.⁶ Trowbridge complicated this conventional narrative by specializing and still insisting upon the relevance of literature in science and of science in literature.
Trowbridge’s work confounded expectations in more ways than one. During his lifetime, libraries classified his novels as juvenilia intended for a fifth- or sixth-grade audience. But these texts were published by presses with a significant market share, including Little, Brown & Co—a fact which suggests that he may have attracted a wider reading base. More importantly, Trowbridge used rhetorics that we now associate with divergent generic traditions. He wrote sentimentally and sensationally, but he also wrote with mimetic exactitude. Indeed, his scientific descriptions were more than realistic—they were technically accurate. While his contemporaries were writing utopias and dystopias that exaggerated electricity into a nearly magical force, Trowbridge wrote novels that described how to build actual circuits.

Since Trowbridge stood apart from writers of his day, we must confront the limitations of our current categories for classifying (and, concomitantly, analyzing) nineteenth-century fiction if we wish to comprehend his texts. For example, I identify Trowbridge as an early science fiction writer because his novels offered detailed explanations about how to build electrical apparatuses. Yet they may not meet the more nuanced and reader-focused definition of science fiction that Darko Suvin, Samuel Delany, and Paul K. Alkon proffer. Trowbridge did invite his readers to interrogate their values, as these students of science fiction would expect. But the physicist-writer did so in a manner more closely associated with sentimental novels than with sf. Rather than defamiliarizing language or imagining a world of heretofore unimaginable possibilities, Trowbridge asked his audience to sympathize with characters who just happened to be electrical experts. If the author “estranged” his readers in Suvin’s sense of the word, it was by focusing on the perspectives of children who saw the world in a different way than cynical adults did. Alkon, Suvin, and Delany’s definitions of sf are thus necessary but not sufficient for interrogating Trowbridge. To analyze this author, we must also read him alongside sentimental fiction, Edisonade dime novels, and other popular forms of the day.

Although he has been difficult to taxonomize, it is worth noting that Trowbridge was not completely forgotten. His novels were not annotated in Thomas D. Clareson’s authoritative bibliography of turn-of-the-century science fiction, but the polymath professor was remembered by at least two recent scholars. In The Body Electric: How Strange Machines Built the Modern American, Carolyn Thomas de la Peña mentions the author briefly to illustrate a larger point about all that electricity could signify in the late nineteenth century. She explains: “In John Trowbridge’s The Electrical Boy, a young orphan manages to climb electric wires to reach his mother in heaven” (107).

That summary was not strictly accurate. In the first chapter of The Electrical Boy, the orphan protagonist, Richard Greatman, climbs a telegraph pole with the hopes of finding his mother. As a result, he is expelled from his tenement home and forced to find shelter with an electrical toy maker. This mentor (whose name Richard does not yet know) begins molding Richard into an “electrical boy” by teaching him “how to connect wires to batteries, how to set up batteries, and how to manipulate electrical keys” (The Electrical Boy 39). That apprenticeship ends abruptly, when the police raid the toymaker’s home and arrest him for stealing power from city lines. Alone again, Richard’s abandonment serves as a plot device: it places him in situations where he can use electricity to hone his skills. Many of these episodes resemble dime-novel literature of the day. By the end of the novel, the child savant has used electricity in a gambling den, a doctor’s office, a circus, and

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many other typically adventurous settings. Peña’s mention of this novel highlights the youthful innocence with which Richard idealized electricity; her study does not examine the more technically accurate descriptions that pervade the novel. In fact, she did not need to dig into greater detail. Her brief mention was sufficient to prove that, in fiction and other cultural fantasies of the era, “a bit of electrical know-how allowed one to transcend physical limitation” (Peña 107).

Roger Luckhurst shed more light on Trowbridge’s first novel in his encyclopedic study, Science Fiction. In a chapter about pulp fiction and the Edisonade, Luckhurst mentions The Electrical Boy briefly, noting: “The affinity of boyhood and electricity was made explicit from the earliest days of this fiction: John Trowbridge worked out the whole typology of the orphaned boy-inventor in The Electrical Boy in 1891, suggesting an equation of the ‘electrical influence’ with ‘the quick and natural intelligence of the child’” (54). As Luckhurst insinuates, Trowbridge shared with other speculative fiction and children’s literature writers a preoccupation with educational themes. Indeed, I will argue that the correlation Trowbridge drew between primary education and electricity is one of the most interesting and consistent elements of his œuvre.

Luckhurst and Peña’s brief citations are the only two references I could find, after searching for scholarship on Trowbridge for almost a decade. (Unfortunately, my search for information on Trowbridge was complicated by the fact that he published alongside a more prominent American author who shared his name: John Townsend Trowbridge. In several libraries, their works are misfiled, shuffled together.) This singular author left too faint an impression on our histories of American literature or science fiction; most of his work has been forgotten in the last century, despite his interesting perspective on literature and science. The few scholars who remember the man mention only one of his novels—and they discuss this small fragment of his work only cursorily. Luckhurst and Peña both invoked Trowbridge brusquely in the service of their larger arguments about American literary and technological culture. Yet what stands out about these citations is not their insufficiency; it is their evocativeness. Neither scholar needed to cite The Electrical Boy to make their broader points. They referenced this book because it was too unusual to be elaborated upon and too interesting to remain unmentioned.7 In other words, these passing references to the book are beacons, pointing future scholars to an artifact that demanded attention from a different angle.

