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## Building Access

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# Notes

## Preface

1. Tanya Titchkosky, *The Question of Access: Disability, Space, Meaning* (Toronto: University of Toronto Press, 2011).

2. “Bodymind” is a term I borrow from Margaret Price, “The Bodymind Problem and the Possibilities of Pain,” *Hypatia* 30, no. 1 (2015): 268–84.

## Introduction

1. As a critical concept, “misfit” is elaborated by Rosemarie Garland-Thomson, “Misfits: A Feminist Disability Materialist Concept,” *Hypatia* 26, no. 3 (2011): 591–609. Along with Garland-Thomson’s neologism “normate,” misfit offers a useful reference to bodies for whom the world was not designed. I elaborate my theory of normate and misfit as users of built environments in Aimi Hamraie, “Designing Collective Access: A Feminist Disability Theory of Universal Design,” *Disability Studies Quarterly* 33, no. 4 (2013), <http://dsq-sds.org/article/view/3871/3411>.

2. I use the term “disabled people,” and occasionally “people with disabilities,” throughout this book. “Disabled people” is the preferred usage for many disability activists, who argue that they are disabled by society and claim disability as an identity. “Person-first language,” such as “people with disabilities,” is often associated with medical and rehabilitative models, which identify personhood as separate from disabled embodiment and experience. With the exception of historical quotations, I avoid outdated terms such as “handicapped” and the myriad derogatory terms used to refer to cognitively and physically disabled people. When describing disabled people, I have used terms with which they appear to identify in public. Ronald Mace, for instance, used the term “disabled person.” There are also generational differences in term preferences and meanings. Although “crip” emerged as an identity term in the 1970s, it has more recently gained popularity within academic discourse, personal identification, and group affiliation.

3. Disability social movement scholars often identify direct action as a key tactic for disability activists, who use their bodies as evidence that disability is a socially produced, rather than medical, phenomenon. See Tom Shakespeare, “Disabled People’s Self-organisation: A New Social Movement?,” *Disability, Handicap and Society* 8, no. 3 (1993): 251–52.

4. On the politics of disability in post-ADA narratives of design, see Aimi Hamraie, “Universal Design and the Problem of ‘Post-Disability’ Ideology,” *Design and Culture* 8, no. 3 (2016): 285–309.

5. As disability scholars such as Georgina Kleege (*Sight Unseen* [New Haven, Conn.: Yale University Press, 1999]) have argued, optical metaphors for knowledge (such as “plain view”) are part of the culture of disability discrimination, elevating the primacy of vision as a way of knowing. My use of these metaphors here is deliberate, however, as this book is concerned with the primacy afforded to legibility and illegibility, whether scientific or political, as a form of power.

6. Most analyses focus on the ADA’s failures to achieve labor inequality, despite mandating accessible built environments and services. See Michelle Maroto and David Pettinicchio, “Twenty-Five Years after the ADA: Situating Disability in America’s System of Stratification,” *Disability Studies Quarterly* 35, no. 3 (2015), <http://dsq-sds.org/article/view/4927/4024>. Data from the U.S. Department of Labor shows that eight out of ten disabled people lack access to employment, compared to three out of ten in the nondisabled population. See Department of Labor, “Persons with a Disability: Labor Force Characteristics,” Department of Labor Statistics News Release, June 21, 2016, 1–11. Disability law expert and former Department of Justice attorney Sam Bagenstos attributes the ADA’s failures to the “inherent limitations of antidiscrimination laws,” which do not provide the “social welfare” necessary to overcome barriers. See Sam Bagenstos, “Disability Laws Are Not Enough to Combat Discrimination,” *New York Times*, July 26, 2015. The failures of ADA Title III to achieve accessible public accommodations is attributed to a “fragile compromise” between advocates and businesses, argues one disability law scholar. See Ruth Colker, “ADA Title III: A Fragile Compromise,” *Berkeley Journal of Employment & Labor Law* 21, no. 1 (2000): 378.

7. An earlier version of this analysis appears in Hamraie, “Universal Design and the Problem of ‘Post-Disability’ Ideology.”

8. Ronald Mace, “Universal Design: Barrier-Free Environments for Everyone,” *Designer’s West* 33, no. 1 (1985): 148.

9. My concept of access-knowledge references Foucault’s “power-knowledge.” See Michel Foucault, *Discipline and Punish: Birth of the Prison*, trans. Alan Sheridan (New York: Vintage Books, 1975), 26–28. Access-knowledge is a regime of intelligibility, or what Foucault calls a “dispositif,” a “thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions—in short, the said as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that can be established between these elements.” Michel Foucault, “The Confession of the Flesh” (1977), in *Power/Knowledge: Selected Interviews and Other Writings*, ed. Colin Gordon (New York: Pantheon Books, 1980), 194. Although access-knowledge fits Foucault’s description of a biopolitical arrangement, I avoid using terms such as “biopower” and “governmentality” because their overuse often obscures meaning. Disability scholars adopting Foucault’s notion of power-knowledge have often treated knowledge as a mere instrument of power relations, rather than taking the politics of knowledge seriously. My approach to entangled knowing-making is more epistemological. Closely affiliated with Foucault’s archaeological method, I locate knowledge-production as itself an exercise of power. See Aimi Hamraie, “Historical Epistemology as Disability Studies Methodology: From the Models Framework to Foucault’s Archaeology of Cure,” *Foucault Studies*, no. 19 (June 2015): 108–34. This approach builds on feminist technoscience scholarship, which has deployed archaeological methods (often referred to as “historical ontology” or “historical epistemology”) to study the relationships between buildings and bodies. The most elegant use of such analysis, in my estimation, is Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham, N.C.: Duke University Press, 2006).

10. Molly Follette Story, James L. Mueller, and Ronald L. Mace, *The Universal Design File: Designing for People of All Ages and Abilities* (Raleigh, N.C.: Center for Universal Design, North Carolina State University, 1998), 6.

11. Mace, "Universal Design," 147–52.

12. The barrier work of this debate is explored in the last half of the book. For examples of these debates, see John Salmen, "The Differences between Accessibility and Universal Design," *Universal Design Newsletter* 1, no. 7 (1994): 2; Abir Mullick and Edward Steinfeld, "Universal Design: What It Is and What It Isn't," *Innovation* 16, no. 1 (1997): 14–24; S. Iwarsson and A. Ståhl, "Accessibility, Usability and Universal Design—Positioning and Definition of Concepts Describing Person-Environment Relationships," *Disability and Rehabilitation* 25, no. 2 (2003): 57–66; Denise Levine, *Universal Design New York* (Buffalo, N.Y.: Center for Inclusive Design and Environmental Access, 2003), 8; Josh Safdie, quoted in Susan Szenasy, "Accessibility Watch: Q&A with Josh Safdie," *Metropolis* magazine, February 2011; Daniel McAdams and Vincent Kostovich, "A Framework and Representation for Universal Product Design," *International Journal of Design* 5, no. 1 (2011): 29–42, <http://www.ijdesign.org/ojs/index.php/IJDesign/article/view/602/327>.

13. On "good design" as a commonsense discourse, see Stephen Hayward, "'Good Design Is Largely a Matter of Common Sense': Questioning the Meaning and Ownership of a Twentieth-Century Orthodoxy," *Journal of Design History* 11, no. 3 (1998): 217–33.

14. John Hockenberry, "Design Is Universal," *Metropolis* magazine, December 2004.

15. Center for Universal Design, North Carolina State University, "The Principles of Universal Design," Version 2.0, April 1, 1997, [http://www.ncsu.edu/ncsu/design/cud/about\\_ud/principlestext.htm](http://www.ncsu.edu/ncsu/design/cud/about_ud/principlestext.htm).

16. Center for Universal Design, North Carolina State University, "Principles of Universal Design in Languages Other than English," 2008, [https://www.ncsu.edu/ncsu/design/cud/about\\_ud/udnonenglishprinciples.html](https://www.ncsu.edu/ncsu/design/cud/about_ud/udnonenglishprinciples.html).

17. Science and technology studies (STS), particularly feminist STS, as well as the histories and sociologies of science and technology, grew from these postpositivist approaches, often working as activists within academic discourse by referencing or working in concert with activists outside the academy. These relations and their challenges to knowing and making are explored productively in Michelle Murphy, *Seizing the Means of Reproduction: Entanglements of Feminism, Health, and Technoscience* (Durham, N.C.: Duke University Press, 2012).

18. Disability and design scholars, including myself, have made similar arguments about Universal Design's disability-neutralizing approaches. See Hamraie, "Designing Collective Access"; Bess Williamson, "Electric Moms and Quad Drivers: People with Disabilities Buying, Making, and Using Technology in Postwar America," *American Studies* 52, no. 1 (2012): 232–33; Elizabeth Ellcessor, "Blurred Lines: Accessibility, Disability, and Definitional Limitations," *First Monday* 20, no. 9 (2015), <http://firstmonday.org/ojs/index.php/fm/rt/printerFriendly/6169/4904>.

19. The Society for Disability Studies was founded in 1986, just a year after Mace named Universal Design. Society for Disability Studies, "Mission and History," <https://disstudies.org/index.php/about-sds/mission-and-history/>.

20. Union of Physically Impaired Against Segregation, "Policy Statement," 1972, <http://disability-studies.leeds.ac.uk/files/library/UPIASUPIAS.pdf>; Simon Brisendon, "Independent Living and the Medical Model of Disability," *Disability, Handicap and Society* 1, no. 2 (1986): 173–78; Michael Oliver, *The Politics of Disablement: A Sociological Approach* (Basingstoke, UK: Palgrave Macmillan, 1990).

21. Also in the mid-1960s, medical sociologist Saad Nagi introduced a matrix distinguishing pathology, impairment, functional limitation, and disability in relation to built environments, defining (as the social model does) disability as oppression and functional limitation as person-environment misfit. Saad Nagi, "Disability Concepts Revisited," in *Disability in America: Toward a National Agenda for Prevention*, ed. Andrew Pope and Andrew Tarlov (Washington, D.C.: National Academy Press, 1991), 309–27.

22. Shelley Tremain, "On the Subject of Impairment," in *Disability/Postmodernity: Embodying Disability Theory*, ed. Mairian Corker and Tom Shakespeare (London: Continuum Press, 2002), 32–47; Isabel Dyck, "Geographies of Disability: Reflecting on New Body Knowledges," in *Toward Enabling Geographies: "Disabled" Bodies and Minds in Society and Space*, ed. Vera Chouinard, Edward Hall, and Robert Wilton (Burlington: Ashgate, 2010), 254–55.

23. Crip theory originated in disability activism of the civil rights era and continues to be developed outside the academy in the disability justice movement. However, scholars drawing on crip theory since 2003 have offered it as a method of analysis, similar to critical race, feminist, or queer frameworks. See Carrie Sandahl, "Queering the Crip or Crippling the Queer? Intersections of Queer and Crip Identities in Solo Autobiographical Performance," *GLQ: A Journal of Lesbian and Gay Studies* 9, nos. 1–2 (2003): 25–56; Robert McRuer and Abby Wilkerson, "Introduction," *GLQ: A Journal of Lesbian and Gay Studies* 9, nos. 1–2 (2003): 1–23; Robert McRuer, *Crip Theory: Cultural Signs of Queerness and Disability*, Cultural Front (New York: New York University Press, 2006). The reclamation of "crip" for radical theorizing has been criticized for centralizing physical disability. This critique is important for my analysis of Universal Design, as well. In this book, I show that physically disabled people, particularly those with postpolio disabilities, were most often the objects of barrier-free design research in the mid-twentieth century and later served in leadership roles when it came to redefining standards. This is not to grant primacy to physical disability but to show why access-knowledge focused on physical disability through most of the century. While I use "crip" to describe a political orientation, I have been careful to note when disabilities that are considered sensory or cognitive appear in relation to these practices.

24. Deaf culture offers an example of a cultural model of disability, wherein disability is the basis of shared language and culture and not understood in purely medical terms. See H-Dirksen L. Bauman and Joseph J. Murray, eds., *Deaf Gain: Raising the Stakes for Human Diversity* (Minneapolis: University of Minnesota Press, 2014). The coalitional, cultural, epistemic, and relational aspects of crip theory are explored in Alison Kafer, *Feminist, Queer, Crip* (Bloomington: Indiana University Press, 2013).

25. David Mitchell and Sharon Snyder, *Cultural Locations of Disability* (Chicago: University of Chicago Press, 2006), 125.

26. Kafer, *Feminist, Queer, Crip*, 8–10.

27. Feminist disability scholars have shown that the liberal project of disability elimination was pervasive in twentieth-century culture. This project had more overt manifestations, such as sterilization and killing, but also circulated through the logics of devalued dependency, the foil of the productive citizen. See Rosemarie Garland-Thomson, "Disability and Representation," *PMLA* 120, no. 2 (2005): 522–27; Martha Fineman, *The Autonomy Myth: A Theory of Dependency* (New York: New Press, 2005).

28. Sandahl, "Queering the Crip or Crippling the Queer?," 30.

29. Jay Dolmage, "Mapping Composition," in *Disability and the Teaching of Writing: A Critical Sourcebook*, ed. Brenda Brueggeman and Cindy Lewiecki-Wilson (Boston: Bedford/St. Martin's, 2006), 14–27.

30. Mia Mingus, “Changing the Framework: Disability Justice,” *Leaving Evidence*, February 12, 2012, <https://leavingevidence.wordpress.com/2011/02/12/changing-the-framework-disability-justice/>; Hamraie, “Designing Collective Access.”

31. Kelly Fritsch, “Accessible,” in *Keywords for Radicals*, ed. Kelly Fritsch, Clare O’Connor, and AK Thompson (Chico, Calif.: AK Press, 2016), 23–28.

32. *Ibid.*, 25. Access studies emerged from the historical materialist and political economic traditions of the social model, particularly in British disability studies. Much of this work was devoted to making a case for access. Critical access studies does not displace the former, *per se*, but its objects of inquiry are often the discourses surrounding access (i.e., first wave access studies). A few texts and projects that I consider to be central to critical access studies include Rob Imrie and Peter Hall, *Inclusive Design: Designing and Developing Accessible Environments* (New York: Spon Press, 2001), 14–18; Rob Imrie, “Universalism, Universal Design and Equitable Access to the Built Environment,” *Disability and Rehabilitation* 34, no. 10 (2012): 873–82; N. D’Souza, “Is Universal Design a Critical Theory?,” in *Designing a More Inclusive World*, ed. S. Keates and J. Clarkson (London: Springer, 2004), 3–9; Graham Pullin, *Design Meets Disability* (Cambridge, Mass.: MIT Press, 2009); Jos Boys, *Doing Dis/Ability Differently: An Alternative Handbook on Architecture, Dis/Ability, and Designing for Everyday Life* (London: Routledge, 2014); Titchkosky, *The Question of Access*; Margaret Price, *Mad at School: Rhetorics of Mental Illness and Academic Life* (Ann Arbor: University of Michigan Press, 2011); Jay Dolmage, “Universal Design: Places to Start,” *Disability Studies Quarterly* 35, no. 2 (2015), <http://dsq-sds.org/issue/view/144>; Melanie Yergeau, Elizabeth Brewer, Stephanie Kershbaum, Sushil Oswal, Margaret Price, Cynthia Selfe, Michael Salvo, and Franny Howes, *Multimodality in Motion: Disability & Kairotic Spaces*, <http://kairos.technorhetoric.net/18.1/coverweb/yergeau-et-al/pages/access.html>; Inger Marie Lid, “Universal Design and Disability: An Interdisciplinary Perspective,” *Disability & Rehabilitation* 36, no. 16 (2014): 1344–49; Elizabeth Ellcessor, *Restricted Access: Media, Disability, and the Politics of Participation* (New York: New York University Press, 2016).

33. Chris Bell, “Introducing White Disability Studies: A Modest Proposal,” in *The Disability Studies Reader*, 2nd ed., ed. Lennard J. Davis (New York: Routledge, 2006), 275. The generative contributions of black disability studies to the field, though often unrecognized, should not be discounted. See Chris Bell, ed., *Blackness and Disability: Critical Examinations and Cultural Interventions* (East Lansing: Michigan State University Press, 2011); Jane Dunham, Jerome Harris, Shancia Jarrett, Leroy Moore, Akemi Nishida, Margaret Price, Britney Robinson, and Sami Schalk, “Developing and Reflecting on a Black Disability Studies Pedagogy: Work from the National Black Disability Coalition,” *Disability Studies Quarterly* 35, no. 2 (2015), <http://www.dsq-sds.org/article/view/4637/3933>.

34. In architectural history and theory, see Lance Hosey, “Hidden Lines: Gender, Race, and the Body in Graphic Standards,” *Journal of Architectural Education* 55, no. 2 (2006): 101–12; Paul Emmons and Andreea Mihalache, “Architectural Handbooks and the User Experience,” in *Use Matters: An Alternative History of Architecture*, ed. Kenny Cuppers (New York: Routledge, 2013), 35–50; Kenny Cuppers, *The Social Project* (Minneapolis: University of Minnesota Press, 2014). In science and technology studies, see Michelle Murphy, *Sick Building Syndrome*; Ruth Schwartz Cowan, “Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology,” in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, ed. Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch (Cambridge, Mass.: MIT Press, 1987); Nelly Oudshoorn and Trevor Pinch, eds., *How Users Matter: The Co-Construction of Users and Technologies*, Inside Technology (Cambridge, Mass.: MIT Press, 2003), 8.



35. Susan M. Schweik, *The Ugly Laws: Disability in Public* (New York: New York University Press, 2010).

36. Anna Carden-Coyne, *Reconstructing the Body: Classicism, Modernism, and the First World War* (Oxford: Oxford University Press, 2009), 22; David Serlin, *Replaceable You: Engineering the Body in Postwar America* (Chicago: University of Chicago Press, 2004), 12; Beth Linker, *War's Waste: Rehabilitation in World War I America* (Chicago: University of Chicago Press, 2011).

37. I appropriate the terms “entanglement” and “sedimentation” from Karen Barad, *Meeting the Universe Halfway* (Durham, N.C.: Duke University Press, 2007).

38. Sandra Harding, *Whose Science? Whose Knowledge? Thinking from Women's Lives* (Ithaca, N.Y.: Cornell University Press, 1991), 10.

39. My concept of crip technoscience was first introduced in Aimi Hamraie, “Crippling Feminist Technoscience,” *Hypatia* 30, no. 1 (2014): 307–13. This concept references and builds on feminist STS. See, for example, Beatriz da Costa and Kavita Phillip, eds., *Tactical Biopolitics: Art, Activism, and Technoscience* (Cambridge, Mass.: MIT Press, 2008), xvii–xxii; Michelle Murphy, *Seizing the Means of Reproduction*; Elizabeth A. Wilson, *Psychosomatic: Feminism and the Neurological Body* (Durham, N.C.: Duke University Press, 2004); Barad, *Meeting the Universe Halfway*.

40. On material culture as an approach to the history of disability, see Katherine Ott, “Disability Things,” in *Disability Histories*, ed. Susan Burch and Michael Rembis (Urbana: University of Illinois Press, 2014), 119–35.

## 1. Normate Template

1. Leslie Kanes Weisman, “Women's Environmental Rights: A Manifesto,” in *Gender Space Architecture: An Interdisciplinary Introduction*, ed. Iain Borden, Barbara Penner, and Jane Rendell (London: Routledge, 2000), 1–5.

2. Elaine Ostroff, “Universal Design: The New Paradigm,” in *Universal Design Handbook*, ed. Wolfgang F. E. Preiser and Elaine Ostroff (New York: McGraw-Hill, 2001), 1.9.

3. Stephen M. Stigler, “Francis Galton's Account of the Invention of Correlation,” *Statistical Science* 4, no. 2 (1989): 73–79; Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France, 1977–1978* (New York: Picador, 2009), 29–49, 55–86.

