

At the Interface

The Case of the Electric Push Button, 1880–1923

RACHEL PLOTNICK

Introduction

In 1916 educator and activist Dorothy Canfield Fisher lamented: “[T]he fact that so often in modern America one may press a button and be served, seems to relieve one of any necessity for responsibility about what goes on behind the button.” She warned that “there is a great danger of coming to rely so entirely on the electric button and its slaves that the wheels of initiative will be broken, or at least become rusty from long disuse.”¹ Fisher recognized how use of push-button interfaces had contributed to making electrical experiences effortless, opaque, and therefore unquestioned by consumers. She and others worried that if button-pressers could not envision the mechanical processes that happened behind buttons, they would lose all ability to navigate in the world. The author’s words reflected social concerns related to managing electrical services and obtaining knowledge about everyday technical objects in the early twentieth century. Could these interfaces, as points of mediation between users and electricity, offer too much of a good thing?²

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1. Dorothy Canfield Fisher, *Self-Reliance*, 3.

2. Key works on the subject of mediation include: Don Ihde, *Bodies in Technology*; Steven D. Lubar and W. D. Kingery, *History from Things*; and Peter-Paul Verbeek, *What Things Do*. Scholars have come to recognize “mediation” as a key concept in studying technological artifacts from social and historical perspectives.

Building from this question, this article examines the case of electric push buttons in the years between 1880 and 1923.³ It studies two phases in the development of push buttons, with particular emphasis on educational strategies employed by a number of relevant social groups, from advertisers and electricians to journalists and educators, who aimed to make button interfaces intelligible to consumers.⁴ The first phase, between approximately 1880 and 1915, represented an indeterminate period of many circulating perspectives about buttons. Some believed that users should creatively interrogate these objects and learn how they worked as part of a broader electrical education. Others, particularly those who profited from sales of push buttons and push-button products, suggested that pushing buttons could help users to avoid complicated and laborious technological experiences. These approaches reflected different groups' attempts at managing fears of electricity: Would knowledge and exploration eliminate fear, or would appeals toward simplicity and effortlessness serve as a better strategy for dealing with electrical anxieties?⁵ Beginning around 1915, users' familiarity with push-button interfaces caused these surfaces to stabilize and become "black boxes," with fewer requirements for education about how buttons worked, as Fisher noted in the above passage.⁶ While at first this evolution behoved the electrical industry, which had long sought to promote buttons as easy, one-touch solutions, electrical experts and promoters soon discovered that buttons' taken-for-granted status made electricity similarly underappreciated. This attitudinal shift thus precipitated a second phase, between approximately 1915 and 1923, when industry members embraced an educational model that strove to make buttons worthy of renewed interrogation by laypersons.

While examining pedagogical strategies and definitions of buttons operating in each of these stages, this article also considers how the study of push buttons illustrates broader issues for consideration when interrogating user interfaces as social, cultural, and historical objects. Although push buttons and their counterparts like dials, keys, and levers may seem

3. These years do not provide hard-and-fast boundaries by any means, but for the purposes of this study they mark the general outlines between one mode of button-pressing behavior/symbolism and another.

4. The term "relevant social groups" comes from the social construction of technology (SCOT) literature; see Wiebe E. Bijker, Thomas P. Hughes, and Trevor J. Pinch, eds., *The Social Construction of Technological Systems*.

5. A number of authors have carefully considered the introduction of electricity from the perspectives of both laypersons and experts, and have particularly noted the anxiety associated during this time period. See, for example, Carolyn Marvin, *When Old Technologies Were New*; David E. Nye, *Electrifying America*; and Linda Simon, *Dark Light*.

6. For more in-depth discussions of "stabilization," "closure," and "black boxes" as they are referred to in science and technology studies (STS), see Bijker, Hughes and Pinch, eds., *The Social Construction of Technological Systems*, and Bruno Latour, *Science in Action*.

trivial in the grand scheme of technological interactions, in fact they offer a fascinating vantage point from which to understand human–machine relationships. The *Oxford English Dictionary* defined an “interface,” as early as 1884, as “a surface lying between two portions of matter or space, and forming their common boundary.”⁷ While this definition referred to science, it offers a useful framework in the context of studying interface technologies past and present. Historians of technology should begin to understand more systematically how these surfaces have acted as vital nodes in a network of pushes, presses, and touches at different historical moments.

Scholars routinely refer to user interfaces when examining objects like radios (dials/knobs), typewriters (keys), or televisions (screens), and in the context of graphical user interfaces for computing, although these mechanisms have yet to receive sustained attention in most literature.⁸ These authors have identified ways in which user interfaces, like any technologies, result from a “dialectical relationship between technological innovations and the conceptions of their uses—and their users.”⁹ Choices to make the QWERTY keyboard a mainstream interface for word processing, to make push buttons the standard mode of operating elevators and microwaves, and to make screens the location of computing each occurred for technological and social reasons.¹⁰ User interfaces carry with them significant metaphorical power, lending popularity and credibility to particular pushes of the finger or twists of the wrist, even when they cannot facilitate tasks as well.¹¹ Different kinds of interfaces also matter in terms of the technical skill required to operate machines, and a number of texts have explored how users’ skill sets change depending on the nature of the equipment.¹² The behaviors involved in tinkering with and tuning a 1920s radio dial do not compare to the digital pushes that now facilitate choosing a radio station in the twenty-first century, for example. And, through their affordances and limitations, interfaces can either encourage or forestall user innovation, a topic of interest that has appeared widely in discussions concerning the social construction of technology (SCOT).¹³

7. *Oxford English Dictionary*, s.v. “interface,” available online: <http://www.oed.com/> (accessed 1 September 2011).

8. See, for example, Thierry Bardini, *Bootstrapping*; Steven Johnson, *Interface Culture*; Lev Manovich, *The Language of New Media*; and Trevor J. Pinch and Frank Trocco, *Analog Days*. In the area of graphical user interfaces (GUI) and the history of user interfaces more broadly, see Jonathan Grudin, “Interface,” 110–19; Anker Helms Jørgensen and Brad A. Myers, “User Interface History,” 2415–18; and Brad Myers, Scott E. Hudson, and Randy Pausch, “Past, Present and Future of User Interface Software Tools,” 3–28.

9. Bardini, *Bootstrapping*, 103.

10. *Ibid.*

11. Thomas Hine, *Populuxe*. Hine does an excellent job of discussing the symbolic meaning of cold war buttons and the ways that “space age” design trumps functionality.

12. See, for example, Andreas Fickers, “Design as Mediating Interface,” 199–213; and Kristen Haring, *Ham Radio’s Technical Culture*.

13. Many have written about user innovation from various disciplinary perspectives.

Despite widespread recognition that user interfaces provide important context to the ways that people interact with machines, literature on the history and historiography of technology has yet to grapple with these surfaces as distinct technical objects that mutate over time.¹⁴ What, in other words, does “dial” or “button” mean at different historical moments? How can histories of user interfaces, ranging from tactile to visual, help scholars to better approach technological artifacts both theoretically and practically? The following sections begin to tackle these questions by considering push buttons as objects that mediated between users and electrical machines of the late nineteenth and early twentieth centuries.

The Electric Push Button as Material Technology

The word “button,” from the French *bouton*, originally referred to “a pimple, any small projection” or “to push, thrust forwards” beginning in the fourteenth century.¹⁵ While it is impossible to pinpoint any single “origin” of push buttons, these interfaces evolved from a number of other surfaces, including the inanimate buttons that adorned clothing.¹⁶ Many mechanical iterations of buttons existed well before the 1880s; in fact, one electrician in 1898 attributed the push button’s origin to the spinet piano used as early as the sixteenth century.¹⁷ The concept of pushing a button stemmed, in part, from pressing the keys of musical instruments, as well as from other interactions with key-driven devices like typewriters and telegraphs.¹⁸ By the 1860s these devices helped to expand the definition of “button” into something that an individual could press to perform an action.¹⁹ While one could approach a history of push buttons from many angles, this study focuses specifically on the powerful combination, both literal and figurative, of buttons and electricity that came about at the end of the nineteenth century: for the first time, electric buttons enabled a binary on/off control of machines by completing an electrical circuit.