These beacons sustained my interest in The Electrical Boy. They indicated that some small community of scholars had cared enough about this text to cite it, if only glibly. This fact helped guide me to the Eaton Collection, where I read widely in various genres in my attempts to make sense of Trowbridge’s experiments on the boundaries of science and fiction writing. Here I explored the Edisonade, sentimental children’s literature, and inventor’s biographies. I found no definitive analog for Trowbridge. He fit in all and none of these subgenres simultaneously. In each class of literature, I found resonances that helped me understand his unique interventions as a writer-scientist. These resonances suggest that we should open up our categories of study to account for such unusual artifacts that defy our conventions of historicization.
The Art and Science of Trowbridge’s Novels

Trowbridge’s most popular book, *The Electrical Boy*, represents more than a scientific practitioner’s dalliance in literature. The fact that it was popular enough to remain in print for multiple editions suggested that a (presumably young) reading public was interested in a blend of adventure and usable scientific detail. This unusual text announces its cross-disciplinarity the moment a reader encounters it. Its very cover promises interesting depictions of literary sentimentalism and electricity (see fig. 1). The title appears in a playful, lightning-bolt font. The binding is further adorned with a stylized sketch of power cables, a drawing of a cherub, and the Shakespearean verse, “I’ll put a girdle round about the Earth in forty minutes.” This book embodies more than a text to “close read”; it is an artifact designed to announce its marriage of literary taste and technological fancy.

Beyond their bindings, Trowbridge’s books betray their cross-disciplinarity by blending technical and fictional illustration styles. *The Electrical Boy* includes four plates drawn by George Brant Bridgman—a life-drawing expert who mentored Norman Rockwell, among others (see fig. 2). Such plates were common in popular literature of the time. They were designed so that they may be removed from the book and hung on a reader’s wall. Yet this novel also includes illustrations in the body of the text that resembled technical drawings (see fig. 3). Note the stylistic similarities between Figure 3 and the electromagnet illustration from his technical book for adults, *The New Physics* (see fig. 4). This blend of visual rhetorics codes *The Electrical Boy* as a hybrid between inventor-adventure fiction and scientific, educational literature. Each of Trowbridge’s novels included hybridized scientific and literary rhetorics in this manner.

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Fig. 1: Cover of *The Electric Boy*

Fig. 2: *Electric Boy*, Front Matter
piece of copper wire with the iron pole of this battery. The carbon pole he connected with the water pipe in the attic. The dead wire was thus in circuit with the

by which, with the expenditure of mechanical work, we could produce strong currents of electricity. Suppose we should wind a ring of iron with wire continuously (Fig. 111), and then revolve this ring between the poles of a permanent horseshoe magnet, the plane of the ring being perpendicular to the axis of revolution, which in turn is perpendicular to the plane in which the poles of the permanent magnet are placed. While one of the spires of the wire on the ring is ap-

Fig. 3: The Electrical Boy, 81

Fig. 4: John Trowbridge, The New Physics (New York: D. Appleton & Co, 1888): 238
These parallels are textual as well as visual. Each novel includes a title page that announces the writer’s impressive day job: “Professor of Physics, Harvard University.” This detail lent his books cultural credibility. It also prompted readers to attend more closely to technical details. Those who did so would not be disappointed. Unlike many other early science fiction writers, Trowbridge did not narrativize the potentials and limitations of speculative scientific discoveries. Instead, he described how to build simple electrical apparatuses. He wove these instructions into chapters that pragmatically paralleled the young-adult literature of his day. While Edisonades imagined young people building usable flying machines to embark on adventures, Trowbridge’s young protagonists marveled at flying toys that his readers could learn how to build.

For example, when “the electrical boy,” Richard, first encounters an electromagnet, the narrator explains: “An electromagnet is simply a number of turns of copper wire on a spool, -- like a spool of thread, with a nail thrust through the hole in its middle” (The Electrical Boy 82). He also details how to build a battery with simple objects like flower pots (74) and how to build a galvanometer (202). Such asides enable inclined readers to build devices as they read along. Indeed, Trowbridge wrote fiction, in part, to help his audiences master basic electrical principles. But his novels were more than embellished technical manuals. The Electrical Boy and The Resolute Mr. Pansy, in particular, develop engaging plot-lines and round characters. More importantly, they discuss art and electrical science together, helping readers to see how these fields of knowledge grew in tension or in tandem with one another.

At times, Trowbridge seems to pit literature against electrical science. In The Electrical Boy, a role-model character, Henry Gresham, “gave Richard some of [James Fennimore] Cooper’s novels to read. He was amused to find that the boy preferred a book on electricity” (258-259). Twenty-first century readers, living amid “two cultures” contestations like the infamous “Science Wars,” might find such passages dismissive of literature. But Trowbridge invests in the literary tradition by writing for readers who would enjoy the thrill of literary fantasy and usable, technical knowledge.

