ENWHEELED

HISTORY, DESIGN, AND THE WHEELCHAIR

PENNY WOLFSON

Enwheeled
History, Design, and the Wheelchair

by Penny Wolfson

COOPER HEWITT
Smithsonian Design Museum

THE NEW SCHOOL
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Preface

This book on wheelchairs grew out of my scholarly work in both disability and design studies. It also grew out of personal experience: As the parent of a disabled child who has become a disabled adult, I have watched with interest over the years as my son Ansel interacted with a variety of these vehicles, both manual and powered; over and over I have been struck by the intimate dance between wheelchair and user. There is no doubt that wheelchairs, especially to the uninitiated, conjure a reservoir of emotion; even a longtime user like the writer and polio survivor Leonard Kriegel regards his chair as an instigator of powerful feelings, as he recalls in his 1992 essay in the *Missouri Review*: "[M]y huge, ungainly, magnificently ugly throne on wheels" is at first an object of great love—"the way home" after a childhood bout with polio—but as Kriegel recovers becomes an object of struggle and anxiety.[1] I myself remember, after being told that my three-year-old would need a wheelchair by the age of twelve, looking down the long tunnel of his childhood and seeing not light but a hard, metal prison. Yet, like a feared stranger who initially seemed to invade the household, the wheelchair soon became actual, and eventually prosaic: a treasured, lively, and fairly reliable member of the family. It was neither light nor dark, just a tool, then a necessary part of Ansel's life. Over the years, the chair has become more and more his home; he is dependent on it, yet controls it; when it is being repaired, he is disgruntled and frustrated, even when another chair is made available. With it his movement has a grace and fluency he otherwise lacks. When I see the wheelchair without him, or him without the chair, when he was recently hospitalized, for example, and I spotted it in the hallway, waiting, like a lost puppy, I feel bereft and confused. (It was a marker for him; yet where was he?) If someone touches his chair, he feels his space has been invaded. Besides holding him, the wheelchair is a receptacle for other objects and a place for others, occasionally, to catch a ride. We used to jokingly call it our mobile shopping unit because we'd hang our grocery bags on the handles to carry them home. It is nearly impossible to avoid the chair; it provides mobility but is also an encumbrance. It announces and precedes him. It is his seat in the car and often, at restaurants or the theater. It is a means of self-expression: on the back of one chair he plastered a sticker in the shape of an abstract sea creature that spelled out "gefilte fish." His latest chair, a Permobil that reclines and elevates his seat and leg rests, lets him relax in a way I've not seen before; it is a flashy neon green. It is a machine yet a part of him. It is to him, Ansel—and his indispensable wheelchair—that I dedicate this thesis.

[1] Leonard Kriegel, "Wheelchairs," *Missouri Review* 15, no. 3 (Summer 1992).

Introduction

In the realm of objects, chairs are, literally, king. Mihaly Csikszentmihalyi and Eugene Rochberg-Halton note the chair's special status in their 1981 work *The Meaning of Things: Domestic Objects and the Self*, first pointing to the blurring of identity of human and chair—"with its worn velvet fabric, musty smell, creaking springs, and warm support"—and going on to reiterate the strong relationship of the chair with human power: "It is difficult to imagine a king without a throne, a judge without a bench, or a distinguished professor without a chair."[1]

The art historian Jules Prown, too, in his essay "Style as Evidence," notes that "chairs are particularly revealing of cultural values because they so easily become human surrogates. . . . We use such analogies as feet, legs, back, and seat. . .[I]t is not unreasonable to speculate that aspects of an object that seem to echo the human anatomy may reflect in abstract terms the ways in which individuals . . . perceive themselves."[2] And recently, as noted by Jessica Green, director of the Built Environment Center at the University of Oregon, biologists have shown that the microbial environment found on chairs is more similar to that of the human ecosystem than that found on any other object. In so many ways, humans and chairs are bound.

One might call wheelchairs the chairiest of chairs. For many users they are not just comfortable places to sit but are transportation, shelter,

[1] Mihaly Csikszentmihalyi and Eugene Rochberg-Halton, *The Meaning of Things: Domestic Objects and the Self* (Cambridge, UK: Cambridge University Press, 1981), 15.

[2] Jules David Prown, "Style as Evidence," *Winterthur Portfolio* 15, no. 3 (Autumn 1980): 199.

and identity. Many wheelchairists (as one writer has taken to calling them) spend the greater part of their lives in their chairs, breaking only to shower, toilet, or sleep. (Rory Cooper estimates sixteen hours a day, almost 365 days a year, in his *Wheelchair Selection and Configuration*.) They are so dependent on their chairs that without them they cannot work, travel within or outside their homes, attend school, visit others, shop—or, in other words, engage in the myriad of activities most of us take for granted. For many, if not all, their sense of self and/or identity includes their wheelchair; they may perceive the chair as their environment or personal space, as an extension of themselves or a means of self-expression; for some, the wheelchair is completely incorporated into their body image.

The evolution of the wheelchair—from comfortable furniture for invalids to iron or steel mobility devices for war-injured veterans to high-performance vehicles for athletes—also gives expression to historical trends and events in the nineteenth and twentieth centuries, as well as to concepts of disability. Through the wheelchair we can trace not just our military conflicts but also the development of stronger, lighter-weight materials, the introduction of antibiotics and other life-extending therapies, the growing importance of the automobile, and cultural trends including disability activism.

Although the last few decades have seen a surfeit of literature on disability, little scholarly work has in fact been done on the wheelchair as a designed object. Herman Kamenetz's 1969 *The Wheelchair Book: Mobility for*

the Disabled, which included a historical chapter, stood for several decades as the only work documenting this object's development over the centuries.[3] It is now quite dated. Recently, the British researchers Nick Watson and Brian Woods have made valuable contributions with their report on the historical sociology of the wheelchair (2003), in which they emphasized the impact of disability activism on new technology: people with disabilities demanding better chairs or simply coming up with their own innovative designs. This activism, in turn, has bettered the lives of disabled people. Several of their articles stemming from that report have added to our understanding of wheelchair history, though their work is biased toward British sources. (See bibliography for relevant works by Watson and Woods.)

The life writing of physically disabled people is less rare, but surprisingly little focuses on the wheelchair itself. Much more has been written about what has been called "the illness narrative": the tale of woe and adjustment that at times attends the disability experience.[4] The few who have written about their relationship with their chairs include the aforementioned Leonard Kreigel, the journalist and radio commentator John Hockenberry, the disability activist Simi Linton (who named her wheelchair "Rufus"), anthropologist/blogger William Peace, and the wheelchair dancer Alice Sheppard. Their work informs this thesis. The engineer and wheelchair user Rory Cooper

[3] Herman Kamenetz, *The Wheelchair Book: Mobility for the Disabled* (Springfield, IL: Charles C. Thomas, 1969).

[4] Arthur Kleinman is generally thought to have coined the phrase in his 1988 book *The Illness Narratives: Suffering, Healing, and the Human Condition* (New York: Basic Books, 1988).

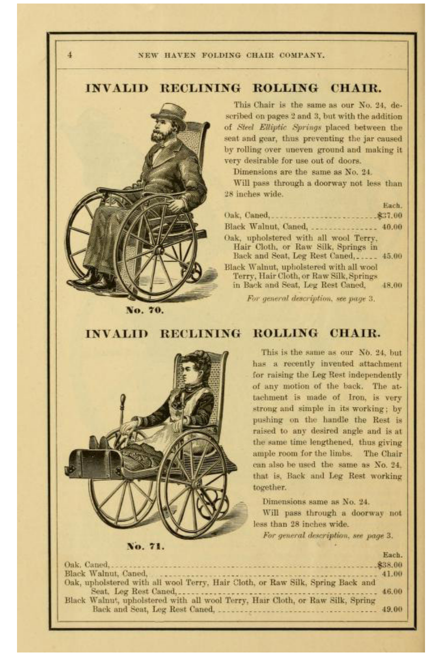
has written two helpful books about wheelchairs—*Rehabilitation Engineering Applied to Mobility and Manipulation* (1995) and *Wheelchair Selection and Configuration* (1998)—but they are quite technical and have poorly reproduced illustrations. Gary Karp's simpler and informative books, such as *Choosing a Wheelchair* (1998) and *Life on Wheels* (2008), are geared toward the practical side of wheelchair use.

None of these works have used the lens of the design historian to explore what I have in this thesis: the close personal relationship between the wheelchair and its occupant, the subtle interplay between disabled human and necessary object. Exactly what is the transaction between this specialized machine and the person who uses it? Does it function as a tool, an instrument, an extension, or a part of the body? How does the user impact the chair, and vice versa? Is the wheelchair master, imprisoning its user, as implied in the phrase "wheelchair-bound"? (As Brian Woods and Nick Watson note in their 2005 article "No Wheelchairs Beyond This Point," "terms such as 'confined to a wheelchair' . . . reinforce the perception that wheelchair users are imprisoned by their machines.") Or is it, as a 1970s Everest & Jennings catalog puts it, touting their improved power chair, the user's slave, able to propel him anywhere—to do his bidding—with the touch of the joystick? ("Whether it's a trip around the house or outside around the block, an amazing Power-Drive chair is its owner's slave."[5])

[5] *Premier* catalog, Everest & Jennings, April 1972.

Along with the movement away from furniture-like chairs toward more machine-like vehicles over the course of two centuries, two trends in the history of wheelchairs are particularly relevant to this study. One is the naissance of the individual chair. Previous to the invention of the Everest and Jennings foldable chair in the 1930s, many chairs were shared, like the early-nineteenth-century Shaker "community" wheelchair noted in chapter 1 (fig. 1) or those utilized by entire hospital wards rather than awarded to an individual. During the Second World War and after, it became standard practice to give veterans and other disabled individuals their own chairs. Second, wheelchairs have become more and more customized over time: we see this in the elaborate seating systems that have been developed for power chairs and in the manufacture of lightweight athletic chairs, which are tailored to the specifications of particular sports and fit the body as closely as a shoe or glove. While it is true that in the late nineteenth century one could order several different models from the available catalogs (see, for example, pages

FIG. 1. Rocking Armchair Adapted to a Wheelchair, 1810–30; Maker unknown; Watervliet/New Lebanon, NY; Birch, maple, beech, ash splint, chestnut, walnut, brass, iron, steel; 47 ½ × 26 × 31 ¾ in.; Collection of Shaker Museum/Mount Lebanon, New Lebanon, NY, photo by Alan LaValle.



4 NEW HAVEN FOLDING CHAIR COMPANY.

INVALID RECLINING ROLLING CHAIR.

This Chair is the same as our No. 24, described on pages 2 and 3, but with the addition of *Steel Elliptic Springs* placed between the seat and gear, thus preventing the jar caused by rolling over uneven ground and making it very desirable for use out of doors.

Dimensions are the same as No. 24.

Will pass through a doorway not less than 28 inches wide.

	Each.
Oak, Caned,	$37.00
Black Walnut, Caned,	40.00
Oak, upholstered with all wool Terry, Hair Cloth, or Raw Silk, Springs in Back and Seat, Leg Rest Caned,	45.00
Black Walnut, upholstered with all wool Terry, Hair Cloth, or Raw Silk, Springs in Back and Seat, Leg Rest Caned,	48.00

For general description, see page 3.

No. 70.

INVALID RECLINING ROLLING CHAIR.

This is the same as our No. 24, but has a recently invented attachment for raising the Leg Rest independently of any motion of the back. The attachment is made of Iron, is very strong and simple in its working; by pushing on the handle the Rest is raised to any desired angle and is at the same time lengthened, thus giving ample room for the limbs. The Chair can also be used the same as No. 24, that is, Back and Leg Rest working together.

Dimensions same as No. 24.

Will pass through a doorway not less than 28 inches wide.

For general description, see page 3.

No. 71.

	Each.
Oak, Caned,	$38.00
Black Walnut, Caned,	41.00
Oak, upholstered with all wool Terry, Hair Cloth, or Raw Silk, Spring Back and Seat, Leg Rest Caned,	46.00
Black Walnut, upholstered with all wool Terry, Hair Cloth, or Raw Silk, Spring Back and Seat, Leg Rest Caned,	49.00

FIG. 2. *Seventeenth Annual Illustrated Catalogue and Price List of Folding Chairs and Invalid Rolling Chairs* (New Haven, CT: The Company, 1879), 4–5.