In particular, see Ronald Kline and Trevor Pinch, “Users as Agents of Technological Change,” 763–95; and Eric A. von Hippel, *The Sources of Innovation*. While these authors emphasize the power of user innovation, this article emphasizes that at times, particular technological design and social factors can actually forestall or make unnecessary user innovation.

14. Although it is ahistorical, see Søren Pold’s “Button,” 31–36, for an examination, from the software studies literature, of the button as a cultural object. This essay begins to conduct the kind of study called for in this article.

15. Hensleigh Wedgwood, “Button,” 121.

16. For a study and history of buttons on clothes, see Nina Edwards, *On the Button*.

17. “Automatic Devices,” 339.

18. For the relationship between musical instruments, key devices, and buttons, see Pinch and Trocco, *Analog Days*; and Ivan Raykoff, “Piano, Telegraph, Typewriter,” 159–74.

19. *Oxford English Dictionary Online*, s.v. “button,” available online: <http://www.oed.com/> (accessed 1 September 2011).

Within a few decades, buttons transformed from largely flat and inanimate surfaces that could only trigger a spring mechanism into “live,” charged interfaces that could command light and sound from distances both long and short. The case of push buttons fits into a broader history of electrical switches and switching, a subject largely untreated by scholars to date.²⁰

In the early 1880s very few electric buttons existed, as, in fact, very few electric devices were available to the general population. An 1882 catalog, for example, offered consumers a total of three push-button options: a pear-shaped push button (“to be attached to [an] Electric Bell”), a compound push button (a panel with three buttons designed for office use so that managers could buzz a cashier or assistant), and a circular push button (in bronze, nickel, or wood) for “insert[ing] in desks or other furniture.”²¹ These buttons ranged from 75 cents to \$2.50 apiece in cost and occupied but half a page in a catalog of more than a hundred pages. Two years later, the same catalog had expanded its offerings to one full page of buttons, most with the same affordances but featuring larger, more detailed illustrations.²² By the early twentieth century over fifty different designs of push buttons existed, all at a fraction of their previous cost²³ (fig. 1). Consumers could purchase buttons that clamped to dining room tables or embedded in floorboards for easy pressing by hand or foot; they could have buttons with lettering, numbering, and intricate decorations; or they could choose buttons that hung from cords, were illuminated, and made a variety of sounds. Ranging from plain to incredibly ornate, push buttons in the early twentieth century had evolved into inexpensive, desirable, and multi-faceted electrical accessories.²⁴

Inventors consistently propelled these push-button technologies forward by mapping out new plans for users to press buttons and receive feedback in the context of daily tasks like ringing a bell, summoning an employee, or honking a car horn. According to one appraiser of these interfaces in 1890, “It would seem that so simple a thing as a push-button leaves little room for improvement or change, but this is not wholly true.”²⁵

20. One exception to this unexamined area of study is Chris Otter’s *The Victorian Eye*. This text, however, focuses on switches primarily from a visual perspective.

21. Patrick & Carter Co., “Patrick & Carter’s Illustrated Catalogue and Price List” (1882), in Warshaw Collection of Business Americana, box 14, National Museum of American History Archives Center (hereafter Warshaw-NMAHAC).

22. Patrick & Carter Co., “Patrick & Carter’s Illustrated Catalogue and Price List” (1884), box 14, in Warshaw-NMAHAC.

23. Patrick, Carter & Wilkins Co., “Patrick, Carter & Wilkins Co. Catalogue of Annunciators, Alarms and Electrical House Goods” (1909), box 14, in Warshaw-NMAHAC.

24. See other catalogs in Warshaw-NMAHAC, including: Belden Manufacturing Company, “Belden Manufacturing Company Catalogue, No. 4” (1909), box 1; Novelty Electric Company, “Novelty Electric Company Illustrated Catalogue and Price List, No. 16” (1899), box 14; and Ohio Electric Works, “Illustrated Catalogue of the Leading Electric Novelties and Appliances” (n.d.), box 14.

25. “An Improved Push-Button,” 266.

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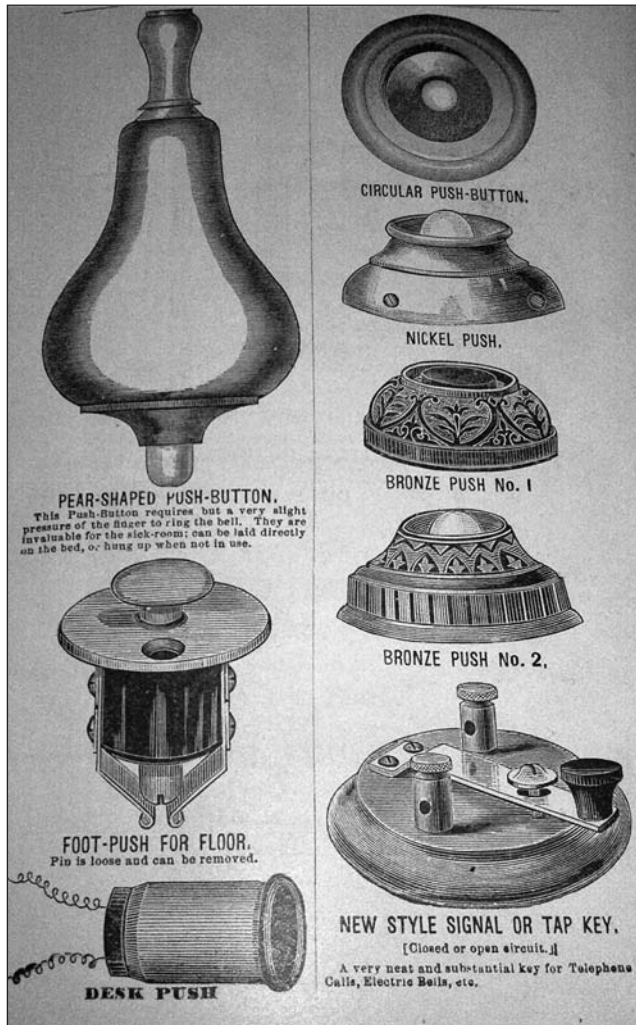


FIG. 1 A catalog advertising a variety of push buttons available for purchase. (Source: Patrick, Carter & Wilkins, *Catalogue of Annunciators, Alarms and Electrical House Goods*, 1909. Image courtesy of Warshaw Collection of Business Americana—Electricity, Archives Center, National Museum of American History, Smithsonian Institution.)

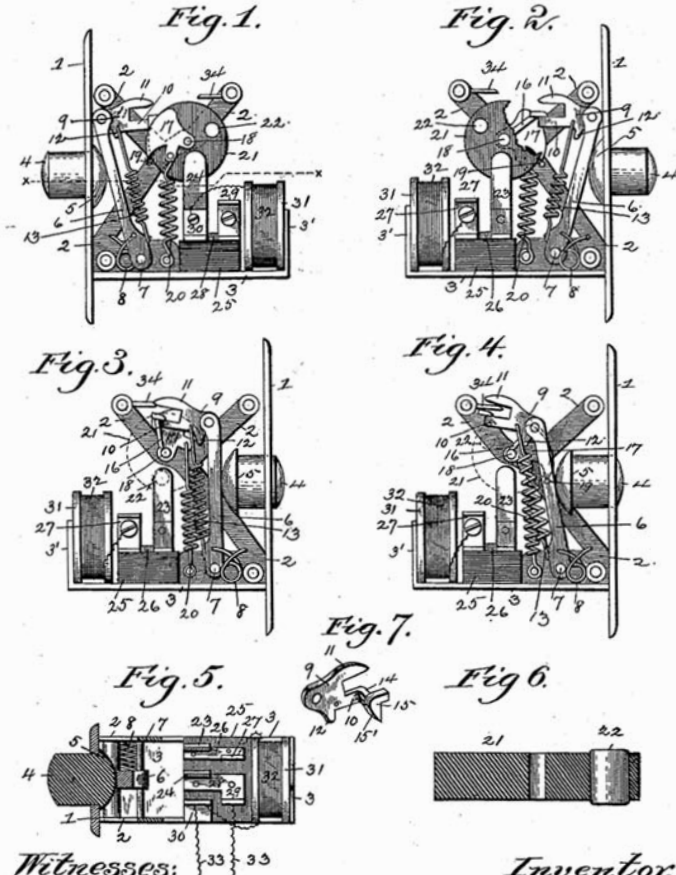
Indeed, hundreds of patent applications were filed for “electric buttons” or “push-buttons” between the 1880s and 1920s, reflecting the fact that these quite common interfaces often served as sites for creativity, innovation, and iterative design (fig. 2). Patents typically fell into three categories regarding engineers’ contributions: first were plans to make push buttons simpler to

(No Model.)