An Electrically Charged Pedagogy

The complex relationship that Trowbridge draws between literature, art, and science becomes most apparent in his discussion of pedagogy. Trowbridge does more than explain electricity; he also characterizes the learning process as electrical. In the process, he develops a pedagogy that is broad-minded enough to imagine, first, that scientific knowledge would be enhanced by artistic and humanistic study and, second, that children should be exposed to every type of human endeavor so that they may discover their own proclivities. Thus, although Richard’s mentor George Greatthings is himself an electrical inventor, he deems Richard’s love of electricity to be an accident of fate or opportunity. He explains:

Your mind...is probably becoming set upon the subject of electricity. I doubt if you will ever devote yourself to another subject. I believe that a boy gets a turn for a certain thing earlier than we generally suppose. I believe that it would be a good thing to have large arcades, radiating from a central station, through which we could be trundled when we are beginning to observe things. These arcades could be
covered with pictured paper representing the various arts and the history of the world. A bent could thus be given the boy very early.
(170-71)

This passage obliquely alluded to electricity: the structure of Greatthings’ edifice of knowledge resembles power plants of the day, which were often called “central stations.” In this idealized model, young boys would pass like electrons down conduits in search of a type of knowledge that would spark their interest. This passage frames electrical science as only one of many exciting options for study, while it models the ideal learning process in terms of power-transmission infrastructure. It suggests that children should learn like an electric plant, even if they do not want to learn about these systems.

In The Electrical Boy, Trowbridge develops this distinctive pedagogy in his descriptions of Richard Greatman. Richard is an electrical savant, and his adeptness represents a convergence of form and function: this character has a knack for electrical science because he is physiologically electrical. The narrator first portrays Richard’s brain with an analogy: “The quick natural intelligence of the child strangely resembled the electrical influence which was also at the beck and call of the old man [George Greatthings, an electrical experimenter]” (41). Here, Richard’s mind appears electrical in that it is like a switch that a mentor can turn on and off. Greatthings, Richard’s anti-heroic mentor, later reiterates this characterization by describing the boy as a “Pretty small battery” with a “Big electro-motive force” (113).

Trowbridge elaborates upon these analogies by describing all children’s minds as electrical. He explains:

Greatthings had decided views in regard to the education of boys. He would have them know how to use their fingers in the first place, in order, as he expressed it, to draw off the charge in the brain and dissipate it through the fingers. It did not matter much what kind of a charge was put into the brain. The way to make the charge strong was to keep turning a crank of some sort and to put in the same kind of charge. The study of electricity, said Greatthings, was a suitable subject for boys. It interested them, kept them from the low pleasures of the street; and the result might in time benefit mankind.
(173)

As Luckhurst recognizes, this understanding of the child’s mind extrapolated upon timely electro-medical descriptions of the human body to make a case for studying electricity and for teaching children to work with their hands. For example, in 1881, electro-medical doctor George Miller Beard (famous for coining the diagnostic term “neurasthenia”) described the human body as functioning much like “Edison’s electric light.” Beard teased this analogy out for two full pages, indicating the significance of this comparison.

Beard was not the first or only expert to identify the body as functionally electrical. As Laura Otis and Timothy Lenoir have argued, Hermann Helmholtz and Emil DuBois-Reymond had understood the body as functionally electrical since 1851. Otis explains that “these comparisons between organic and technological systems were not mere devices for popularization but became incorporated into the
scientists’ own vision and understanding of the nervous system” (“Metaphoric” 106). In this context, Trowbridge’s descriptions of the child’s electrical mind could appear to contemporary readers as both scientifically accurate and metaphorically appealing. Glimmers of this medical metaphor—and of its applications to pedagogy—pervade Trowbridge’s larger body of work, especially including his final novel, *The Resolute Mr. Pansy*, and his quasi-nonfiction text, *Philip’s Experiments*.

Trowbridge explicitly reveals his pedagogical reason for linking fictional situations with electrical knowledge in *Philip’s Experiments*, a book that exemplifies his fascinating blend of fictional and scientific writing styles. He explains that he uses apparently nontechnical details about the world to elicit interest in physics, and he suggests his readers follow a similar program. Addressing fathers, he reasons that it might be easier to teach children a passion for physics than for natural philosophy because the laws of physics are encoded in everything a child might do: “The illustration of the working of natural forces lie about us on every side, and are involved in stretching the arms, in breathing, in riding the bicycle, in swimming, and in sailing a boat” (4). According to this worldview, every thoughtfully crafted action scene might be said to pique his reader’s interest in underlying physical phenomena.

While cultivating interest in physics, Trowbridge also advocates for the “ascetic ideal” that was popular in didactic children’s literature at the time. That is, he constructs industrious heroes who succeed by prioritizing educational enrichment over idle entertainment. He does more than teach children how to learn about electricity or other arts; he models how an idealized learner should behave. Historian of technology Eric S. Hintz notes that a similar emphasis upon ascetic education was conventional in one popular subset of children’s literature: the inventor’s biography. Hintz adds that, “While biographers confidently encouraged reading, they had to be careful about how they presented the attainment of formal education. Certainly, highly literate authors appreciated the advantages of their own schooling and desired a population of educated readers to consume their books. On the other hand, biographers did not want to offend any readers who may not have attended a traditional school” (201). Trowbridge balances similar concerns in *The Electrical Boy* and in his later work. Although he focuses on pedagogy, he pens underprivileged, often self-educated protagonists. In this way, the professor-writer repeatedly insists that education could best be considered transformational when it occurs outside of formal institutions. The metaphor of electricity underscores this point. According to Trowbridge, the child’s brain was naturally charged and awaiting any outlet for its electrical energy.