4. Lennard J. Davis, “Constructing Normalcy: The Bell Curve, the Novel, and the Invention of the Disabled Body in the Nineteenth Century,” in *The Disability Studies Reader*, 2nd ed., ed. Lennard J. Davis (New York: Routledge, 2006), 3–16.

5. Genealogies of normate templates in architecture include (sans analysis of disability) Hosey, “Hidden Lines”; Emmons and Mihalache, “Architectural Handbooks and the User Experience”; Georges Teyssot, “Norm and Type: Variations on a Theme,” in *Architecture and the Sciences: Exchanging Metaphors*, ed. Antoine Picon and Alessandra Ponte (Princeton, N.J.: Princeton Architectural Press, 2003), 140–73.

6. Vitruvius, *Ten Books on Architecture* (New York: Cambridge University Press, 2001), 72, 14. On the influence of Greek mathematics on Vitruvius, see Richard Padovan, *Proportion: Science, Philosophy, Architecture* (New York: Taylor and Francis, 2002), 305–6; Alexander Tzonis, *Towards a Non-Oppressive Architecture* (Cambridge, Mass.: MIT Press, 1972), 20, 27; Henry Guerlac, “Copernicus and Aristotle's Cosmos,” *Journal of the History of Ideas* 29, no. 1 (1968): 109–13.

7. Vitruvius, *Ten Books on Architecture*, 73.

8. Rob Imrie, “Architects' Conceptions of the Human Body,” *Environment and Planning D: Society and Space* 21, no. 1 (2003): 47–65; Rudolph Wittkower, *Architectural Principles in the Age of Humanism* (New York: W. W. Norton, 1971), 7; Padovan, *Proportion*, 82, 106.

9. Vitruvius, *Ten Books on Architecture*, 3.
10. In the Renaissance revival of architecture as an aesthetic (rather than functional) discipline, da Vinci renewed interest in Vitruvius by retaining epistemological associations of the body with nature and nature with the cosmos. See Dennis Cosgrove, "Ptolemy and Vitruvius: Spatial Representation in the Sixteenth-Century Texts and Commentaries," in *Architecture and the Sciences: Exchanging Metaphors*, ed. Antoine Picon and Alessandra Ponte (Princeton, N.J.: Princeton Architectural Press, 2003), 22–24.
11. Toby Lester, *Da Vinci's Ghost: Genius, Obsession, and How Leonardo Created the World in His Own Image* (New York: Free Press, 2012), 40.
12. On the professionalization of drafting as distinct from architects' work, see George Johnston, *Drafting Culture: A Social History of Architectural Graphic Standards* (Cambridge, Mass.: MIT Press, 2008); David Brain, "Practical Knowledge and Occupational Control: The Professionalization of Architecture in the United States," *Sociological Forum* 6, no. 2 (1991): 239–68.
13. Indra Kagis McEwen, *Vitruvius: Writing the Body of Architecture* (Cambridge, Mass.: MIT Press, 2003), 2; William Wetmore Story, *Proportions of the Human Figure, According to the Canon, for Practical Use* (London: Chapman and Hall, 1864), 21–23, 25.
14. Michel Foucault, "The Ethics of the Concern of the Self as a Practice of Freedom," in *Ethics, Subjectivity, and Truth*, ed. Paul Rabinow (New York: New Press, 1997), 281.
15. Evelyn Hammonds and Rebecca Herzig, *The Nature of Difference: Sciences of Race in the United States from Jefferson to Genomics* (Cambridge, Mass.: MIT Press, 2008), 148; Daniel Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (Berkeley: University of California Press, 1985), 14–15; Stephen Jay Gould, *The Mismeasure of Man* (New York: W. W. Norton, 1981), 108, 116, 171; Allan Sekula, "The Body and the Archive," *October* 39 (Winter 1986): 20.
16. Stephen Stigler, *The History of Statistics: The Measurement of Uncertainty before 1900* (Cambridge, Mass.: Harvard University Press, 2000), 170; Gould, *The Mismeasure of Man*, 108, 116, 171.
17. Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990), 180–88.
18. Adolphe Quetelet, *Sur l'homme et le développement de ses facultés, ou essai de physique sociale* (Paris: Bachelier, 1835). Quetelet charted data of Scottish soldiers' chest measurements, discovering that they fell along what mathematicians refer to as a "Gaussian curve."
19. As Ian Hacking explains, Quetelet's rendering of human statistics on the bell curve "transformed the theory of measuring unknown physical quantities, with a definite probable error, into the theory of measuring ideal or abstract properties of a population. Because these could be subjected to the same formal techniques they became real quantities. This is a crucial step in the taming of chance. It began to turn statistical laws that were merely descriptive of large-scale regularities into laws of nature and society that dealt in underlying truths and causes" (*Taming of Chance*, 107–8).
20. Tobin Siebers, *Disability Theory* (Ann Arbor: University of Michigan Press, 2008), 8.
21. Hayward, "Good Design Is Largely a Matter of Common Sense."
22. "Boundary work" is a term that sociologists of science use to describe the ways that differences and boundaries are drawn between interests, concepts, and other phenomena. See Thomas Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review* 48, no. 6 (1983): 781–95.
23. Le Corbusier, "Eyes Which Do Not See: Automobiles," in *The Industrial Design Reader*, ed. Carma Gorman (New York: Allworth Press, 2003), 107.



24. Le Corbusier, *The Modulor: A Harmonious Measure to the Human Scale, Universally Applicable to Architecture and Mechanics* (1954; repr., Boston: Birkhäuser, 2004).

25. On the “view from nowhere,” see Donna J. Haraway, “Situated Knowledges,” in *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991), 183–202.

26. Michel Foucault, *Archaeology of Knowledge and the Discourse on Language*, trans. A. M. Sheridan Smith (New York: Vintage Books, 2010), 198.

27. Buckminster Fuller, “Universal Architecture” (1932), in *Programs and Manifestoes on 20th-Century Architecture*, ed. Ulrich Conrads (Cambridge, Mass.: MIT Press, 1975), 128–36.

28. Congrès internationaux d’architecture moderne (CIAM), “Charter of Athens,” in *Programs and Manifestoes on 20th-Century Architecture*, ed. Ulrich Conrads (Cambridge, Mass.: MIT Press, 1975), 142.

29. Rob Imrie, “The Interrelationships between Building Regulations and Architects’ Practices,” in *Papers in “The Codification and Regulation of Architects’ Practices,”* ed. Rob Imrie and Emma Street (London: King’s College, 2007).

30. Chris Chapman, Allison Carey, and Liat Ben-Moshe, “Reconsidering Confinement: Interlocking Locations and Logics of Incarceration,” in *Disability Incarcerated*, ed. Chris Chapman, Allison Carey, and Liat Ben-Moshe (New York: Palgrave Macmillan, 2014), 6–7; Mitchell and Snyder, *Cultural Locations of Disability*, 84–85.

31. On the “ugly laws” and public space in the United States, see Schweik, *The Ugly Laws*. On urban public space and feeble-mindedness, see Mitchell and Snyder, *Cultural Locations of Disability*, 84–85. On streamlining and eugenics, see Christina Cogdell, *Eugenic Design: Streamlining America in the 1930s* (Philadelphia: University of Pennsylvania Press, 2010). See also Adolf Loos, “Ornament and Crime,” in *Programs and Manifestoes on 20th-Century Architecture*, ed. Ulrich Conrads (Cambridge, Mass.: MIT Press, 1975), 19–24.

32. Ernst Neufert, *Bauelementelehre [Architects’ Data]* (Berlin: Bauwelt Verlag, 1936); Charles Ramsey and Harold Sleeper, *Architectural Graphic Standards* (New York: John Wiley and Sons, 1932).

33. On the Latin prefix “ortho-” and its relation to norms, see Hacking, *The Taming of Chance*, 162–63.

34. Emmons and Mihalache, “Architectural Handbooks and the User Experience,” 40.

35. Ernest Irving Freese, *The Geometry of the Human Figure, American Architect and Architecture*, July 1934, 57–60. For several editions, the figures appear under “General Information” near the back of the book. See, for example, Charles Ramsey and Harold Sleeper, *Architectural Graphic Standards*, 5th ed. (New York: Wiley, 1962), 669. See also Hosey, “Hidden Lines,” 109.

36. Hyungmin Pai, *The Portfolio and the Diagram: Architecture, Discourse, and Modernity in America* (Cambridge, Mass.: MIT Press, 2002), 348.

37. Anna G. Creadick, *Perfectly Average: The Pursuit of Normality in Postwar America* (Amherst: University of Massachusetts Press, 2010), 15.

38. *Ibid.*, 28–32.

39. Rosemarie Garland-Thomson, “Eugenic World Building and Disability: The Strange World of Kazuo Ishiguro’s *Never Let Me Go*,” *Journal of Medical Humanities* (December 2015): 1–13.

40. On neutrality and the unmarked architectural inhabitant, see Imrie, “Architects’ Conceptions of the Human Body,” 47–65; Leslie Kanes Weisman, *Discrimination by Design: A Feminist Critique of the Man-Made Environment* (Urbana: University of Illinois Press, 1992); Jos Boys, “Neutral Gazes and Knowable Objects,” in *Desiring Practices: Architecture, Gender, and the Interdisciplinary*,

ed. Katerina Rüedi, Sarah Wigglesworth, and Duncan McCorquodale (London: Black Dog Publishing, 1996), 32–45.

41. Hosey, “Hidden Lines,” 105.

42. American Institute of Architects, *Architectural Graphic Standards*, 7th ed. (New York: Wiley, 1981), 2–8.

43. By the 1980s, Henry Dreyfuss Associates had acquired anthropometric data from the general population. However, earlier figures relied on military human factors data from World Wars I and II. Henry Dreyfuss, *The Measure of Man: Human Factors in Design*, 2nd ed. (New York: Whitney Library of Design, 1967), 5.

44. Henry Dreyfuss, *Designing for People* (1955; repr., New York: Allworth Press, 2003). On Dreyfuss’s career, see Russell Flinchum, *Henry Dreyfuss, Industrial Designer: The Man in the Brown Suit* (New York: Rizzoli, 1997). Dreyfuss had been a theater designer for Norman Bell Geddes, a designer and eugenics proponent. See Cogdell, *Eugenic Design*, 3.

45. “Configuration” is a term I borrow from Nelly Oudshoorn and Trevor Pinch, *How Users Matter: The Co-Construction of Users and Technologies*, Inside Technology (Cambridge, Mass.: MIT Press, 2003), 8.

46. Dreyfuss, *The Measure of Man*, 4.

47. Ibid. On this passage as a reflection of ergonomics as an emerging science, see John Harwood, “The Interface: Ergonomics and the Aesthetics of Survival,” in *Governing by Design: Architecture, Economy, and the Politics of the Twentieth Century* (Pittsburgh: University of Pittsburgh Press, 2012), 78–80.

48. Michel Foucault, *Abnormal: Lectures at the Collège de France, 1974–1975*, trans. Graham Burchell (New York: Picador, 2003), 33.

49. Dreyfuss, *The Measure of Man*, 4.

50. Henry Dreyfuss, “Tailoring the Product to Fit,” *Industrial Design* 7, no. 6 (1960): 68–81.

51. Ibid.; Henry Dreyfuss Associates, “Background Data: Joe & Josie Portfolio,” July 26, 1960, Whitney Publications, Dreyfuss Collection, Cooper Hewitt, Smithsonian Design Museum. This portfolio was published as the book *The Measure of Man* in 1960 and the drawings were included as loose pages in an attached folder.

52. William Wilson Atkin, letter to Dick Stinette (Henry Dreyfuss Associates), May 9, 1961, Henry Dreyfuss Collection, Cooper Hewitt, Smithsonian Design Museum.

53. Henry Dreyfuss Associates, “Bibliography,” 1973, folder 5.9, Henry Dreyfuss Collection, Cooper Hewitt, Smithsonian Design Museum.

54. Dreyfuss, *The Measure of Man* (1967), 3.

55. Ibid., 4.

56. Ibid., 27.

57. On the genealogy of autism symptoms and diagnosis, see Steve Silberman, *Neurotribes: The Legacy of Autism and the Future of Neurodiversity* (New York: Penguin Random House, 2015), 261–334.

58. Dreyfuss, *The Measure of Man* (1967), page R.

59. Alvin Tilley notes that the majority of the firm’s data was derived from military sources, which depicted “90% of the adult males acceptable for certain segments of military service,” and that even in the 1960s when the U.S. Department of Health, Education, and Welfare made civilian data available, it was still not as “comprehensive as the military data.” See Alvin Tilley, *The Measure of Man and Woman: Human Factors in Design* (New York: Whitney Design Library, 1993), 9.

60. Niels Diffrient, Alvin R. Tilley, and Joan C. Bardagjy, *Humanscale 1/2/3: A Portfolio of Information* (Cambridge, Mass.: MIT Press, 1974).

61. The rise of “barrier-free design” and its legal enforcement is detailed in chapters 3–6.

62. Ronald Mace, *An Illustrated Handbook of the Handicapped Section of the North Carolina State Building Code* (Raleigh: North Carolina Building Code Council, 1974).

63. Niels Diffrient, Alvin R. Tilley, and Joan C. Bardagjy, *Humanscale 4/5/6: A Portfolio of Information* (Cambridge, Mass.: MIT Press, 1981).

## 2. Flexible Users

Chapter epigraph: Krystyna Golonka, “Ronald Mace and His Philosophy of Universal Design,” *Ergonomics: An International Journal of Ergonomics and Human Factors* 28, no. 3 (2006): 189.

1. See, for example, Karen A. Franck, “A Feminist Approach to Architecture: Acknowledging Women’s Ways of Knowing,” in *Gender Space Architecture: An Interdisciplinary Introduction*, ed. Iain Borden, Barbara Penner, and Jane Rendell (London: Routledge, 2000), 300.

2. Center for Universal Design, “Principles of Universal Design.” For examples of discourses of flexibility within Universal Design, see Jim Weiker, “Universal Design Lab—A Dream Home for User of Wheelchair—To Open for Public Tours,” *Columbus Dispatch*, October 19, 2014; Melissa Stanton, “5 Questions for Richard Duncan,” *AARP Livable Communities*, July 2014, <http://www.aarp.org/livable-communities/info-2014/interview-richard-duncan-better-living-design.html>; Martin C. Petersen, “Total Access,” *Metropolis* magazine, March 2007.

3. David Meister, *The History of Human Factors and Ergonomics* (Mahwah, N.J.: Lawrence Erlbaum Associates, 1999), 25; Avigail Sachs, “Architects, Users, and the Social Sciences in Post-war America,” in *Use Matters: An Alternative History of Architecture*, ed. Kenny Cupers (London: Routledge, 2013), 72. On flexibility and Cold War-era spatial planning, see William J. Rankin, “The Epistemology of the Suburbs: Knowledge, Production, and Corporate Laboratory Design,” *Critical Inquiry* 36 (Summer 2010): 777–80. Accounts of the “user” and “flexibility” in relation to architecture are found in Adrian Forty, *Words and Buildings: A Vocabulary of Modern Architecture* (London: Thames & Hudson, 2000), 312–15, 142–48. In contrast to Adrian Forty, who argues that the user “was always a person unknown” (312), this chapter is concerned with how specific types of users and knowledge about them materialized. Accounts of twentieth-century ergonomics attribute the first use of the term to British operations researcher K. F. H. Murrell in the late 1940s. See W. T. Singleton, *The Body at Work: Biological Ergonomics* (Cambridge: Cambridge University Press, 1982), 1–2; John Harwood, “The Interface: Ergonomics and the Aesthetics of Survival,” in *Governing by Design: Architecture, Economy, and the Politics of the Twentieth Century* (Pittsburgh: University of Pittsburgh Press, 2012), 74. Murrell’s work focused on introducing data on human variation to industrial engineers. K. F. H. Murrell, *Data on Human Performance for Engineering Designers* (London: Engineering, 1957); K. F. H. Murrell, *Fitting the Job to the Worker: A Study of American and European Research into Working Conditions in Industry* (Paris: Organization for European Economic Cooperation, 1958); K. F. H. Murrell, *Human Performance in Industry* (New York: Reinhold, 1965).

4. Singleton, *The Body at Work*, 1.

5. Few historians have considered the role that disability has played in the development of user-centered design. One exception is Bess Williamson, “Getting a Grip: Disability in American Industrial Design of the Late Twentieth Century,” *Winterthur Portfolio* 46, no. 4 (2012): 214–15.

6. Arthur Williams, quoted in “‘Labor Turnover,’ an Amazing Industrial Waste,” *International Steam Engineer* 34 (January 1818): 51.

7. For example, the adoption of “user” in reference to the operation of guns and weapons. See William Greener, *The Science of Gunnery, as Applied to the Use and Construction of Fire Arms* (London: E. Churton, 1846), vii.

8. Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1990), 45, 90.

9. Wojciech Jastrzębowski, “An Outline of Ergonomics: I.e. Science of Work, Based on Truths Taken from the Natural Science” (1857), in *International Encyclopedia of Ergonomics and Human Factors*, 2nd ed., vol. 1., ed. Waldemar Karkowski (Boca Raton: CRC Press, 2006), 161–75.

10. *Ibid.*, 163.

11. *Ibid.*

12. *Ibid.*, 168.

13. Near the end of the first Industrial Revolution, American sculptor Horatio Greenough articulated an early version of the doctrine of architectural functionalism. See Horatio Greenough, “The Law of Adaptation” (1852), in *The Industrial Design Reader*, ed. Carma Gorman (New York: Allworth Press, 2003), 11–18. See also Forty, *Words and Buildings*, 175–77.

14. Robert Scott Burn, *The Grammar of House Planning: Hints on Arranging and Modifying Plans of Cottages, Street-Houses, Farm-Houses, Villas, Mansions, and Out-Buildings* (Edinburgh: A. Fullarton, 1864), 3.

15. Rabinbach, *The Human Motor*, 52.

16. Robert Scott Burn, *Practical Ventilation as Applied to Public, Domestic, and Agricultural Structures* (Edinburgh: William Blackwood and Sons, 1850); Robert Scott Burn, *The Illustrated London Practical Geometry: And Its Application to Architectural Drawing; For the Use of Schools and Students* (London: Ingram, Cooke, 1853); Robert Scott Burn, *The Steam Engine: Its History and Mechanism; Being Descriptions and Illustrations of the Stationary, Locomotive, and Marine Engine; For the Use of Schools and Students* (London: H. Ingram, 1854).

17. Cliff White, *The Steam User: A Book of Instruction for Engineers and Steam Users* (New York: C. A. White, 1890); Robert Scott Burn, ed., *The Steam Engine User, Being Practical Descriptions and Illustrations of the Stationary Steam Engine in Its Various Forms* (London: Ward, Lock, and Bowden, 1894). See also David Meister and Thomas G. O’Brien, “The History of Human Factors Testing and Evaluation,” in *Handbook of Human Factors Testing and Evaluation*, ed. S. Charlton and T. G. O’Brien (Mahwah, N.J.: Lawrence Erlbaum Associates, 1996), 6–8, on human performance testing of weapons; Rabinbach, *The Human Motor*, 117.

18. George Stocking, ed., *Bones, Bodies, Behavior: Essays on Biological Anthropology* (Madison: University of Wisconsin Press, 1988), 5; S. S. Adebisi, “Medical Impacts of Anthropometric Records,” *Annals of African Medicine* 7, no. 1 (2008): 42–47; Kavita Philip, *Civilizing Natures: Race, Resources, and Modernity in Colonial South India* (New Brunswick, N.J.: Rutgers University Press, 2004), 99; Claude Blanckaert, “On the Origins of French Ethnology: William Edwards and the Doctrine of Race,” in *Bones, Bodies, Behavior: Essays on Biological Anthropology*, ed. George W. Stocking Jr. (Madison: University of Wisconsin Press, 1988), 49.