J. F. McLAUGHLIN.
PUSH BUTTON.

No. 521,808.

Patented June 26, 1894.



Witnesses:
J. M. Givv.
G. T. Chapman

Inventor,
James F. McLaughlin,
By *Joseph Hyman,*
Attorney.

FIG. 2 James F. McLaughlin's patent drawing for a push button with a regulator which prevented users from pressing the mechanism for too long and overheating the circuit (filed 22 March 1893, issued 26 June 1894). (Source: www.google.com/patents/US521808.)

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operate, typically by finger or by foot;²⁶ second were plans to strengthen buttons' electrical contacts to convey electricity and to fortify them against dust and weather elements;²⁷ and third were plans to construct buttons with refined aesthetics so they would blend into overall décor schemes in domestic spaces.²⁸

These categories indicate inventors' priorities when considering how push buttons fit into a spectrum of electrical technologies. First and foremost, buttons should easily bend to the will of their operators; they should cause no difficulty for pressers, feature inexpensive materials (such as wood or readily available metals), and facilitate rapid access to electricity.²⁹ Second, buttons should withstand the rigors of human use and survive both indoor/outdoor conditions, and electricians should be able to conduct repairs without wholly removing wiring from walls or floors.³⁰ Finally, buttons should not attract excessive notice; rather, they should act as decorative accoutrements rather than focal points. From a material perspective, push buttons fell into a class of everyday objects for those who could afford electrical wiring; they were made of reasonably priced parts, and were straightforward in operation and ordinary by most appearances.³¹ Although buttons provided luxury by domesticating electricity with a finger's press, early producers and users envisioned these interfaces primarily as labor-saving tools meant to fit in with social and cultural patterns of efficiency, control, and modern design demanded by the Industrial Revolution.³²

26. For examples, see Charles H. Delano, "Push-Button," U.S. Patent no. 470,372; George Jepson, "Push-Button," U.S. Patent no. 574,247; and George H. Streichenberg, "Push-Button," U.S. Patent no. 435,866.

27. See, for example, Percy C. Howe, "Push-Button," U.S. Patent no. 638,680; Lenora H. Jones, "Electric Push-Button or Push-Button Switch," U.S. Patent no. 1,333,115; and Charles W. Wachtel, "Push-Button," U.S. Patent no. 900,006.

28. See, for example, Charles Auth, "Push-Button," U.S. Patent no. 985,101; and Frederick J. List, "Push-Button," U.S. Patent no. 606,562.

29. "Hart H. & H. Push Switch," 324. Hart & Hegeman Mfg. Co. developed a product in 1905 that would be "desirable in hotels, private houses and other places where women and children use switches, something [that] should be employed which did not call for the strength of a man's hand to operate."

30. "An Improved Moisture-Proof Push Button," 12. Outdoor buttons were prone to moisture seeping in, particularly in places like breweries, icehouses, or damp cellars, which led one inventor in 1898 to create a moisture-proof button that would "last for years unaffected by external conditions."

31. The material culture of push buttons is important in terms of understanding how these objects were perceived and used. For a discussion of the ways that a turn toward "materiality" have figured into histories of technology, see Tara Hamling and Catherine Richardson, *Everyday Objects*; Lubar and Kingery, *History from Things*; and Daniel Miller, *Material Cultures*.

32. Marvin, *When Old Technologies Were New*, 124. Marvin notes that "[t]he electric pushbutton, another luxury artifact, symbolized a streamlined consumer electricity capable of delivering instant gratification," and that these interfaces often seemed "dangerous" to elites and laypersons alike because of the luxuries they could afford. While

Of the various kinds of push-button devices in use between 1880 and 1923, electric bells (today called doorbells) were certainly the most common, although they received little attention as electrical novelties due to their simplicity.³³ Electric-bell outfits, which operated by a battery and a wired push button that would close an electrical circuit, offered an inexpensive and effective way to incorporate electricity into one's home at the end of the nineteenth century.³⁴ Used both indoors and outside, the push button for ringing a bell was "so well known that we need not describe it," wrote Édouard Hospitalier and C. J. Wharton in their book *Domestic Electricity for Amateurs* in 1889. Still, they did provide a few details, mentioning that the "bell-push" was "made of wood, ebony, porcelain, bronze, copper, ivory, celluloid," and that the button would allow for "electric communication" by a simple mechanical motion.³⁵ *The Standard Electrical Dictionary* of 1892 similarly noted that buttons were primarily used for ringing doorbells, room-bells, and those constructed for insertion into floors to be operated by foot.³⁶ An array of publications for electrical experts and amateurs surfaced regarding the electric bell and its push-button interface, including *Bell-Hangers' Hand Book* (1889), *Electric Bells and All About Them* (1889), *How to Make and Use an Electric Bell* (1906), and *Practical Electric Bell Fitting* (1907).³⁷ These texts promoted the bell and push button duo as easy to implement and use in any domestic environment.

As time progressed, inventors created and promoted a multitude of new technologies that integrated push buttons into machines, particularly by finding ways to make electricity mobile and untethered. While a key-shaped switch would operate individual lights like chandeliers or table lamps from the light's location, wall plates featured one or multiple buttons to control lights in living spaces, such as hallways, basements, and bedrooms, from a distance. Designers routinely aimed to provide users with remote access to electricity, offering products like alarm clocks that users could operate from their bedsides with a push button attached via a cord.³⁸ Other novelties in later years included the "Ever-Ready communicator" (1910), designed to allow a driver to communicate with his backseat passenger by push button, and the "Ever-Ready vest pocket light" (1915), one

push buttons did connote luxury, materially, these interfaces were quite ordinary and unassuming as compared to many other electrical curiosities.

33. "A Century of Electricity," 266.

34. John Munro, *The Story of Electricity*.

35. Édouard Hospitalier and C. J. Wharton, *Domestic Electricity for Amateurs*, 28.

36. Thomas O'Connor Sloane, *The Standard Electrical Dictionary*.

37. See F. B. Badt, *Bell-Hangers' Hand Book*; Selimo Romeo Bottone, *Electric Bells and All About Them*; Edward Trevert, *How to Make and Use an Electric Bell*; and Frederick Charles Allsop, *Practical Electric Bell Fitting*.

38. J. Elliott Shaw Co., "Household and Experimental Electrical Supplies" (1903), 21, box 15, and Manhattan Electrical Supply Co., "Electrical, Bicycle, and Photographic Supplies," box 13 (n.d.), both in Warshaw-NMAHAC.

of the first push-button flashlight designs.³⁹ Just a few of the many advances made in the realm of push buttons, they increasingly came to represent instantaneous control on the go and in one's home. Electric-button interfaces underwent a number of material changes as inventors experimented with ways to integrate these surfaces fluidly into daily life, while symbolically they also took on a variety of situation-dependent meanings. The following sections consider educational strategies employed to render push buttons as symbolic mediators between users and electricity.