Trowbridge’s investment in the subtheme of autodidacticism was most apparent in *Philip’s Experiments*. This seemingly non-fiction book imparts a series of lessons to improve the reader’s skills for studying art and science. However, Trowbridge couched these lessons within a fictional narrative frame. In this volume, he invents an ideal wife character who was ancillary to the book’s content, but who betrays the writer’s investment in sentimentality—a topic I will return to below. (Despite Trowbridge’s idealization of an ascetic work ethic, the writer did not advocate an unemotional severity.) Trowbridge also invents the son, Philip, and the persona of the father-tutor, for Trowbridge never had children. This cast of fictional characters created an occasion for the book. It enabled the author to structure his lessons as a long-form response to the inquiry of a purported admirer.

The rhetorical convention of the epistolary response was common in fiction and autobiography of the day, and Trowbridge misleadingly coded this book as
autobiographical. Speaking only in the first person, he encourages the reader to imagine that this book outlines a teaching regiment that he used with his own son. Reader expectations for technical literature also play a role here: since Trowbridge offers lessons in supposedly factual fields of knowledge, readers were unlikely to approach the book as a fiction.

Throughout *Philip’s Experiments*, Trowbridge fictionalizes his own educational and familial experiences in order to encourage parents and children from different educational backgrounds to undertake the study of physics and art in their spare time. In the Preface, the narrator lays out an educational program that defies or supplements institutionalized education. It begins, “Many boys think that they can not [sic] acquire knowledge in any subject outside a school. It is the object of this book to show that a few moments devoted each day, at home, to simple investigations can result in habits of self-reliance and in the acquirement of a modern language and in the study of the art of drawing. I endeavor also to show how to cultivate a taste for mathematics by studying practical problems...” (v). The Preface goes on to explain that educational institutions are inevitably inferior to independent study—a disingenuous claim for a writer who gained ethical appeal by announcing his position at Harvard on the title page of his every book.

While *The Electrical Boy* and *Philip’s Experiments* both celebrated the ascetic upstart’s willingness to learn outside of any formal institution, Trowbridge focuses on the theme of formal education most closely in his last novel, *The Resolute Mr. Pansy*. Where his earlier stories followed young protagonists who use electrical know-how to find adventure and middle-class respectability, this novel offers a fictionalized proposal for reforming middle school curricula in small-town America. Mr. Pansy is enthusiastic about electrical science and committed to improving the infrastructure of his small town by preparing his students to harness this energy. The unconventional teacher inspires disaffected youth to recommit to their education by infusing electrical knowledge and service work into their daily training. He trains his students to illuminate their hometown with hand-made electrical lights. In the process, Mr. Pansy cultivates the teens’ excitement for electric science along with their civic pride. These plotlines and their attending technical details distinguish Trowbridge’s novels from other didactic children’s literature of his day. Above, I mentioned how Trowbridge’s fiction resonates with children’s books about inventors, like the one that Hintz describes. But the professor-writer’s novels also diverge from this better-established subgenre in one important way. Hintz has noted that texts in the latter genre “provided children with moral rather than technical instruction” (209). In contrast, Trowbridge emphasizes technical accuracy alongside his moral lessons. To the professor-author, technical details are never trivial. They give him a warrant for writing, and they deepened the accuracy of his otherwise romantic stories.

Reciprocally, fictional details were germane to Trowbridge’s technical content. *Philip’s Experiments* offers an idealized educational program within a fictional storyline about a perfect family; *The Electrical Boy* explores the moral and technical lessons we might learn from a protagonist with an imperfect home life and limited access to educational resources. In contrast, the entirely technical *What Is Electricity?* addresses adults and lacked the fictional narrative frame of *Philip’s Experiments*, but even this book examines the use of metaphor in science: it begins by discussing the insufficiency of the fluid metaphor in popular understandings of
electricity (19). Each of these books suggest that familial and personal contentment will follow from the thoughtful consideration of art, morality, and science, as interwoven pursuits.

In retrospect, we might say that this marriage of science and fantasy was unintentionally injurious. Trowbridge, like other writers of his day, misleads readers to imagine that learning about electricity would be enough to bring a poor, orphan child to the middle-class. In this way, Trowbridge’s ideological investments come to the forefront. His sentimental plots enhance his depictions of electricity—and our understanding of his literary legacy.

**Sentimentality, Science, and Supremacy**

While Trowbridge consistently wrote about an electrically inflected pedagogy, his body of work cultivated other notable nontechnical themes. Aside from didacticism, his most prominent theme was sentimentality. As I suggested above, the writer’s sentimental themes appear most arresting in *Philip’s Experiments*, since this book was marketed as a textbook of sorts. Despite its ostensibly technical agenda, this volume recapitulated ideas from the early nineteenth century sentimental novel about “The Cult of True Womanhood.” Such incongruous images reveal the extent to which Trowbridge reinscribed the conventions of sentimentality into his understanding of science, and vice versa.

*Philip’s Experiments* includes an invented mother/wife character who meets all of the ideals that were common within the nineteenth-century domestic novel. Like the stereotypical sentimental heroine, this character enjoys ruling the private sphere as a natural-born nurse and mother: “Philip’s mother has never been willing to delegate her offices to a nurse, except at rare intervals... My wife said that she was willing to leave to men the public rostrum and suffrage, if she could have the formation of the character of the coming man” (9). This passage is all the more provocative because it has no relation to the larger premise of the book. *Philip’s Experiments* was a guide for the study of art, mathematics, and electrical science. Since it is packaged as a non-fiction guide, its invention of an idealized mother character reveals Trowbridge’s assumptions about the underlying value of a scientific education. He believes that technical expertise enables men to differentiate themselves from women and to stake a claim to the public sphere.