19. The history of the Sanitary Commission appears in Charles J. Stillé, *History of the United States Sanitary Commission, Being the General Report of Its Work during the War of the Rebellion* (Philadelphia: J. B. Lippincott, 1866). The commission led efforts on behalf of civilians to support the war effort, in both fundraising and providing care. Among its notable leaders was landscape architect Frederick Law Olmstead, who left his post in New York to serve as executive secretary. See Ianthe Jeanne Dugan, “Civil War Letters Shed Light on Pain of Troops’ Families,” *Wall Street*

*Journal*, June 22, 2007. For chronicles of Olmstead's work at the commission, see *The Papers of Frederick Law Olmsted*, vol. 4, *Defending the Union: The Civil War and the U.S. Sanitary Commission, 1861–1863* (Baltimore: Johns Hopkins University Press, 1986).

20. Stillé, *History of the United States Sanitary Commission*, 453.

21. *Ibid.*, 453, 459. Olmstead was responsible for expanding the emphasis on anthropometrics to include "social statistics." See Olmstead, *The Papers of Frederick Law Olmsted*, 4:51. This is around the time that Francis Galton began publishing about statistics and eugenics. See Kevles, *In the Name of Eugenics*, 3–4, 13–14.

22. Stillé, *History of the United States Sanitary Commission*, 460.

23. *Ibid.*

24. Benjamin Apthorp Gould, *Investigations in the Military and Anthropological Statistics of American Soldiers* (New York: Arno Press, 1869).

25. *Ibid.*, 107.

26. See Lundy Braun, "Black Lungs and White Lungs," in *Breathing Race into the Machine: The Surprising Career of the Spirometer from Plantation to Genetics* (Minneapolis: University of Minnesota Press, 2014), 27–54.

27. Gould, *Investigations in the Military and Anthropological Statistics of American Soldiers*, 464.

28. *Ibid.*, 153.

29. *Ibid.*, 115.

30. *Ibid.*, 244.

31. Statisticians such as Francis Galton, a eugenicist, used statistical calculations of the average to determine standard deviations, which they used to make claims about racial difference. See Ruth Schwartz Cowan, "Francis Galton's Statistical Ideas: The Influence of Eugenics," *Isis* 63, no. 4 (1972): 509–28; Hacking, *The Taming of Chance*, 183–84.

32. Gould, *Investigations in the Military and Anthropological Statistics of American Soldiers*, v.

33. On a similar paradox in biomedical research, see Steven Epstein, *Inclusion: The Politics of Difference in Medical Research* (Chicago: University of Chicago Press, 2007).

34. Edward Hartwell, "A Preliminary Report on Anthropometry in the United States," *Publications of the American Statistical Association* 3, no. 24 (1893): 557; Noël Cameron and Laura L. Jones, "History, Methods, and General Application of Anthropometry in Human Biology," in *Human Evolutionary Biology*, ed. Michael P. Muehlenbein (New York: Cambridge University Press, 2010), 94.

35. See Cameron and Jones, "History, Methods, and General Application of Anthropometry in Human Biology," 91 and 94–99, for detailed descriptions of anthropometric instruments in historical perspective.

36. Frank Spencer, "Anthropometry," in *History of Physical Anthropology: An Encyclopedia*, vol. 1, ed. Frank Spencer (New York: Garland, 1997), 80–88.

37. Cameron and Jones, "History, Methods, and General Application of Anthropometry in Human Biology," 94.

38. The term "epistemic object," which describes objects of scientific study once they are deemed knowable, is attributed to Hans-Jörg Rheinberger, *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube* (Stanford: Stanford University Press, 1997), 29.

39. Kevles, *In the Name of Eugenics*, 82.

40. Harris Wilder, *A Laboratory Manual of Anthropometry* (Philadelphia: Blakiston, 1920), 151. Foucault describes the work of a similar position in bodily discipline, particularly in prisons, schools, and the military. Foucault, *Discipline and Punish*, 15.



41. Charles Davenport and Albert Love, *Army Anthropology: The Medical Department of the United States Army in the World War* (Washington, D.C.: Government Printing Office, 1921).
42. Charles Davenport and Albert Love, *Defects Found in Drafted Men: Statistical Information Compiled from the United States Surgeon General's Office* (Washington, D.C.: Government Printing Office, 1920), 25, 51; Davenport and Love, *Army Anthropology*.
43. Davenport and Love, *Defects Found in Drafted Men*, 19–24.
44. *Ibid.*, 25. This occurs throughout the text, which examines “defect” in relation to state-based locations. The authors frequently comment on the distribution of immigrants and their dominant physical features or illness experiences as explanations for morphological phenomena. For instance, they correlate small chest size to inherited congenital conditions, as well as to hookworm infestations, which they characterize as prevalent in “French-Canadian immigrants” and the “agricultural Negroes of the South and agricultural Whites of the South” but not in the urban citizens of the northeastern United States (34).
45. H. T. Hertzberg, G. S. Daniels, and E. Churchill, *Anthropometry of Flying Personnel—1950*, WADC Technical Report 52-321 (Wright-Patterson Air Force Base, Ohio: Wright Air Development Center, 1953), 1.
46. Aleš Hrdlička, *Anthropometry* (Philadelphia: Wistar Institute of Anatomy and Biology, 1920), 46.
47. Meister, *The History of Human Factors and Ergonomics*, 147; Meister and O'Brien, “The History of Human Factors Testing and Evaluation,” 6.
48. Sekula, “The Body and the Archive.”
49. Georges Canguilhem, *The Normal and the Pathological* (1966; repr., New York: Zone Books, 1991), 42, 110–11, 122–23.
50. Horace Wells, *A History of the Discovery of the Application of Nitrous Oxide Gas, Ether, and Other Vapors to Surgical Operations* (Hartford: J. Gaylord Wells, 1847); Joseph Lister, “On the Antiseptic Principle in the Practice of Surgery,” *British Medical Journal* 2, no. 351 (1867): 246–48; Henri Jacques Garrigues, *Practical Guide in Antiseptic Midwifery in Hospital and Private Practice* (Detroit: G. S. Davis, 1886).
51. Stephen Mihm, “A Limb Which Shall Be Presentable in Polite Society,” in *Artificial Parts, Practical Lives: Modern Histories of Prosthetics*, ed. Katherine Ott, David Serlin, and Stephen Mihm (New York: New York University Press, 2002), 284.
52. Rabinbach, *The Human Motor*, 86–87.
53. U.S. Orthopedic Institute, “Pamphlet for the Application of Improved Anatomical Machinery to the Treatment of Every Variety of Deformity,” ca. 1851, Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution.
54. *Ibid.*, 5.
55. Beth Linker, *War's Waste: Rehabilitation in World War I America* (Chicago: University of Chicago Press, 2011), 2; Mihm, “A Limb Which Shall Be Presentable in Polite Society,” 283.
56. Mihm, “A Limb Which Shall Be Presentable in Polite Society,” 290.
57. A. A. Marks, *Artificial Limbs with India Rubber Hands and Feet* (New York: William B. Smyth, 1867), 37.
58. James Foster, “Illustrated Circular,” ca. 1868, Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution.
59. A. A. Marks, *Manual of Artificial Limbs: Copiously Illustrated* (New York: A. A. Marks, 1905).
60. Mihm, “A Limb Which Shall Be Presentable in Polite Society,” 290.



61. Mary Ellen Zuckerman and Mary L. Carsky, "Contribution of Women to U.S. Marketing Thought: The Consumers' Perspective, 1900–1940," *Journal of the Academy of Marketing Science* 18, no. 4 (1990): 313–18.

62. Marks, *Manual of Artificial Limbs*, 226–29.

63. *Ibid.*, 290.

64. Heather Perry, "Re-Arming the Disabled Veteran: Artificially Rebuilding State and Society in World War One Germany," in *Artificial Lives, Practical Parts*, ed. Katherine Ott, David Serlin, and Stephen Mihm (New York: New York University Press, 2002), 93.

65. Frederick Winslow Taylor, *Principles of Scientific Management* (Minneapolis: Filiquarian, 1911), 8.

66. *Ibid.*, 11, 32–33.

67. James Hartness, *The Human Factor in Works Engineering* (London: McGraw-Hill, 1912), 24–25.

68. *Ibid.*, v.

69. James Hartness, *Hartness Flat Turret Lathe Manual: A Hand Book for Operators* (London: Jones and Lamson Machine, 1910), 5.

70. Hartness, *The Human Factor in Works Engineering*, 32–35.

71. *Ibid.*, 112–13.

72. Lillian Gilbreth, *The Psychology of Management: The Function of the Mind in Determining, Teaching and Installing Methods of Least Waste* (New York: Sturgis and Walton, 1914), 223.

73. *Ibid.*, 24.

74. *Ibid.*, 27.

75. *Ibid.*, 49–50.

76. Frank B. Gilbreth, "Measurement and Standardization," in *The Human Factor in Industrial Preparedness: Complete Proceedings of the National Conference* (Chicago: Western Efficiency Society, 1917), 178–86. On the rise of rehabilitation as a medical and vocational corrective in relation to scientific management, see Glenn Grittier and Arnold Arluke, *The Making of Rehabilitation: A Political Economy of Medical Specialization, 1890–1980* (Berkeley: University of California Press, 1985), 38–60.

77. Gilbreth, "Measurement and Standardization," 179.

78. Elspeth Brown, "The Prosthetics of Management: Time Motion Study, Photography, and the Industrialized Body in World War I America," in *Artificial Parts, Practical Lives: Modern Histories of Prosthetics*, ed. Katherine Ott, David Serlin, and Stephen Mihm (New York: New York University Press, 2002), 249–81.

79. Henri-Jacques Stiker, *A History of Disability*, trans. William Sayers (Ann Arbor: University of Michigan Press, 2000), 125.

80. Williamson, "Getting a Grip," 213–36.

81. Gilbreth, "Measurement and Standardization," 179.

82. Rabinbach, *The Human Motor*, 269.

83. Gilbreth, "Measurement and Standardization," 186.

84. Lillian Gilbreth and Frank Gilbreth, *Motion Study for the Handicapped* (London: Routledge, 1920), 68.

85. *Ibid.*, xi.

86. Gilbreth, "Measurement and Standardization," 179.

87. *Ibid.*, xiv.

88. Ibid., 182–83.
89. Stiker, *A History of Disability*, 124; Serlin, *Replaceable You*, 115, 124.
90. Gilbreth and Gilbreth, *Motion Study for the Handicapped*, xv.
91. Ibid.
92. Garland-Thomson, “Disability and Representation.”
93. Edna Yost, in collaboration with Lillian Gilbreth, *Normal Lives for the Disabled* (New York: Macmillan, 1944), vii.
94. Howard Rusk and Eugene Taylor, *New Hope for the Handicapped* (New York: Harper and Brothers, 1949), quoted in Book Reviews, *Journal of Bone and Joint Surgery* 32, no. 2 (April 1950): 472.
95. Serlin, *Replaceable You*, 12–13; Carden-Coyne, *Reconstructing the Body*, 22. On the cultural influence of rehabilitation, see also Jennifer James, “‘On Such Legs Are Left Me’: Gwendolyn Brooks, World War II, and the Politics of Rehabilitation,” in *Feminist Disability Studies*, ed. Kim Q. Hall (Bloomington: Indiana University Press, 2011), 136–58.
96. Michael C. Wood and John C. Wood, eds., *Frank and Lillian Gilbreth: Critical Evaluations in Business and Management*, vol. 1 (New York: Routledge, 2003), 128; Jane Lancaster, *Making Time: Lillian Moller Gilbreth—A Life beyond “Cheaper by the Dozen.”* (Lebanon, N.H.: University Press of New England, 2004), 315. See also Charles R. Shrader, *History of Operations Research in the United States*, vol. 2, 1961–1973 (Washington, D.C.: Government Printing Office, 2008), 7–12.
97. Meister, *The History of Human Factors and Ergonomics*, 148.
98. Morley Gray Whillans, *Anthropometry and Human Engineering: A Symposium on Anthropometry, Human Engineering and Related Subjects* (London: Butterworths Scientific, 1955), 113.
99. David Meister and Valerie Gawron, “Measurement in Aviation Systems,” in *Handbook of Aviation Human Factors*, ed. John A. Wise, V. David Hopkin, and Daniel J. Garland (Boca Raton: CRC Press, 2010), 3-1.
100. Cogdell, *Eugenic Design*, 5.
101. M. W. Ireland, Charles Davenport, and Albert Love, *Army Anthropology: The Medical Department of the United States Army in the World War* (Washington, D.C.: Government Printing Office, 1921); Hertzberg, Daniels, and Churchill, *Anthropometry of Flying Personnel—1950*, 1.
102. The collection of anthropometric data for uniforms after World War I was one of the first human factors studies conducted by trained scientists using the scientific method (which, in this case, included the eugenicist and statistician Charles Davenport, among others). See Ruth O’Brien, *An Annotated List of Literature References on Garment Sizes and Body Measurements*, U.S. Department of Agriculture, Miscellaneous Publication no. 78 (Washington, D.C.: U.S. Department of Agriculture, 1930), 3.
103. Meister and Gawron, “Measurement in Aviation Systems,” 3-1-3-2.
104. Robert Procter and Trisha Van Zandt, *Human Factors in Simple and Complex Systems* (Boca Raton: CRC Press, 1993), 12–13; Meister and Gawron, “Measurement in Aviation Systems,” 3-1-3-2. Some of these programs were formally established in the late twentieth century, but human factors preceded them within the military on the whole.
105. Whillans, *Anthropometry and Human Engineering*, 113.
106. Marcy Babbit, “As a Woman Sees Design: An Interview with Belle Kogan” (1935), in *The Industrial Design Reader*, ed. Carma Gorman (New York: Allworth Press, 2003), 138–39.
107. H. H. Manchester, “Recent Investigations of Average Proportions,” *Clothing Trade Journal* 27 (1926): 18–20; O’Brien, “An Annotated List of Literature References on Garment Sizes and Body Measurements,” 3.

108. Meister, *The History of Human Factors and Ergonomics*, 152–53.
109. See chapter 1.
110. Murrell, *Human Performance in Industry*, 146.
111. *Ibid.*, 160.
112. *Ibid.*

### 3. All Americans

1. Bernard McNulty, *Strength for the Fight: A History of Black Americans in the Military* (New York: Free Press, 1986), 204–5.

2. Raymond Frey, “Truman’s Speech to the NAACP, 29 June 1947,” in *The Civil Rights Legacy of Harry S. Truman*, ed. Raymond H. Geselbracht (Kirksville, Mo.: Truman State University Press, 2007), 97. Regarding the line “When I say all Americans I mean all Americans,” Frey notes that Truman had “penciled [it] in himself during the writing process” (97).

3. Timothy J. Nugent, “Founder of the University of Illinois Disabled Students’ Program and the National Wheelchair Basketball Association, Pioneer in Architectural Access,” conducted by Fred Pelka, 2004–5, Oral History Center, Bancroft Library, University of California, Berkeley, 2009, xiii (Fred Pelka, “Interview History”).

4. Keith Roberts and Ray Crigger, “Wheelchair Vets Trek to Springfield in Vain Effort to Keep Division Open,” *Galesburg Illini* 3, no. 20 (1949), 1; “Disabled Vets Protest Closing of U. of I. Unit,” *Chicago Tribune*, April 2, 1949, 10; Nugent, “Founder,” 17. Asked whether any black students were part of the group, Nugent reported that there were none until the second year (29).

5. Nugent, “Founder,” 46.

6. *Ibid.*

7. *Ibid.*, 49.

8. The University of Michigan’s Institute for Human Adjustment extended the rehabilitation frame to gerontology and the concerns of aging citizens in 1948 by holding several well-attended annual national conferences on topics such as the “Rehabilitation of the Handicapped Worker over Forty.” In 1952 the conference focused on “Housing the Aging” and included panels on housing and architecture for both disabled and nondisabled elderly people.

9. My approach here draws from rhetorical histories of disability. See, for example, Jay Dolmage, *Disability Rhetoric* (Syracuse: Syracuse University Press, 2014), 63–92; Allison Hitt, “Dis/Identification with Disability Advocacy: Fraternity Brothers Fight against Architectural Barriers, 1967–1975,” *Rhetoric Review* 34, no. 3 (2015): 336–56. My analysis of race focuses on the racialization of blackness and whiteness in the mid-twentieth-century United States. This focus reflects my primary sources, but future research should consider the racialized construction of barrier-free design in relation to other racial categories. Likewise, my focus on the figure of the white, middle-class disabled woman arises from the prevalence of this figure in primary source documents. Further investigation on more legible queer gender and sexual identities in relation to barrier-free design is encouraged.

10. Ostroff, “Universal Design,” 1.3. These types of claims are further contextualized in chapters 6 and 7.

11. Elizabeth Grace Hale, *Making Whiteness: The Culture of Segregation in the South, 1890–1940* (New York: Vintage Books, 1999), xi, 151–67. On Jim Crow-era built environments, see Elizabeth Guffey, “Knowing Their Space: Signs of Jim Crow in the Segregated South,” *Design Issues* 28, no. 2 (2012): 41–60.

12. On whiteness in disability studies, see Bell, "Introducing White Disability Studies."
13. Daniel Bernardi, *The Birth of Whiteness: Race and the Emergence of U.S. Cinema* (New Brunswick, N.J.: Rutgers University Press, 1996), 1; Tracy Teslow, *Constructing Race: The Science of Bodies and Cultures in American Anthropology* (Cambridge: Cambridge University Press, 2014), 246–49.
14. Michelle Alexander, *The New Jim Crow: Mass Incarceration in the Age of Colorblindness* (New York: New Press, 2011), 2–3; Bernardi, *The Birth of Whiteness*, 1–2. While race-neutral ideology is typically associated with the post-Jim Crow era, the discourse of "all" performed similar work in eliding the realities of racial oppression in the midst of state-mandated segregation, essentially reinforcing the doctrine of "separate but equal."
15. Teresa Guess, "The Social Construction of Whiteness: Racism by Intent, Racism by Consequence," *Critical Sociology* 32, no. 4 (2006): 660–62.
16. Charles Mills, *The Racial Contract* (Ithaca, N.Y.: Cornell University Press, 1997), 97.
17. Sarah E. Chinn, *Technology and the Logic of American Racism: A Cultural History of the Body as Evidence* (New York: Continuum, 2000), 93–140.
18. *Ibid.*, 103–6.
19. *Ibid.*, 122, 126.
20. I borrow the term "redesigned" from Alexander, *The New Jim Crow*, 2.
21. Nirmala Erevelles, *Disability and Difference in Global Contexts: Enabling a Transformative Body Politic* (New York: Palgrave Macmillan, 2011), 165.
22. *Ibid.*, 165–66. Ethnic studies scholar Lisa Lowe makes a similar, useful point about racialized "economies of affirmation and forgetting," wherein freedom becomes a celebrated affordance of Western democratic cultures in the majority world, while non-Western cultures are cast as "backward, uncivilized, and unfree." Lisa Lowe, *The Intimacies of Four Continents* (Durham, N.C.: Duke University Press, 2015), 3.
23. David Mitchell and Sharon Snyder frame this figure as an embodiment of "ablenationalism." See David Mitchell and Sharon Snyder, *The Biopolitics of Disability: Neoliberalism, Ablenationalism, and Peripheral Embodiment* (Ann Arbor: University of Michigan Press, 2015).
24. Gilbreth, "Measurement and Standardization."
25. Timothy Nugent, "Design of Buildings to Permit Their Use by the Physically Handicapped," in *New Building Research: Proceedings of the Conference of the Building Research Institute* (Washington, D.C.: National Academy of Sciences, 1960), 52. The notion of disabled people as "burdens" to society came from U.S. eugenicists, whose ideas informed Nazi efforts to eliminate disabled people. Henry Friedlander, *The Origins of Nazi Genocide: From Euthanasia to the Final Solution* (Chapel Hill: University of North Carolina Press, 2000), 7–9.
26. Leon Chatelain, "Architectural Barriers—A Blueprint for Action," in *A National Attack on Architectural Barriers* (Chicago: National Society for Crippled Children and Adults, 1965), 2.
27. *Ibid.*, 4.
28. Mills, *The Racial Contract*, 83–89; Ally Day, "Resisting Disability, Claiming HIV: Introducing the Ability Contract and Conceptualizations of Liberal Citizenship," *Canadian Journal of Disability Studies* 3, no. 3 (2014): 113.
29. Mitchell and Snyder, *Cultural Locations of Disability*, 28, 71–72.
30. Harriet McBryde Johnson, "The Disability Gulag," *New York Times Magazine*, November 23, 2003, 1–6; Chapman, Carey, and Ben-Moshe, "Reconsidering Confinement," 8–9. On the institutionalization of nonwhite disabled, elderly, and low-income people in the early and mid-twentieth

centuries, see Richard Frank and Sherry Glied, *Better but Not Well: Mental Health Policy in the United States* (Baltimore: Johns Hopkins University Press, 2008), 8–20.