Promoting Tinkering, Education, and Exploration

At the end of the nineteenth century many laypersons had a working knowledge not only of electricity, but also of the buttons they pressed and the relationship between the two. In formal classroom settings, educators taught students in elementary schools how to create electric bells, buzzers, and buttons; indeed, schools considered building these household electric devices an important part of students' science curriculums. Outside of the classroom, a wealth of books and magazines targeted school-aged tinkerers, encouraging them to explore and understand their physical world, including the push buttons that animated their everyday environments. Numerous publications also appeared for adults—both men and women—to help them manage a growing set of electrical tools. In each of these cases, a “push-button education” involved thinking about the button as a gateway to understanding electricity's nuances; popular and academic primers often featured lessons on how buttons worked in their first few pages.

Prior to the twentieth century students received erratic education in natural science, with little formalized instruction. In 1905 elementary-school science teacher Hugo Newman noted that this branch of science was “treated at first with contempt” and as a “fad,” but that recently educators had come to accept natural phenomena as a necessary part of education for boys and girls.⁴⁰ As this kind of comprehensive science education gained traction, students in grades 6–8 in traditional schools routinely began learning tasks like constructing a push button, fixing an electric bell, understanding the mechanisms underlying telephones and telegraphs, and creating burglar alarms. While educators typically described boys as their target audience for lessons about electricity and magnetism, most professionals agreed that girls also could benefit from lessons on “domestic economy” and the simple devices one might operate in a home.⁴¹ In education journals, many teachers proposed a hands-on approach to electricity,

39. Eveready Corporation, “Eveready Motor Accessories, London” (1910), 29, box 19, and “Don't Grope in the Dark” (1915), 6, box 14, both in Warshaw-NMAHAC.

40. Hugo Newman, “Science Teaching in Elementary Schools,” 194.

41. See P. Crecelius, “Repairing the Electric Bell,” 163–64; and Hazel W. Severy, “Applied Science as the Basis of the Girl's Education,” 1020–24.

where students could utilize the classroom as a laboratory for tinkering with the objects they encountered outside of school: “[W]e are not only acquainting our pupils with the great truths of science,” wrote Newman, “but we are creating and fostering that most desirable and productive quality, the ‘scientific habit of mind.’”⁴² Understanding how push buttons worked played an integral role, in educators’ estimations, of thinking scientifically about everyday technologies.

In part, teachers envisioned a push-button education as a means to counteract fear and misinformation about how electricity worked, particularly given adults’ hesitancy about it. An 1889 article in *Pennsylvania School Journal* spoke to this effect about the pedagogical value of an electrical education. According to the author, “I have known persons who were afraid to have an electric bell in the house, and have been told that such cases are common. These persons are even afraid to ring an electric door-bell. A little child, however, after observing a few simple experiments in electricity, probably thinks with perfect coolness when he touches an electric bell knob, ‘Now I have closed the current.’” The writer concluded: “We have not yet given the very smallest children the experiments in electricity, but mean to do so before long, and they are such as to remove the feeling of awe (as of unnatural agency) that many have for electricity.”⁴³ This passage described both the uncertainty surrounding electrical devices as seemingly simple as a doorbell, and the educational system’s efforts to indoctrinate children about electricity’s processes in order to counteract fear at an early age. By calling for education about how to close and break a current, the author suggested that learning about a button’s mechanisms could prevent unnecessary “awe” about electricity’s powers; push-button interfaces could act as safe mediators between young button-pressers and electrical forces.⁴⁴

Teachers also viewed buttons and other electrical tools as a way to “hook” students to appreciate science more generally. Asked professor of education Paul Hanus in 1909: “Why cannot we begin natural science with the study of the push button, the camera, the electric light or the lighting of a match? . . . [A]ll studies should be taught with reference to their social significance.”⁴⁵ Teacher Otis Caldwell similarly commented in 1910 that hands-on experiments, such as building and taking apart electric bells and examining telephones, telegraphs, and dynamos, were necessary activities for students to fully grasp their lessons.⁴⁶ In 1915 C. F. Phipps of the School

42. Newman, “Science Teaching in Elementary Schools,” 202.

43. Jennie Darlington, “Science for Children,” 170.

44. For a discussion of the relationship between anxiety and electricity, see Simon, *Dark Light*. Simon notes that historical actors associated electricity with visions of wonder, magic, and haunting, among other things. Other books that deal with this issue include Graeme Gooday, *Domesticating Electricity*; and Jeffrey Sconce, *Haunted Media*.

45. Paul Hanus, “The Month’s Review,” 3–15.

46. Otis W. Caldwell, “Natural History in the Grades,” 49–62; see also L. Dow McNeff, “Electricity as a Subject for Study in Elementary Schools,” 271–76.

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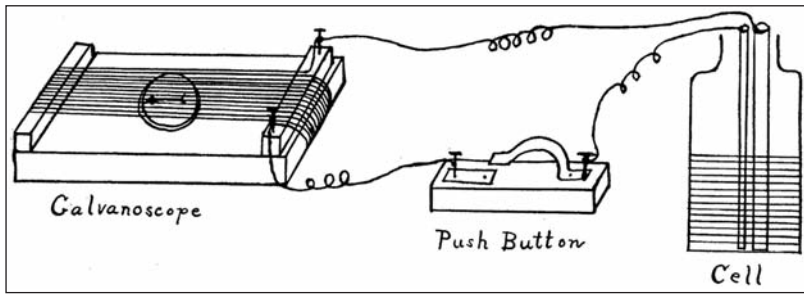


FIG. 3 A typical diagram used in educational primers to describe how push buttons connected to an electrical circuit. (Source: *The Elementary School Journal* 15, no. 8 [1915]: 407–20. Image courtesy of University of Chicago Press.)

of Education at the University of Chicago also advocated for a range of classroom activities that allowed sixth- and seventh-grade students to engage with everyday electric bells, buzzers, and push buttons. Phipps's "Lesson on the Push Button" suggested that teachers should begin by "allow[ing] students to examine an ordinary push button, which may be purchased for ten cents, learning parts and connecting it in with bell and cell"⁴⁷ (fig. 3). The article instructed teachers to "have the children draw a plan of a simple push button which they would like to make," and to permit them to "keep [the push button] for future use in school or at home."⁴⁸ The lesson portrayed buttons as ordinary, easily purchased and constructed objects, but it also motivated students to investigate their inner workings. Educators routinely noted that they wanted their students to use push-button interfaces as blank slates for experimentation.

In addition to formal lessons in classrooms regarding push buttons, popular newspapers, magazines, and books also encouraged children to take an interest in constructing bells, buzzers, and buttons. The book *Things a Boy Should Know About Electricity* (1900), for example, outlined various uses of push buttons for aspiring young male engineers, including affixing buttons to windows and doors for burglar alarms and for turning lights on and off.⁴⁹ Similarly, an article in the *Atlanta Constitution* in 1900 titled "A Boy and a Bell" detailed how a boy should go about constructing his first bell for his mother. In a section called "The Push Button," the author noted that "the push button is so simple that the average boy can take two pieces of thin sheet brass, copper, or iron and make a temporary one in a few minutes."⁵⁰ Other texts included *Questions and Answers About*

47. C. F. Phipps, "Classroom Methods and Devices," 411.

48. *Ibid.*

49. Thomas M. St. John, *Things a Boy Should Know About Electricity*.

50. "A Boy and a Bell," B2.

Electricity: A First Book for Students (1892), *Real Things in Nature: A Reading Book of Science for American Boys and Girls* (1903), *The Sciences: A Reading Book for Children* (1904), and *Harper's Electricity Book for Boys* (1907), each of which included a section on buttons and their relationship to electricity.⁵¹ The latter book told readers about push buttons' important role in making and breaking electrical connections, explaining the user interface's logic while at the same time emphasizing its importance to the electrical circuit's overall functionality.⁵² While some texts targeted high-level scientists and inventors and aimed to demystify the nuances of electricity, this primer and others focused on the ways that children could tangibly and meaningfully interact with electricity.