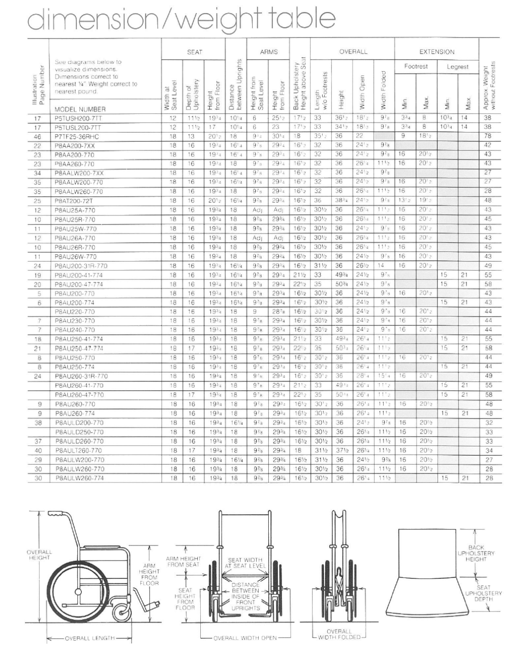


FIG. 3. "Dimension/Weight Table," *Premier* catalog, Everest & Jennings, April 1972, 58.

from the New Haven Folding Chair Company, 1879 [fig. 2]), wheelchairs are now essentially bespoke items: in the twentieth century, fitting a wheelchair to any client has become a complex undertaking. (See the chart in a 1972 Everest and Jennings catalog, fig. 3). These factors no doubt have contributed toward a new body/machine awareness. A user may well feel more of a connection to a chair literally made just for him.

Defining the Wheelchair

Wheelchairs are not generally classed as prostheses; they fall into the category of orthopedic or assistive appliances, closer to worn than attached object, according to most classifications—like those of bioethicists Courtney

Campbell and her colleagues. In their 2007 study "The Bodily Incorporation of Mechanical Devices: Ethical and Religious Issues," the scientists divide such devices into five categories: worn, attached, penetrating, implanted, and transbodied. They do not actually mention wheelchairs, but refer to worn objects as things squarely outside the corporeal body: "The least intrusive technology can be donned and doffed at will. Eyeglasses, hearing aids, false teeth, limb braces, and other assistive technologies possess a quality of easy reversibility. . . ." Yet in the user's often profound dependence on the chair, and in the chair's adaptation to the user's needs and idiosyncrasies, to his actual shape and hand or eye movements, he and it are inextricably connected. As the disability researcher Myriam Winance has said in her 2006 article, "Trying Out the Wheelchair: The Mutual Shaping of People and Devices through Adjustment," the wheelchair and person have to adjust to one another, and in the process, become one: "[T]he aid becomes part of the body and the person. . . . [I]t modifies the way the person perceives, moves, and relates to the world."[1] Wheelchair and person are linked through a common and continuous circuitry; the chair becomes literally a vehicle through which emotions and actions are carried out.

The tool as part and parcel of human circuitry is Gregory Bateson's notion, as put forward in a 1971 article in the journal *Psychiatry*, "The Cybernetics of Self: A Theory of Alcoholism" (and collected in *Steps to an Ecology of Mind*). This is how the disability scholar and paraplegic wheelchair dancer Alice Sheppard expressed it in a talk she gave at Columbia University's Institute for Research on Women, Gender, and Social Difference in 2012: "Once your spine is 'broken' you don't just freeze in two halves, one functioning, the other not. You acquire instead a new spinal anatomy. Disabled people who use assistive technologies like crutches, canes, and wheelchairs often speak of this equipment as part of our bodies. We are describing both the emotional connection and the feeling of metal, wood, and plastics becoming an essential part of the body."[2]

In research on patients with spinal cord injuries, the Italian psychologist Marcella Mariella and her colleagues have also noted the seeming dissolution of the chair/human boundary. In the report of one 2013 study they concluded: "Among all patients the regular use of a wheelchair induced the perception that the body's edges are not fixed, but are instead plastic and flexible to include the wheelchair." While a few of the paraplegics and quadriplegics they studied did view the wheelchair as simply an artificial device, many others voiced the sense of being "enwheeled," of having the corporeal boundary between the person and the machine disappear, in the process radically revising their body schema.[3] In this sense, the wheelchair is even more

[1] Myriam Winance, "Trying Out the Wheelchair: The Mutual Shaping of People and Devices through Adjustment," *Science, Technology and Human Values* 31, no. 1 (January 2006): 52–72.

[2] "Showing Spine," (lecture, Institute for Research on Women, Gender, and Social Difference, Columbia University, New York, Feb. 9, 2012, unpublished text), 11.

[3] Mariella Pazzaglia, Giulia Galli, Giorgio Scivoletto, and Marco Molinari, "A Functionally Relevant Tool for the Body

than a prosthetic replacing a lost or no-longer-functional body part; here one can no longer distinguish between body and appliance. (Of course the user of a prosthetic arm or leg may experience this as well. See Vivian Sobchack's essay "A Leg to Stand On," Chapter 2, in Marquard Smith and Joanne Morra, *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*.) Mariella Pazzaglia and colleagues see this dissolution as a therapeutic opportunity: "The ability to embody new essential objects extends the potentiality of physically impaired persons and can be used for their rehabilitation." (They also note a difference in the body schema of those who have upper as opposed to lower spinal cord injuries.)

Since I often rely in this study on the language of prosthetics, I would be remiss if I did not pause here to refer to what has become a vast body of literature on the subject. Prostheses—manufactured "replacements" for lost limbs or other body parts—have a long and complex history. (See Katherine Ott's introduction in Katherine Ott, Stephen Mihm, and David Serlin, eds. *Artificial Parts, Practical Lives: Modern History of Prosthetics*.) "Prosthetic" was originally a grammatical term, meaning an addition of a letter or syllable to the beginning of a word, but by the nineteenth century was used to describe the numerous artificial devices humans had used for centuries to make themselves whole. In the twentieth century, the word has taken on a much larger meaning, which often has nothing to do with the physical,

Following Spinal Cord Injury," *PLOS ONE* 8, no. 3 (March 2013): 1. doi:10.1371/journal.pone.0058312.h.

replacement body parts to which "prostheses" traditionally referred. Instead the term is used metaphorically, as a trope, as in Marshall McLuhan's idea of technology as prosthesis, or even more inclusively, as any tool, as Freud would have it in *Civilization and Its Discontents*: "With every tool man is perfecting his own organs. . . . Man has, as it were, become a kind of prosthetic God."[4] As Marquard Smith and Joanne Morra explain in their introduction to the essay collection *The Prosthetic Impulse*, "Pointing to an addition, a replacement, an extension, augmentation, and an enhancement, prosthesis has become a staple in the armory of metaphors or tropes utilized by intellectuals, scholars, students, and practitioners."[5]

In Freud's vision, a tool or prosthetic is an enhancement through which imperfect man becomes more and more godlike, not a replacement for something missing—which may also provoke a discourse on what the normative body is, and open the door to discussion on bionic humans, cyborgs, and the endless ability to transform or better ourselves through technology; in that world biodeficient and bionic become merely points along a continuum. (See Donna Haraway's seminal essay "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature*. Haraway ironically uses the concept of the cyborg, "a condensed image of both imagination and material

[4] Sigmund Freud, *Civilization and Its Discontents*, Standard edition, trans. and ed. James Strachey (New York: Norton, 1961), 43.

[5] Smith and Morra, *The Prosthetic Impulse*.

reality," to expand the possibilities of feminism. The terms "biodeficient" and "bionic" were mentioned in the sense I've indicated by a Columbia PhD student, Zoe Wool, during a discussion at the Future of Disabilities Studies workshop session at Barnard College.) The performance-enhancing drugs of Major League ballplayers or the Cheetah legs of the amputee Oscar Pistorius coexist, and everyone can reimagine and reinvent himself or herself using technology.

Yet while actual prosthetic devices have been examined in the context of "prosthetic theory"—in, for example, the work of Vivian Sobchack ("A Leg to Stand On") and Sarah Jain (see for example, her 1999 article "The Prosthetic Imagination: Enabling and Disabling the Prosthesis Trope") or in the 2002 collection *Artificial Parts, Practical Lives*, wheelchairs have not. One of the things I seek to do here is to situate wheelchairs between literal prostheses and the much larger landscape in which practically anything can be seen as prosthetic. Like Ott and Mihm, as well as Sobchack and Jain, I don't want to throw out the baby with the bathwater; metaphoric thinking is essential to this exploration. But I do want to claim the wheelchair's physical and undeniable place in this continuum, which has not previously been widely considered. While prosthetic devices like artificial arms and legs have had their day and their portion of the scholarly landscape, wheelchairs and other "appliances" have not.

Methodologies and Resources: Nineteenth and Twentieth Centuries

This work, then, is about the special relationship of the "wheelchairist" and his/her instrument, the transaction or set of transactions that occur, as Mihaly Csikszentmihalyi might say, between object and user; or, even, as described in Mimi Hellman's "Furniture, Sociability, and the Work of Leisure in Eighteenth-Century France," the object and user's shared performance.[1] For Hellman, furniture influences the bodily positions of sitters as much as the sitters influence the furniture.

To study this interface, I began by looking at wheelchairs and related ephemera from the early nineteenth century, soon after they first were manufactured and sold in this country.[2] In the era before photography and film, the evidence of chairs consists mostly of records of trade fairs, patent drawings and descriptions, print advertising and trade cards, hospital inventories, newspaper and magazine articles, books, and wheelchair companies' catalog pictures and text. (Some actual chairs from the period remain, and I have had the opportunity to view one such chair at the New York State Museum in Albany.) Photographs of wheelchairs begin to appear during the Civil War, and these greatly enrich our knowledge of late-nineteenth-century chairs.

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[1] As described in Csikszentmihalyi and Rochberg-Halton, *The Meaning of Things*, chap. 7; Mimi Hellman, "Furniture, Sociability, and the Work of Leisure in Eighteenth-Century France," *Eighteenth-Century Studies* 32, no. 4 (1999): 415–45.

[2] See Nancy Goyne Evans, *Windsor Chairs: Specialized Seating*, 90.

All of these have been consulted here to investigate how wheelchair users might relate to their chairs; how they might sit or act; what they might expect or might be expected of them by manufacturers, merchants, and the society at large; and how they actually used or use the chair in the built environment. Facts of materials and construction, user testimonials, sickroom instructions, and patentees' designs reveal a fount of information about the chairs, their users' or makers' thinking, and concepts of disability.

Evolution and Structure of Thesis

I had read the work of Csikszentmihalyi and Halton-Rochberg many years ago, but was reintroduced to *The Meaning of Things* in a class taught by Marilyn Cohen in the Cooper Hewitt master's program, where this book had its start. Their ideas, which utilize object-relations theory as well as sociological methods to understand our transactions with things, are significant in these chapters, as is my understanding of actor-network theory (ANT), described by Bruno Latour in *Reassembling the Social: An Introduction to Actor-Network Theory* but which I first came across in the work of Myriam Winance. In ANT, "actants," objects and people equally, engage in a constant process of making and doing.[1] In "Thinking the Poetics of Things," a class taught by Clive Dilnot, in the spring of 2012, I had the liberty to further explore some of the

[1] See Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (New York: University Press, 2005), http://dss-edit.com/plu/Latour_Reassembling.pdf.

observations I had made about wheelchairs and users. Some of this material, particularly about prosthetic theory, is presented in the introductory chapter, but informs much of the thesis in more invisible ways. I was also influenced by readings from the French Annales School, particularly by the historian Marc Bloch, and utilized various methodologies, including those of Csikszentmihalyi, Hellman, and Ruth Schwartz Cowan. Bill Brown's "thing theory," which gives primacy to objects, exploring how the material environment affects people, was also significant. Rather than trying to understand how people create and transform the world, thing theory asks: how does our material environment shape us? In Brown's view, "The inanimate object world helps to form and transform human beings . . . ."[2]

Finally, Karen Harvey's book *History and Material Culture* and the work of the art historian Jules Prown have informed my thinking about wheelchairs as material culture. Prown, an art historian, insists on the primacy of objects, their nuanced shapes and details—their presence—in understanding particular cultures, and Harvey points to material culture's general acknowledgment of the active quality of objects: in differentiating *things* from most of the other resources used by historians, "objects are actual and autonomous, not reflective."[3] This attention to the specialness of objects has been important to this study.

[2] From the video *The Nature of Things*, Big Think, posted March 30, 2010, accessed February 3, 2014. http://bigthink.com/videos/the-nature-of-things.

[3] Karen Harvey, *History and Material Culture* (New York: Routledge, 2009), 19.

Chapter 1: Wheelchair and User in the Nineteenth Century

"Alexander Stephens…is one of the most powerful figures in the United States Senate, and when the wheeled chair and its occupant are missed from the accustomed place, among the first questions asked is Where is Stephens?"