31. For instance, in 1944 the U.S. Supreme Court upheld the constitutionality of Japanese internment in *Korematsu v. United States*.

32. Douglas C. Baynton, “Disability and the Justification of Inequality in American History,” in *The New Disability History: American Perspectives*, ed. Paul Longmore and Lauri Umanski (New York: New York University Press, 2011), 33–57.

33. Barry Trevelyan, Matthew Smallman-Raynor, and Andrew D. Cliff, “The Spatial Dynamics of Poliomyelitis in the United States: From Epidemic Emergence to Vaccine-Induced Retreat, 1910–1971,” *Annals of the Association of American Geographers* 95, no. 2 (2005): 269–93.

34. Naomi Rogers, “Race and the Politics of Polio: Warm Springs, Tuskegee, and the March of Dimes,” *American Journal of Public Health* 97, no. 5 (2007): 784–95.

35. On racial disparities to accessing the benefits of the G.I. Bill, see Ira Katznelson, *When Affirmative Action Was White* (New York: W. W. Norton, 2005), 111–39; Melissa Murray, “When War Is Work: The G.I. Bill, Citizenship, and the Civic Generation,” *California Law Review* 96, no. 4 (2008): 967–98; Sarah H. Rose, “The Right to a College Education? The G.I. Bill, Public Law 16, and Disabled Veterans,” *Journal of Policy History* 24, no. 1 (2012): 26–52.

36. Physically disabled people, particularly wheelchair users, gained access to public spaces with the availability of accessible built environments in some cities in the 1960s, but deinstitutionalization for intellectually and cognitively disabled people became a major point of disability struggle in the 1970s. See Fred Pelka, *What Have We Done: An Oral History of the Disability Rights Movement* (Amherst: University of Massachusetts Press, 2012), 312–23.

37. W. M. L. Wilkoff, *Practicing Universal Design: An Interpretation of the ADA* (New York: John Wiley & Sons, 1994), 14.

38. Dierdre L. Cobb, “Segregated Students at the University of Illinois, 1945–1955,” *Journal of the Midwest History of Education Society* 24 (1997): 46–51; Carrie Franke, “Injustice Sheltered: Race Relations at the University of Illinois and Champaign-Urbana, 1945–1962” (PhD diss., University of Illinois at Urbana-Champaign, 1990), 61.

39. Franke, “Injustice Sheltered,” 26–27. See also Natalie Prochaska, “‘Old’ Urban Renewal in Champaign-Urbana, 1960–1969,” *The Public*, March 2016, <http://publici.ucimc.org/old-urban-renewal-in-champaign-urbana-1960-1969/>.

40. In his 2009 oral history, Nugent reports that there were black players on the wheelchair basketball team and black students at the university. When the team traveled to southern states, for instance, Nugent and other coaches apparently stayed in black hotels with the black players. See Nugent, “Founder,” 102–3.

41. The American National Standards Institute was called the American Standards Association in 1961 and underwent several name changes in later years. For consistency, I use the contemporary abbreviation ANSI (rather than ANS). Nugent, “Founder,” 126, describes this research. See also Nugent, “Design of Buildings.”

42. Chatelain, “Architectural Barriers,” 3.

43. “Minutes of the Sectional Committee Meeting,” A.S.A. Project A-117, June 19, 1961, Box 1, Accessibility Standards Project File, 1955–74, University of Illinois Archives.

44. “Minutes of the Steering Committee,” A.S.A. Project A-117, May 8, 1961, Box 1, Accessibility Standards Project File, 1955–74, University of Illinois Archives.

45. "Minutes: Organization Meeting, Sectional Committee on Facilities in Public Buildings for Persons with Physical Handicaps, A117," September 2, 1959, Box 1, Accessibility Standards Project File, 1955–74, University of Illinois Archives, 11.
46. Chatelain, "Architectural Barriers," 2.
47. "Minutes of the Steering Committee Meeting," A.S.A. Project A-117, June 12, 1961, Box 1, Accessibility Standards Project File, 1955–74, University of Illinois Archives.
48. "Minutes of the Steering Committee Meeting," A.S.A. Project A-117, May 18, 1961, Box 1, Accessibility Standards Project File, 1955–74, University of Illinois Archives.
49. "Minutes: Organization Meeting, Sectional Committee on Facilities in Public Buildings for Persons with Physical Handicaps, A117," 9.
50. Nugent, "Design of Buildings," 59.
51. *Ibid.*, 56.
52. William Lotz, "Let's Stop Constructing Inaccessible Buildings," *The Constructor*, May 1962, 1–2.
53. Nugent, "Design of Buildings," 59.
54. *Ibid.*
55. *Ibid.*, 52.
56. Chatelain, "Architectural Barriers," 2–3.
57. Nugent, "Design of Buildings," 52.
58. *Ibid.*
59. Barbara Penner, *Bathroom* (London: Reaktion Books, 2013), 200.
60. Selwyn Goldsmith, *Universal Design: A Manual of Practical Guidance for Architects* (New York: Routledge Architectural Press, 2000), 16. See also Selwyn Goldsmith, *Designing for the Disabled: The New Paradigm* (New York: Routledge Architectural Press, 1963).
61. For a concise overview of these policies and effects, see Martha R. Mahoney, "Residential Segregation and White Privilege," in *Critical White Studies: Looking behind the Mirror*, ed. Richard Delgado and Jean Stefancic (Philadelphia: Temple University Press, 1997), 273–75.
62. Robert Sickels, *The 1940s* (Westport, Conn.: Greenwood Press, 2004), 69–70.
63. Leon Chatelain and Donald Fearn, "That All May Enter," *Your Church*, October 1963, 1–2. On the segregation of U.S. churches in relation to housing and other factors, see Michael L. Owens, *God and Government in the Ghetto: The Politics of Church-State Collaboration in Black America* (Chicago: University of Chicago Press, 2007), 49, 68–69.
64. Chatelain and Fearn, "That All May Enter," 1–2. See also J. J. Gilbert, "Keep Handicapped in Mind, Group Urges Church Planners," *Catholic Standard*, March 31, 1966, 1, reprinted by the President's Committee on Employment of the Handicapped, Elaine Ostroff Collection, Archives Center, National Museum of American History, Smithsonian Institution.
65. Chatelain and Fearn, "That All May Enter," 1–2.
66. *Ibid.*, 2.
67. Ronald Junius, "Twenty Million," 1966, 1–3, reprinted by the President's Committee on Employment of the Handicapped, Elaine Ostroff Collection, Archives Center, National Museum of American History, Smithsonian Institution.
68. "Banning Those Barriers," *Journal of American Insurance* 40, no. 9 (1964): 1–4.
69. Jayne Shover, "Architectural Barriers," *Home Safety Program Guide*, Summer 1962, 6–7.
70. *Ibid.*



71. Dolores Hayden, *The Grand Domestic Revolution: A History of Feminist Designs for American Homes, Neighborhoods, and Cities* (Cambridge, Mass.: MIT Press, 1982): 285–86; Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983) 211–14.

72. Hayden, *The Grand Domestic Revolution*, 28.

73. Serlin, *Replaceable You*, 56.

74. Howard A. Rusk, *A Manual for Training the Disabled Homemaker* (New York: Bellevue Medical Center, 1955).

75. Gordon H. Hughes, “Review of *Planning Homes for the Aged*, ed. Geneva Mathiasen and Edward Noakes,” *Psychiatric Services* 1 (April 1960): 53.

76. Rusk, *A Manual for Training the Disabled Homemaker*; Howard Rusk, *A Functional Home for Easier Living, Designed for the Physically Disabled, the Cardiac, and the Elderly* (New York: NYU Medical Center, Institute of Physical Medicine and Rehabilitation, 1959); Helen E. McCullough and Mary B. Farnham, *Space and Design Requirements for Wheelchair Kitchens*, Bulletin no. 661 (Urbana, Ill.: College of Agriculture Extension Service, 1960); Helen E. McCullough and Mary B. Farnham, *Kitchens for Women in Wheelchairs*, Circular 841 (Urbana, Ill.: College of Agriculture Extension Service, 1961).

77. Alexander Kira, *The Bathroom* (Ithaca, N.Y.: Center for Housing and Environmental Studies, Cornell University, 1966); Alexander Kira, “Housing Needs of the Aged, with a Guide to Functional Planning for the Elderly and Handicapped,” *Rehabilitation Literature* 21, no. 12 (1960): 370–77. See also Penner, *Bathroom*.

78. This trope of the white, elderly disabled woman appears throughout representations of the user in rehabilitation manuals of the 1950s–70s. See, for example, Figure 3.2.

79. Nancy Krieger, Jarvis Chen, Brent Coull, Jason Beckfield, Mathew Kiang, and Pamela Waterman, “Jim Crow and Premature Mortality among the US Black and White Population, 1960–2009: An Age–Period–Cohort Analysis,” *Epidemiology* 25, no. 4 (2014): 494–504.

80. On racism in rehabilitation practices, see Beth Linker, *War’s Waste: Rehabilitation in World War I America* (Chicago: University of Chicago Press, 2011), 115, 136–38. On whiteness in the rehabilitation profession, see Paul Leung, “National Association of Multicultural Rehabilitation Concerns,” in *Encyclopedia of American Disability History*, ed. Susan Burch (New York: Facts on File, 2009), 641–42. For a history of whiteness and black resistance in the architecture profession, see Victoria Kaplan, “Architecture: A White Gentleman’s Profession?,” in *Structural Inequality: Black Architects in the United States* (Lanham, Md.: Rowman & Littlefield, 2006), 19–52, 205.

81. On the black feminist critique of the figure of the white suburban housewife, see bell hooks, “Rethinking the Nature of Work,” in *Feminist Theory: From Margin to Center* (Cambridge: South End Press, 2000), 96–107.

82. William Henry Chafe, *Civilities and Civil Rights: Greensboro, North Carolina, and the Black Struggle for Freedom* (New York: Oxford University Press, 1981), 71.

83. *Ibid.*, 122.

84. I draw these biographical details from a range of sources, including oral histories, published biographies, and my own archival research in Mace’s private home. Mace’s entry to the hospital was reported in “Forsyth County Reports Sixth Polio Case; Four Transferred,” *Greensboro Daily News*, August 29, 1950, 7; Charles Sasser, “Report of 10 More Polio Cases Made,” *Greensboro Daily News*, August 30, 1950, 15.

85. Chafe, *Civilities and Civil Rights*, 29; "Polio Patient Total Holds at 105," *Greensboro Daily News*, August 31, 1950, 1.
86. "Polio Patient Total Holds at 105," 1.
87. Arthur Johnsey, "Law Schools Case Rested for Negroes," *Greensboro Daily News*, August 31, 1950, 1.
88. J. S. Stevenson, "Everybody's Hospital: A Brief History of the Central Carolina Convalescent Hospital," *North Carolina Medical Journal* 27, no. 1 (1966): 23–28.
89. Tom Turner, "Blind Persons Are Operating the Largest Broom Plant between Richmond and Atlanta," *Greensboro Record*, August 30, 1950, 15.
90. Rixie Hunter, "'51 Polio Seen Relatively Low," *Winston-Salem Journal Sentinel*, July 29, 1951.
91. Alexander, *The New Jim Crow*. See also Jonathan Metzl, *The Protest Psychosis: How Schizophrenia Became a Black Disease* (Boston: Beacon Press, 1999).
92. Civil Rights Congress, *We Charge Genocide: The Historic Petition to the United Nations for Relief from a Crime of the United States Government against the Negro People* (New York: International Publishers, 1951).
93. "Three Discharged at Polio Hospital," *Greensboro Record*, August 8, 1951, 10; Steven Litt, "Breaking Down Barriers, Stubbornly, by Design," *News and Observer*, August 7, 1988, 3D.
94. Jim Southerland, "Polio Victim Invited to Model Plane Meet," *Winston-Salem Journal*, August 6, 1953, 16.
95. Mace's high school yearbooks confirm that his school remained white even after mandated desegregation.
96. On such signage in the Jim Crow South, see Guffey, "Knowing Their Space."
97. Patricia Leigh Brown, "House Plans Begin to Meet Needs of Disabled," *Springfield Union*, September 4, 1988, D6.
98. Vic Garcia, "Disabled Architect Dreams of World Accessible to All," *Salt Lake Tribune*, December 16, 1991.
99. Litt, "Breaking Down Barriers."
100. William Doggett, Ronald Mace, William Marchant, Fred Tolson, and L. Rockett Thompson, "Housing Environmental Research" (fifth year architecture thesis, North Carolina State University, Raleigh, 1966), 77.
101. Litt, "Breaking Down Barriers."
102. James Jeffers, "Barrier-Free Design: A Legislative Response," in *Barrier-Free Environments*, ed. Michael J. Bednar (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1977), 46.
103. Litt, "Breaking Down Barriers."
104. Even today, nonwhite architects in the United States comprise less than 2 percent of the population. Lekan Oguntoyinbo, "In Architecture, African-Americans Stuck on Ground Floor in Terms of Numbers," *Diverse: Issues in Higher Education* (August 5, 2013), <http://diverseeducation.com/article/55050/>.
105. Black civil rights activists engaged in direct action to demand desegregation. See Henry Hampton and Steve Fayer, *Voices of Freedom: An Oral History of the Civil Rights Movement from the 1950s through the 1980s* (New York: Bantam Books, 1991), 18; Metzl, *The Protest Psychosis*, xi. On the historical relationship between disability and incarceration, see Liat Ben-Moshe, "Disabling Incarceration: Connecting Disability to Divergent Confinements in the USA," *Critical Sociology* 39, no. 3 (December 2011): 385–403. Feminist activists also demanded desegregation and spatial access, drawing connections to disability rights demands. See Dolores Hayden, "What Would a

Non-Sexist City Be Like? Speculations on Housing, Urban Design, and Human Work,” *Signs* 5, no. 3 (1980): 170–87; Weisman, “Women’s Environmental Rights,” 4. On disability rights protests in intersection with race, see Susan M. Schweik, “Lomax’s Matrix: Disability, Solidarity, and the Black Power of 504,” *Disability Studies Quarterly* 31, no. 1 (2011), [dsq-sds.org/article/view/1371/1539](http://dsq-sds.org/article/view/1371/1539).

106. On individual versus systemic racism, see Stokely Carmichael and Charles V. Hamilton, *Black Power: The Politics of Liberation in America* (New York: Vintage Books, 1967), 2–3. On the mundane, everyday aspects of racism, see Clair Drake and Horace R. Clayton, *Black Metropolis: A Study of Negro Life in a Northern City* (Chicago: University of Chicago Press, 1945).

107. Disability theorists have drawn similar parallels. See Phil Smith, “Whiteness, Normal Theory, and Disability Studies,” *Disability Studies Quarterly* 24, no. 2 (2004), <http://dsq-sds.org/article/view/491/668>.

108. Chatelain, “Architectural Barriers,” 4.

109. *Ibid.*

110. Elizabeth Hinton, “‘A War within Our Own Boundaries’: Lyndon Johnson’s Great Society and the Rise of the Carceral State,” *Journal of American History* 102, no. 1 (2015): 100–112.

111. On the role of experts in the Kerner Report, see Ellen Herman, “The Kerner Commission and the Experts,” in *The Romance of American Psychology: Political Culture in the Age of Experts* (Berkeley: University of California Press, 1995), 208–37.

112. See National Advisory Commission on Civil Disorders, “Kerner Report,” 1968, <https://www.ncjrs.gov/pdffiles1/Digitization/8073NCJRS.pdf>. On the Kerner Report and the politics of integration (versus nonsegregation and material spatial equality), see John O. Calmore, “Spatial Equality and the Kerner Commission Report: A Back-to-the-Future Essay,” in *Race, Poverty, and American Cities*, ed. John Boger and Judith Wegner (Chapel Hill: University of North Carolina Press, 1996), 309–42.

113. National Advisory Commission on Civil Disorders, “Kerner Report,” 1.

114. On the co-construction of race and disability, see Baynton, “Disability and the Justification of Inequality in American History,” 33; Leroy Moore Jr. and Pamela S. Fadem, “Race,” in *Encyclopedia of American Disability History*, ed. Susan Burch (New York: Facts on File, 2009), 757–59; Dea H. Boster, *African American Slavery and Disability: Bodies, Property, and Power in the Antebellum South, 1800–1860* (New York: Routledge, 2013); Ellen Samuels, *Fantasies of Identification: Disability, Gender, Race* (New York: New York University Press, 2014).

115. Herman, “The Kerner Commission and the Experts,” 212.

116. *Ibid.*, 223–34.

117. National Advisory Commission on Civil Disorders, “Kerner Report,” 1.

118. *Ibid.*

119. Metzl, *The Protest Psychosis*.

120. Hinton, “‘A War within Our Own Boundaries.’”

121. Edmond Leonard, “Lives Are Salvaged” (speech delivered to the Seventh International Conference of the Federation Internationale des Mutilés et Invalides du Travail et des Invalides Civils, Italy, 1965), 3–5, Elaine Ostroff Collection, Archives Center, National Museum of American History, Smithsonian Institution.

122. Wilkoff, *Practicing Universal Design*, 15.

123. *Ibid.*

124. *Ibid.*, 16.

125. National Commission on Architectural Barriers to Rehabilitation of the Handicapped,

*Design for All Americans: A Report of the National Commission on Architectural Barriers to Rehabilitation of the Handicapped* (Washington, D.C.: Rehabilitation Services Administration, 1967), 2. See also Jeffers, “Barrier-Free Design,” 46.

126. Jeffers, “Barrier-Free Design,” 46–47.

127. *Ibid.*, 47.

128. See U.S. Congress, Senate, *A Barrier-Free Environment for the Elderly and the Handicapped: Hearings before the Special Committee on Aging, United States Senate, 92nd Congress, First Session* (October 18–20, 1971) (Washington, D.C.: Government Printing Office, 1972).

129. National Commission on Architectural Barriers to Rehabilitation of the Handicapped, *Design for All Americans*, 2.

130. *Ibid.*, 4.

131. On the gendering of disabled soldiers, see Rose, “The Right to a College Education?”

132. National Commission on Architectural Barriers to Rehabilitation of the Handicapped, *Design for All Americans*, 2.

133. For a historical overview of the intersections of race, poverty, aging, and disability in healthcare disparities of the 1960s, including a focus on nursing homes and institutions, see Rosemary A. Stevens, “Health Care in the Early 1960s,” *Health Care Financing Review* 18, no. 2 (1996): 11–22.