A similar set of texts existed for adults that focused on the practical applications of electricity in homes, with education on push buttons available for amateur tinkerers. Titles such as *Domestic Electricity for Amateurs* (1889), *Everybody's Hand-Book of Electricity* (1890), *Electricity in Daily Life* (1890), *Popular Electric Lighting* (1891), *Electric Toy Making for Amateurs* (1891), and many others provided detailed instructions and visual diagrams on buttons as electrical components.⁵³ Magazine articles, including "Electricity Applied to Household Affairs" (1893), "Electricity in the Household" (1897), and "Electricity as a Domestic" (1901) specifically addressed home repair for do-it-yourselfers.⁵⁴ While most of these texts identified men as their primary constituents, others appealed to women, given push buttons' prominence in domestic spaces. In a 1905 *Good Housekeeping* article titled "The Electric Bell a Woman's Charge," for example, author Helena Higginbotham informed female readers that she had wired nine homes beside her own, and she articulated that any woman could easily gain this knowledge. Describing problems that someone might encounter when installing electric bells, Higginbotham gave special attention to push buttons and their potential misfires.⁵⁵ Rather than as inaccessible, taken-for-granted interfaces, buttons appeared in this article and the others discussed above as simple technical objects that individuals of all ages should understand. These

51. E. T. Bubier, ed., *Questions and Answers About Electricity*; Edward S. Holden, *Real Things in Nature* and *The Sciences*; and Joseph Henry Adams and Joseph B. Baker, *Harper's Electricity Book for Boys*.

52. Adams and Baker, *Harper's Electricity Book for Boys*.

53. Hospitalier and Wharton, *Domestic Electricity for Amateurs*; Edward Trevert, *Everybody's Hand-Book of Electricity*; Cyrus F. Brackett et al., *Electricity in Daily Life*; Edmund Inrside Bax, *Popular Electric Lighting*; and Thomas O'Conor Sloane, *Electric Toy Making for Amateurs*.

54. E. S. Greeley, "Electricity Applied to Household Affairs," 7–8; "Electricity in the Household," 50; George Iles, "Electricity as a Domestic," 344. For a broader analysis of do-it-yourself culture during this time period, see Steven M. Gelber, "Do-It-Yourself," 66–112. Gelber suggests the "acceptable" nature of housework for men when it is couched in a do-it-yourself, "Mr. Fix-it" culture.

55. Helena Higginbotham, "The Electric Bell a Woman's Charge," 642–44.

viewed buttons as but one of many mechanisms that conveyed electricity and that required education, tinkering, and exploration. Novices were encouraged to take up buttons for household projects and to think creatively about their uses. As one children's author put it in 1904: "Somebody understands these things,—push buttons, electric lamps, telescopes, and so forth. Why should not you? You can if you pay attention enough. The world is, after all, your world."⁵⁶ This author and a number of his peers viewed the push-button interface as a technology that would promote empowerment by mediating between users and the world around them.

Selling Effortless Electrical Experiences

Unlike educators and hobbyists, many others, particularly those working in the electrical industry, promulgated a view of early push buttons as nonintimidating and effortless faces of electricity. This meant lauding these switches for their ability to automatically deliver incredible electrical forces at a mere touch, without the necessity (or cause) for users' tinkering or in-depth understanding. An emphasis on push-button interfaces as simplistic and worry-free provided a strategic advantage for manufacturers and promoters of electricity. At this time many public concerns circulated about electricity's safety in homes; unlike dripping candles or inconsistent gas burners, push buttons promised safe and hassle-free light and energy from interfaces that users could learn to operate almost instantaneously.⁵⁷ As an exemplar of this attitude, the Eastman Company's slogan "You press the button, we do the rest" for Kodak cameras caught on in all areas of the electrical industry, emphasizing that one could merely press a button and then let machines safely take the lead.⁵⁸

One tactic employed by manufacturers and distributors of push buttons and their associated devices involved promoting these switches as pleasurable luxuries that would make life easier for the wealthier set. J. H. Bunnell & Co., in its "Illustrated Catalogue and Price List of Telegraphic, Electrical & Telephone Supplies, No. 9" of 1888, for example, advertised "The Automatic," a wall-plate control system that would allow its opulently dressed user to turn gas lights on and off remotely (fig. 4). Outlining the button's various uses, the catalog described a house entirely run by buttons: "One in the front hall, to be lighted by buttons placed at the front door and also by the chamber door, or one in the cellar, with press-bttns [*sic*] or keys at the head of the cellar stairs . . . or one in the family chamber, to be lighted

56. Holden, *The Sciences*, 6.

57. Concerns about electricity cropped up in many places. For examples, see T. M. Clark, *The Care of a House*; Robert Hammond, *The Electric Light in Our Homes*; and Philip Coombs Knapp, *Accidents from the Electric Current*.

58. The origin of the phrase is discussed in Elisabeth L. Sylvester, "Some Famous Advertisements," 80.

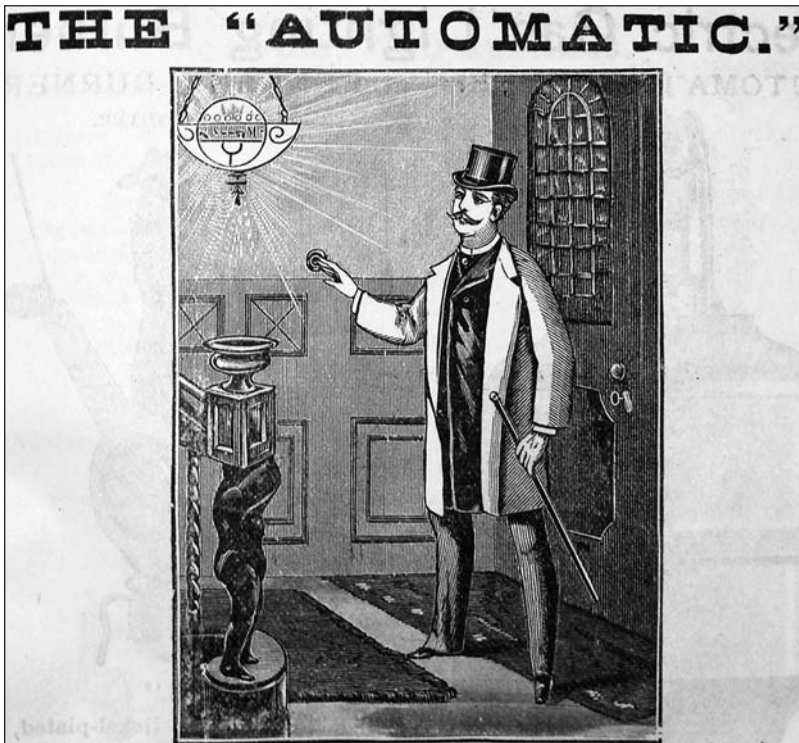


FIG. 4 Advertisement for a push-button switch made to appeal to an elite class of early electricity users. (Source: J. H. Bunnell & Co., “Illustrated Catalogue and Price List of Telegraphic, Electrical & Telephone Supplies, No. 9” (1888), 137. Image courtesy of Warshaw Collection of Business Americana—Electricity, Archives Center, National Museum of American History, Smithsonian Institution.)

from the bedside and chamber door, are all luxuries which, after accustomed use, become necessities to household comfort.”⁵⁹ Although the advertisement suggested that the cost of such a device would make its widespread use unlikely at first, it depicted a powerful fantasy of the button as an “automatic” provider of light throughout one’s home. During this time period Americans relentlessly pursued automaticity, but this desire frequently backfired by causing users to work harder with their technologies.⁶⁰

59. J. H. Bunnell & Co., “Illustrated Catalogue and Price List of Telegraphic, Electrical & Telephone Supplies, No. 9” (1888), 137, box 2, in Warshaw-NMAHAC.