"The Exercises of the Evening High School," *Brooklyn Eagle*, Feb. 21, 1880

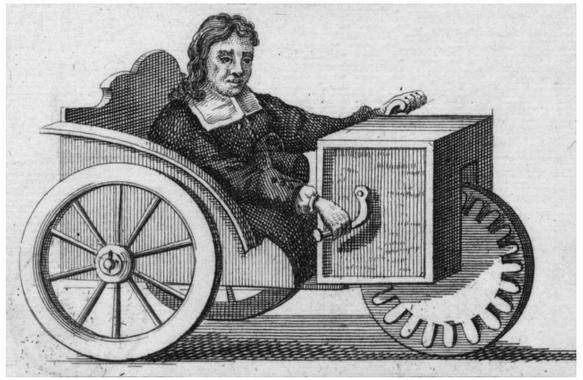
In his 1969 *The Wheelchair Book: Mobility for the Disabled*, Herman Kamenetz recounts the history of the wheelchair: a sarcophagus engraving from sixth-century China, King Philip of Spain's gout chair from the 1590s, the German paraplegic Stephen Farffler's ingenious vehicle of the seventeenth century, and the Bath chairs of the English spa town. (See figs. 4–7.) He dates the beginning of the wheelchair in America to the War Between the States: "[T]here is no report of the use of wheelchairs before the time of the Civil War, when they appeared for sick and wounded soldiers."[1] But in fact we have evidence that a variety of wheelchairs were manufactured and retailed in America at least a half-century before the Civil War.

As Nancy Goyne Evans writes in her 1996 volume *Windsor Chairs: Specialized Seating*, wheelchairs were known in this country at least from the late 1700s; and by the first quarter of the next century cabinetmakers like Abraham McDonough of Philadelphia and J. C. Hubbard of Boston produced wheeled invalid chairs.[2] A Windsor wheelchair, pictured in her book (fig. 8), is

[1] Herman Kamenetz, *The Wheelchair Book: Mobility for the Disabled* (Springfield, IL: Thomas, 1969), 30.

[2] Nancy Goyne Evans, *Windsor Chairs: Specialized Seating* (New York: Hudson Hills, 1997), 90–92.

displayed at the Pennsylvania Farm Museum in Lancaster, and is from about 1840. High-backed, with the requisite slats, it seems to be adapted from a household chair—note that it has all four legs. It is painted mustard yellow with black penciling, and its single wooden wheels are rimmed with iron. The tacks in the arms show they were once stuffed, Evans notes, and its rather large, slanted footboard was once attached by straps. Another chair from the period, dated 1825–40, is a maple-wood "community" wheelchair, with a



Clockwise from top left:

FIG. 4. Stephen Farffler's hand-operated wheelchair, ca. 1655, Herman Kamenetz, *The Wheelchair Book: Mobility for the Disabled*, Springfield, IL: Charles C. Thomas, 1969, chap. 1.

FIG. 5. King Philip of Spain's gout chair, 1595, Kamenetz, *The Wheelchair Book: Mobility for the Disabled*, chap. 1.

FIG. 6. Bath chairs, England, 18th–19th century, Banes Photography vintage postcard "Bath chairs in Abbey Churchyard," http://banes.photography/vintage%20postcards%20and%20photos.html.

FIG. 7. Sarcophagus, 6th century AD, China, Kamenetz, *The Wheelchair Book: Mobility for the Disabled*, chap. 1.

caned seat and oval finials, exhibited at the Shaker village in Watervliet, New York; it is the group's adaptation of a ladder-back rocking chair, its rockers still in place. Several chairs with wheels are mentioned at trade fairs of the 1830s and '40s: in 1834, at the Seventh Annual Fair of the American Institute at Niblo's Garden in New York, a J. C. Jenekes showed a "carriage chair for an invalid," described as "a very ingenious contrivance by which sick persons are able to move themselves around from room to room, and also alter their position of sitting."[3]

Another conveyance, by James Grey of Brooklyn, at the First Annual Fair of the New York Mechanics Institute, was a "mahogany chair of compact size. . .[with a] mechanism by which the person moves it with either hand...."[4] And at the exhibitions and fairs of the Massachusetts Charitable Mechanic Association in 1839 and 1847, I. C. Hubbard and Charles Howe, respectively, displayed "locomotive invalid chairs."

[3] "Seventh Annual Fair of the American Institute Held at Niblo's Garden," in *Mechanics Magazine* 4, no. 4 (October 1834): 245.

[4] "Fair of the American Institute," *Mechanics Magazine and Journal of the Mechanics Institute* 6, no. 5 (Jan. 1, 1835).

FIG. 8. Wheeled invalid chair, 1825–40; various woods and iron; light mustard yellow ground with black. Pennsylvania Farm Museum of Landis Valley Lancaster, PA, photo, Winterthur. In Nancy Goyne Evans, *American Windsor Furniture, Specialized Seating* (New York: Hudson Hills, 1997), 91.

None of these was patented, but in 1853 a chair invented by Thomas Minniss, of Meadville, Pennsylvania, was (fig. 9). Minniss showed his locomotive chair at New York's Crystal Palace the same year and received this review in Horace Greeley's *Art and Industry in the Exhibition*: "[The] locomotive chair . . . is a model machine . . . . With a slight effort of one hand, the poor invalid can propel himself in doors and out, turning the shortest corners with ease, going back or forward, upon smooth surfaces, absolutely without labor. Then in one minute he can change it from a self-propeller to a little wagon, to be drawn by an assistant."[5]

Also on display at the exhibition were the wares of the furniture maker M. W. King & Sons. Matthew King, who established his business on lower Broadway in Manhattan in 1833, had patented a swivel chair and sold a number of other types of seating, including a wheeled invalid chair. In an April 25, 1857, text advertisement in the *Rockland County Courier*, King & Sons "in-

[5] Horace Greeley, *Art and Industry of the Crystal Palace* (New York: Redfield, 1853), 314.

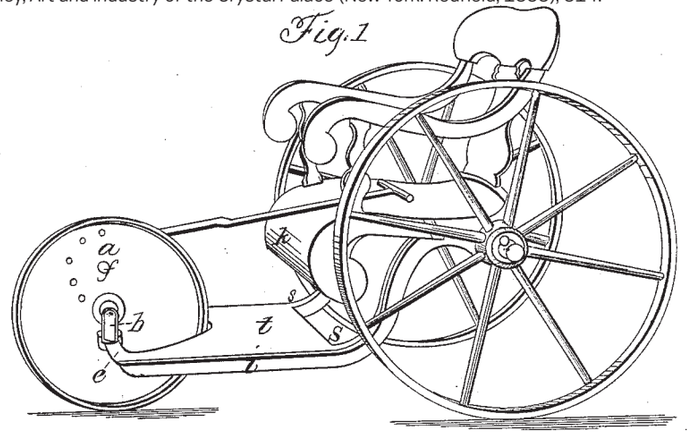


FIG. 9. Patent drawing for locomotive invalid chair, Thomas Minniss, US Patent 9708, May 10, 1853.

vite an examination of their great variety and superior assortment of CHAIRS, manufactured at their own establishment, including Pivot Revolving Chairs, Self-Acting Extension Recumbent Chairs, Improved Invalid Wheel Chairs . . . for the luxury of the Sick, the Aged, the Infirm, the Lame, and Lazy."[6]

Manufacturers often took the design for a patented reclining chair and just added wheels, as the H. Thompson company apparently did for its recumbent chair, using one of the designs inherited from King, from whom Thompson took over the business in the 1860s or '70s. An advertisement shows both nearly identical chairs (fig. 10). The fact that wheelchairs were largely the province of patent furniture makers may seem odd. ("Patent furniture" was the nineteenth-century term for seating, tables, beds, etc., that was newly invented and patented because of novel or innovative technology.

[6] *Rockland County Journal*, no. 52 (April 25, 1857): 1, news.hrvh.org.

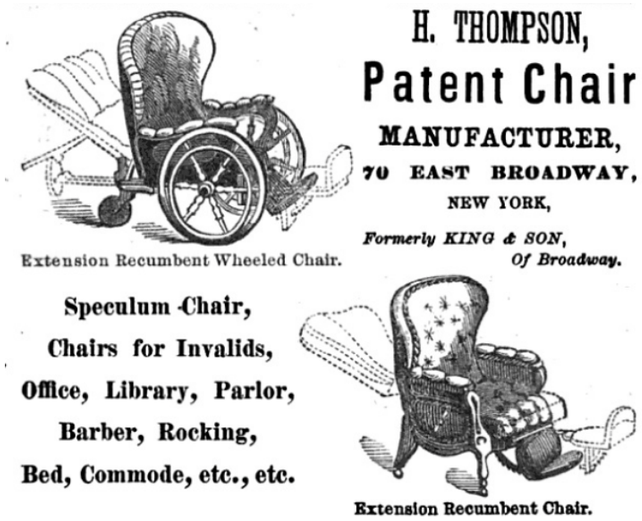


FIG. 10. Advertisement for H. Thompson patent chairs, 1869, in *The Medical Register of New York, New Jersey, and Connecticut*, New York: Bradstreet and Sons, 1869, 333.

Popular in Victorian Age America, such furniture was based on notions of health, posture, comfort, and mobility and often involved adjustments made by the user.) But the mid–nineteenth century was an age that prized comfort, adaptability, and mobility; it was also, as Sigfried Giedeon puts it in his classic *Mechanization Takes Command* (1948), a time when the furniture maker took his cues from the "technics of the engineer."[7] Moreover, Giedeon notes, the posture of the nineteenth century—halfway between lying and sitting—was derived directly from sickroom furniture.[8] (See especially "The Constituent Furniture of the Nineteenth Century," 389–422, in Giedeon, *Mechanization*.) Invalid couches and sofas invented in Europe evolved into the American "variety couch" or invalid chair, capable of elevating head or feet or maintaining a number of positions. Reclining furniture, like that of George Wilson or the Marks Adjustable Folding Chair Company popular through the 1890s, often had castors or wheels for portability; both companies also manufactured wheelchairs per se, with large wheels for transport. So closely associated were patent and invalid chairs that, in a 2008 article in the *Journal of Design History*, Jennifer Pynt and Joy Higgs go so far as to say that "patent seating fell into disfavor with the public because of its connotation of infirmity."[9]

One of the most important wheelchair makers in the United States was the New Haven Chair Company, which started life in 1863 as the New

[7] Sigfried Giedeon, *Mechanization Takes Command* (New York: Oxford University Press, 1948), 420, caption.

[8] See especially "The Constituent Furniture of the Nineteenth Century," 389–422, in Giedeon, *Mechanization*.

[9] Jennifer Pynt and Joy Griggs, "Nineteenth-Century Patent Seating: Too Comfortable to be Moral?" *Journal of*

Haven Folding Chair Company and initially made only a range of rather elegant collapsible seats. But by 1871 New Haven also showed one model of rolling chair; and it is interesting to see, in a broadside from the 1876 centennial displaying the company's stock, how the wheelchair, with its slightly reclining high back and up-slanting footboard, blends in (fig. 11).[10] In 1878, Isaac Dann and Dan Kelsey patented an improved wheelchair, which New Haven manufactured.[11] The objective of the invention was "to provide . . . springs as well as to make the adjustment of the chair more convenient for the occupant." By the 1890s, advertisement for the New Haven Chair Company highlighted its "invalid furniture": an 1895 ad in the *Century Illustrated* magazine mentions reclining chairs, but also bidets and commodes, which seems to indicate a permanent change in direction.[12] An 1890 New Haven catalog shows twenty-two models of wheelchair as well as two reclining couches with wheels. [13]

The centennial of 1876 in Philadelphia featured another innovation: special wheeled chairs available for rent, supplied by the Smith Rolling Chair Company. They were utilized not just by fairgoers who didn't wish to walk but also by those who couldn't—such as a man disabled by a bad leg (see fig.

Design History 21, no. 3 (September 1, 2008): 285.

[10] New Haven Folding Chair Co., 1876, Connecticut History Online, Broadsides, http://www.cthistoryonline.org/cdm/singleitem/collection/cho/id/726/rec/1.

[11] Isaac Dann and Dan Kelsey, "Improvement in Chairs," U.S. Patent 205,059, June 18, 1878.

[12] *The Century* 49, nos. 1–6 (Nov. 1894–April 1895): 1085.

[13] New Haven Folding Chair Co., Price List of Invalid Folding Chairs (New Haven, CT: The Company, 1890). http://archive.org/details/pricelistofinval00newh.