The flat female character is not the only trope that Trowbridge borrows from sentimental literature. The most sentimental of his texts, *The Electrical Boy*, focuses intently on the protagonist’s electrical and emotional connections with older male characters. Whether we read the protagonist’s emotional connections as queer or asexually sympathetic, the tone of these scenes in a largely technical text warrants attention because they were published during a historical moment when emotionality was becoming increasingly dissociated from rationality and science. During the early nineteenth century, electricity was closely associated with sympathy. Both were considered invisible, tangible forces that influenced human life. This association becomes less prevalent in the late-nineteenth century, in part because of the masculinization of science and technology. Mark Twain famously ventriloquizes this purported schism in his *A Connecticut Yankee in King Arthur’s Court* (1889), by developing a protagonist who introduces himself as being, “practical; yes, and nearly barren of sentiment, I suppose—or poetry, in other words” (20). As readers familiar with this book know, the Yankee did not excel at self-assessment; he overstates his ability to separate his practicality and
sentimentality. Nonetheless, this example establishes the fantasy that reason and sympathy could be disjointed from one another.

Despite the perceived divergence of science and sentiment at the turn of the twentieth century, *The Electrical Boy* persisted in framing sympathy in scientific terms. It suggests that learning to empathize with the poor would constitute “an interesting experiment [...] and one well worth trying,” since treating the poor unsympathetically is “an experiment, the origin of which is lost in the dark ages, and which has never been successful” (69). By identifying sympathetic and unsympathetic behavior as alternative “experiments,” the narrator advocates kindness. According to him, it would be irrational to reproduce an experiment—in this case, austerity towards the poor—that has repeatedly yielded failing results for centuries.

Trowbridge emphasizes sympathetic bonds among characters. He also provokes his readers to feel sympathetic responses. In addition to framing sympathy as a logical response, he adopts a generic convention from domestic fiction: he emotionally appealed to his readers with leading rhetorical questions. To amplify the reader’s sympathy for the orphan protagonist of *The Electrical Boy*, his narrator asks questions like: “Could the tears on the swollen eyelids, and the trembling tender lips be false?” (97). When narrating these sentimental moments, Trowbridge does not employ metaphors drawn from electricity in the same way that he did when describing education. Although sympathy and sentiment were coded as electrical in the early nineteenth century, this late-nineteenth-century novel uses less-charged language to convey its moral lessons.

Nonetheless, the technical electrical details of *The Electrical Boy* amplify the sentimental storyline in two significant ways. First, Richard forges his emotional connections by working with electricity. He entices a wide cast of characters with his technical expertise, attracting admiration that develops into friendship or queer affection. Second, Trowbridge’s descriptions of electrical circuitry—much like his direct address to readers—encourage the audience to empathize with Richard. In other words, by enticing the audience to build electrical circuits alongside Richard, the narrator helps readers identify with him.

To twenty-first century readers, these emotionally appealing rhetorical devices might seem to contrast the jarring racism of Trowbridge’s description of nonwhite characters. For example, in the above-mentioned scene where Richard expresses his disdain for James Fenimore Cooper, his mentor sinisterly agrees. Greatthings recites American-imperialist and white-supremacist ideals, telling Richard: “I read Cooper’s novels when I was a boy…and thought that Chingachgook was a real character. Look at these vagabonds sitting under their blankets, for all the world like poisonous lizards. Do you see any Chingachgooks among them? I wish I could clear the earth of them” (259). This casual paean to ethnic cleansing, juxtaposed with Richard’s preference for technical manuals, suggests that romantic visions of masculinity and racial harmony have no place in the *fin de siècle*. Instead, this passage hints that modern literature should emphasize white technological prowess over romanticized, humanistic, or pluralistic themes. In *The Electrical Boy*, electrical tinkering helps to forge material and sympathetic connections between white men, who work together in this episode to antagonize stereotypical American Indian characters.

Trowbridge was not alone for representing nonwhite characters unsympathetically within a largely sentimental novel; this popular genre aspired to
help readers learn how to “feel right” and who to feel for. Here, too, electricity plays a subtle role in the sympathetic subplot. According to popular mythology of the time, electricity forged connections between white men while leaving indigenous people disconnected and unable to cope with the modern world. This was a common trope in western literature and art, exemplified by the early-twentieth-century painter Henry F. Farny, whose “Song of the Talking Wire” (1901) (and related works) juxtaposed somber, lonely native figures with telegraph poles and icons of technological modernity to suggest that the rise of the latter had contributed to the perceived decline of the former. Notably, this mythology, like the ideologies presented in Trowbridge’s novels, was just one story white Americans told themselves to rationalize the racial violence that persisted in the face of supped progress.

Although it was published years after The Electrical Boy, Eugene Ware’s autobiographical history, The Indian War of 1864 (1911), can provide twenty-first century readers with a useful context for understanding how Trowbridge’s “emplotment” of racial superiority emphasized some historical details while leaving others out. First, Ware explains how settlers used telegraphs to assert their superiority over indigenous peoples:

In order to give the Indians a profound respect for the wire, chiefs had formerly been called in and had been told to make up a story and then separate. When afterwards the story was told to one operator where one chief was present, it was told at another station to the other chief in such a way as to produce the most stupendous dread. No effort was made to explain it to the Indians upon any scientific principle, but it was given the appearance of a black and diabolical art. The Indians were given some electric shocks; and every conceivable plan, to make them afraid of the wire, was indulged in by the officers and employés [sic] of the company, it being much to their financial advantage to make the Indian dread the wire. (110-11)

Ware’s account demonstrates how the white settlers used their ability to control electric power as a means to shock the native population—literally and figuratively. The telegraph operators deliberately withheld scientific explanations, mystifying the wires in order to protect their financial investment. Trowbridge mimics these exact racial and technological dynamics. His characters ridicule the Indian characters who do not understand electricity, and they set up circuits specifically to shock and trick racial Others—including Mexicans and Indians (250-54).