60. See Lisa Gitelman, *Scripts, Grooves, and Writing Machines*, 190. In her study of writing machines, Gitelman provides a useful account of the term “automatic,” noting that it often covered a wide variety of convoluted and contradictory meanings. Regarding labor and effort and the ways that technologies often make life more difficult, see Ruth Schwartz Cowan, *More Work for Mother*.

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Still, the term “automatic” referred to a pervasive cultural craving for efficient relationships between humans and machines; button interfaces routinely connoted an ideal interaction that would shield users from complex processes that occurred behind their surfaces.

Pursuits of automaticity took on numerous forms, as illustrated by Bunnell’s promotion of a push-button wall switch that would illuminate around its edges for easier access in darkness. The advertisement proclaimed of its switch: “This enables a person to light the gas or ring a bell in the night, *at once*, without searching in the dark to find button or matches.”⁶¹ Promoting the button as a way to overcome darkness served as a recurring trope in user-interface ads. The Edison Electric Illuminating Company, in a promotional storybook titled “Solid Comfort or The Matchless Man” written in the early 1900s, sold the push button as a savior to a domesticated man: “No stumbling over the furniture! No breaking of bric-a-brac! No black cats, coal piles, dark cellars and midnights! Not a trace of them! Light, light at a touch, and plenty of it!”⁶² An illustration of a man with his finger upon the switch accompanied these words, emphasizing the powerful simplicity of an electrified touch. The corporation also created an illustrated comic strip as an ode to electricity in 1906. Here again, the button fended off hazards⁶³ (fig. 5). This depiction of “The Edison Man,” although couched in a playful tone, portrayed a modern user as one in control of his situation, body, and technology through the use of the push-button interface. In each of these instances, the man need not pull out a tool belt or worry himself over the details of how electricity worked.

Years later, in 1913, Edison Electric continued its promotion of button switches as modern triumphs of light over darkness. Roscoe Gilmore Scott, in a poem for *The Edison Monthly* titled “Let Us Go Back,” wrote:

Let us go back to the candle-light
To those famous “good old days”
To the good old dark, to the good old
plight
Of a stumble in the haze:
Let us feel the fear that we used to
know,
When the midnight fire-bell
clanged;
Let us search for matches high and
low,

61. Bunnell & Co., “Illustrated Catalogue and Price List” (emphasis in original).

62. Edison Electric Illuminating Company, “Solid Comfort or The Matchless Man; a Modern Realistic Story in Two Parts” (n.d.), box 3, in Warshaw-NMAHAC.

63. Edison Electric Illuminating Company, “The Edison Man” (1906), box 3, in Warshaw-NMAHAC.



FIG. 5 Depiction of a man using a push button, symbolizing modern interfaces triumphing over outdated modes of summoning light. (Source: Edison Electric Illuminating Company, "The Edison Man," 1906. Image courtesy of Warshaw Collection of Business Americana—Electricity, Archives Center, National Museum of American History, Smithsonian Institution.)

That the thief may go unchanged!
Let us go back for a minute slight—
Then press the button and have real light!⁶⁴

64. Roscoe Gilmore Scott, "Let Us Go Back" (*The Edison Monthly*, September 1913), box 22, in Warshaw-NMAHAC.

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Each of the above examples across a number of years identified life before push buttons as a horror, because of the possibility of incurring injuries, thieves running loose, and fear and stumbling in the darkness, and present, modern life as one of convenience and comfort. Where many educators portrayed the button interface's mediating role as one of exposure to a rich, complex electrical world, this educational model focused on buttons as mediators that would take over the unnecessary work of individuals.

Beyond static, two-dimensional advertisements in catalogs and magazines, promoters also took a hands-on approach to encouraging electric-button usage in homes. In these cases, sellers played on psychological factors, which suggested that individuals liked to press buttons to see what would happen.⁶⁵ As early as 1892 Chicago's *Daily Inter Ocean* newspaper commented on a scheme devised for the next year's World's Columbian Exposition in Chicago to expose consumers to button-pressing experiences: "In the German village it will only be necessary to press a button and a fresh, rosy-cheeked and buxom fraulein will appear with a tankard of foaming lager. In the 'Streets of Paris' one touch on the button will bring most anything the visitor may want, from a bottle of wine to a perfumed bottle."⁶⁶ The widespread use of buttons to convey commodities (and servants) at the world's fair functioned as a way to associate button-pressing with wish fulfillment. One could even enjoy button-pressing while commuting to the fair, as the Pennsylvania Railroad Company told potential travelers in an informational brochure about switch installations that were "always at hand and from which you can procure what you may desire."⁶⁷ Linking instant gratification with simplistic technology, the world's fair experience offered visitors a chance to live out a fantasy, if only briefly, of a button-powered world.

Some electrical experts did, in fact, dissent from this dominant narrative of push buttons as effortless user interfaces, but these voices rarely successfully penetrated mainstream dialogues. In an 1893 essay regarding upcoming electrical exhibits at the World's Columbian Exposition, for example, author Clyde Jones admonished members of his industry "who have entirely lost sight of the duty they owe to the public, that of educating them."⁶⁸

65. See, for example, "An Individually-Operated Washing Machine Demonstration," 209; *How to Sell Electrical Labor-Saving Appliances*; and National Electric Light Association, "A Good Way to Sell Fans," 603. These sales techniques continued well into the twentieth century, with manufacturers promoting fans, washing machines, and a number of other products through button-pressing experiments designed for window-shoppers.

66. "Another Button Scheme," 5.

67. Pennsylvania Railroad Company, "Pennsylvania Railroad to the Columbian Exposition" (1892), box 5, folder 6, in Warshaw-NMAHAC.

68. W. Clyde Jones, "The \$25 Prize Essay: How Can the Department of Electricity at the World's Columbian Exposition Best Serve the Electrical Interests?" (*World's Fair Electrical Engineering, an Illustrated Monthly Magazine*, March 1893), box 22, folder 5, in Warshaw-NMAHAC.

Jones's colleague Herbert Laws Webb had similarly commented a month earlier on this issue, noting that he knew "of people who would not have an incandescent lamp in their houses because they believe it is 'dangerous,' and of others who are prejudiced against all electrical appliances because they have had unfortunate experiences with cheaply made and badly arranged electric bell installations."⁶⁹ Both men articulated a need for industry members to teach users (and nonusers) what happens behind buttons, inside batteries, and through wires in order to create an educated and engaged citizenry. Yet an overwhelming body of evidence indicates that the electrical industry as a whole remained focused on selling idealized, simplified views of push buttons and their associated technologies to the public.⁷⁰ In general, the industry did not possess an anti-tinkering mentality, but rather, for the most part, its members believed that push-button designs made such tinkering unnecessary.

In order to sell this vision of electricity, experts often relied on tropes of magic and effortlessness to embody users' experiences with buttons.⁷¹ In 1916, for example, the Society for Electrical Development chose a poster for "America's Electrical Week" from among 781 entries that whimsically celebrated the benefits of button-powered electricity⁷² (fig. 6). An electrician, in a positive endorsement of the poster, enthused: "Gone is the ancient lamp. Now it is the gentle touch of a button and forthwith comes the Genie, Electricity."⁷³ The campaign and its admirers indicated that users needed no knowledge or skill to make electrical miracles possible, as long as a button stood at hand. The user interface heralded electricity seemingly from the heavens, making electrical circuits, wires, plugs, and other mechanisms invisible. As an ironic unintended consequence, this rhetorical strategy would ultimately have a negative impact on the electrical industry as a whole, because buttons' iconic status came to obscure the complexities of providing electricity to individual homes.⁷⁴ In order to render electricity (and its costs) as continually relevant to and appreciated by users, industry participants would have to reconsider their approach to educating consumers about buttons' mediating role.