134. National Commission on Architectural Barriers to Rehabilitation of the Handicapped, *Design for All Americans*, 19.

135. U.S. Department of Justice, Civil Rights Division, “A Guide to Disability Rights Laws,” July 2009, <http://www.ada.gov/cguide.htm>. Mace’s firm, Barrier Free Environments, took the lead on publishing guides for accessible housing. See Barrier Free Environments, *Fair Housing Act Design Manual* (Raleigh, N.C.: Barrier Free Environments, 1996). Mace justified the inclusion of disability alongside racial, gender, and religious protections by invoking disability as a unique type of vulnerability. “As a protected class,” Mace argued, “people with disabilities are unique in at least one respect because they are the only minority that can be discriminated against solely by the built environment.” Barrier Free Environments, *Fair Housing Act Design Manual*, 1.

136. Peter Lassen, quoting a New York State law, “Statement of Peter L. Lassen, Executive Director, Paralyzed Veterans of America, Washington, D.C.,” in *Design and Construction of Federal Facilities to Be Accessible to the Physically Handicapped: Hearings before the United States House Committee on Public Works, Subcommittee on Public Buildings and Grounds, Ninety-First Congress, First Session, on December 9, 1969* (Washington, D.C.: Government Printing Office, 1970), 20.

137. Jack H. McDonald, quoted in *Design and Construction of Federal Facilities to Be Accessible to the Physically Handicapped*, 6.

#### 4. Sloped Technoscience

Chapter epigraph: Karen Barad, “Intra-actions (Interview of Karen Barad by Adam Kleinman),” *Mousse* 34 (Summer 2012): 81.

1. As an origin story for the disability rights movement, the guerrilla curb cut narrative circulates widely. Joseph Shapiro discusses it briefly in *No Pity: People with Disabilities Forging a New Civil Rights Movement* (New York: Times Books, 1994), 126. Those alleged to have been involved, particularly Hale Zukas and Eric Dibner, deny involvement in heroic, unsanctioned, guerrilla curb cutting but have acknowledged engaging in do-it-yourself curb cutting at other times of the day and often for less explicitly confrontational purposes. See Hale Zukas, “National Disability

Activist: Architectural and Transit Accessibility, Personal Assistance Services,” an oral history conducted in 1998 by Sharon Bonney and published in *Builders and Sustainers of the Independent Living Movement in Berkeley*, vol. 3, (Berkeley: Oral History Center, Bancroft Library, University of California, 2000), 122; Eric Dibner, “Advocate and Specialist in Architectural Accessibility,” an oral history conducted in 1998 by Kathy Cowan and published in *Builders and Sustainers of the Independent Living Movement in Berkeley*, 3:24–25; Eric Dibner, e-mail message to author, August 18, 2016. In 2015 Dibner, now a national accessibility expert, reframed the story at an event celebrating the twenty-fifth anniversary of the ADA: “Myth is rampant, however, and it is retrospective. There is a story that we had a guerrilla group building curb ramps in the middle of the night. The city had begun to replace curbs at the busy corners, but there were several thousand corners without ramps, yet to be built. Ed, who traveled about a dozen blocks to get to CIL, could manage his wheelchair on quiet residential streets, where some corners only had very low curbs or there were driveways that sometimes let him on or off the sidewalk. So, we decided to save the city some effort and mixed up a bag of concrete and smoothed out a half dozen low curbs along his route, troweling a wedge of cement at the gutter. Now, the story is told that the first curb ramp was put in by a gang of midnight revolutionaries.” Eric Dibner, “Disability and Learning” (presentation at Willing and Able ADA Slam Event, Portland, Maine, July 2, 2015). This chapter is concerned not with whether these events occurred at night but with the political work of crip design cultures.

2. “Critical making,” a more recent concept, resembles the sensibility that I describe in this chapter as “crip technoscience.” Matt Ratto and Robert Ree, “Materializing Information: 3D Printing and Social Change,” *First Monday* 17, no. 7 (2012), <http://firstmonday.org/ojs/index.php/fm/article/view/3968/3273>.

3. Jane Jacobs, *The Death and Life of Great American Cities* (1961; repr., New York: Vintage Books, 1992), 55.

4. Jack Fisher, quoted in Steven Brown, “The Curb Ramps of Kalamazoo: Discovering Our Unrecorded History,” *Disability Studies Quarterly* 19, no. 3 (1999): 205, <https://www.independentliving.org/docs3/brown99a.html>.

5. *Ibid.*

6. In 1973 Section 504 of the federal Rehabilitation Act established a right to federally funded programs and activities for disabled people and Section 228 of the Federal-Aid Highway Act allocated funds for building curb cuts at crosswalks.

7. Bess Williamson, “The People’s Sidewalks: Designing Berkeley’s Wheelchair Route,” *Boom California* 2, no. 1 (2012), <http://www.boomcalifornia.com/2012/06/the-peoples-sidewalks/>.

8. Ed Roberts, quoted in Doris Zames Fleisher and Frieda Zames, *The Disability Rights Movement: From Charity to Confrontation*, 40. Zames and Fleisher do not note the date of the speech, but judging by its content and language, it was most likely from the early 1990s, between the ADA’s passage in 1990 and Roberts’s death in 1995.

9. On the work of disability as multivalent and complex, see Susan Schweik, “Homer’s Odyssey: Multiple Disabilities and the *Best Years of Our Lives*,” in *Civil Disabilities: Citizenship, Membership, and Belonging*, ed. Nancy Hirschmann and Beth Linker (Philadelphia: University of Pennsylvania Press, 2015), 22.

10. “Crip technoscience” is a term I coined in “Crippling Feminist Technoscience.” While historical studies of crip technoscience are so far rare, scholars have studied disabled makers in the recent past. See Elizabeth Petrick, *Making Computers Accessible* (Baltimore: Johns Hopkins University Press, 2015); Bess Williamson, “Electric Moms and Quad Drivers: People with Disabilities



Buying, Making, and Using Technology in Postwar America,” *American Studies* 52, no. 1 (2012): 5–29; Melanie Yargeau, “Disability Hacktivism,” in “Hacking the Classroom: Eight Perspectives,” curated by Jentery Sayers and Mary Hocks, special issue of *Computers and Composition Online* (Spring 2014).

11. My term “politically adaptive” here references Chikako Takeshita’s study of the intrauterine device as a “politically versatile technology,” which materializes new arrangements of knowing-making. Chikako Takeshita, *The Global Biopolitics of the IUD: How Science Constructs Contraceptive Users and Women’s Bodies*, Inside Technology (Cambridge, Mass.: MIT Press, 2012), 3.

12. Institute of Medicine, *Enabling America: Assessing the Role of Rehabilitation Science and Engineering* (Washington, D.C.: National Academies Press, 1997), 148; Nagi, “Disability Concepts Revisited.”

13. This movement is narrated later in this chapter. Politicized disability activism began as early as the 1930s. See Paul Longmore and David Goldberger, “The League of the Physically Handicapped and the Great Depression: A Case Study,” *Journal of American History* 87, no. 3 (2000): 888–92. I use the term “D/deaf” here to signify a recognition of deaf culture, as well as people who identify as hearing impaired but not as culturally deaf.

14. These terms emerged from UK disability activism and theory. See Union of Physically Impaired Against Segregation (UPIAS), “Policy Statement,” 1972, <http://disability-studies.leeds.ac.uk/files/library/UPIAS-UPIAS.pdf>; Oliver, *The Politics of Disablement*; Carmelo Masala and Donatella Rita Petretto, “Models of Disability,” in *International Encyclopedia of Rehabilitation*, ed. Maurice Blouin and John Stone (New York: Center for International Rehabilitation Research Information and Exchange, 2012), <http://cirrie.buffalo.edu/encyclopedia/en/article/135/>. On critiques of the social model, see Tom Shakespeare and Nicholas Watson, “The Social Model of Disability: An Outdated Ideology?,” *Research in Social Science and Disability* 2 (2002): 9–28.

15. UPIAS, “Policy Statement.”

16. Here my argument is in conversation with Rosemarie Garland-Thomson’s notion of the “misfit,” articulated in her article “Misfits.” Whereas Garland-Thomson is concerned with disability as an epistemic position, however, my aim is to historicize crip practices of knowing-making across the periods in which the social model was articulated.

17. Iris Marion Young, “Foreword,” in *Disability/Postmodernity: Embodying Disability Theory*, ed. Marion Corker and Tom Shakespeare (London: Continuum, 2002), xii. For further examples of this association between ramps and Universal Design, see Rosemarie Garland-Thomson, *Extraordinary Bodies: Figuring Physical Disability in American Culture and Literature* (New York: Columbia University Press, 1997), 7; Kafer, *Feminist, Queer, Crip*, 175; Katherine Seelman, “Universal Design and Orphan Technology: Do We Need Both?,” *Disability Studies Quarterly* 25, no. 3 (2005), <http://www.dsqu-sds.org/article/view/584/761>.

18. Product designer George Covington has claimed that “the first barrier to universal design is the human mind. If we could put a ramp into the mind, the first thing down the ramp would be the understanding that all barriers are the result of narrow thinking.” George Covington, quoted in Susan Szenazy, “Twenty Years and Counting,” *Metropolis* magazine, September 2010.

19. Steve Jacobs, “Section 255 of the Telecommunications Act of 1996: Fueling the Creation of New Electronic Curbcuts,” 1999, <http://www.accessiblesociety.org/topics/technology/elec curb cut.htm>; Brooke A. Ackerly, *Universal Human Rights in a World of Difference* (Cambridge: Cambridge University Press, 1998), 35.

20. Steve Jacobs, “The Electronic Curb Cut Effect,” 2002, <http://www.icdri.org/technology/eceff.htm>.



21. McRuer, *Crip Theory*, 35.
22. Dibner, "Advocate and Specialist in Architectural Accessibility," 26.
23. Galileo understood simple machines as instruments that magnify force by creating mechanical advantage. Terry S. Reynolds, *Stronger Than a Hundred Men: A History of the Vertical Water Wheel* (Baltimore: Johns Hopkins University Press, 1983), 200.
24. Ibid.
25. See Carl DiSalvo, *Adversarial Design* (Cambridge, Mass.: MIT Press, 2012). This "agonistic" approach to design draws on radical democratic theory, which locates politics in antagonism, divergence, and contention. See Ernesto Laclau and Chantal Mouffe, *Hegemony and Socialist Strategy: Toward a Radical Democratic Politics* (New York: Verso, 2001).
26. Sara Hendren, *Slope: Intercept*, <http://slopeintercept.org/>.
27. I borrow "disorientation" from feminist theorist Sara Ahmed, *Queer Phenomenology: Orientations, Objects, Others* (Durham, N.C.: Duke University Press, 2006), 166. If disorientation works queerly to disrupt normative orders, crip operates in a similar capacity here.
28. Anthony Dunne, *Hertzian Tales: Electronic Products, Aesthetic Experience, and Critical Design* (Cambridge, Mass.: MIT Press, 2008). See also Anthony Dunne and Fiona Raby, *Speculative Everything: Design, Fiction, and Social Dreaming* (Cambridge, Mass.: MIT Press, 2013).
29. Critical disability scholars have critiqued simulation exercises conducted in the name of "disability awareness." These exercises appear to have been part of rehabilitation education throughout the twentieth century. Critiques of such activities emerged with the independent living movement and entered scholarly debates in the 1980s. See Daniel Pfeiffer, "Disability Simulations Using a Wheelchair Exercise," *Journal of Post-Secondary Education and Disability* 7, no. 2 (1989): 53–60; Sally French, "Simulation Exercises in Disability Awareness Training: A Critique," *Disability and Society* 7, no. 3 (1992): 257–66.
30. Dunne, *Hertzian Tales*, 42.
31. Murphy, *Seizing the Means of Reproduction*; Barad, *Meeting the Universe Halfway*. On design and feminist technoscience, see Maja van der Velden, "Design for a Common World: On Ethical Agency and Cognitive Justice," *Ethics and Information Technology* 11, no. 1 (2009): 37–47; Jutta Weber, "Making Worlds: Epistemological, Ontological, and Political Dimensions of Technoscience," *Poiesis & Praxis* 7, no. 1 (2010): 17–36. On technoscience and environmental design, see John Law and Annemarie Mol, "Situating Technoscience: An Inquiry into Spatialities," *Environment and Planning D: Society & Space* 19, no. 5 (2001): 609; Thomas F. Gieryn, "What Buildings Do," *Theory and Society* 31, no. 1 (2002): 53. On the critique of technology as inherently enframing, see Andrew Feenberg, *Questioning Technology* (London: Routledge, 1999).
32. Ahmed, *Queer Phenomenology*, 166. "Disorientation" is also a phenomenological experience related to disability. Practices of orienteering and wayfinding, for instance, focus on providing people with sensory or cognitive disabilities access to the spatial layouts of built environments. My intention is not to valorize disorientation but to use this concept to point out where tensions arise within the category of disability, as well as between disabled and nondisabled ways of accessing built space.
33. Kafer, *Feminist, Queer, Crip*, 107.
34. Ibid., 119–20.
35. Williamson, "Electric Moms and Quad Drivers."
36. Young, white, middle-class polio survivors and their families were disproportionately represented in the *Toomey Gazette*, while people of color only appeared as representations of institutionalized populations. Williamson, "Electric Moms and Quad Drivers," 9.

37. Ibid.
38. Ibid., 24.
39. Ibid.
40. Alice Loomer, "Hanging onto the Coattails of Science," *Rehabilitation Gazette* 25 (1982): 30–31.
41. Ibid.
42. Ibid.
43. On crip critiques of the disabled cyborg figure, see Kafer, *Feminist, Queer, Crip*, 103–28.
44. Dolmage, "Universal Design."
45. "Disabled Vets Protest Closing of U. of I. Unit." Accounts of the University of Illinois Rehabilitation Education Center also appear in chapters 3 and 5.
46. Roberts and Crigger, "Wheelchair Vets Trek to Springfield in Vain Effort to Keep Division Open," 1.
47. Ibid.
48. Nugent, "Founder," 49. My narrative here draws in large part from Nugent's oral history, which has some limitations in terms of historical accuracy that are addressed in other chapters. For my purposes, however, Nugent's perceptions of the strategies and material practices taking place at the University of Illinois are both far more detailed than other accounts and provide evidence of the ways in which narratives about curb cuts and ramps form.
49. Ibid.
50. Fleischer and Zames, *The Disability Rights Movement*, 36–37.
51. Nugent, "Design of Buildings to Permit Their Use by the Physically Handicapped," 56.
52. Nugent, "Founder," 54–59.
53. "The University Picture," *Toomey Gazette* 5, no. 1 (1962): 22.
54. In the early 1950s, vocational rehabilitation counselor Emerson Dexter, the city's mayor, mobilized to install curb cuts even before the university itself became accessible (Nugent, "Founder," 112–13). In some cases, such as when existing narrow sidewalks would not allow space for a ramp, the city completely repaved entire sidewalks, elevating them at a slight incline to be level with doorways (118–19).
55. Ibid., 135–36.
56. Ibid.
57. Ibid.
58. Ibid., 68–69.
59. "Higher Education," *Toomey Gazette* 10, no. 1 (1967): 42–43.
60. The term "crip," though experiencing recent repopularization with crip theory, was used in the movement to distinguish between rehabilitation and anti-assimilation positions. Raymond Lifchez and Barbara Winslow, *Design for Independent Living: The Environment and Physically Disabled People* (Berkeley: University of California Press, 1979), 9.
61. James Donald, "University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975: Catalyst for Berkeley's Independent Living Movement," an oral history conducted in 1998 by Kathryn Cowan and published in *University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975: Catalyst for Berkeley's Independent Living Movement* (Berkeley: Oral History Center, Bancroft Library, University of California, 2000), 93–94.
62. As Corbett O'Toole notes, the majority of disability rights movement leaders and activists memorialized in the movement's primary archive at the Bancroft library at the University of

California at Berkeley are white (as well as cisgender and heterosexual). Corbett O'Toole, *Fading Scars: My Queer Disability History* (Fort Worth, Tex.: Autonomous Press, 2015), 48. Major histories of the movement barely mention race. These histories typically draw parallels between racism and ableism rather than analyzing the dynamics of race within the movement. See, for example, Fleisher and Zames, *The Disability Rights Movement*, 38–39.

63. Michael Fuss and John Hessler, "Proposal for the Physically Disabled Students' Program—First Draft—1969," Michael Fuss Papers, BANC MSS 99/146 c, Bancroft Library, University of California, Berkeley; Michael Fuss and John Hessler, "Draft Proposal to Expand Cowell Program—1969," Michael Fuss Papers; John Hessler, "Grant Proposal for the Physically Disabled Students' Program, Proposed to Assistant Secretary/Commissioner of Education for Support Through the Special Services for Disabled Students in Institutions of Higher Education," 1970, Michael Fuss Papers.

64. Billy Charles Barner, "First African American Student in Cowell Program, 1969–1973," an oral history conducted in 1999 by Kathryn Cowan and published in *University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975*, 253, 278; Catherine Caulfield, "First Woman Student in the Cowell Program," an oral history conducted in 1996 by Susan O'Hara and published in *University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975*, 139.

65. In vocational rehabilitation, the term "independent living" had, prior to the disability rights movement, meant to benefit people "for whom a vocational goal is thought to be impossible. Independent living is seen as an alternative to the vocational goal—thus, the term 'independent living rehabilitation' as distinct from 'vocational rehabilitation.'" Gerben DeJong, "Independent Living: From Social Movement to Analytic Paradigm," *Archives of Physical Medicine and Rehabilitation* 60, no. 10 (1979): 438.

66. Michael Fuss, "A Proposal for Berkeley Disabled and Blind Supportive Services Program Center for Independent Living, Inc.," March 1972, Michael Fuss Papers, BANC MSS 99/146 c, Bancroft Library, University of California, Berkeley.

67. See chapter 3.

68. Martinez and Duncan, "The Road to Independent Living in the USA: An Historical Perspective and Contemporary Challenges," *Disability World* 20 (2003): 3; Rosemarie Garland-Thomson, "Integrating Disability, Transforming Feminist Theory," *NWSA Journal* 14, no. 3 (2002): 14. See also Paul Longmore, *Telethons: Spectacle, Disability, and the Business of Charity* (New York: Oxford University Press, 2016).

69. I borrow the concept of "epistemic cultures," or "amalgams of arrangements and mechanisms—bonded from affinity, necessity, and historical coincidence," from Karin Knorr-Cetina, *Epistemic Cultures* (Cambridge, Mass.: Harvard University Press, 1989), 1.

70. Boston Women's Health Collective, *Our Bodies, Ourselves*, 2nd ed. (New York: Simon & Schuster, 1971). On the politics of knowledge in the feminist women's health movement in California, see Murphy, *Seizing the Means of Reproduction*.

71. Herbert R. Willsmore, "Student Resident at Cowell, 1969–1970," an oral history conducted in 1996 and 1999 by Susan O'Hara and published in *University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975*, 168–88; Fleisher and Zames, *The Disability Rights Movement*, 39; Gerald Belchick, "Department of Rehabilitation Counselor, Liaison to the Cowell Program, 1970s," an interview conducted by Sharon Bonney and published in *UC Berkeley's Cowell Hospital Residence Program: Key Administrators and California Department of*

*Rehabilitation Counselors* (Berkeley: Oral History Center, Bancroft Library, University of California, 1998), 187–90.

72. Dibner, “Advocate and Specialist,” 26; Willsmore, “Student Resident at Cowell,” 190–91.

73. Willsmore, “Student Resident at Cowell,” 168.

74. James Charlton, *Nothing about Us without Us: Disability Oppression and Empowerment* (Berkeley: University of California Press, 2004), 3–4.