12). Herbert Smith was the patentee; after the exposition his company continued to make these rolling chairs, which, unlike earlier ones, had no caster in back but had two small wheels in front, which allowed them to be lifted over curbs. However, they did need to be pushed by another person. Smith's company continued to manufacture and advertise these chairs until at least 1891.[14]

The interest in health foods, hygiene, and fresh air, which led to the opening of invalid hotels and spas midcentury, and later, the emergence of tuberculosis sanitariums, supplied a growing market for wheelchairs: in a picture circa 1890, seven women sit in a semicircle in wheelchairs in an outdoor arcade, attendants at the ready despite the fact these are self-propelling

[14] Advertisement in *Century Illustrated Magazine* 41, no. 5 (March 1891): 36.

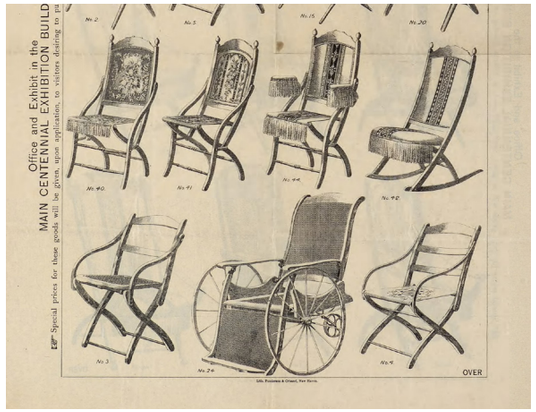


FIG. 11. Broadside for the 1876 Centennial, New Haven Folding Chair Co., 1879, Connecticut Historical Society. Printed by Punderson & Crisand, New Haven, CT. Broadsides Medium 1876, Call #N5486n. http://www.cthistoryonline.org.

FIG. 12. Rolling Chair at the 1876 Centennial, designed by Herbert Smith, in *Philadelphia's 1876 Centennial Exhibition*, Linda P. Gross and Theresa R. Snyder, Charleston, SC: Arcadia, 2005, 22.

chairs with hand rims (fig. 13). As early as 1879 the physician J. H. Kellogg, inventor of breakfast cereal and director of the Battle Creek Sanitarium, wrote to the New Haven Chair Company expressing his satisfaction with the first wheelchairs his institution had received.[15] By 1889 Battle Creek had at least thirty wheelchairs from the company and was ordering five more.

Some disabled people and family members have always fashioned their own wheelchairs, and nineteenth-century America was no exception. Home inventors could find any number of suggestions for DIY chairs. The maker of the Crystal Palace locomotive chair, Thomas Minniss, proposed making use of "a common chair mounted on its back end with two plain hind wheels [which] would afford a cheap and effective perambulator for the affected poor, who will perhaps oftener need assistance. . . ."[16] In her 1865 *Domestic Receipt Book*, Catherine Beecher proposes jury-rigging a rocking

[15] New Haven, *Price List*, 47.

[16] T. S. Minniss, "Invalid Locomotive Chair," U. S. Patent 9708, May 10, 1853.

FIG. 13. Women in Sanitarium, 1890, Bentley Historical Library, University of Michigan, Disability History Museum Library Collection, https://quod.lib.umich.edu

chair to create an invalid chair; she describes

> a contrivance for securing exercise in the open air for invalids… Such an article can easily be made of the broken toy of a child, called a velocipede, or the back wheels of a child's wagon. Nothing but shafts are needed, and a common rocking-chair, with a foot-board nailed across….[17]

A May 19, 1883, *Scientific American* article discusses an 1883 patent for a wheelchair by M. J. Koenig of Jersey Shore, Pennsylvania: his "improved attachment for chairs will convert an ordinary chair into an invalid chair which can easily be moved about."[18]

Writing in 1865, Beecher may have been directing her ideas at a new audience: the families of wounded Civil War veterans. According to the statistics of the U.S. National Library of Medicine, at least half a million Confederate and Union men were wounded, and nearly 60,000 amputations were performed by surgeons of both armies; about a third were amputations of the leg.[19] The majority of these men survived, and some of them may have used wheelchairs. As we have seen, there were wheelchairs available. Yet there is little direct proof of their use. I have found only three photos of

[17] Catherine Beecher, *Domestic Receipt Book* (New York: Harper, 1850, 1846), 216.

[18] *Scientific American* 48, no. 20. (May 19, 1883): 312.

[19] Statistics from "Maimed Men," U.S. National Library of Medicine. History of Medicine, accessed October 11, 2013. http://www.nlm.nih.gov/exhibition/lifeandlimb/maimedmen.html.

single soldiers in wheelchairs during the conflict—this after combing websites, museums, and libraries—and one was the often-replicated picture by Mathew Brady of Armory Hospital, Washington, DC, from 1865 (fig. 14). The two others (figs. 15–16) appear among those taken by the army surgeon R. B. Bontecou at Harewood Hospital, Washington, DC, some of which were part of a 2013 exhibition at the Metropolitan Museum of Art in New York. (Reed Bontecou was an army surgeon who documented and memorialized, through hundreds of photos, men with newly amputated limbs and other war injuries.)[20]

[20] From the collection of Dr. Stanley Burns. *Shooting Soldiers* (New York: Burns Archive Press, 2011) 6; "Photography and the American Civil War," Metropolitan Museum of Art, New York, NY, April 2–September 2, 2013.

Clockwise from top left:

FIG. 14. *Armory Square Hospital*, Mathew Brady, 1863-65, albumen silver print from glass negative, Metropolitan Museum of Art, New York, Harris Brisbane Dick Fund, 1933, accession number 33.65.306.

FIGS. 15–16. Two Civil War soldiers in wheelchairs, Top, Jas Armstrong, and bottom, Hiram Williams, Plates 1 and 80, *Shooting Soldiers: Civil War Medical Photography*, R. B. Bontecou, Plates 1 (Armstrong and 80 (Williams).

Hiram Williams was injured at the battle of Appomattox Courthouse, and is shown awaiting an artificial limb. The other soldier, the Confederate Jas Armstrong of South Carolina, suffered a gunshot wound to the right leg, at Petersburg, Virginia. The two chairs they use look similar but may not be identical; they seem to be made from Windsor chairs and may have been cobbled together on-site; they have large carriage-type wheels and a large footboard.

There are also photographs from the decades after the war of two highly decorated officers seated in wheelchairs. One is General Daniel Sickles. At Gettysburg, Sickles was wounded, and his right leg was amputated—he apparently visited the amputated leg once a year thereafter—and he used a wheelchair or crutches to get around. Two of these chairs seem to be the type seen at the centennial, with two front wheels, and a handle in back pushed by an attendant, without hand rims. They resemble any number of reed, willow, or rattan examples from catalogs of the 1870s on. He was also photographed in a self-propelling chair.

Colonel Elijah Parkhurst, pictured with his wife in an undated photo ca. 1890 (fig. 17) was wounded at Lynnville, Tennessee, during his second term of service; his left leg was hit by cannon fire and later amputated, as was, eventually, his other leg, due to blood poisoning. Parkhurst's chair, which was of a later vintage, probably the 1890s, was self-propelled, a "locomotive"

chair with hand cranks that had more in common with the bicycle than with either patent furniture or medical appliances. In fact, in 1890 Peter Gendron of Toledo invented a wire wheel that he originally used for bicycles, wagons, and baby carriages, but that he also applied to invalid chairs; later his company switched entirely over to wheelchair manufacture. Gendron is now the oldest continuously operating wheelchair company in the United States.

One of the few mentions of soldiers in wheelchairs during the war comes from a *New York Times* article dated June 26, 1864. Titled "Our Military Hospitals," the piece seems to point toward a distinction between regular soldiers, who "hobble about with cane and crutch," and officers: at the Armory Square Hospital in Washington, DC, the anonymous author says, "Lieutenants, Captains, Majors, and others, who have shed their blood and lost their limbs in the service of their country, may be seen on their snow white beds, and in wheeled chairs, or at their tables reading and writing, killing

FIG. 17. Colonel Elijah Parkhurst and his wife, ca. 1890, in his locomotive chair, M. F. Phillips, photographer, Hamburg, LA, http://www.flickr.com/photos/neato-coolville/6359654641/.

time—all that is left for them to kill, since the war is ended."[21] It doesn't say so explicitly, but this might mean that only officers were granted wheelchairs as a special privilege, or that their own families had provided them.

Wheelchairs may not be mentioned often, but artificial limbs are, for good reason.[22] Both the Union and the Confederacy issued prostheses of all kinds to wounded and disfigured men—noses and ears as well as limbs—yet, as far as I can tell, never similarly gave out wheelchairs. Why this privileging of artificial limbs over wheelchairs by the government?

David Serlin, an expert on prostheses and coauthor of *Artificial Parts, Practical Lives*, proposed in a 2013 email that "limbs, especially by makers like Hanger [founded by the Confederate James Hanger, whose leg had been amputated] and [A. A.] Marks [of New York] were pretty state-of-the-art technologies in the 1870s. While wheelchairs could be made by any number of artisans—coach makers, furniture makers, blacksmiths, etc.—and could be purchased secondhand or even handmade at home, the art of the prosthetist and limb maker were [sic] such that the government might have recognized the rarity of those devices over the relative ease with which one could purchase or even build a wheelchair." This may have seemed, he remarks, like a more respectful or committed response to veterans.[23]

[21] *New York Times*, "Our Military Hospitals," June 26, 1864. http://www.nytimes.com/1865/07/02/news/our-military-hospitals-a-glance-at-their-organization-and-work.html.

[22] A list of supplies from the Bath (New York) Home for Soldiers in 1902 listed four wheelchairs for a population of 250, I have uncovered little else about wheelchairs even tangentially relating to the Civil War.

[23] Personal communication, April 4, 2013.

Other reasons proposed by the British researchers Nick Watson and Brian Woods, as well as the French philosopher and historian Henri-Jacques Stiker, reflect contemporary attitudes toward disability, which in some ways, as others have said, paralleled the idea of patching up the union of states after the war. (See, for example, Lennard Davis, in "Stumped by Genes: *Lingua Gataca*, DNA and Prosthesis" in Smith and Morra, *The Prosthetic Impulse*.) "The nineteenth century discourse of rehabilitation situated disability as a lack to be filled by medical correction and technology," Stiker writes in his 1997 *History of Disability*.[24] As Woods and Watson note in their 2008 article "The Social and Technological History of the Wheelchair," there was "the assumption that with a prosthesis you could replace or augment what had been lost."[25] On the other hand, they continue, wheelchairs "denoted failure and ran counter to a wider ideology which deemed it the duty of disabled people to adjust themselves to society."[26]

Since soldiers had to buy their own wheelchairs, cost was almost certainly a consideration. According to Peter Blanck and Chan Song, "Never Forget What They Did Here: Civil War Pensions for Gettysburg Army Veterans and Disability in Nineteenth-Century America," in 1863 a fully disabled Union soldier's pension was only $8 a month—officers got as much as $30—and

[24] Henry-Jacques Stiker, trans. William Sayers, *A History of Disability* (Ann Arbor: University of Michigan Press, 1999), xii.

[25] Brian Woods and Nick Watson, "The Social and Technological History of Wheelchairs," *International Journal of Therapy and Rehabilitation* 11, no. 9 (September 2004): 407.

[26] Woods and Watson, "Social and Technological History," 407–08.

although pensions rose through the following decades, by 1900 the average disabled Union veteran still might receive only $12 or $13 a month. Confederate veterans received far less, just $3 or $4 a month.[27] The cheapest, most basic wheelchair in the New Haven Folding Chair Company catalog of 1879—the first year for which I have figures—made completely of oak, including wheels, with no hand rims and incapable of reclining, cost $16, and most were far more expensive.[28] An upholstered chair with hand rims and caned back and seat cost between $34 and $42; if made of black walnut, $45. But these seem to be on the low end. An 1873 piece in *Scribner's*—which may have had a relatively wealthy readership—prices a chair at $50 to $150 for "ordinary styles." Their recommended chair cost $125, and prices went up to $350 for one made to order.[29]

Can we assume that this was a century that moved invalids and "cripples"—as some nineteenth-century Americans might have said—toward greater independence and mobility, from the sickroom into the street? Certainly it was a century that prized movement, from the locomotive to the barber's chair to the velocipede. But did this extend to ill and/or disabled people? Aspects of the chairs themselves—hand rims, springs, and cranks, and

[27] From Peter Blanck and Chan Song, "Never Forget What They Did Here: Civil War Pensions for Gettysburg Army Veterans and Disability in Nineteenth-Century America," *William and Mary Law Review* 44, no. 3. http://scholarship.law.wm.edu/wmlr/vol44/iss3/5.

[28] New Haven Folding Chair Co., *Seventeenth Annual Illustrated Catalogue and Price List* (New Haven: The Company, 1879).