69. Herbert Laws Webb, "The \$100 Prize Essay: How Can the Department of Electricity of the World's Columbian Exposition Best Serve the Electrical Interests?" (*World's Fair Electrical Engineering, an Illustrated Monthly Magazine*, February 1893), box 22, folder 5, in Warsaw-NMAHAC.

70. The World's Columbian Exposition was widely known for its illusions of spectacle and showmanship over education and substance. For specific analysis of the world's fair, see John G. Cawelti, "America on Display"; and Neil Harris et al., *Grand Illusions*.

71. "The Mystery of the Little Black Button," 68–69. For a further discussion of "magic" in discourses about technology, see William A. Stahl, "Venerating the Black Box," 234–58.

72. "Picturing Electric Service," 638.

73. "Prize-Winning Poster Selected for America's Electrical Week," 321.

74. For a broader discussion of technology and its unintended consequences, see Edward Tenner, *Why Things Bite Back*.

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FIG. 6 Poster representing the common advertising strategy of depicting push-button interfaces as magical and instantaneous. (Source: *Electrical Review* 69, no. 8 [19 August 1916]: 321–22. Image courtesy of Warshaw Collection of Business Americana—Electricity, Archives Center, National Museum of American History, Smithsonian Institution.)

Exposing Mechanisms behind the Button

Beginning in about 1915 social views consolidated around push-button interfaces as vehicles that would make interactions with electricity simplistic and effortless. This shift occurred in large part because electricity had become a more widespread, affordable, and safe option for energy in many public and private domains. As inventors improved on push-button designs and demonstrated additional technological affordances and as electric services stabilized, the electric industry's once hyperbolic promises could be realized in practice. These factors caused many players to reify the user interface into an unchallenged technical object. Not without conse-

quences, this taken-for-granted status of push buttons meant that, symbolically, machines and their associated circuitry seemed to vanish from descriptions of human-machine interactions. Pushing a button represented the sum total of one's experience with electrical technologies; as a result, the electrical industry faced an apathetic populace that took its services for granted. This posed a significant problem, as companies and suppliers struggled to make a case for the cost and value of their services in the early twentieth century. Industry members began marshalling resources to educate consumers about how their electric presses worked. Where electric push buttons once served as the industry's greatest promotional asset, they now, by having thoroughly succeeded, hampered it.

Although advertisements for push buttons as automatic, magical, and effortless interfaces by no means disappeared, electricians, corporations, and the industry's umbrella organization, the National Electric Light Association (NELA), assumed a new strategy that focused on demystifying how buttons worked. These groups initiated this project, which was far from altruistic in nature, to generate consumers' sympathies and to "sell the public on the need of giving a larger revenue to the electric light and power companies of the country."⁷⁵ Participants in this new educational movement, spearheaded by the NELA, took a two-pronged approach. The first involved helping consumers to understand how buttons worked by exposing wires and other electrical parts that existed behind push-button interfaces, thereby touting buttons as nonmagical and practical. The second emphasized the cadre of human beings involved in rendering electrical services possible, and it tried to humanize the industry as a whole by making push buttons more inconsequential to the process of receiving electricity.

According to an editorial in a 1915 appeal to readers of *Electrical World*, "[s]team and gas, being tangible, need no explanation, but the illumination of a room or a whole house by merely pushing a small button far exceeds the darkest magic of the East." It proposed as a remedy that "[g]reater effort should be made to impress on every man and woman the simple, lucid explanations that convert electric service from a mystery into a kindly household friend."⁷⁶ Over the next few years electric companies took up this charge by widely distributing pamphlets and advertisements to compel users to once again interrogate the buttons they pressed. This constituted no easy task, however, as Henry Beers Jr. noted in his analysis of the Western Electric Company's advertising campaign of 1918: "Even if the consumer can be forced to think of the wiring when he pushes the button, it may be too late as far as these advertisers are concerned."⁷⁷ Beers thus gestured to a successful ad that featured a hand pushing a button with wires

75. Martin Hussobee, "Electric Light Companies Appeal to Public in Big Campaign," 10.

76. "Remove the Mystery," 1051.

77. Henry A. Beers Jr., "Winning the Architect Instead of 'Forcing' Him," 40.

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spooling from the interface. According to him, “[t]hus the existence of a less obvious, but no less important element behind the scenes is brought graphically to the attention of the reader—the wiring—that when pushing a button he or she may realize its presence and its share in the electric service.”⁷⁸ Like school educators and authors of tinkering manuals and articles, Western tried to establish a connection between everyday practices and the mechanisms that made these practices possible.

The General Electric Company (GE) used a similar educational message for potential consumers of “tomorrow,” directing its efforts toward college students. In an analysis of GE’s approach, Augustus Paul Cooke wrote in 1920 about ways to take the “mystic force” of electricity and turn it into an opportunity for education. He demonstrated how the company had created an ad that would “show the thousand and one parts electricity and electrically driven machinery play on the stage of every-day life.”⁷⁹ Similarly, in 1921 the NELA targeted average (male) button-pressers in a striking ad titled “Who Are You?” by asserting: “Ninety-nine chances out of a hundred you are the man whose second finger on the right hand is expert in pressing electric buttons. By [them] we make elevators rise and fall for us, we summon employees, we give orders, we start big machinery whirring, we turn the light on and off, and—we could go on indefinitely.” The ad then warned its reader: “But remember, it is not the half-inch button that does all this. There is the tremendous power behind the button,” including turbines, steam engines, and a vast network of wires.⁸⁰ Both GE’s and the NELA’s interventions sought to explode the black box of push buttons created in no small part by their own organizations and others like them. Each ad demonstrated how a wealth of invisible technical processes and products connected with “mystical” buttons. These ads attempted to redefine push-button interfaces as gateways to electricity—starting points rather than end points.

In addition to its advertising campaign, the NELA worked with industry constituents on a number of public-outreach initiatives. The organization’s president explicitly stated in a 1920 meeting that he wanted to do away with the “three B’s” so familiar to consumers—“you push the Button, you get the light from the Bulb, and at the end of the month you get the Bill”—and replace them with service-oriented messages about “human factors” instead of “the cold machine.”⁸¹ To follow through on this new strategy, the NELA released two films, respectively titled *Back of the Button* and *Yours to Command*. The latter film promised to give the public “a comprehension of the billions that must be invested and of the army of workers who must toil in order that, when they push the button, electricity may spring into harness.”⁸² In 1922 the NELA noted that over two million peo-

78. *Ibid.*

79. Augustus Paul Cooke, “Training the College Mind toward G.E.,” 89.

80. National Electric Light Association, “Who Are You?” 12.

81. E. A. Baily, “President Ballard Addresses Baltimore Section,” 135–36.

82. “‘Yours to Command’ New Movie Film of N.E.L.A.,” 636.

ple had viewed *Back of the Button*, with 2,027 theatrical and 115 nontheatrical showings having taken place.⁸³ According to an advertising executive for Commonwealth Edison, the films were well-received by the public, and the NELA considered its outreach efforts a great success.⁸⁴

In 1923 GE electrical engineer Charles Steinmetz similarly appealed to the public, especially women, in a comprehensive article titled “Back of the Electric Button” in *Good Housekeeping* to make a case for consumers’ understanding of what happened behind push buttons. Steinmetz argued that after a finger-press, which would provide light, heat, or power “instantly at one’s command,” the real work would then begin: “[H]ow few of us stop to think of the vast natural resources, harnessed by the skill of the engineer, which are behind these simple acts.”⁸⁵ Without question, Steinmetz’s encouragement of laypersons’ education, and other efforts made in this vein by industry professionals, stemmed primarily from political and financial motives that aimed to bolster the electrical community with increased consumer support. Still, these tactics offer useful insight into the ways that electrical experts perceived the public’s knowledge, and more importantly, how these individuals interpreted the role of push-button interfaces in daily life. Now that average users could easily and quickly access electricity in their homes through push buttons, industry professionals were forced to return to basic strategies by attempting to render buttons “strange” and unfamiliar rather than a taken-for-granted, invisible device. These campaigns increasingly resembled the techniques employed between the 1880s and early 1900s by educators and journalists to explicate how push buttons worked in order to reduce potential users’ anxiety about electricity and its mysterious mechanisms. Push-button interfaces were promoted as educational tools because they represented an important juncture, or point of mediation, between individuals and electricity; they occupied a liminal position, serving as symbols of simplicity or investigation, depending on the social groups that sought to define them.