75. Sandra G. Harding, “Rethinking Standpoint Epistemology: What Is ‘Strong Objectivity’?,” in *Feminist Theory: A Philosophical Anthology*, ed. Ann E. Cudd and Robin O. Andreasen (Oxford: Blackwell, 2005), 218–36.

76. Fuss and Hessler, “Draft Proposal to Expand Cowell Program,” 5.

77. On the influence of the self-help movement on disability activism, see Irving Zola, “Helping One Another: A Speculative History of the Self-Help Movement,” 1979, <http://www.independentliving.org/docs4/zola1979.html>; DeJong, “Independent Living,” 438–39.

78. Fuss and Hessler, “Draft Proposal to Expand Cowell Program,” 1–2.

79. *Ibid.*

80. DeJong, “Independent Living,” 440.

81. Hessler, “Grant Proposal for the Physically Disabled Students’ Program,” 7.

82. Fuss, “A Proposal for Berkeley Disabled and Blind Supportive Services Program,” 7.

83. On independent living as a paradigm shift within rehabilitation, see DeJong, “Independent Living,” 435–78.

84. “Disabled People Help Run Herrick’s New Clinic,” *HMH Hospitaler*, Herrick Memorial Hospital, Berkeley, California, February 1974, 3–9, Hale Zukas Papers, BANC MSS 99/150 c, courtesy of the Bancroft Library, University of California, Berkeley.

85. “Disabled People Help Run Herrick’s New Clinic,” 4.

86. Hessler, “Grant Proposal for the Physically Disabled Students’ Program,” 16.

87. Corbett O’Toole, “Advocate for Disabled Women’s Rights and Health Issues,” an oral history conducted in 1998 by Denise Sherer Jacobson (Oral History Center, Bancroft Library, University of California, Berkeley, 2000), 38; Catherine Caulfield, “First Woman Student in the Cowell Program,” an oral history conducted in 1996 by Susan O’Hara and published in *University of California’s Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975*, 32–33.

88. O’Toole, “Advocate for Disable Women’s Rights,” 39; Barner, “First African American Student in Cowell Program,” 264; Center for Independent Living, “Wheelchair Design Innovation,” *CIL Newsletter* (1975), Hale Zukas Papers, BANC MSS 99/150 c, courtesy of the Bancroft Library, University of California, Berkeley.

89. “Computer Training Project 1975,” pamphlet, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley. In the 1980s computing would once again become a frontier of disability technoscience when the CIL helped to establish the Disabled Children’s Computer Group, an organization in which parents hacked and tinkered computer technologies to create access for disabled children. See Elizabeth Petrick, “Fulfilling the Promise of the Personal Computer: The Development of Accessible Computer Technologies, 1970–1998” (PhD diss., University of California, San Diego, 2012). As Petrick notes, “This was an environment of problem solving, reminiscent of the kinds of hobbyist tinkering with personal computers that had helped start the personal computer industry roughly a decade earlier” (125).

90. My concept of “epistemic activism,” further explored in subsequent chapters, points to strategies and tactics carried out within the domain of knowledge to change material arrangements.

This dimension of knowing-making encompasses the materialization of knowledge production and dissemination and not simply acts of design themselves. Epistemic activism relates to “tactical politics” (da Costa and Phillip, *Tactical Biopolitics*, xix) and practices that sociologists of technoscience refer to as “evidence-based activism.” See Vololona Rabeharisoa, Tiago Moreira, and Madelein Akrich, “Evidence-Based Activism: Patients’, Users’ and Activists’ Groups in Knowledge Society,” *BioSocieties* 9, no. 2 (2014): 111–28.

91. “Disabled People Help Run Herrick’s New Clinic,” 9.

92. DeJong, “Independent Living,” 437.

93. Willsmore, “Student Resident at Cowell,” 221.

94. Zukas, “National Disability Activist,” 119–20. When Ed Roberts joined the CIL after its founding, he began entering the organization into federal rehabilitation grant competitions for rehabilitation engineering and design. A grant in 1975 from the California Department of Rehabilitation allowed the CIL to expand its maker activities into “an exhaustive study of the state of the art of wheelchair design” (Center for Independent Living, “Wheelchair Design Innovation”). Through that program, the CIL offered more trainings in wheelchair repair, taught by its “augmented engineering and machine staff” (ibid.). These trainings constituted a form of citizen rehabilitation engineering, using the technological expertise of disabled people trained in repairs at the CIL to carry out research and design with rehabilitation funding. Note that Roberts is often misattributed as the founder of the CIL and the Rolling Quads. Reportedly, he joined the CIL in 1973 or 1974. See Zukas, “National Disability Activist,” 174. See also O’Toole, *Fading Scars*, 125.

95. “CIL Facts—August 1979,” brochure listing CIL activities, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

96. Jean A. Cole, “What’s New about Independent Living?,” *Archives of Physical Medicine and Rehabilitation on Independent Living* 60, no. 10 (1979): 458.

97. Williamson, “The People’s Sidewalks,” 4; Zukas, “National Disability Activist,” 139; Hessler, “Grant Proposal for the Physically Disabled Students’ Program,” 25.

98. Dibner, e-mail to author, August 18, 2016.

99. Ibid.

100. Dibner, “Advocate and Specialist in Architectural Accessibility,” 3.

101. Ibid., 24.

102. Ibid., 25.

103. Ibid.

104. One of the other services that Dibner performed was DIY wheelchair maintenance. Ibid., 12.

105. Ibid., 140; Charles A. Grimes, “Attendant in the Cowell Residence Program, Wheelchair Technologist, and Participant/Observer of Berkeley’s Disability Community, 1967–1990s,” an oral history conducted in 1998 by David Landes (Oral History Center, Bancroft Library, University of California, Berkeley, 2000), 117–18.

106. Zukas, “National Disability Activist,” 140.

107. Ibid., 141.

108. Ibid.

109. Dibner, “Advocate and Specialist in Architectural Accessibility,” 85–86.

110. Grimes, “Attendant in the Cowell Residence Program,” 79–80.

111. Ibid., 80.



112. Hale Zukas, letter to Edwin Shomate, June 14, 1976, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

113. Ibid.

114. Ibid.

115. Ibid.

116. One model, which used terminology of the time, positioned disabled people as “consumers” with significant power and knowledge (in apparent reference to Ralph Nader’s consumer protection movement). See Lex Frieden, “Independent Living Models,” *Rehabilitation Literature* 41, nos. 7–8 (1980): 169–73. The term is not just an unfortunate coincidence, however. While activists challenged dominant rehabilitation norms, they did not always unsettle the values associated with white, middle-class citizenship. O’Toole argues that while histories of the early disability rights movement give the impression that “all disabled people who came into their circles were welcomed and included” and that, simultaneously, few disabled people of color were present, movement leadership did not reflect the diversity of disabled people of color at the time. O’Toole, *Fading Scars*, 125–26.

117. CIL, “Public Education,” Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

118. Edmond Leonard, “National Center for a Barrier-Free Environment Report,” December 11, 1975, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley; “Architecture 198: Barrier-Free Design community design course,” flier, Eric Dibner Papers; letter from Friedner D. Wittman to Richard Bender on CIL and UC–Berkeley Architecture department collaborations, February 20, 1975, Eric Dibner Papers; letter from Eric Dibner to Raymond Lifchez, ca. 1975, Eric Dibner Papers.

119. Leonard, “National Center for a Barrier-Free Environment Report.”

120. Ibid.; “Bibliography for Barrier-Free Design,” Eric Dibner Papers, BANC MSS 99/186 c, Bancroft Library, University of California, Berkeley; letter from Eric Dibner to Edwin Shomate, June 14, 1976, Eric Dibner Papers. The ANSI A117.1–1961 standard did mention the need to make curb cuts accessible to blind people, noting that curbs, “particularly if they occur at regular intersections, are a distinct safety feature for all of the handicapped, particularly the blind.” American Standards Association, *American Standard Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped* (ANSI A117.1–1961, approved October 31, 1961) (New York: American Standards Association, 1961), 8.

121. Raymond Lifchez, “Educator in Architectural Access, University of California, Berkeley,” an oral history conducted by Susan O’Hara in 2000 and published in *Architectural Accessibility and Disability Rights in Berkeley and Japan* (Berkeley: Oral History Center, Bancroft Library, University of California, 2004), 75. Some of these efforts were carried out by a Campus Committee for Removal of Architectural Barriers. Dibner, “Advocate and Specialist in Architectural Accessibility,” 34.

122. Lifchez, “Educator in Architectural Access,” 75–76.

123. Ibid., 76.

124. Lifchez and Winslow, *Design for Independent Living*, 140–41.

125. Lifchez, “Educator in Architectural Access,” 76.

126. Lifchez and Winslow, *Design for Independent Living*; Raymond Lifchez, *Rethinking Architecture: Design Students and Physically Disabled People* (Berkeley: University of California Press, 1987); Lifchez, “Educator in Architectural Access,” 89–90. Elaine Ostroff later coined the term

“user-expert.” Elaine Ostroff, “Mining Our Natural Resources: The User as Expert,” *Innovation* 16, no. 1 (1997): 33–35.

127. Phil Draper, Jerry Wolf, and Eric Dibner, letter to Ray Lifchez and Barbara Winslow, December 29, 1976, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

128. Dibner, “Advocate and Specialist in Architectural Accessibility,” 54–55; Eric Dibner, e-mail to author, August 18, 2016.

129. Lifchez and Winslow, *Design for Independent Living*, 150.

130. *Ibid.*, 153.

131. Williamson, “The People’s Sidewalks.”

132. Grimes, “Attendant in the Cowell Residence Program,” 23; Michael Fuss, “Attendant for Cowell Residents, Assistant Director of the Physically Disabled Students’ Program, 1966–1972,” an oral history conducted in 1997 by Sharon Bonney and published in *Builders and Sustainers of the Independent Living Movement in Berkeley*, 2:67–68; Charles Grimes, “Attendant in the Cowell Residence Program,” 117–18; Board of Directors Meeting, September 30, 1974, BANC MSS 99/150 c, courtesy of the Bancroft Library, University of California, Berkeley; Dibner, e-mail to author, August 18, 2016.

133. Dibner, “Advocate and Specialist in Architectural Accessibility,” 36–37.

134. Invoice from CIL to the Center for Feminist Therapy and Education, January 3, 1978, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

135. *Ibid.*

136. Eric Dibner, letter to Aileen Frankel, March 5, 1979, Eric Dibner papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

137. Alison Kafer pointed out this detail in a personal communication, February 7, 2015.

138. Dibner, e-mail to author, August 18, 2016.

139. John Curl and Ishmael Reed, *For All the People: Uncovering the Hidden History of Cooperation, Cooperative Movements, and Communalism in America* (Oakland: PM Press, 2012), 379, 428. Eventually Ma Revolution was shut down in 1977 when it became the site of a shooting arising over conflicts in the movement (*ibid.*, 217).

140. Dibner, “Advocate and Specialist in Architectural Accessibility,” 65; Eric Dibner, report in preparation for *Less Than the Minimum* (videotape), June 6, 1982, Eric Dibner Papers, BANC MSS 99/186 c, courtesy of the Bancroft Library, University of California, Berkeley.

141. For an in-depth sociological and historical analysis of the cross-disability coalitions engendered by the occupation, see Sharon Barnartt and Richard Scotch, *Disability Protests: Contentious Politics, 1970–1999* (Washington, D.C.: Gallaudet University Press, 2001); Michael Ervin, “The 25 Day Siege That Brought Us 504,” *Mainstream*, April 18, 1986, <http://www.independentliving.org/docs4/ervin1986.html>; O’Toole, “Advocate for Disabled Women’s Rights and Health Issues,” 48.

142. O’Toole, “Advocate for Disabled Women’s Rights and Health Issues,” 47.

143. *Ibid.*, 48.

144. Kitty Cone, quoted in Fred Pelka, *What Have We Done*, 267. Frank Bowe, a deaf activist, organized the nationwide protest in ten cities. Fred Pelka attributes the occupation strategy to Saul Alinsky’s *Rules for Radicals*, which Franke Bowe, executive director of the National Coalition of Citizens with Disabilities in 1977, reportedly consulted to organize the sit-ins. Pelka, *What Have*

*We Done*, 262–63; Saul Alinsky, *Rules for Radicals: A Practical Primer for Realistic Radicals* (New York: Vintage Books, 1989).

145. Kitty Cone, “Short History of the 504 Sit In,” 1996, <http://dredf.org/504site/histover.html>. See also Alice Wong, “Disability Justice and Social Justice: Entwined Histories and Futures,” *BK Nation*, January 16, 2014, <http://bknation.org/2014/01/disability-justice-social-justice-entwined-histories-futures/>.

146. On incarceration, disability, and whiteness, see Ben-Moshe, “Disabling Incarceration.” Some disability scholars, such as Nirmala Erevelles, focus on “how race and disability are imbricated in their collective formation of the black disabled body that now becomes a commodity that has economic, social, cultural, and linguistic implications for transnational subjectivities.” Erevelles, *Disability and Difference in Global Contexts*, 39. I am concerned with how drawing parallels elides this imbrication.

147. Richard E. Allen, “Legal Rights of the Disabled,” *Braille Monitor*, December 1970. For contemporary examples of advocates drawing parallels between race and disability, see Korydon H. Smith, Jennifer Webb, and Brent T. Williams, *Just below the Line: Disability, Housing, and Equity in the South* (Fayetteville: University of Arkansas Press, 2010), 51–52.

148. Joseph Shapiro, “Disability Rights as Civil Rights,” in *The Disabled, the Media, and the Information Age*, ed. Jack A. Nelson (Westport, Conn.: Greenwood Press, 1994), 62.

149. On the disappearance of racial segregation from activist and policy rhetorics in the 1970s and '80s, see Douglas Massey and Nancy Denton, *American Apartheid: Segregation and the Making of the Underclass* (Cambridge, Mass.: Harvard University Press, 2003), 1–3.

150. As Massey and Denton note in *American Apartheid*, “Despite the provisions of the Fair Housing Act, segregation continued; . . . the decade [of the 1970s] ended in record unemployment, inflation, falling wages, increasing income inequality, and rising rates of black poverty. Not only did the ghetto fail to disappear; in many ways its problems multiplied. As segregation persisted, black isolation deepened, and the social and economic problems that had long plagued African American communities worsened. During the 1970s, the ghetto gave birth to the underclass.” Massey and Denton, *American Apartheid*, 61–64.

151. *Ibid.*, 81. On the persistence of residential segregation in the early twenty-first century, see John R. Logan, “The Persistence of Segregation in the 21st Century Metropolis,” *City & Community* 12, no. 2 (2013): 160–68. On contemporary residential segregation and its effects on environmental injustice, see Dorceta E. Taylor, *Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility* (New York: New York University Press, 2014), 147–90.

152. Massey and Denton, *American Apartheid*, 66–67.

153. Combahee River Collective, “Combahee River Collective Statement,” April 1977, <http://circuitous.org/scraps/combahee.html>; Kimberlé Crenshaw, “Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color,” *Stanford Law Review* 43, no. 6 (1993): 1241–99.

154. On intersectionality and disability history, see Susan Burch and Lindsey Patterson, “Not Just Any Body: Disability, Gender, and History,” *Journal of Women's History* 25, no. 4 (2013): 122–37.

155. Disability historiography has turned attention to disabled people of color and their omission from official histories and narratives. As Susan Schweik argues in “Lomax’s Matrix,” “We come to a better understanding of the fluid and intricate dynamics of alliance that comprised the ‘power of 504’ when we place a disabled Black Panther and a Black Panther caregiver at the center both of Panther and of American disability history.” On the contributions of the Black Panther

Party to the 504 protests, see O'Toole, "Advocate for Disabled Women's Rights and Health Issues," 48. Few narratives from disabled women of color appear in the archives of the independent living movement. One exception is Johnnie Lacy, "Director, Community Resources for Independent Living: An African-American Woman's Perspective on the Independent Living Movement in the Bay Area, 1960s–1980s," an oral history conducted in 1998 by David Landes (Oral History Center, Bancroft Library, University of California, Berkeley, 2000). O'Toole discusses Lacy in *Fading Scars*, 118–33.

156. Josh Lukin, "The Black Panther Party," in *Encyclopedia of American Disability History*, ed. Susan Burch (New York: Facts on File, 2009), 113–14.

157. "Interest convergence" is a term that critical race scholars use to describe the overlapping interests of seemingly disparate groups (such as black civil rights activists and white residents of suburbs) that result in consensus about shared outcomes. See Derrick Bell Jr., "*Brown v. Board of Education* and the Interest Convergence Dilemma," *Harvard Law Review* 93, no. 3 (1980): 518–33. On accessible design as an "interest convergence," see Jay Dolmage, "Disability Studies Pedagogy, Usability and Universal Design," *Disability Studies Quarterly* 25, no. 4 (2005), <http://dsq-sds.org/article/view/627/804>.

158. Leroy Moore, "Black History of 504 Sit-In for Disability Rights: More Than Serving Food—When Will the Healing Begin?," *San Francisco Bay View National Black Newspaper*, February 11, 2014, <http://sfbayview.com/2014/02/black-history-of-504-sit-in-for-disability-rights-more-than-serving-food-when-will-the-healing-begin/>.

159. Schweik, "Lomax's Matrix."

160. *Ibid.*

161. Zukas, "National Disability Activist," 169–70; Dibner, "Advocate and Specialist in Architectural Accessibility," 52–53. Dibner began officially consulting for the Oakland Housing Authority on accessibility on May 17, 1978, and served as an accessibility expert for museums and hospitals in the area, as well. See letter from Eric Dibner to Robert R. Raber, Modernization Projects Manager, Housing Authority of the City of Oakland, June 7, 1978, Eric Dibner Papers, BANC MSS 99/186 c, Bancroft Library, University of California, Berkeley; letter from Eric Dibner to Tish Brown, Document Council at the De Young museum, January 9, 1979, Eric Dibner Papers; Eric Dibner, "Comments on plans for additions to Children's Hospital Medical Center," February 13, 1979, Eric Dibner Papers; letter from Eric Dibner to Aileen Frankel, Office of Community Development, Oakland, March 5, 1979, Eric Dibner Papers.

## 5. Epistemic Activism

1. F. W. Rees Jr. and E. Burch, "Barrier-Free Design Reflects the Spirit of the Law," *Hospitals* 52, no. 4 (1978): 121–26. See also Edward Steinfeld, "Barrier-Free Design Begins to React to Legislation, Research," *Architectural Record* 165, no. 3 (1979): 69–71.

2. Shakespeare, "Disabled People's Self-Organization," 251–52; Barnartt and Scotch, *Disability Protests*, 62.

3. James Donald, "University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962–1975: Catalyst for Berkeley's Independent Living Movement," an oral history conducted in 1998 by Kathryn Cowan and published in *University of California's Cowell Hospital Residence Program for Physically Disabled Students*, 93–94.

4. See chapter 3.

5. See chapter 1.

6. On architectural expertise and modernism, see Sachs, “Architects, Users, and the Social Sciences in Postwar America.” On the “research economy” within which architectural research circulated, see Avigail Sachs, “The Postwar Legacy of Architectural Research,” *Journal of Architectural Education* 62, no. 3 (2009): 53–64.

7. American Institute of Architects, “Barrier-Free Architecture: A Report to the Rehabilitation Services Administration,” in National Commission on Architectural Barriers to Rehabilitation of the Handicapped, *Design for All Americans*, 42–43, 48.

8. *Ibid.*, 43.

9. *Ibid.*, 46.

10. *Ibid.*, 45.

11. *Ibid.*, 44.