Ware’s history eventually undermines this early image of technological superiority. By the end of his account, his military company has completely lost its superficial control over the electric network. No longer amazed by the wires, Native Americans from the Southern Confederacy “cut down telegraph poles, and camped from time to time, and burned the telegraph poles for a long distance,” destroying more than seven times the number of telegraph poles than a recent electrical storm (510). Ware recalls that:

Those were the days when there were no railroads and no rapid mail communications, and the telegraph wire was in very great demand, and as there was only one wire to do the business through on each
route, it was busy every minute of the day, from the end of one month to the end of another; and so when the line was down, great interests suffered, as did also many private and personal matters. (530-31)

Throughout this history, the telegraph is described as aiding the settlers as they continue westward. It was their only way to ask for help and to stay connected with the East. Yet their dependence on this system and their inability to improvise by modifying the system or working without it, became a liability. Trowbridge omits any discussion of similar vulnerabilities: his protagonists can control electricity absolutely, without fear of shock or mistake. Their technological prowess symbolizes their racial and social superiority. Texts like Trowbridge’s, which rehearse narratives of racial and social superiority, helped white readers to imagine that electrical developments inevitably bolstered their racial superiority. The education that Trowbridge offers in his novels and nonfiction works was ideological as well as technical.

Conclusion: Comparing Trowbridge to His Contemporaries
Trowbridge—like other writers of early science fiction—imagined how electrical inventions could help a specific set of men gain control of the public sphere. In some cases, these male characters were traditional, and virile adventurers, but more often their inventiveness compensated for some sort of physical weakness. The protagonists in these Edisonades were often young, weak, disabled, or effeminate white men. In *The Electrical Boy*, Richard Greatman “made rapid progress in intellectual aptitude,” but in the process he “grew pale and thin” (174). According to prevailing medical orthodoxies, this could be an indicator of neurasthenia or nervous exhaustion.

In this cultural milieu, the nervous frailty of white men could be perceived as a problem because it could enable nonwhite men to embody an idealized masculinity that threatened existing cultural mores. However, within *The Electrical Boy*, Richard’s feebleness is not a problem. The protagonist sublimates his youthful energies and desires into electrical invention—an act that the narrator codes as exciting, sympathetic, and healthy. By demonstrating his prowess over the electrical current, Richard grows into an idealized young man. The analogies Trowbridge draws between the human mind and electrical power reinforced this point. This character’s facility with electricity seems to convey the compensatory adroitness of his brain and nervous system.

By idealizing weak male characters like Richard, Trowbridge develops sentimental subplots that engage with popular culture ideas about electrical devices as prosthesis.26 Similar representations were common in the Edisonade dime novel, an increasingly popular class of adventure literature that focused on invention and technical expertise.27 Trowbridge’s novels cannot be classified as texts in this subgenre, exactly; his novels were designed to be displayed on bookshelves, while Edisonade dime novels were printed on newsprint and intended to be replaced with each new installment.28 Nonetheless, the resonances between his novels and this more-recognizable form of early science fiction are worth outlining as we draw conclusions about Trowbridge’s body of work. The similarities and dissimilarities between these texts can further elucidate Trowbridge’s place in cultural history. Specifically, reading Trowbridge alongside Edisonade dime novels can help to throw
his texts into relief, enabling scholars to differentiate common tropes from more unique rhetorical decisions.

The subgenre we now associate with the Edisonade emerged in 1868, before Edison's name had become an analog for modern inventiveness and before Trowbridge composed his first novel. Edward S. Ellis's *The Huge Hunter, or, The Steam Man of the Prairies* was successful enough to inspire an onslaught of similar storylines. By the turn of the twentieth century, young characters like Frank Reade, Jr. and Tom Edison, Jr. were embarking on weekly adventures that any reader could enjoy for a nickel. These tales were among the first that we correlate to today's science fiction. While they did not typically share the same level of reproducible technical detail that Trowbridge's novels did, they too re-inscribed themes from romantic children's literature into technical terms by suggesting to generations of young readers that heroes always win because of their superior technical savvy. In this way, Trowbridge and Edisonade dime-novel writers each translated the belief that "machines are the measure of men" into legends for children—and in the process they perpetuated (and perhaps even co-constructed) that deterministic and racist bias. Trowbridge's debt to this subgenre remains imprinted on the titles of his first two novels. *The Electrical Boy* conjures the image of a younger, up-to-date model of the once-popular "Steam Man"; *Three Boys on an Electric Boat* fits the common Edisonade algorithm: Child hero + New Invention = Adventure. In fact, the latter novel was derivative of the Edisonade in terms of its plot and character development, as well as its title.