[29] "Furniture for the Sick Room," *Scribner's Monthly* 5, no. 4 (February 1873), 510.

the improvements in wheels, from all wood to iron-rimmed to bicycle-style rubber—would certainly have us think so. The copy in advertising and catalogs also promotes or takes for granted the self-sufficiency of wheelchair users, from changing their own position to changing their scenery. The attitude of these texts is relentlessly optimistic and forward-looking. And there were role models: several important figures, including Civil War bigwigs as well as politicians—like the former Confederate vice president, congressman, and governor of Georgia Alexander Stephens, General Dan Sickles, and Colonel Elijah Parkhurst—appeared in public in wheelchairs, some self-propelling. And rolling chairs made a splash at the Centennial, blurring boundaries between the able-bodied and the disabled.

Twentieth-century scholars have their doubts—"[The wheelchair's] primary function of mobility was limited, even under the best conditions," says Nancy Goyne Evans—but the wheelchair companies of the day seemed at pains to assure patrons of a smoother, easier ride and of their own independence.[30] Drawings show dignified-looking, well-dressed ladies and gentlemen in both indoor and outdoor clothing, comporting themselves in private and public. *The Sharp and Smith Catalog of Surgical Instruments and Deformity Apparatus* of 1889 makes the modest claim that its self-propelling invalid chair, a locomotive-style vehicle, "will work comparatively well on a sandy or rough road (and) when ascending a moderate incline" and advertises

[30] Evans, *Windsor Chairs*, 90.

that its chairs are made with connections of malleable iron, steel axles, and "welded oval tires."[31] The earlier, 1879, Seventeenth Annual New Haven catalog is even more confident: "The Invalid Rolling Chair has added Steel Elliptic Springs placed between the seat and gear, thus preventing the jar caused by rolling over uneven ground and making it very desirable for outdoor use."[32]

Certainly the testimonials in the New Haven catalogs of both 1879 and 1890 underline the idea that disabled wheelchair occupants were using them indoors and out, for work, pleasure, and travel. As early as 1877 the company was apparently in receipt of a letter from a George Tyrrell of New Haven, who stated: "I have used no other chair for the past two years, and am able to roll myself around in all parts of the city, without assistance."[33] Mr. H. E. Jackson writes colorfully from Walpole, Massachusetts: "With the aid of the Chair I can go around and take care of forty hens, and raise 100 chickens each season; can also run from my house to the postoffice, which is one half-mile. Without the Chair I would be confined to my room."[34]

Another, a John Tate from Louisville, Kentucky, asked "to know the price of a pair of wheels for [the] #24 chair. I have been using one for almost eight years and find it as you recommend. I travel over two miles in it every

[31] *Sharp and Smith Catalog of Surgical Instruments and Deformity Apparatus* (Chicago, IL: Blakely Printing Co., 1889), 793, 794.

[32] New Haven, *Seventeenth Annual*, "Invalid Reclining Rolling Chair," 4.

[33] New Haven, *Seventeenth Annual*, 16.

[34] New Haven, *Price List*, 48.

day."[35] Others speak of foreign or domestic travel, getting around Chicago, New York, and Cleveland.

Yet Woods and Watson insist in their *Historical Sociology of the Wheelchair* that "few wheelchairs facilitated independent mobility outdoors…. [T]he…assumption was that the user would be housebound or institutionalized. Nearly all occupant-propelled wheelchairs…had the propelling wheels…at the front and the castor/s at the rear, best suited for indoor use," they point out. "Once outdoors… front-propelling wheels were useless. The rear castor/s made it impossible to tip and balance these types of wheelchair, which prevented progress up kerbs [sic] or up/down steps."[36]

Still, nineteenth-century photos do record outdoor use, including a man on his ramped porch, and another who is taking a ride on a country road (see figs. 18–19). Advertising and catalog testimonials are only that, projected wishes and possibly invented stories. But it is worth considering that present-day scholars may be looking at this issue through a modern lens. In the post–Civil War age people rode in carriages, often not on paved streets; they were not used to the cushioned automobile rides we now enjoy. A somewhat rough ride in a wheelchair may not have been different from a ride in another type of transport—jarring and uncomfortable, perhaps, but not unexpectedly so.

[35] New Haven, *Price List*, 47.

[36] Woods and Watson, *A Historical Sociology of the Wheelchair: Full Report*, 13.

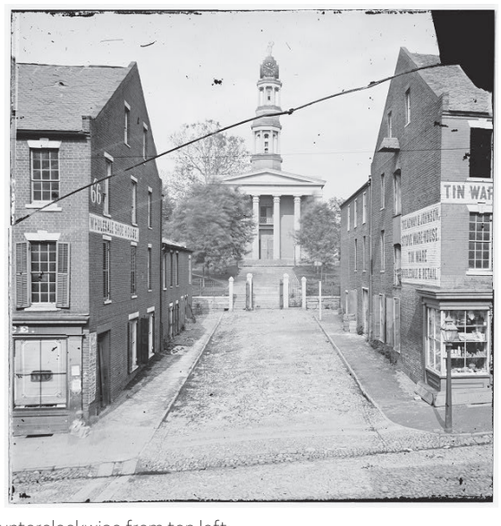
As for the difficulty of getting up and down curbs: This is still a problem for wheelchair users in many locales, where the users nevertheless negotiate their chairs outdoors and in. It may in fact have been easier in the nineteenth century, as a Civil War photograph of Petersburg, Virginia, seems to demonstrate (fig. 20): As you can see, the pavement slopes down toward the street at corners and the distance between sidewalk and street in general is quite small. The writer on a website (http://jeanhuets.com/"Leaves of Grass") displaying the photos says that "the crossing, made of granite slabs, and the ramped transition from sidewalk to street are not to accommodate the handicapped, but rather for handcarts and wheelbarrows."[37] In that nineteenth-century world, where such wheeled conveyances were often used, and where the bumps and jolts of sandy and stony roads were the norm, it may have been easier to use a wheelchair outdoors than it is now.

The development of the wheelchair in the nineteenth century was not as event-driven as we may have thought; the Civil War may not have played as direct a role as implied by previous histories. The patent furniture movement, the centennial, the growth of sanitariums and hospitals, and the development of the bicycle all played their parts. While many users did not have their own conveyances and relied on the few wheelchairs kept by institutions, others made or bought their own from the many new companies like

[37] Jean Huets, "Leaves of Grass," posted April 27, 2012, accessed April 2, 2014, http://jeanhuets.com/19th-century-streetscapes-petersburg-virginia.

New Haven or Smith. Whether moving themselves or being moved by others, users all forged relationships with these machines. Pynt and Griggs have observed in *A History of Seating, 3000 BC to 2000 AD* that in the nineteenth century, "interactions with furniture were not considered to be refined"; we can only guess at the intimacies thus implied between a person and a wheelchair, which demands constant touch and adjustment.[38] As we shall see in the chapters to come, in the twentieth century and the era of film, this close relationship of person and chair becomes more apparent.

[38] Jennifer Pynt and Joy Griggs, *A History of Seating, 3000 BC to 2000 AD: Function Versus Aesthetics* (London: Cambria Press, 2010), 201.



Counterclockwise from top left:

FIGS. 18–19. Nineteenth-century photographs of outdoor wheelchair use: man on a porch in a wheelchair (Shutterstock image ID 1418725) and vintage photo of man in wheelchair (Shutterstock image ID 230521).

FIG. 20. Petersburg, VA, Courthouse, photographer unknown, late spring 1865, Library of Congress, LC-B811-3293.

Chapter 2: Twentieth-Century Wheelchair History

Thus far we have spoken of wheelchairs as an entity, one group of like objects. But in the twentieth century, at least three different types of wheelchairs emerged, each of which created a unique user–machine relationship. These included the flexible, foldable chair introduced by Everest & Jennings in 1933 (fig. 21); the motorized chair with joystick pioneered by George Klein and the Canadian National Research Council in the 1950s (fig. 22); and Marilyn Hamilton's sports wheelchair, the Quickie, from 1979, which heralded a generation of super-lightweight athletic chairs (fig. 23).[1] One might arguably

[1] Dates vary for the E & J chair. Everest and Jennings invented the chair sometime between 1927, when they met, and 1932, the year they established their company. The year 1933 may have been when the first wheelchair rolled off the line. Their first patent was not filed until 1936.

FIG. 21. Advertisement for an Everest and Jennings foldable wheelchair, in *Spastic Review* 8, no. 9 (September 1947), 11.

FIG. 22. George Klein in the electric wheelchair he invented with the Canadian National Research Council, 1953, in Richard Bourgeois-Doyle, *George J. Klein:The Great Inventor* (Ottawa: NRC, 2004), 162.

FIG. 23. The Quickie, Marilyn Hamilton's tennis wheelchair, 1983. National Museum of American History, Smithsonian Institution, Washington, DC, online exhibition "Breaking Records/Breaking Barriers," history.si.edu/sports/exhibit/removers/wheelchair.

add to this Dean Kamen's end-of-the-century invention, the iBot, a chair that could climb stairs and jump curbs, and raise and lower the user, all based on a sophisticated system of gyroscopes, as well as wheelchairs that are voice- or breath-activated.[2] But I will keep to the three major groupings outlined above.

The Rise of Everest & Jennings: The Transportable Chair

By 1899, according to *Seeger and Guernsey's Cyclopedia of Manufactures and Products of the United States*, more than a dozen companies across the country produced wheelchairs, including New Haven Chair in Connecticut, W. D. Allison in Indianapolis, J. S. Ford in Chicago, Milwaukee Chair, and A. A. Marks in New York.[3] Some of these, like New Haven, had begun as furniture companies; others, like Marks, provided a variety of orthopedic apparatuses including artificial limbs, crutches, and wheelchairs. Still others, like Gendron in Toledo, Ohio, primarily made baby carriages and bicycles, but also produced rolling chairs, utilizing some of the same materials and parts.

The wheelchairs made by these companies varied, as we have seen in the preceding chapter; many were pushed by attendants, but many others were self-propelled; some were attractively covered in upholstery or wicker

[2] The iBot, manufactured by Johnson & Johnson, was discontinued after six years because of its high price tag—about $24,000—and the decision by the Centers for Medicare and Medicaid Services not to reimburse disabled buyers for the cost (http://mobilitybasics.ca//wheelchairs/drivecontrols.php). Even thought-controlled wheelchairs are in the works (http://disinfo.com/2011/02/wheelchair-controlled-by-brain-signals-and-prosthetics-that-feel/). All of these bring up different ideas about the relationship of body to machine.

[3] See *Seeger and Guernsey's Cyclopedia of Manufactures and Products of the United States* ([New York?]: U.S. Industrial Publishing Co., 1899), 141.

or reed. Some had reclining mechanisms, or articulated leg rests that could accommodate a broken limb. Rubber "cushion" wheels had been added to some, after the pneumatic and then the detachable tire were invented late in the nineteenth century. Some had coil springs, to protect the user from hard knocks or ruts in the road. Some could be propelled by the occupant using levers and cranks. There were both three-wheeled and four-wheeled vehicles. But all were rigid-frame, unwieldy affairs, constructed of wood and/or steel castings, whose manufacturers, by and large, as articulated by an 1896 ad from the Go Lightly Rolling Chair company, emphasized "comfort, strength, durability, and finish."[4] For example, the early-century Gordon's catalog dated 1900–1910, says that "Our chairs…are made by skilled and experienced reed and wood workers, and… are not only artistic in design but perfect in the proportion, shape and fit to the body. . . ." It goes on: "All

[4] From an advertisement for the Go-Lightly Rolling Chair Manufactury, *Century* 30 (new series), no. 52, May–October 1896, 1000.

FIG. 24. Colson Company wheelchair, April 1933, *The Polio Chronicle*, Roosevelt Warm Springs Institute for Rehabilitation Archives.

oak chairs are finished in golden oak, rubbed and polished, the finest quality of varnish being used."[5] Even after World War I, and into the twenties and thirties, wheelchair companies continued to make similar chairs (see ad for Colson Company, 1933, fig. 24).

Collapsible, lighter-weight chairs were invented earlier in the century: The first, by Chester Hockney, was patented in 1907.[6] Another, reported in *Scientific American* on January 17, 1914, was the joint endeavor of two fathers with disabled daughters. According to the author, the chair "rolls up somewhat like a bolt of cloth." A third was E. B. Green's "folding wheel-chair," patented in 1916. The invention is described as "a stanch trundle chair, collapsible at will to fold within narrow compass for easy storage in car or closet, as may often times be necessary." It is interesting that the automobile/wheelchair interface is already included. But there is no evidence that any of these was ever manufactured beyond a single prototype. It was the Everest & Jennings chair that made history—and it took several decades to make it.