12. Mace, quoted in Elaine Ostroff, Mark Limont, and Daniel G. Hunter, *Building a World Fit for People: Designers with Disabilities at Work* (Boston: Adaptive Environments, 2002), 15. See also Litt, “Breaking Down barriers,” 3D.

13. Vic Garcia, “Disabled Architect Dreams of World Accessible to All,” *Salt Lake Tribune*, December 16, 1991. St. Andrews University, ninety-six miles from Raleigh, built its barrier-free campus in 1961. Whether Mace was aware of its existence or would have attended a Catholic university is unknown.

14. *Ibid.*; Golonka, “Ronald Mace and His Philosophy of Universal Design,” 184–90.

15. Doggett, Mace, Marchant, Tolson, and Thompson, “Housing Environmental Research.”

16. *Ibid.*, 183. Although the thesis is coauthored, several aspects of the texts lead me to conclude that these sections were written by Mace. The ethnographic portion took place at two public housing communities where, according to photos, the buildings had stairs to their entrances and would not have been accessible to him. The interview instruments and solicitation letters suggest that the other students played a more active role in collecting ethnographic data. Given Mace’s accounts of his social isolation during this time, it is likely that he conducted and wrote the bulk of the literature review. The most important clue, however, is that much of the language quoted here also continues to appear later in Mace’s work on barrier-free design and Universal Design, indicating the influence of the thesis on his later work.

17. *Ibid.*, 76.

18. *Ibid.*

19. On an earlier exploration of this argument, see Aimi Hamraie, “Universal Design Research as a New Materialist Practice,” *Disability Studies Quarterly* 32, no. 4 (2012), <http://dsq-sds.org/article/view/3246/3185>. The multidisciplinary scholarly field of environmental design research (often alternately referred to as the study of environment-behavior, environmental psychology, human-centered design, evidence-based design, or person-environment relations) emerged to study the relationships between people, their bodies and minds, and built environments. Although these fields are in some ways discrete, I will refer to them collectively as “environmental design research,” naming them individually when appropriate to differentiate them historically or functionally. Gary T. Moore, D. Paul Tuttle, and Sandra C. Howell, *Environmental Design Research Directions: Process and Prospects* (New York: Wiley, 1985), ix. A classic of the field is John Zeisel, *Inquiry by Design: Tools for Environment-Behavior Research* (Cambridge: Cambridge University Press, 1984). For a more recent review of knowledge circulating in environmental design research, see Keith Diaz Moore and Lyn Geboy, “The Question of Evidence: Current Worldviews in Environmental Design Research and Practice,” *Architectural Research Quarterly* 14, no. 2 (2010): 105–14.



20. Sachs, "Architects, Users, and the Social Sciences in Postwar America," 71–73, 76.
21. Joy R. Knoblauch, "Going Soft: Architecture and the Human Sciences in Search of New Institutional Forms (1963–1974)" (PhD diss., Princeton University, 2012).
22. Moore, Tuttle, and Howell, *Environmental Design Research Directions*, xvi–xvii, 21. See also John Burgess, *Human Factors in Built Environments* (Newtonville, Mass.: Environmental Design and Research Center, 1981), 1.
23. Sachs, "Architects, Users, and the Social Sciences in Postwar America," 71.
24. Jon Lang, *Design for Human Behavior: Architecture and the Behavioral Sciences* (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1974), 3. See also Edward Steinfeld, Steven Schroeder, James Duncan, Rolf Paste, Deborah Chollet, Marilyn Bishop, Peter Wirth, and Paul Cardell, *Access to the Built Environment: A Review of Literature* (Washington, D.C.: U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 1979).
25. On epistemologies of ignorance in relation to design, see the introduction.
26. On "epistemic community" in relation to access-knowledge, see Hamraie, "Universal Design Research as a New Materialist Practice"; Imrie, "Universalism, Universal Design and Equitable Access to the Built Environment."
27. EDRA's precursor was the Design Methods Group at MIT. Henry Sanoff, "The Roots of EDRA," in *The Ethical Design of Places: Proceedings of the 40th Annual Environmental Design Research Association Conference* (Edmond, Okla.: Environmental Design Research Association, 2009) 9–12. See also Sachs, "Architects, Users, and the Social Sciences in Postwar America," 78; Knoblauch, "Going Soft."
28. Henry Sanoff and Sidney Cohn, *Proceedings of the 1st Annual Environmental Design Research Association Conference* (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1970), 29.
29. Doggett, Mace, Marchant, Tolson, and Thompson, "Housing Environmental Research," 13–15.
30. *Ibid.*, 20.
31. Moore, Tuttle, and Howell, *Environmental Design Research Directions*, xvi–xvii.
32. Moore and Geboy, "The Question of Evidence," 105.
33. Moore, Tuttle, and Howell, *Environmental Design Research Directions*, 45; Gary T. Moore, "Environment-Behavior Studies," in *Introduction to Architecture*, ed. J. C. Snyder and A. J. Catanese (New York: McGraw-Hill, 1979), 53–56.
34. Moore, "Environment-Behavior Studies"; Clovis Heimsath, *Behavioral Architecture: Toward an Accountable Design Process* (New York: McGraw-Hill, 1977).
35. Gary T. Moore and Reginald Gollege, *Environmental Knowing: Theories, Research, and Methods* (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1976); Moore, "Environment-Behavior Studies," 53–56. On the history of architectural phenomenology, see Jorge Otero-Pailos, *Architecture's Historical Turn: Phenomenology and the Rise of the Postmodern* (Minneapolis: University of Minnesota Press, 2010). On function as "environmental competence," see Steinfeld et al., *Access to the Built Environment*, 138–39. See also Leon Pastalan, Robert K. Mautz II, and John Merrill, "The Simulation of Age-Related Sensory Loss," in *Environmental Design Research: Fourth International EDRA Conference*, vol. 1, *Selected Papers*, ed. Wolfgang Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973), 383–93.
36. Doggett, Mace, Marchant, Tolson, and Thompson, "Housing Environmental Research," 13–15.

37. See chapter 3. These dynamics are also explored in Knoblauch, "Going Soft," 64–103.
38. "The Interface between Behavior and the Milieu in the Total Institution" (panel presentation, Proceedings of EDRA<sub>3</sub>/AR8 conference, University of California at Los Angeles, January 1972), 2.
39. Charles H. Burnette, "Design Languages as Design Methods," in *Environmental Design Research: Fourth International EDRA Conference*, vol. 2, *Symposia and Workshops*, ed. Wolfgang Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973), 309.
40. Charles Burnette, Donald Lyndon, Kent Bloomer, Michael Benedict, Ray Lifchez, Thomas Hubka, Jay Farbstein, W. Mike Martin, Uriel Cohen, David Gaarder, Linda Johnson, Tim Ginty, and Gary Moore, "The Role of Environmental Psychology in Basic Design Education," Section 4: Teaching and Learning, in *EDRA7 Proceedings*, vol. 2 (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1976), 166–72.
41. Gary T. Moore, *Designing Environments for Handicapped Children* (New York: Educational Facilities Laboratories, 1979).
42. As early as 1972, scholarship on "Discrimination by Design: Mobility Barriers" and "Environments for the Aged" had made their way into this epistemic community, albeit represented as "Special Group Needs." Carolyn Vash, "Discrimination by Design: Mobility Barriers" (panel presentation, Proceedings of EDRA<sub>3</sub>/AR8 conference, University of California at Los Angeles, January 1972), 1–5.
43. *Ibid.*, 4.
44. See Henry Sanoff, *Community Participation Methods in Design and Planning* (New York: John Wiley and Sons, 2000). For a discussion of this method and its relation to standards of good design, see Sachs, "Architects, Users, and the Social Sciences in Postwar America," 78–79.
45. Edward Steinfeld, "Action Research in Man-Environment Relations," in *Environmental Design Research*, 2:396.
46. Elaine Ostroff, "Reflections after Having Begun to Loosen Up a Very Tight Bureaucratic System" (panel presentation, Proceedings of EDRA<sub>6</sub> conference, Lawrence, Kans., January 1975), 1–2, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution. Ostroff's many projects included repurposing a casino in Providence, Rhode Island, as the Looking Glass Theater, a participatory community theater project that enlisted design researchers in its construction. In 1968 Ostroff was awarded a Radcliffe fellowship for her work with the Research and Design Institute on interdisciplinary, research-driven design. Ronald Beckman, letter to Constance Smith, Radcliffe Institute for Independent Study, October 29, 1968, Elaine Ostroff Universal Design Papers.
47. Elaine Ostroff, "Understanding the Physical Environment in the Education of Children with Special Needs," unpublished manuscript, July 1972, 1–4, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution. At this time, mentally disabled children were described as "mentally retarded," a label implying so-called degeneracy or atavism.
48. Elaine Ostroff, "Do-It-Yourself Kits for the Handicapped," pamphlet, 119–24, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution; Elaine Ostroff, "Enriching the Learning Environment: Doing It Ourselves, with Recycled Materials," flier, Fernald State School, 1972, Elaine Ostroff Universal Design Papers; Elaine Ostroff, "Fact Sheet on the Fernald Associate Instructional Material Center," ca. 1972, Elaine Ostroff Universal Design Papers; Benjamin Taylor, "New Center Opens at Fernald," *Boston Evening*

*Globe*, November 16, 1972, 40; Lynda Morgenroth, "People with Special Needs Need Special Places," *Boston Globe*, July 17, 1983.

49. Ostroff, "Understanding the Physical Environment in the Education of Children with Special Needs," 1.

50. *Ibid.*

51. Later, Ostroff would coin the term "user-expert" to describe the focus of her work. Ostroff, "Mining Our Natural Resources," 33–35.

52. Elaine Ostroff, *Humanizing Environments: A Primer* (Cambridge, Mass.: Word Guild, on behalf of the Massachusetts Department of Mental Health, 1978).

53. EDRA later awarded Ostroff with two achievement awards, for both her accessibility work and her publication of the *Universal Design Handbook* with Wolfgang Preisler, another EDRA leader.

54. Lifchez, "Educator in Architectural Access," 74–75.

55. Lifchez and Winslow, *Design for Independent Living*, 20. See also Steinfeld et al., "Impact of Accessibility," in Steinfeld et al., *Access to the Built Environment*, 129–43.

56. Mayer Spivack, back cover blurb, in Lifchez and Winslow, *Design for Independent Living*.

57. Lifchez and Winslow, *Design for Independent Living*, 150.

58. *Ibid.*, 20.

59. Ostroff, Limont, and Hunter, *Building a World Fit for People*, 15; Litt "Breaking Down Barriers," 3D.

60. Litt, "Breaking Down Barriers," 3D.

61. *Ibid.*

62. Ostroff, Limont, and Hunter, *Building a World Fit for People*, 15.

63. Mace, *An Illustrated Handbook of the Handicapped Section of the North Carolina State Building Code*. On the process of developing the standards, see Ronald Mace, "Architectural Accessibility in North Carolina—The Quest for Barrier-Free Design," *N.C. Insight*, October 1983, 40–47.

64. Theresa J. Rosenberg Raper, "Regulations and Communication in the Implementation of a Building Code for Accessibility to the Physically Handicapped," in *Research and Innovation in the Building Regulatory Process*, ed. Patrick Cooke (Washington, D.C.: National Bureau of Standards, 1977), 243.

65. On the process of developing and implementing the North Carolina accessibility code, see *ibid.*, 241–51.

66. *Ibid.*, 242.

67. *Ibid.*

68. *Ibid.*, 244.

69. *Ibid.*

70. Barrier Free Environments, "Capsule History of the Firm," 1991, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.; Barrier-Free Environments, pamphlet produced for the North Carolina Department of Insurance on state laws for persons with disabilities, ca. mid-1970s, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

71. Barrier Free Environments, "Design for Disability," pamphlet, ca. 1989, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

72. Barrier Free Environments, "Mobile Homes: Alternate Housing for the Handicapped," pamphlet produced for the HUD Office of Policy Development and Research, 1976, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.; Barrier Free Environments, *Group Homes: The Design of Accessible HUD 202 Small Group Homes* (Washington, D.C.: Department of Housing and Urban Development, 1990).

73. Elizabeth Geimer, "A Top Job for Lockhart Mace," *Fayetteville Observer*, September 19, 1977, 18; Rebecca Angell, "Her Goal: Helping the Handicapped Live as Others Do," *Winston-Salem Journal*, September 27, 1977, 8.

74. "Lockhart Follin-Mace, Advocate for Disabled," *Raleigh News & Observer*, November 28, 1991.

75. Barrier Free Environments, "Mobile Homes: 504 Technical Assistance," pamphlet, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

76. National Commission on Architectural Barriers to Rehabilitation of the Handicapped, *Design for All Americans*, 9.

77. On the spatial contexts of scientific knowledge production, see David Livingstone, *Putting Science in Its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003). On the "spatial turn" in the history of science, and the humanities more generally, see Beat Kümin and Cornelia Osborne, "At Home and in the Workplace: A Historical Introduction to the 'Spatial Turn,'" *History and Theory* 52, no. 3 (2013): 305–18. On science as shared and coproduced knowledge, see Helen Longino, *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry* (Princeton, N.J.: Princeton University Press, 1990).

78. American Institute of Architects, "Barrier-Free Architecture," 48.

79. Jeffers, "Barrier-Free Design," 46–47; Frank Laski, "Civil Rights Victories for the Handicapped, Part I," *Social and Rehabilitation Record* 1, no. 6 (1975): 25–32; Mary E. Osman, "Barrier-Free Architecture: Yesterday's Special Design Becomes Tomorrow's Standard," *AIA Journal* 63, no. 3 (1975): 40–44; Michelle Morgan, "Beyond Disability: A Broader Definition of Architectural Barriers," *AIA Journal* 65, no. 5 (1976): 50–53.

80. Jeffers, "Barrier-Free Design," 53–55.

81. *Ibid.*, 62.

82. *Ibid.*, 55, 60–62.

83. The legal literature on the Americans with Disabilities Act has made a similar argument that the narrow definition of disability (as a legally knowable object) limited the efficacy of the ADA's protections, particularly in the courts. See Ani Satz, "Disability, Vulnerability, and the Limits of Anti-Discrimination," *Washington Law Review* 83, no. 4 (2008): 513–68; Samuel Bagenstos, "The Future of Disability Law," *Yale Law Journal* 114, no. 1 (2004): 1–84.

84. Lifchez, *Rethinking Architecture*, 39.

85. U.S. Architectural and Transportation Barriers Compliance Board, *UFAS Retrofit Manual* (Raleigh, N.C.: Barrier Free Environments, 1991), 8.

86. The center was established as a nonprofit organization in 1974 and was to serve as a clearing house for information by eleven "major design, rehabilitation, and disability organizations." See National Center for a Barrier Free Environment, *Technical Assistance Network Newsletter* 9 (1981), Eric Dibner papers, BANC MSS 99/186 c, Bancroft Library, University of California, Berkeley; National Center for a Barrier Free Environment, *Opening Doors: A Handbook on Making*

*Facilities Accessible to Handicapped People* (Washington, D.C.: National Center for a Barrier Free Environment, 1978). Ruth Hall Lusher, a disabled architect and gerontologist whose work on compliance issues was groundbreaking and who worked closely with Mace, began working at the NCBFE in 1982. Elaine Ostroff, Mark Limont, and Daniel G. Hunter, "Ruth Lusher," in Elaine Ostroff, Mark Limont, and Daniel G. Hunter, *Building a World Fit for People: Designers with Disabilities at Work* (Boston: Adaptive Environments Center, 2002), 77–80.

87. Selwyn Goldsmith, "The Ideology of Designing for the Disabled" (panel presentation, Proceedings of EDRA14 conference, Lincoln, Neb., January 1983), 198–214.

88. Susan Hammerman and Barbara Duncan, eds., "Report of the United Nations Expert Group Meeting on Barrier-Free Design, June 3–8, 1974, United Nations Secretariat, New York," in *Access to the Environment*, vol. 3 (London: Forgotten Books, 2013), 396.

89. *Ibid.*, 389–90.

90. *Ibid.*, 390.

91. *Ibid.*, 412.

92. *Ibid.*

93. *Ibid.*, 419.

94. *Ibid.* On histories of the ISA, see Liat Ben-Moshe and Justin Powell, "Sign of Our Times: Revis(it)ing the International Symbol of Access," *Disability and Society* 22, no. 5 (2007): 489–505; Guffey, "The Scandinavian Roots of the International Symbol of Access," *Design and Culture* 7, no. 3 (2015): 357–76.

95. Ronald Mace, "Architectural Accessibility," in *White House Conference on Handicapped Individuals*, vol. 1, *Awareness Papers* (Washington, D.C.: Government Printing Office, 1977), 160–61.

96. Dean Phillips, "Opening Plenary Session," in *Proceedings of National Conference on Housing and the Handicapped*, ed. Eileen Lavine (Houston, Tex.: Goodwill Industries of America, 1974), 14.

97. Paraphrased in "Summary and Recommendations," in Lavine, *Proceedings of National Conference on Housing and the Handicapped*, 11. See also Edward Noakes, "What Is the Problem? Whose Problem Is It? How Widespread Is It?," in Lavine, *Proceedings of National Conference on Housing and the Handicapped*, 15–17.

98. "Summary and Recommendations," 11.

99. *Ibid.*, 12.

100. *Ibid.*, 11–12.

101. "Discussion Groups," in Lavine, *Proceedings of National Conference on Housing and the Handicapped*, 10.

102. Edward Steinfeld, "Developing Standards for Accessibility," in *Barrier-Free Environments*, ed. Michael Bednar (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1977), 81.

103. Donna Shalala, "Foreword," in Edward Steinfeld, Steven Schroeder, and Marilyn Bishop, *Accessible Buildings for People with Walking and Reaching Limitations* (Washington, D.C.: U.S. Department of Housing and Urban Development, Office of Policy and Development Research, 1979), i.

104. Steinfeld, Schroeder, and Bishop, *Accessible Buildings*.

105. Edward Steinfeld, Jonathan White, and Danise R. Levine, *Inclusive Housing: A Pattern Book; Design for Diversity and Equality* (New York: W. W. Norton, 2010), 17–18.

106. John T. McConville, "Anthropometry in Sizing and Design," in *Anthropometric Source Book*, vol. 3 (Washington, D.C.: National Aeronautics and Space Administration, Scientific and Technical Information Office, 1978), 3.