Throughout his career, Trowbridge adapted multiple elements from these dime novels. Like Frank Reade and Johnny from *The Huge Hunter*, Trowbridge's characters fought racialized Others with high-tech (often electrified) apparatuses of their own invention. And, while each of these texts bent towards the sensational, they also channeled sentimentality in ways that warrant attention. For example, this class of children's literature, like the feminized sentimental novel that came before it, frequently addressed readers directly to guide their emotional responses. Trowbridge might have been the only writer to address his reader as "gentle" in the conventional sentimental fashion, but emotionality and sympathy played a salient role in most Edisonade stories; the physicist was not alone for bringing adventure, science, and sentimentality together.

*The Huge Hunter* exhibits a specific brand of sentimentality that would become a hallmark of its subgenre and a model for Trowbridge's work. It illustrates how an invention could create a strong emotional bond between "The strong, hardy, bronzed trapper, powerful in all that goes to make up the physical man" and the "pale, sweet-faced boy [Johnny the inventor], with his misshapen body" (Chapter IV). Hump-backed and dwarfed, young Johnny's inventive genius allows him to transcend the limits of his body and effectively become a "hardy" frontiersman himself. He forges emotional connections and contributes to his family and small town by using his inventions to help others. He creates toys and solves problems for his mother and fellow students. He also uses an enormous steam robot to protect a group of virtuous prospectors from flat, villainous Indian characters, who cannot produce or understand complex devices like "the Steam Man." In this case, Johnny's inventions underwrite the novel's sentimentality, because they create and protect certain social and emotional bonds—and because they appeal to the reader's emotion by erasing the bodily differences between Johnny and the trapper. Ellis originated a theme that Trowbridge would elaborate upon repeatedly in his body of
work: inventions and electrical power can supplement the masculinity of effeminate or disabled young white men, allowing them physical and social power (including power over indigenous characters) that would otherwise be inaccessible to them.

Although Trowbridge cannot be classified as an Edisonade dime-novel writer, the resonances between his texts and works like The Huge Hunter can prove to be mutually illuminating. For example, the prevalence of sentimentality in both types of work can complicate Hintz’s account of the “ascetic ideal.” Trowbridge and other early science fiction writers imagined a technically adept masculinity that was also deeply emotional, suggesting that science and sentiment did not depart as early or as completely as historians have often imagined.

Trowbridge also drew upon the Edisonade dime novel’s mystification of electricity—even though he also instructs his readers how to use this energy. In The Electrical Boy, Richard and his friend Bill muse over the fact that they can see what electricity does but that they cannot know quite what it is (54). Trowbridge’s technical volume What is Electricity? elaborates upon this philosophical conundrum. It explains that an expert could describe electricity mathematically, and that he could demonstrate its effects, but that narrating its qualities would prove more difficult (v-vi). Trowbridge never fully answer the question he posed in the title to this non-fiction volume. Instead, he invites readers to continue to ponder electricity—to wonder where the metaphors they drew from it ended and where its physical realities began.

Trowbridge’s wide-ranging body of work can help us ask new questions about better-studied genres like the Edisonade dime novel or sentimental fiction; it can also challenge existing narratives of literary and cultural history, by complicating our understanding of genre or of the social meanings of electricity. This fascinating writer-professor has remained inscrutable to twentieth- and twenty-first-century scholars because his writing defied the generic conventions we now use to categorize historical literary texts. As long as we approach the archive of this era looking for science or literature, for sentimentality or technicality, works like Trowbridge’s, which challenge these still-permeable boundaries, will continue to escape our scrutiny and theorization. By approaching the archive expansively—or by lighting beacons so that future scholars may do the same—we can help to recover authors like Trowbridge, who can offer today’s readers a richer sense of the cross-disciplinary world of the late-nineteenth century.

Notes
1. On the layering of the technological and the natural sublime, see Nye, American Technological Sublime, 143-158. See also Lieberman, “Introduction.”
2. Hall, 204. I have encountered three books that were not attributed to Trowbridge in Hall’s biography, including The Advance in Electricity Since the Time of Franklin (Cambridge: Harvard University Press, 1922), Franklin as a Scientist (New York: Cambridge University Press, 1917), and the pseudonymously printed The Great Match, and Other Matches (Boston: Roberts Brothers, 1877). I focus on the books the National Academy of Sciences records in his biography because only these six are positively verified as Trowbridge’s work. These three unlisted books are also outliers in other ways. Franklin as a Scientist is not exactly a book; it is a short pamphlet that was reprinted from the publications of the Colonial Society of Massachusetts, Vol. XVIII. The Great Match is attributed to “Noname.” The Advance in
Electricity is more historical than technical or literary in its tone and construction.

3. Trowbridge was a prolific writer. According to the NAS biography, his earliest scientific article was published in 1872, his latest in 1911.

4. On the professionalization of electrical engineering as opposed to popular or business-oriented understandings of electricity, see Nye, Electrifying America, 158-169; on specialization and mechanization, see Trachtenberg, 42-46.

5. See Debourgo, 199-200; Gilmore, 62-3; Tresch, 29-59.

6. On the development of engineering education, see Layton, 1-19. On the rise of objectivity, see see Gallison and Daston, 11-53.


8. Trowbridge was not the only scientific practitioner to take on literary pursuits in the nineteenth century. James Clerk Maxwell wrote poetry, for example. On Maxwell’s poetry, see Clarke, 89-93. Indeed, Laura Otis compiled an excellent anthology on the intersections between science and literature in this time period, Literature and Science in the Nineteenth Century. Still, as I discuss, The Electrical Boy is unique for its form and its popularity.