Conclusion

At a 1921 meeting of the NELA in Philadelphia, the association’s executive manager, M. H. Aylesworth, tried to persuade representatives from numerous electric companies that their promotional tactics had made push buttons and electrical service overly familiar to consumers: “We are all used to seeing innumerable advertisements of fans and irons and washing machines running without any lines or central stations,” Aylesworth said. “Don’t leave the idea with the people that the button is the entire investment of the Company. Don’t have a lady in a nice afternoon gown, just

83. George F. Oxley, “More Than Two Million People View First N.E.L.A. Film,” 357.

84. *Ibid.*

85. Charles P. Steinmetz, “Back of the Electric Button,” 48.

ready to go to tea, doing her washing before she goes by just pushing a button.” He concluded: “It looks like perpetual motion, no wires, no central station, no organization, and no investment.”⁸⁶ Aylesworth aimed to make a case for consumer education that would clarify what actually happened behind push-button interfaces. Where promoting buttons as effortless devices had once helped the electrical community render its service as a less daunting proposition, now these images prevented the same organizations from garnering laypersons’ respect. Consumer education about push buttons thus figured significantly into the broader political and social climate surrounding domestic electricity use. The sections above have interrogated how a number of pedagogical strategies during the nineteenth and twentieth centuries helped to construct both competing and complementary definitions of push buttons.

As conduits for electricity, push buttons facilitated interactions between humans and machines across a number of domestic devices, including bells, annunciators, lights, elevators, clocks, and alarms. Due to the anxiety that this new form of power often produced, many sectors of society intervened to provide education that would make electrical activities more intelligible and accepted. Lessons about push buttons figured importantly here, because these interfaces often served as the first point of contact for domestic users. Between approximately 1880 and 1915, inventors, designers, and marketers worked diligently to create a vision of the push button as safe, automatic, and effortless, while teachers, journalists, and hobbyists simultaneously encouraged the public to understand how push buttons worked, just as they would with any other electrical device. Over time, in the years following 1915, however, the button’s simple design, on/off capabilities, and symbolic power meant that few people needed to know what happened behind the interface. It remained unclear whether industry officials could turn back this tide of technological stabilization, whether a new pedagogical model could demystify this black box. Push-button education (or a lack thereof) had real, tangible effects, not only for the electrical industry and its financial stability, but also for consumers, who had more or less positive relationships with machines based on their level of skill and understanding.⁸⁷ Rather than remaining neutral or determining technical objects, push buttons were deeply embroiled in political negotiations around electricity, consumption, and everyday practices.

This article has sketched an early history of electric push buttons in order to argue for more systematic scholarly attention to user interfaces as objects of study. While every technological artifact, from radio to telephone, has its own trajectory with an evolving set of features (such as push buttons, dials, and so on), studying interfaces specifically can produce

86. National Electric Light Association, “The Christmas Meeting of the Philadelphia Electric Company Section,” 112.

87. See Fisher’s comments discussed at the outset of this article in *Self-Reliance*, 3.

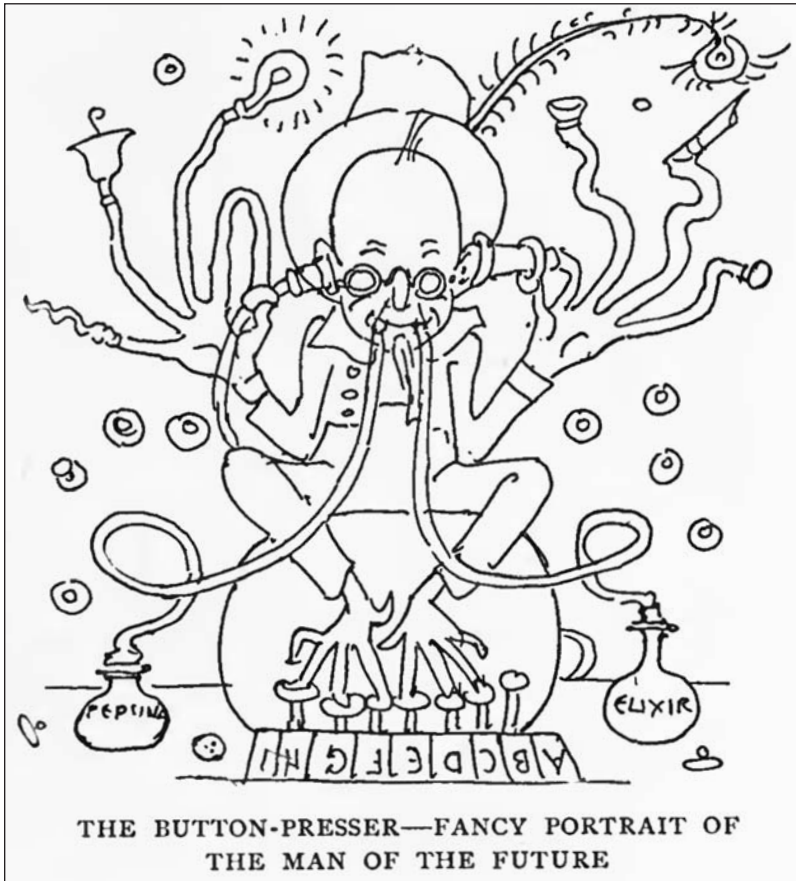


FIG. 7 An imaginative rendering of push-button future suggests the potency of fantasies and fears surrounding these interfaces. (Source: Walter Crane, *An Artist's Reminiscences*, 1907. Image courtesy of the University of Toronto, Robarts Library, accessed from the internet archive [<http://archive.org/details/artistsreminisce00cranuoft>].)

alternative histories regarding the mundane interactions that take place between users and devices. This is not to say that the history of buttons, dials, screens, or other interfaces can be told without consideration of the device they animate; rather, it calls for attention to the ways in which a user interface like the push button—so seemingly ordinary and invisible—comes to take a particular shape and meaning within a given technology. Peeling back the social, cultural, and historical layers of these interfaces can yield insights into the complex fantasies and fears of end users that may otherwise pass unnoticed⁸⁸ (fig. 7). Although scholars have written many histo-

88. While this article has not dealt extensively with fantasies and fears, the push but-

ries of electricity, approaching this subject from a historiographical perspective of the push-button interface presents a new vantage point that is focused on user education as a mode of laypersons' engagement with the technology.⁸⁹

User interfaces act as sites of mediation and points of access that help to demystify human-machine interactions; users engage with push buttons that operate an array of devices, but usually they possess no intimate knowledge of how these devices work. At other times, the push button can serve as the first step in revealing a technological process, as in museum settings where push buttons provide instant information and feedback.⁹⁰ In this regard, push buttons, keys, dials, screens, and other devices can render their inner mechanisms as either accessible or inaccessible, bringing machines either closer to or further from their users. Presses of the finger and twists of the wrist thus invaluablely help individuals in constructing mental models about the artifacts of everyday life. Reimagining the history of technology not as a series of machines, but instead as a series of user interfaces, promises a new direction for scholars interested in the ways that we connect to technology and to one another.

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ton, as a cultural icon, has been deeply embedded in popular imaginings of the future; see Walter Crane, *An Artist's Reminiscences*, 379.

89. As mentioned previously, electrical switching is an area of historical research that has remained largely uninterrogated.

90. Classen, "Touch in the Museum," 275–79. Classen notes that most museums privilege visibility over tactility and take a "look, don't touch" approach. Children's museums are most likely to provide opportunities for tactile engagement with objects.

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