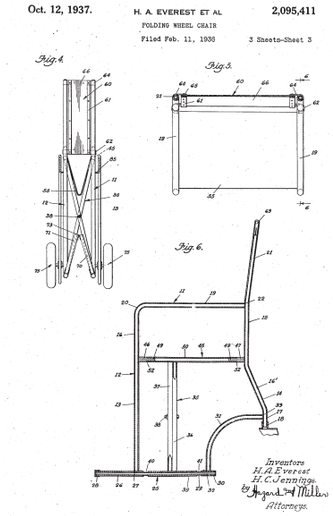

Oct. 12, 1937. H. A. EVEREST ET AL. 2,095,411
FOLDING WHEEL CHAIR
Filed Feb. 11, 1936 3 Sheets-Sheet 3
Fig. 4.
Fig. 5.
Fig. 6.
Inventors
H. A. Everest
H. C. Jennings
By Hyman and Miller
Attorneys.

FIG 25. Sheet three of US Patent 2,095,411 for Everest and Jennings's folding wheelchair, filed in 1935.

[5] *Gordon's Invalids' Chairs Catalogue* (Toledo, OH: Gordon Manufacturing Co. ca. 1900–1910), 4.

[6] Chester L. Hockney, "Wheel-Chair," U.S. Patent 909411, filed November 25, 1907.

The invention came about as many wheelchairs have: through the creative initiative of a disabled person. Herbert Everest, an engineer, had broken his back in a mining accident in 1918 or 1919, and as a result was rendered paraplegic.[7] Frustrated with the heavy wooden chair he used, he proposed to his friend and fellow engineer Harry Jennings that they invent something better. In 1932, they designed a simpler, easier-to-propel, collapsible chair made of steel aircraft tubing; it had a folding cross brace and a fabric back (fig. 25).[8] Though the 1936 patent indicates four small wheels of equal size, later versions reverted to large rear wheels "to accommodate the passage… over bumps or depressions in a road or other surface on which the vehicle is used…. One of the objects of this flexible construction is to maintain both driving wheels always in contact with the floor or ground and thus enable the occupant of the chair to propel it."[9] Maneuverability, transportability, and the independence of the user were thus paramount. The E & J chair was also about half the weight of earlier folding chairs, about thirty five pounds, allowing, say, a paraplegic with upper-body strength to fold and stow the wheelchair himself. The chair highlighted in the 1914 *Scientific American* article weighed seventy pounds—"not any more," the anonymous author remarked, "than the non-collapsible article." (This in and of itself is a fascinating rever-

[7] Watson and Woods say 1919 in *A Historical Sociology: Full Report*, 14.

[8] Herbert Everest and Harry Jennings, "Wheel Chair," U.S. Patent 2,095,411, filed February 11, 1936.

[9] Herbert Everest and Harry Jennings, U.S. Patent 2,095,411 A, October 12, 1937.

sal of independence/dependence of person/object.)[10] The two engineers established a small company in Los Angeles, which would, in time, take up three city blocks and come to dominate the market in the United States and Canada for many years.

Like many inventors, Everest and Jennings had to wait for the culture around them to catch up with their idea. It was only in the aftermath of World War II, which created a large class of veterans with spinal cord injuries, that the E & J chair became indispensable and, eventually, ubiquitous. That was in large part because the Canadian government, and later the U.S. government, became convinced that, with the combination of a car and an easily stowed wheelchair, seriously wounded veterans could once again become independent, capable citizens. Several developments allowed this to come about: the introduction of antibiotics, which allowed many more people with spinal cord injuries to survive; the birth of modern rehabilitative medicine; and the growing popularity of cars. (According to Mary Tremblay, in "Going Back to Civvy Street," in World War I, over 80 percent of soldiers with spinal cord injuries died within a few weeks as a result of infection.) The automobile was a crucial link in the chain: the U.S. government actually paid for cars with hand controls for wounded American GIs, while the Canadians gave preference for the purchase of cars to their veterans.[11]

[10] A friend once told me he had watched an athletic-looking man in a wheelchair approach the stairs to a New York subway station; and then stop, get up out of the chair, load it onto his back, and descend the stairs on his rump.

[11] "By 1946, [Canadian] veterans were beginning to purchase automobiles, for which they were given preference during the post-war period. Veterans were not given automobiles as were American veterans in the late 1940s," says Tremblay in "Going Back to Civvy Street," 157.

This gave a whole new energy, so to speak, to the idea of the wheelchair: it was no longer an article of invalid furniture, used to conveniently ensconce an elderly or ill family member at home or to transport institutionalized patients from ward to ward, but, rather, a means of mobility, a vehicle for a heretofore isolated group of people to hold jobs, go to school, access entertainment—to have a life. With this in mind both governments began to issue E & J wheelchairs to every veteran with a spinal cord injury in the mid-1940s. The first order, by the Canadians, was for 200 chairs; the U.S. government, the Red Cross, and others ordered thousands.[12]

Two aspects of these chairs are particularly relevant to this study. Other scholars have emphasized the independence afforded the user by the E & J chair, which was certainly true—and revolutionary, at that. This was a chair you could take hold of, direct, and propel on your own. The transformative ability of such objects to change the lives of their users should not be lost on us.

But the new chair also promoted the idea of the *individual* wheelchair. As Tremblay points out, citing interviews with Canadian World War II war veterans, before Everest & Jennings, hospitalized patients did not have their own chairs. Most institutions kept only a few wheelchairs on hand; often, a crowded ward of patients would have only one. Thus you could not form a close relationship with a wheelchair; it wasn't yours, after all. "The first one up

[12] Bourgeois-Doyle, *George J. Klein, The Great Inventor*, 167–68. I have not been able to find more accurate numbers.

got the wheelchair," reminisced Jack Higman, a Canadian veteran interviewed by Tremblay, who spent time in a Toronto hospital in 1944. "You knew darn well you weren't going to get out of bed the rest of the day because if someone got it first they would be gone."[13] Many others attest to the prevailing philosophy that still kept paraplegic patients and amputees in bed, assuming they would die or have no life after their injury, in some ways a relic from pre-antibiotic days. Even during and after World War II, wheelchair use was regarded as either impractical or an admission of failure, and the wheelchairs themselves underlined this concept. As Angelo Nicosia, another World War II quadriplegic veteran, remembers in a 1990 interview:

> The type of wheelchair that was commonly used by the military in those days…had a wicker seat and back and sometimes was called a 'cane chair.' It had two large wheels in the front—24-inch wheels, I think—and two casters in the rear. It was extremely difficult even for a strong paraplegic to propel this kind of chair.[14]

In other words, this type of wheelchair was not meant for routine, personal use. And accepting a better wheelchair would be tantamount to accepting one's injuries, as opposed to fighting against them. Struggling nobly to walk with crutches, for example, no matter how difficult, would be seen

[13] Tremblay, "Going Back," 156.

[14] Lynn Phillips and Angelo Nicosia, "Clinical Perspectives on Wheelchair Selection," *Journal of Rehabilitation Research and Development* 24, suppl. 2 (1990): 1–7.

as better than sitting in a wheelchair. The idea of the wheelchair as failure or defeat was still being debated as late as 1950. For example, the neurosurgeon Donald Munro, in an article appearing in the *Paraplegia News* in late 1949—which prompted a series of angry letters from veterans—attacked the Paralyzed Veterans Association for advocating the use of wheelchairs. (The discussion began with a letter from Munro, in which he claimed that the use of a wheelchair was a sign of defeat. For months disabled readers wrote in, challenging and rejecting Munro's ideas.)

Gradually, as this ideology was challenged, the resistance to wheelchair use began to change. When the culture was ready, it pounced on the E & J chair. The Canadian and American veterans became the guinea pigs for this large experiment, for the most part eager to be pioneers and to improve their lot. Nicosia describes the anticipation and joy when he received his new folding chair: "It took three months for me to receive my new Everest & Jennings 18-inch-width wheelchair. It was all shiny and chrome plated, and I felt like someone had given me a new Cadillac convertible. Propelling it was a pleasure compared to that old high-back wicker chair that I had used in the hospital."[15]

In large part because of the lucrative contracts awarded by the U.S. and Canadian governments, and the popularity of these portable chairs among disabled users, E & J became the most powerful wheelchair company

[15] Tremblay, "Going Back," 156.

in the world, controlling more than 70 percent of the U.S. market according to a *Los Angeles Times* article by James Peltz that appeared in 1990. In the early 1980s a *New York Times* article estimated sales at $145 million and profits at $8 million. At that point the company was producing about 150,000 wheelchairs a year, about half the domestic wheelchair market. Yet in the 1940s, the Everest & Jennings Company was the great innovator, and the lighter-weight foldable wheelchair became the ultimate in independence. With its use, a population of disabled people with different expectations emerged, users who forged a new kind of relationship with their very own mobile wheelchairs, transformable things that could, significantly, transform their owners.

George Klein and The Power Chair: Customization and User Input

The power wheelchair has a rather different history—but one also connected to the automobile. It is in some ways a *descendant* of the automobile, or perhaps its cousin; it does not really work with it as much as it comes from it. Thus its connection to its occupant is quite different. The chair may be said to have a less direct connection to the user's physical self because it involves at least one more step in the transfer of energy. The user does not move directly by means of his or her own hand, but rather by touching a joystick, which then converts power through a battery.

In the early twentieth century a variety of vehicles propelled by electricity or gasoline came on the market, as did, especially in England, the motorized tricycle. ("Invalid tricycles" were a sort of three-wheeled, low-maintenance, low-speed motorcar made for disabled users and subsidized by the British and other European governments. They never became popular in the United States.)

These were certainly not all meant for a disabled user—many were considered pleasure vehicles—but like some of the earlier, manual wheelchairs they served dual purposes as conveyances for those who couldn't walk and those who didn't want to. A good example was the Osborn Electriquette (fig. 26), produced especially for the 1915 San Diego world's fair and featured in the silent Fatty Arbuckle short *Fatty and Mabel at the San Diego Exposition*.[1] The Electriquette was a wicker-covered two-person chair pow-

[1] *Fatty and Mabel at the San Diego Exposition*, Keystone Films, 1915. http://www.youtube.com/watch?v=l8ce-byi-s1k.

The real, easy, classy, comfortable, luxurious way to see and thoroughly enjoy the Exposition is in an Osborn Electriquette, which supplants the antiquated push-chair and jinrikisha. The only passenger conveyance permitted on the grounds.

The simplicity of operation renders experience unnecessary. A child can drive it. It's great fun.

Stations at each entrance gate, all prominent points, and "Neptune's Wonderland" on the "Isthmus."

EXPOSITION MOTOR CHAIR COMPANY,
San Diego Exposition

FIG. 26. Advertisement for The Electriquette, 1915, reproduced in the Spring 2013 newsletter, The Committee of One Hundred (Balboa Park, San Diego), http://www.c100.org.

ered by a battery and steered by a movable wand. It rode at a maximum of three and half miles per hour, considered walking speed. Some weak or elderly people may have used the vehicle, but those with severe handicaps would have found the Electriquette too difficult to climb into and too open to keep their balance in. Another was the Custer, a gasoline-powered chair made for one, with more of the profile of a motorbike than a car. (An advertisement from 1933 said Custer Specialty of Dayton, Ohio, had been making motor-propelled chairs since 1916.)[2] Later, similar motorized chairs for one or two were marketed to the disabled, such as the Mitchell chair, which sold for $395 and could go six miles an hour, and the Autoette, made by Blood Sales in Long Beach, California. An advertisement for the chair, which appeared in an October 1950 *Paraplegia News*, claims that "simple hand controls allow even a 90 percent paraplegic to drive with safety anywhere an ordinary car will go."[3]

These vehicles were meant for outdoor use; they were far too large and cumbersome for homes and other buildings. They were also impossible for a quadriplegic or other severely disabled person to operate. What was needed was a chair that could transition between indoor and outdoor, that was maneuverable in tight spaces but powerful and resilient enough to drive around town, a chair that was responsive and supportive enough that it could be used by the most impaired individuals.

[2] "Introducing Our Latest," advertisement, *The Polio Chronicle*, July 1933, Courtesy of Warm Springs Institute, disabilitymuseum.com. http://www.disabilitymuseum.org/dhm/lib/detail.html?id=1122.

[3] *Paraplegia News* (October 1950): 5.

Such a chair was not created until midcentury, when Canada's Department of Veterans' Affairs, mindful of the larger number of seriously wounded soldiers who had survived World War II, put aside previous reservations—they had previously seen such chairs as hazardous and impractical—and asked the country's National Resources Council and the well-known inventor George J. Klein to come up with a power wheelchair for disabled veterans.