9. Trowbridge’s middle novel, Three Boys in an Electric Boat, includes fewer technical details and is less innovative in many ways than his first and last novel.

10. C.P. Snow lamented the perceived antagonism between science and art in “The Two Cultures,” a 1959 lecture which is now available as a book. “The Science Wars” were a public disagreement regarding the public discussion of science, often attributed to Alan Sokal’s publication of a phony paper in Social Text during the 1990s.

11. In fact, Richard Greatman and George Greatthings visit “the whizzing dynamo electric machines of a central station” in an earlier episode (132).


14. On the theme of asceticism in inventor’s biographies, see Hintz, 205.

15. See Hintz, 200-01.

16. It is worth noting that the “drawing” Trowbridge describes is not necessarily technical draughting; he describes drawing sailboats and other images. For more on the role of draughting in national technological identity, see Brown, 195–238.

17. Trowbridge discusses these plans in The Resolute Mr. Pansy on pages 48 - 81.

18. Jack London was among the young people who were duped by this ideology. He describes how he was tricked into believing that technical skills would help him work his way up from poverty in London, 187-193.

19. See Welter, 151-174. As a postbellum writer, Trowbridge penned his novels after the heyday of the true woman that Welter describes, but his conservative and flat depictions of angelic women correspond to the domestic ideals she identifies.

20. Some of these relationships are utilitarian, but most are homosocial and arguably queer. For example, when the protagonist reunites with his friend Bill after a brief separation, the latter “let Richard caress his hand, feeling glad that there were none of the other boys round to see” (59-60). Later in the novel, Richard befriends an effeminate giant named Leap who describes himself as “a sensitive, shrinking spirit, almost like that of a girl, enslaved in a frame that grew to be a
This character stares at Richard with an “intense yearning gaze” that signifies both devoted friendship and desire (190).

21. On the correlation between electricity and sympathy, see Gilmore, 116.
22. On the process of gendering technical labor, see Oldenziel, 19-50.
24. For more on how white electrical experts differentiated themselves from racialized and gendered Others, see Marvin, 17-32.

25. Hayden White describes the process of constructing history as “emplotment,” as historians fit details into plots that tell a story—romantic, tragic, ironic, or otherwise. See Metahistory, 29.

26. This fantasy about technological prosthesis mapped onto prevailing medical treatments for men who suffered from nerve weakness. While women were famously prescribed a rest cure, men were prescribed either the “West Cure” (adventures in the outdoors) or energy-supplementing tools such as electrical belts. On this electro-medical tradition, see Peña, 89-136. Notably, the frailty of the “civilized” white man was not necessarily seen as a weakness compared to the stereotypically virile primitive man. See Bederman, 22-23.

27. Like Edisonade writers, Trowbridge drew inspiration from the mythologized persona of Thomas Edison and similar figures. In the physicist’s first novel, the eponymous “electrical boy” rose up from poverty by attracting the attention of beneficent investors with his work ethic and his natural talent for telegraphy—much like the “Wizard of West Orange” himself. Trowbridge’s second novel featured young boys who were also self-taught tinkerers. The image of the young, bootstrapping electrical expert captured the imagination of Trowbridge and of his desired audience.

For a complete definition of Edisonade, see Clute and Nicholls, 368 and Luckhurst, 50-75. Since this genre is identified as a predecessor to (or earlier form of) science fiction, it can be left out of U.S. histories of children’s science fiction, which typically begin with Robert A. Heinlein’s Rocket Ship Galileo (1947). On this history of children’s sf, see Esmonde, 3. Hugo Gernsback, the magazine editor largely credited to be the father of science fiction disagreed, tracing the scientific romance back to Edgar Allan Poe’s writing. On Gernsback’s account of the history of sf, see Westfahl, 280. Still, Trowbridge has escaped the attention of bibliographers of this genre.

28. The materiality of these objects bespoke their cultural currency. Trowbridge’s novels were socially sanctioned, whereas dime novels and sentimental fiction were considered dangerous. The physical properties of Trowbridge’s books aligned them more closely with technical guidebooks for children and with inventor’s biographies than with dime novels. Sensational Edisonade weeklies for young readers were listed among influential politician Anthony Comstock’s “traps for the young.” He warns: “Parents and teachers, you may look upon the dumb pages of these story-papers and think there is no harm in them. You may be indifferent, negligent, and careless. But I warn you against these leprous influences.” Comstock, 41. Comstock focuses on weeklies about crime, but his larger concern about the dissipation of youth and the de-emphasis of virtue in children’s literature extends to other dime novels of the day. For earlier versions of this criticism, see “Pleasant and Profitable,” 67.

29. On this prejudice, see Adas, 241-70.
30. For examples of this title style, see Frank Reade and his Steam Man of the
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*Plains;* Robert T. Toombs, "Electric Bob’s Sea Cat," *Brave and Bold* (25 Mar 1905), or most of Victor Appleton’s *Tom Swift* titles.

31. The address to the “gentle reader” was a convention of the American sentimental novel, dating back to Susanna Rowson’s *Charlotte: A Tale of Truth* (1791). Trowbridge invokes this literary tradition explicitly when he addresses the reader as “gentle” in *The Electrical Boy,* 384. For more on the sentimental tradition that Trowbridge invokes, see Howard, 62-81. Randall Knoper’s discussion of electro-vitalist understandings of sympathy is particularly salient. See Knoper, 715-45.

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