The electric wheelchair fashioned by Klein was actually an Everest & Jennings manual chair with a motor that he adapted to his purposes. With input from other engineers and, importantly, from paraplegics and quadriplegics themselves, he came up with a new kind of a controller—a kind of proto-joystick that let users manipulate the chair with as little as a finger touch. (One very disabled veteran who could not use his hands at all but wanted a chair persuaded Klein and his group to come up with a version that he could control with his cheek. This kind of approach was unique at the time and brought about a new field called "rehabilitation engineering."[4]) The chair had a twenty-four-volt electrical system and utilized two motors to control the wheel; previous chairs used only one. It had a top speed of 2.5 miles per hour, and a twenty-mile range.[5] It was easy to operate and maneuver, and was from the start hugely popular with those who tried it.

Canada famously offered this chair to the world, actually gifting one of the Klein chairs to the U.S government in an effort to interest American

[4] Bourgeois-Doyle, *George J. Klein, The Great Inventor*, 183.

[5] Watson and Woods, "A Short History of Powered Wheelchairs," 167.

manufacturers in production, since it was felt that there wasn't a large enough market in Canada. Eventually both the American Wheelchair Company and E & J began to make chairs using the Klein motorized device—the Electromatic and the Powerdrive, respectively.

At least until the 1970s, this type of wheelchair with motor attachment was the standard, offering a new kind of independence to previously homebound individuals—like the "Rolling Quads," a group of disabled college students who, in the mid-1960s, were able to attend classes at Berkeley (fig. 27). As Woods and Watson relate, the activism of the Berkeley students would lead not only to more inclusion and better accessibility but also to new and better wheelchair technology.

During the 1960s and early 1970s the Berkeley students and others still had manual chairs augmented by add-on motors. Though these were useful—the Rolling Quads would never have existed without them—and

FIG. 27. The Rolling Quads at Berkeley, mid-1960s. "Herb Willsmore - E. Roberts," Chris Carlsson, FoundSF.org, posted December 2, 2013, accessed August 18, 2017, http://www.disabilitybible.com.

were a great improvement over earlier versions, they nevertheless were not ideal. They often needed repair; they couldn't climb steep gradients; and they were not made for the rough and continuous use of the Berkeley students. Out of necessity, the students finally created their own repair service, where, with constant user input, the technicians came up with alternate solutions and innovations for these wheelchairs. Over time they became authorities in their field, so much so that they began to have an equal if initially contested place at the wheelchair design table.

In 1978, they were invited to the Wheelchair Conference in Miami to present their findings and opinions to representatives from the VA Office of Prosthetic Research, NASA, and others. This turned out to be a watershed event; discussions held there as well as emerging technology spawned a new generation of powered wheelchairs, like the Invacare Rolls Arrow (fig. 28), with a frame factory-built to house the motor, a more sophisticated operating system, multiple speed control, more power, better maneuverability, and greater reliability.[6]

In a section on electric-powered wheelchair in the book *Spinal Cord Medicine*, Rory Cooper, a well-known expert in the field and a wheelchair-using veteran and athlete, cites the changes in technology that enabled these

[6] The Invacare Corporation grew out a long line of wheelchair makers: first the Fay Co., established in the 1870s in Elyria, Ohio, which subsequently became the Worthington Co. and then the Colson Corp. Colson, renamed Mobilaid, was bought by Boston Capital Group in 1971 and combined with the Invelex company to form Invacare, which was acquired by Johnson & Johnson in 1978.

FIG. 28. Power wheelchair, Rolls Arrow by Invacare, 1984, NMAH Trade Literature Collection, Smithsonian Institution, Washington, DC.

new chairs to emerge.[7] Initially, wheelchair makers used starter motors and batteries from automobiles; later they switched to relays and then transistors; and finally, microprocessors and metal-oxide-semiconductor-field-effect-transistors (MOSFETs). Later still, programmable computers came into play. Over time, these provided better control and greater efficiency.

Interestingly, just as for a time motors and frames were separate, a new, important trend began to appear in the 1990s, according to Cooper: the separation of seat and frame. Each element could be customized to meet the needs of the user.[8] The Swedish company Permobil, innovator in seating design, became an important contributor, focusing on systems that could address persistent problems of wheelchair users like pressure sores and poor posture. Frames and seats could be mixed and matched to users' needs, even to the extent of combining manufacturers. People who had

[7] "Electric Powered Wheelchairs," in Lin, ed., *Spinal Cord Medicine*, http://www.ncbi.nlm.nih.gov/books/NBK8915.

[8] Ibid.

limited trunk control, for example, could obtain seating with more upper-body support; features like tilting and reclining, which were beneficial to those with different disabilities, could be built into the chair independent of frame type. The power frame could be customized for indoor or outdoor use, for rough or smooth terrain, for going to class or going to the beach.

One might say that as motorized chairs became more complex, more technologically sophisticated, tougher and more powerful, they once again began to resemble the early automobile-like vehicles such as the Electriquette. But unlike those, often used for pleasure and entertainment, these chairs were and are customized to suit the most disabled individuals, allowing them to fully enter a previously inaccessible world.

The Lightweight Rigid Chair: Quickies and "Super Crips"

While the folding chair of the World War II veteran gave him new freedom, it still bore all the signs of the institution and what it connoted: with its muted or somber color and its metallic frame, the chair still gave off a whiff of hardship and the hospital. The Quickie, the first of the ultralights, came on the market in 1979, and said "fun," "action," "color"—even "sex," especially given the chair's double-entendre moniker. This is in a lot of ways what Marilyn Hamilton meant to do when she persuaded two technologically sophisticated friends to build her a wheelchair she could play tennis in.[1] Hamilton, an

[1] The National Museum of American History at the Smithsonian Institution in Washington, DC, exhibits a Quickie

athletic young woman who broke her back in a hang-gliding accident, wasn't about to stop living or doing what she loved best. She wanted a wheelchair that would not only enable her to carry out her lifestyle but also to express who she was. With her input, her friends came up with a sleek, sky blue machine that advertised Hamilton's optimistic personality and allowed her to play tennis and other sports. It weighed only twenty-six pounds, about half of what previous rigid chairs weighed, and was more stable than the collapsible, folding chairs.

Her chairs and others like them caught on, both for athletics and for the everyday use of active wheelchairists, who were becoming more vocal and more numerous as the disability rights movement began to blossom. "Hamilton's brightly colored chairs tapped into [the] growing sense that there was no shame in being disabled," says Joseph Shapiro in "The Screaming Neon Wheelchair," a chapter in his book *No Pity: People with Disabilities Forging a New Civil Rights Movement*. "Hamilton's stylish product reassuringly said it was okay, it could even be cool to be in a wheelchair."[2]

Many other similar versions of the Quickie followed. California, particularly, spawned a number of new companies—many of which didn't survive—which were founded by active, liberated users who took saws and

wheelchair and acknowledges Hamilton's contribution in its online exhibition "Sport/Breaking Records, Breaking Barriers." In 1983, Hamilton won the Women's Open Wheelchair Tennis Competition. http://amhistory.si.edu/sports/exhibit/removers/wheelchair/index.cfm.

[2] Shapiro, *No Pity*, 213.

welding torches to their conventional chairs to mold them into the vehicles they wanted. Some just wanted an easy, sporty chair to use on an everyday basis, which would be lighter, faster, easier to manipulate, and more forgiving in often-still-inaccessible environments. Users had for so long been seen as invalids; the new chairs, with their relentlessly contemporary looks and their speedy profiles, broadcast their users' new idea of themselves in keeping again with the disability rights movement.

Others wanted hard-core athletics, and began to modify their chairs for particular sports, like racing, tennis, basketball, and hockey. As time went on, the everyday ultralights became more and more differentiated, so that, for example, by 1985, as Rory Cooper points out, "racing wheelchairs no longer had any components in common with everyday wheelchairs."[3] But many of the ultralight chairs still functioned as crossovers; the catalog copy for the Everest & Jennings 1983 Lightning chair, for example, touts its suitability for all users: "Lightning responds with amazing ease and agility. And Lightning's stability makes it an excellent chair for everyone from active sportspersons to users who can benefit from the extra advantages of an ultralight chair."[4] (See fig. 29.)

Wheelchair sports had begun as rehabilitation for World War II vet-

[3] Rory Cooper, *Wheelchair Selection and Configuration* (New York: Demos, 1998), 273.

[4] Everest & Jennings, "Lightning" catalog (1983). For a discussion of the advantages of rigid versus folding wheelchairs, see Robbie B. Leonard, "To Fold or Not to Fold?: Rigid vs. Folding Wheelchairs," wheelchairnet.org. TeamRehab Report. March/April 1992: 30–32. http://www.wheelchairnet.org/wcn_prodserv/Docs/TeamRehab/RR_92/9203art4.PDF.

FIG. 29. Everest & Jennings "Lightning" chair, 1983, catalog NMAH Trade Literature Collection, Smithsonian Institution, Washington, DC.

erans in England. Lewis Guttmann, a German-born neurosurgeon, had witnessed the virtual abandonment by hospital staff of soldiers with spinal cord injuries during World War I. When he immigrated to England and became director of a unit for World War II veterans with spinal cord injuries at Stoke Manville Hospital in Aylesbury, he began a modest sports program, which at first consisted of darts, snooker, archery, and table tennis, but soon expanded to wheelchair polo, basketball, and other sports. In 1948, on the same day the Olympics opened in London, the Stoke Manville Games was held for the first time; sixteen paralyzed veterans competed in archery.[5]

Meanwhile, paralyzed veterans returning from the war began playing wheelchair basketball for recreation at Veterans Administration hospitals in the United States. Soon teams and leagues were formed. The Eastern Paralyzed Veterans Association of New York, with the help of local sports teams like the Nets, pioneered and sponsored many of these teams, but

[5] It was intentionally held on the same day the Olympics opened in London, and since 1960, the Paralympic Games have taken place in the same year and the same city as the Olympic Games. The Games were initially open only to athletes in wheelchairs; athletes with different disabilities were included for the first time at the 1976 Summer Paralympics. More than 4,000 athletes competed at the 2012 London Paralympics. "The IPC: Who We Are: History of the Movement." http://www.paralympic.org/the-ipc/history-of-the-movement.

they sprang up all over the country, particularly in California. In 1946 the first competitive wheelchair basketball match was played by the Birmingham, California, team.[6] The pages of *Paraplegic News*, a publication devoted to veterans in the post–World War II period, are filled with news of these wheelchair sports tournaments in the early 1950s. By the 1960s, about a dozen sports were played in the United States, but all athletes still played with "depot-style" chairs—that is, the kind of wheelchairs one found in institutions, not customized for use or user.[7] By the late 1960s, according to Rory Cooper, wheelchair racers began to modify their own chairs, looking for speed and maneuverability. Greater differentiation of sport and of user led to many modifications over the next decades. As athletes have become more competitive, looking for an edge, specialized wheelchairs for sports have become faster, more streamlined, stripped down to the essentials. And wheelchair athletics has become sexy, turning on its head many people's concept of disability. Such chairs are compared to sports cars: sleek, minimalistic chairs fitted as tight as a glove.[8]

Much as the popularity of skiing led to the use of synthetic fabrics in clothing, wheelchair sports have also brought new materials to everyday

[6] WNBA web page, "History," http://www.nwba.org/index.php?option=com_content&view=article&id=34&Itemid=200.

[7] According to Herman Kamenetz in chapter 14, "Wheelchair Sports," in *The Wheelchair Book*, 190–97; Cooper, *Wheelchair Selection*, 272; this also seems obvious from a photo in Kamenetz's book, published in 1969, of a javelin thrower, page 197.

[8] See, for example, the video *BMW Presents Man and Machine with David Weir*, interview with Yann Yonnakis Jones. March 21, 2012. Accessed December 22, 2013. http://www.youtube.com/watch?v=x7NKsiBqZ1U. For a lengthy discussion of athletic wheelchairs, see Rory Cooper, *Wheelchair Selection and Configuration* (New York: Demos, 1998), 273.

rigid chairs. Aluminum and titanium are routinely used in lightweight chairs, and now carbon-fiber materials are being used for the first time by wheelchair companies like Norway's Panthera. According to the Panthera website, their carbon-fiber chair costs more than $10,000—very steep for a manual chair and certainly for most users. Most ultralights made of titanium cost in the range of $2,000 to $3,000. We have seen how the power chairs of the Berkeley students began a revolution in wheelchairs that brought better chairs and greater accessibility to their users. The ultralights literally propelled the movement forward. In a self-reflexive action, disabled people created new machines, which then re-created the people. Whether they are simply active everymen and everywomen or athletic superstars, as Woods and Watson repeatedly note, these new wheelchair users are on their way to creating new concepts of disability.[9]

Most important for this book, the ultralight seems to "complete" bodies in a way that other wheelchairs do not entirely. Minimalist and stripped-down, easily disassembled and transportable, these chairs seem in very real ways to be part of the body. This is most true for the sportsmen and sportswomen who play their games with their exquisitely tuned chairs. But even for those less physically gifted, when the chair/human interaction works, energy flows both ways, and machine and human become one.

[9] Much of the work of Woods and Watson's "historical sociology" in their report and subsequent articles revolves around this idea.

Conclusions

"When an object is imbued with qualities of the self, it expresses the being of that person, whether in written words or a chair that was crafted or a photograph. It becomes an objectified form of consciousness no less than words spoken into someone's ear . . . ."

Csikszentmihalyi and Rochberg-Halton, *The Meaning of Things*[1]

Little has been written on the relationship of human to wheelchair. Yet what has been often reveals the most profound attachment and kinship, as evidenced by the words of such users as psychologist Galen Buckwalter, in a 2007 article in the *New England Journal of Medicine* and the psychologist who also appeared in the documentary film *Rolling*. "I live in a manual wheelchair, which is, in a meaningful sense, my legs. I enjoy the gentle dance of playing with gravity as I swivel down slight grades and the jarring thwack of timing the jump across a large crack in the sidewalk—every bit as much as I used to love the feel of freshly cut grass on bare toes . . . ."[2]

Wheelchair users including William Peace, Leonard Kriegel, National Public Radio's John Hockenberry, the activist Simi Linton, and the dancer Alice Sheffield have also described an extraordinary, interdependent relationship of object and person, wherein the wheelchair merges with or extends the user. One experiences the chair as one might experience one's own body. "I love my wheelchair—every piece of it," says Peace in a posting on his blog

[1] Csikszentmihalyi and Rochberg-Halton, *The Meaning of Things*, 190.

[2] J. Galen Buckwalter, "The Good Patient," *New England Journal of Medicine* (December 20, 2007): 357:2534–535.

Bad Cripple. "It is a part of me, akin to my leg or arm. I cannot envision life without it. It is a vibrant positive part of who I am."[3]

Through an examination of nineteenth- and twentieth-century wheelchairs and related ephemera, I have explored the relationship of wheelchairs and users, and found numerous examples of this bonding. Using Bruno Latour's actor-network theory and drawing on the ideas of Csikszentmihalyi and Rochberg-Halton, I have looked at the emotional transactions and the redefining and remaking of self through these interactions. Like the scientist Pazzaglia and colleagues, who found that the body schema of many people with spinal cord injuries was rearranged to incorporate their wheelchairs, and Myriam Winance, who demonstrated that user and chair become one entity through a making and unmaking process of the *collectif*, I have shown the "enwheelment" of the wheelchair user and the manner in which the wheelchair may become the fulcrum of emotional transactions. In all of these instances, the object—that is, the wheelchair—has its own agency that has not always been acknowledged, an agency that works in tandem with the human—like the Nuer tribesman's spear in *The Meaning of Things*, which both symbolizes and extends the self and grants the user the power he lacks. The two are a creative whole: "In a sense it is animate, for it is . . . an external symbol . . . which stands for the strength, vitality, and virtue of the person."[4]

[3] *Bad Cripple* blog, posted October 24, 2013, accessed December 23, 2013, http://badcripple.blogspot.com/2013/10/an-ode-to-my-wheelchair.html.

[4] E. E. Evans-Prichard, *Nuer Religion* (New York: Oxford University Press, 1956, 1974), 233, cited in Csikszentmihalyi and Rochebrg-Halton, *The Meaning of Things*, 26.

A less often considered aspect of the chair is the physical impact it may have on its owner. In *Rolling*, Galen Buckwalter, who has used a manual wheelchair for decades, is considering switching to a power chair in part because of the physical effect on his own body from wheeling the machine for so long. "Parts of my body have had to absorb the wear and tear of sitting all the time," he says in the film. "I've had increasing pain in both my shoulders. It's not surprising considering I've spent so many years pushing my chair. I've made thousands of transfers in and out of it."

In some transactions, the user and/or the others around him or her literally consider the chair part of his or her being; we can see this in language and movement. For example: someone sympathizes by placing a hand on the chair's arm rather than the arm of the wheelchairist. Chair and user represent a unified dyad much of the time, but sometimes things fall apart, and then we don't know if the wheelchair is slave or master, something to depend on or something to abandon, a monster or a lover that turns against its flesh-and-blood user. There is usually a symbiosis between man and machine, but sometimes that fails. Using the machine can be hard, dangerous, faulty, lacking the beauty and ease of interdependent beings. The road can be bumpy, even treacherous.

Yet the road continues. The user needs to move, the wheelchair needs him to turn on a switch, to steer, to animate. Neither can act without the

other. When they do, man and machine mesh. To quote David Weir in a BMW ad, commenting on his relationship with his racing chair, "The chair must be part of you, so you flow into the machine."[5] Perhaps this completes some modern-day fantasy where the wedding of human and technology is consummated.

Readings and personal observations about the closeness of the wheelchair/user bond brought me to this subject. But it was from the point of view of a design scholar that I wrote this book, bringing together ideas about the evolution of technology, about our deep and transactive relationship with things, and how the wheelchair can be experienced and examined as a unique, transactive object.

[5] Video, *BMW Presents Man and Machine with David Weir*.

Bibliography

Notes on the Reference List

For a general background on the history of the wheelchair, there is no better way to begin than the first chapters of **Herman Kamenetz**'s *The Wheelchair Book*, published in 1969 but still a valuable resource. The Britons **Brian Woods** and **Nick Watson** have added much to this basic chronology with their detailed 2005 study "A Historical Sociology of the Wheelchair," as well as such articles as "The Social and Technological History of Wheelchairs" and "A Short History of Powered Wheelchairs." For both a brief history as well as a more technical take on wheelchairs, see **Rory Cooper**'s *Wheelchair Selection and Configuration* as well as his chapter called "Wheeled Mobility" in the *Biomedical Engineering Handbook*. For a more practical approach, there is **Gary Karp**'s clear and concise *Choosing a Wheelchair*.

For understanding the emergence of wheelchairs in the context of American furniture, see **Nancy Goyne Evans**'s illustrated *Windsor Chairs: Specialized Seating*. **Sigfried Giedion**'s classic *Mechanization Takes Command*, David Hanks's *Innovative Furniture in America*, and the work of **Jennifer Pynt** and **Joy Higgs** are particularly useful in considering patent furniture and its relationship to wheelchairs. And **Mimi Hellman**'s brilliant article on eighteenth-century French furniture illuminates how furniture and its inhabitants interact.

The catalogs produced by the **New Haven Folding Chair Company**

between 1871 and 1890 (available at archive.org, connecticuthistory.org) provide a wealth of information on how and when U.S. wheelchairs began to be manufactured and on attitudes toward those who used them. The illustrated booklets show close details of models and prices. Some of the catalogs of other wheelchair companies like **Gordon's and Colson**'s can be found online; others, such as those from **Everest & Jennings**, can be perused at the library of the National Museum of American History in Washington, D.C. The entire archive of ***Scientific American*** magazine, which began publication in 1845 and often ran articles about new patents, can be found at nature.com/scientificamerican/archive; past issues can be ordered for a price. Selected issues are online for free.

U. S. Patents are searchable via Google; they are a wonderfully detailed source for descriptions and drawings of wheelchairs. **The Disability History Museum** is a virtual source with an index of artifacts, photos, and patents (disabilitymuseum.org). Reports and summaries of expositions, like **Horace Greeley**'s book on the 1853 Crystal Palace, and of lesser trade fairs like those of the **Massachusetts Charitable Association**, can be searched with keywords like "wheeled chair," "invalid chair," "locomotive chair," and "rolling chair." Many are available at archives.org and hathitrust. Newspapers such as the *New York Times*, whose archives extend back to 1851, carried ads and articles relating to wheelchairs, as did *Scribner's*, *Harper's*, and

The Century magazines, many found online. **Catherine Beecher**'s *Domestic Receipt Book*, originally published in the 1840s, which includes a relevant chapter on the sickroom, gives insight on the place of the "invalid" and of the ingenuity of families before manufactured wheelchairs were common.

Civil War studies and archives abound — although with very little mention of wheelchairs. Three sources I found particularly helpful were **James Marten**'s *Sing Not War: The Lives of Union and Confederate Veterans in Gilded-Age America* and a thesis by **Jalynn Olsen Padilla** called "Army of 'Cripples': Northern Civil War Amputees, Disability, and Manhood In Victorian America." The extraordinary photos of Civil War soldiers taken by **Reed Bontecou**, an army surgeon, and compiled by **Stanley Burns**, are a stark illustration of injuries suffered on both sides; a few feature men in wheelchairs. The **New York State Library and Museum** in Albany has a Civil War–era wheelchair on display and archives brimming with primary source materials, including letters and army records.

Issues of *Paraplegia News*, put out by the **Paralyzed Veterans of America** beginning in 1945 (I read those published during the early fifties) and some of which are available at Columbia University's Health Sciences Library, were interesting both for imparting news of technology and the emerging wheelchair sports movement, and for revealing, through letters and editorials, the thinking toward disability during that period. Ditto for *Spastic*

Review, published by the **Institute of Logopedics at the University of Wichita**, starting in 1940, and the **Muscular Dystrophy Digest** from the 1950s. Some issues of these publications are also available at the Health Sciences Library.

Material about prosthetics can be found in a variety of sources across fields: thinkers from **Sigmund Freud** to **Gregory Bateson** to **Mihaly Csikszentmihalyi** touch on this subject. Work by **Sobchack** — "A Leg to Stand On" — **Jain**'s "The Prosthetic Imagination," **Tiffany Funk**'s "The Prosthetic Aesthetic," and **Smith and Morra**'s compilation "The Prosthetic Impulse" are all valuable in discussing the meanings and implications of prosthetics; the book of essays called *Artificial Parts, Practical Lives* (edited by **Stephen Mihm**, **Katherine Ott**, and **David Serlin**, with a fine introduction by Ott), gives a historical perspective.

The links between machines and people and the advent of cyborgs is closely associated with prosthetics. **Adam Gyngell**'s "Mechanisms of Fear," **Adam Goodheart**'s "The Machine of the Myth," **Anthony Vidler**'s "Homes for Cyborgs," and **Donna Haraway**'s seminal essay "The Cyborg Manifesto" are all worthwhile reading.

To understand the interactions between humans and tools on a scientific level, see the studies by **Pazzaglia et al.**, **Cardinali et al.**, and **Carlson**; for more about the bioethical aspects, see the article by **Courtney Campbell et al. Myriam Winance**'s inspiring case study, of a boy learning to use a power wheelchair, employs the ideas of **Bruno Latour**, whose actor-network theory is explained in his book *Reassembling the Social*. Other important reading is the 2001 issue of *Critical Inquiry*, which lays out **Bill Brown**'s "thing theory."

For more on the importance of the lightweight foldable wheelchair, see **Mary Tremblay**, "Going Back to Civvy Street: A Historical Account of the Impact of the Everest and Jennings Wheelchair for Canadian World War II Veterans with Spinal Cord Injury." For the story of the Klein power chair, see **Richard I. Bourgeois-Doyle**'s, "The First Wheelchairs for Quadriplegics," in *George Klein: The Great Inventor*, chapter 7. For a history and discussion of the impact of Marilyn Hamilton's Quickie chair see "The Screaming Neon Wheelchair," chapter 7 in **Joseph Shapiro**, *No Pity: People with Disabilities Forging a New Civil Rights Movement*, as well as the Smithsonian page dedicated to her achievement.

For motorized chairs, see **Watson and Woods**, "A Short History of Powered Wheelchairs," and "No Wheelchairs beyond This Point: A Historical Examination of Wheelchair Access in the Twentieth Century in Britain and America." The archives of the **Independent Living Movement at Berkeley**, searchable online, are a tremendous resource for those interested in twentieth-century disability history: bancroft.berkeley.edu/collections/drilm/.

Finally, for those who wish to read personal, current accounts of

wheelchair use, see **John Hockenberry**'s *Moving Violations*, as well as his TED talk; **Gary Presley**'s *Seven Wheelchairs*; **Alice Sheppard**'s provocative "Showing Spine"; **J. Galen Buckwalter**'s piece in the *New England Journal of Medicine*, **Bill Peace**'s *Bad Cripple* blog, and **Leonard Kriegel**'s "Wheelchairs," which appeared in the *Missouri Review*.

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