107. Ibid., 5.
108. Steinfeld, Schroeder, and Bishop, *Accessible Buildings*, 9.
109. Steinfeld, Schroeder, and Bishop, *Accessible Buildings*, 23.
110. Steinfeld, White, and Levine, *Inclusive Housing*, 17–18.
111. Wilder, *A Laboratory Manual of Anthropometry*, 8–9.
112. Steinfeld et al., *Access to the Built Environment*, 3.
113. Ibid.
114. For instance, see its role in an overview of the practice and theory of evidence-based design in Moore and Geboy, “The Question of Evidence.”
115. Steinfeld, “Developing Standards for Accessibility,” 86.
116. Steinfeld wrote in 1977 that the lack of evidence-based standards was a “significant issue” determining the “validity of technical criteria” for accessibility. Steinfeld, “Developing Standards for Accessibility,” 85.
117. Steinfeld et al., *Access to the Built Environment*.
118. Ibid., 140.
119. Ibid., 11.
120. Steinfeld, “Developing Standards for Accessibility,” 85. See chapter 1 for a discussion of Freese’s drawings.
121. Edmund Leonard, “The Handicapped Building,” *Rehabilitation Literature* 39, no. 9 (1978): 266.
122. Ibid., 267.
123. Lynn Catanese, “Thomas Lamb, Marc Harrison, Richard Hollerith and the Origins of Universal Design,” *Journal of Design History* 25, no. 2 (2012): 206–17.
124. Williamson, “Getting a Grip,” 223.
125. James Mueller, *Designing for Functional Limitations* (Washington, D.C.: George Washington University Rehabilitation Research and Training Center, Job Development Laboratory, 1979); K. Mallik, S. Yuspeh, and J. Mueller, eds., *Comprehensive Vocational Rehabilitation for Severely Disabled Persons* (Washington, D.C.: George Washington University Medical Center, Job Development Laboratory, 1975).
126. James Mueller, “Design Criteria and Functional Aids,” in Mallik, Yuspeh, and Mueller, *Comprehensive Vocational Rehabilitation for Severely Disabled Persons*, 117.
127. James Mueller, “Letters: Experience Proves Designers Can Aid the Handicapped,” *Industrial Design* 24, no. 3 (1977): 1.
128. Ibid.
129. See, for example, Lifchez and Winslow, *Design for Independent Living*, 150; see also chapter 3.
130. Jeffers, “Barrier-Free Design,” 44.
131. Ibid.
132. Lifchez and Winslow, *Design for Independent Living*, 150.
133. Bednar, *Barrier-Free Environments*, 3.
134. Gerben DeJong and Raymond Lifchez, “Physical Disability and Public Policy,” *Scientific American* 248, no. 6 (1983): 40–49.
135. Nugent, “Founder,” 156–57; Ostroff, Limont, and Hunter, *Building a World Fit for People*, 15.
136. Ostroff, Limont, and Hunter, *Building a World Fit for People*, 15. See also Nora Richter Greer, “The State of the Art of Design for Accessibility,” *Architecture* 76, no. 1 (1987): 58.

137. Mace, "Architectural Accessibility," 147–64.
138. Steinfeld, "Developing Standards for Accessibility," 81–82. See also Edward Steinfeld, James Duncan, and Paul Cardell, "Toward a Responsive Environment: The Psychosocial Effects of Inaccessibility," in *Barrier-Free Environments*, ed. Michael Bednar (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1977), 7–16.
139. Ronald Mace, quoted in Don Bedwell, "New Buildings Must Consider the Handicapped," *Charlotte Observer*, June 3, 1977, 7B.
140. Mace, "Architectural Accessibility," 153.
141. *Ibid.*, 154.
142. *Ibid.*, 156.
143. *Ibid.*, 156.
144. Federal Highway Administration, *Designing Sidewalks and Trails for Access* (Washington, D.C.: U.S. Department of Transportation, 1999), 1–2.
145. Ronald Mace, letter to Hale Zukas, September 9, 1980, Eric Dibner Papers, BANC MSS 99/186 c, Bancroft Library, University of California, Berkeley.
146. *Ibid.*
147. Steinfeld was commissioned to study how people with multiple disabilities experience design. Researchers at the Georgia Institute of Technology gathered data about surface treatments and textures on curb cuts. Access American, information from the United States Architectural Barriers Compliance Board, Washington, D.C., Sept./Oct. 1982, 1–2, Eric Dibner Papers, BANC MSS 99/186 c, Bancroft Library, University of California, Berkeley.
148. United States Architectural and Transportation Barriers Compliance Board, *UFAS Retrofit Manual*, 9.
149. My narrative here draws from Mace, "Architectural Accessibility," 40–47.
150. *Ibid.*, 40.
151. Mace, quoted in Yoshihiko Kawauchi, *Universal Design: A Reconsideration of Barrier-Free* (Boston: Institute for Human Centered Design, 2010), 6.
152. Barrier Free Environments, "Technical Proposal: Provide Section 504 Training and Technical Assistance to Handicapped Persons and Their Parents in the Northeastern United States," submitted to the Department of Education, December 30, 1980, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.; Joseph Hafery, letter to Ronald Mace, March 28, 1991, Ronald L. Mace Papers. On the involvement of disabled people in the 504 training process, see O'Toole, *Faded Scars*, 68–73.
153. Mary Lou Breslin, "Cofounder and Director of the Disability Rights Education and Defense Fund, Movement Strategist," an oral history conducted in 1996–98 by Susan O'Hara (Oral History Center, Bancroft Library, University of California, Berkeley, 2000), 259–60, 304.
154. National Center for a Barrier Free Environment, "Cooperative Future in Barrier Free Design," November 6–7, 1980, Eric Dibner Papers, BANC MSS 99/186 c, Carton 1, Bancroft Library, University of California, Berkeley.
155. *Ibid.*
156. *Ibid.*
157. Conference Proceedings, "Designed Environments for All People," United Nations Headquarters, New York City, January 22–24, 192, Eric Dibner papers, BANC MSS 99/186 c, Carton 1, Bancroft Library, University of California, Berkeley.
158. *Pennhurst State School v. Halderman* (1981).

159. Elaine Ostroff and Daniel Iacofano, "Teaching Design for All People: The State of the Art," Design Faculty Seminar, Adaptive Environments Center, Boston, Mass., April 1–3, 1982, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

160. *Ibid.*, 11.

161. *Ibid.*

162. *Ibid.*

## 6. Barrier Work

1. Mace, "Universal Design," 147.

2. Thomas Gieryn, "Boundary Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review* 48, no. 6 (1983): 781–95.

3. Karen Barad, "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter," *Signs: Journal of Women in Culture and Society* 28, no. 3 (2003): 815.

4. Mace and Perlman met at a benefit concert hosted by DREDF in 1984. Invitation to "An Evening with Itzhak Perlman," October 1, 1984, courtesy of Joy Weeber. Like Mace, Perlman was also disabled due to childhood polio, and used crutches and a wheelchair to navigate his environment. See Carol Vogel, "Adapting a House for Itzhak Perlman," *New York Times*, February 25, 1982, C8.

5. Based on his conversations with Charles Goldman, general counsel of the Access Board, in 1982, it appears that Pei understood that meaningful access required going beyond the codes. Meeting the minimal standards, however, was still difficult to navigate. See Charles Goldman, "Architectural Barriers: A Perspective in Progress," *Western New England Law Review* 5, no. 3 (1983): 465.

6. What Perlman or Pei meant by "accessible escalator" is unclear. Curiously, the Javits Center's building rules note, "All large and heavy equipment should be transported using the freight elevator. No equipment may be transported on escalators. This includes items such as easels, chairs, tables, wheelchairs, baby carriages, and other similar devices." Javits Center, "Building Rules," <http://www.javitscenter.com/exhibit/building-rules/>.

7. Mace's strategy is described in Elaine Ostroff, letter to John Cary, September 9, 2005, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

8. Lifchez and Winslow, *Design for Independent Living*, 150.

9. Hayward, "'Good Design Is Largely a Matter of Common Sense,'" 222.

10. Doggett, Mace, Marchant, Tolson, and Thompson, "Housing Environmental Research," 183.

11. Mace, "Universal Design," 152.

12. During this period, Mace was married to Lockhart Follin-Mace, a disabled woman and wheelchair user who was involved in antiracist, feminist, and disability activism. Steven Litt, "Breaking Down Barriers," 3D. Although neither discussed it, Follin-Mace's influence on the article and on Mace's broader work (at least until her death in 1991) is more than likely.

13. Mace, "Universal Design," 152.

14. *Ibid.*, 148.

15. *Ibid.*

16. Ibid.
17. Ibid., 147.
18. Ellen Samuels, *Fantasies of Identification: Disability, Gender, and Race* (New York: New York University Press, 2014), 9.
19. Ronald Mace, "Universal Design," 148, 150.
20. Ibid., 148–49.
21. Ibid., 150.
22. Ibid., 151, emphasis added.
23. Ibid., 148.
24. Ibid., 150.
25. Bednar, *Barrier-Free Environments*, 3.
26. Ruth Lusher and Ronald Mace, "Design for Physical and Mental Disabilities," in *Encyclopedia of Architecture: Design Engineering and Construction*, ed. Joseph A. Wilkes and Robert T. Packard (New York: John Wiley and Sons, 1989), 755.
27. Lynn Nesmith, "Designing for 'Special Populations,'" *Architecture* 76, no. 1 (1987): 62; James J. Pirkl, "Transgenerational Design: An Instructional Project to Prepare Designers," *Innovation: The Journal of the Industrial Designers Society of America* (Summer 1987): 4–5.
28. Mitchell and Snyder, *Cultural Locations of Disability*, 10.
29. Pullin, *Design Meets Disability*, 93.
30. Kafer, *Feminist, Queer, Crip*, 4.
31. Mace, "Universal Design," 147.
32. "Visitability: Becoming a National Trend?," *Ragged Edge Online*, January/February 2003, <http://www.raggededgemagazine.com/0103/visitability.html>; "Concrete Change: An Advocate for Visitability," *Universal Design Newsletter* 5, no. 3 (2000): 9–10.
33. Eleanor Smith, "Advocate for Accessible Housing," oral history conducted by Laura Hershey in 2008 (Oral History Center, Bancroft Library, University of California, Berkeley, 2011), 88–89.
34. Katherine Ott, "Ruth Lusher," in *Encyclopedia of American Disability History*, ed. Susan Burch (New York: Facts on File, 2009), 581; Department of Housing and Urban Development, *Universal Design: Housing for the Lifespan of All People* (Washington, D.C.: U.S. Department of Housing and Urban Development, 1988), reprinted in 2000 with updates by the Center for Universal Design (citations are to the 2000 reprint); Ostroff, Limont, and Hunter, "Ruth Lusher." Mace and Lusher also coauthored housing standards together a year before the publication of Mace's "Universal Design." See Ronald Mace and Ruth Hall Phillips, *ECHO Housing: Recommended Construction and Installation Standards* (Washington, D.C.: American Association of Retired Persons, 1984); Ruth Lusher, letter to Ron Mace, June 5, 1987, courtesy of Joy Weeber.
35. Breslin, "Cofounder and Director of the Disability Rights Education and Defense Fund," 237.
36. Ibid., 236–37.
37. Barrier Free Environments, *Accessible Housing: A Manual on North Carolina's Building Code Requirements for Accessible Housing* (Raleigh: North Carolina Department of Insurance, 1980).
38. Williamson, "Getting a Grip," 221.
39. Center for Universal Design, *Universal Design*, 6.
40. Ronald Mace, Tub Seat Design, 1982, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

41. The Honeywell “Easy-to-See” model is a product of these redesigns.
42. Center for Universal Design, “CUD Show and Tell,” ca. July 1994, courtesy of Joy Weeber.
43. Center for Accessible Housing, “Center for Accessible Housing Thermostat Project,” 1993, from the private collection of Joy Weeber; Center for Accessible Housing, “CAH Management Meeting Minutes,” 1995, from the private collection of Joy Weeber.
44. The historical details I present here are arranged from my archival research from Mace’s personal files in Joy Weeber’s private collection, as well as from communications with many of the people I mention here. The CAH’s collaborators included James Mueller, Elaine Ostroff, John Salmen, Bettye Rose Connell, Mike Jones, Jon Sanford, Leslie Young, and Richard Duncan. See also James Mueller, “Toward Universal Design: An Ongoing Project on the Ergonomics of Disability,” *American Rehabilitation* 16, no. 2 (1990); Center for Affordable Housing, “CAH Meeting Minutes,” 1995, from the private collection of Joy Weeber; Lucy Harber, letter to Catherine Shaw of the American Institute of Architects Professional Development Department, 1991, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.
45. James Leahy, “Supply Push Program: Transferring New, Useful, and Innovative Products to the Marketplace through a Supply Push Approach,” *Tech Transfer RERC* 6, no. 2 (2004): 11–12.
46. Arthur Jampolsky, letter to Ronald Mace, January 20, 1994, from the private collection of Joy Weeber.
47. Ibid.
48. Although unbuilt in his lifetime, the Universal Thermostat marks Mace’s experiments with more conspicuously showing access features, a strategy that would later manifest in “Principles 2.0.”
49. Mace, “Universal Design,” 152.
50. Michael Cala, “House Retrofits That Make It Easier for the Handicapped,” *Home Mechanics*, March 1985, 90, 86.
51. Elizabeth Schmidt Ringwald, “On the Eve of Universal Design,” *Home* 34, no. 10 (1988): 104.
52. Patricia Leigh Brown, “Designs Take Heed of Human Frailty,” *New York Times*, April 14, 1988, C1; Patricia Leigh Brown, “For the Aging and Disabled, Products They Can Use,” *New York Times*, April 21, 1988, C1.
53. Yoshihiko Kawauchi, “Universal Design and Legal Advocacy for People with Disabilities in Japan,” an oral history conducted by Mary Lou Breslin in 2002 and published in *Architectural Accessibility and Disability Rights in Berkeley and Japan* (Berkeley: Oral History Office, Bancroft Library, University of California, 2004), 23–24. The results were published in Kawauchi, *Universal Design*, the book that came out of this research.
54. Smith, “Advocate for Accessible Housing,” 86; Kawauchi, “Universal Design and Legal Advocacy for People with Disabilities in Japan,” 25.
55. Harding, *Whose Science? Whose Knowledge?*, 10. Social movement scholars studying the disability movement have often focused on the movement’s relationship to policy. See Jerry Alan Winter, “The Development of the Disability Rights Movement as a Social Problem Solver,” *Disability Studies Quarterly* 23, no. 1 (2003): 33–61.
56. Janet Reno, “Enforcing the ADA,” Tenth Anniversary Status Report from the Department of Justice, Washington, D.C., 2000, <http://www.ada.gov/pubs/10thrpt.htm>.



57. Ed Pell, "Universal Design: One in Eight Americans Is over 65," *Kitchen and Bath Business*, September 1990, 40–41; Norman Remich, "Universal Design," *Appliance Manufacturer*, July 1992, 50–52.

58. AIA Colorado Field Report, "Caudill, Mace, and Church Selected as Barrier Free Design Awards Program Jurors," 1990, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

59. "1990 Colorado Universal Design Awards Program," Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

60. D. W. Calmenson, "Accessible for All: Universal Design by Ron Mace," *Interiors and Sources* 8, no. 17 (1991): 28–31.

61. Mace, "Architectural Accessibility," 154.

62. See Chad Nilep, "'Code Switching' in Sociocultural Linguistics," *Colorado Research in Linguistics* 19, no. 1 (2006): 1–22.

63. Center for Accessible Housing, "Definitions: Accessible, Adaptable and Universal Design," fact sheet, North Carolina State University, Raleigh, 1991, from the private collection of Joy Weeber; Edie Lee Cohen, "Student Work: A Portfolio of Universal Design," *Interior Design* 63, no. 11 (1992): 98–101.

64. Ronald Mace, "Universal Design Leadership Initiatives Report," September 12–13, 1990, 7, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

65. *Ibid.*, 4.

66. The CAH and Adaptive Environments Center continued developing resources for code compliance. Center for Accessible Housing, "Definitions"; Adaptive Environments Center, *Readily Achievable Checklist: A Survey for Accessibility*, ADA Access Facts Series (Boston: Adaptive Environments Center, 1991); Adaptive Environments Center, *Achieving Physical and Communication Accessibility*, ADA Access Facts Series (Boston: Adaptive Environments Center, 1995).

67. Ronald L. Mace, Graeme J. Hardie, and Jaine P. Place, "Accessible Environments: Toward Universal Design," in *Design Intervention: Toward a More Humane Architecture*, ed. Wolfgang F. E. Preiser (New York: Van Nostrand Reinhold, 1991), 155–76.

68. Story, Mueller, and Mace, *The Universal Design File*, 126.

69. Mace, "Universal Design Leadership Initiatives Report," 4.

70. *Ibid.*, 8. See also Mace, "Architectural Accessibility," 55.

71. Barrier Free Environments, *UFAS Retrofit Manual* (Washington, D.C.: United States Architectural and Transportation Barriers Compliance Board, April 1991), 8; Lucy Harbor, letter to Catherine Shaw, 1991, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

72. U.S. Architectural and Transportation Barriers Compliance Board, *UFAS Retrofit Manual*, 8.

73. *Ibid.*, 8.

74. *Ibid.*, 3–4.

75. *Ibid.*, 4.

76. *Ibid.*, 27, 39, 136, 189, 2–3. Human factors and ergonomics data, no doubt through Steinfeld's influence, also appeared throughout.

77. J. S. Sandhu, "An Integrated Approach to Universal Design: Toward the Inclusion of All Ages, Cultures, and Diversity," in *Universal Design Handbook*, ed. Wolfgang F. E. Preiser and Elaine

Ostroff (New York: McGraw-Hill, 2001), 3.3–3.14; Jim Sandhu, “The Rhinoceros Syndrome: A Contrarian View of Universal Design,” in *Universal Design Handbook*, 2nd ed., ed. Wolfgang F. E. Preiser and Korydon H. Smith (New York: McGraw-Hill, 2011), 44.3–44.12; European Institute for Design and Disability, “Stockholm Declaration,” 2004, [http://dfaeurope.eu/wp-content/uploads/2014/05/stockholm-declaration\\_english.pdf](http://dfaeurope.eu/wp-content/uploads/2014/05/stockholm-declaration_english.pdf).

78. There was a long history of international barrier-free design, beginning with a 1961 conference in Stockholm. Goldsmith wrote Mace in 1993, as he was assembling his own history of the accessibility movements in Britain and the United States. He asked Mace what he thought of the idea that accessibility should be “for everyone” and how he should frame the history of this idea in his book. Goldsmith indicates that he also consulted with Tim Nugent, Edward Leonard, and Hugh Gallagher. Selwyn Goldsmith, letter to Ronald Mace, November 2, 1993, from the private collection of Joy Weeber. See also “Remove Architectural Barriers,” ca. 1960, reprinted from the *Electrical Workers’ Journal*, Official Publication of the International Brotherhood of Electrical Workers (AFL-CIO), 1–5, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution; Kawauchi, “Universal Design and Legal Advocacy for People with Disabilities in Japan,” 23–24. Kim Kullman studies Kawauchi’s engagements with global accessibility ideas in “Universalizing and Particularizing Design with Professor Kawauchi,” in *Mobilizing Design*, ed. Justin Spinney, Suzanne Reimer, and Philip Pinch (London: Routledge, forthcoming).

79. Selwyn Goldsmith, *Designing for the Disabled: The New Paradigm* (New York: Routledge Architectural Press, 1963); Kawauchi, *Universal Design*.

80. Steven Bodow, “Universal Design Conference in New York,” *Architecture* 81, no. 7 (1992): 85; “Universal Design: Access to Daily Living,” May 13–14, 1992, conference program, Ronald Mace Collection, National Museum of American History, Smithsonian Institution.

81. Barrier Free Environments, “Strategic Plan,” 1991, Ronald L. Mace Papers, MC 00260, North Carolina State University Libraries, Raleigh, N.C.

82. Ronald Mace, Elaine Ostroff, James Mueller, John Salmen, Susan Goltsman, Cynthia Leibrock, and James DiLuigi, “The Differences between Accessibility and Universal Design,” *Universal Design Newsletter* 1, no. 7 (1994): 2, 6; “Designs for the 21st Century,” *Universal Design Newsletter* 2, no. 8 (1996): 1, 4.

83. “One Step Forward, No Steps Back,” *Universal Design Newsletter* 2, no. 5 (1996): 1, 5; “Reach Out and Touch,” *Universal Design Newsletter* 2, no. 5 (1996): 5; “New Products,” *Universal Design Newsletter* 2, no. 5 (1996): 9.

84. “Accessing the Past,” *Universal Design Newsletter* 1, no. 7 (1994): 1, 10; “Recreation Guidelines,” *Universal Design Newsletter* 1, no. 7 (1994): 1, 4.

85. “ASAP Discusses Accessible Telecommunications,” *Universal Design Newsletter* 2, no. 1 (1995): 7; “Design Tips,” *Universal Design Newsletter* 2, no. 8 (1996): 8.

86. Bobrick Washroom Equipment, “Barrier-Free Washroom Guide,” 1993, 10–11, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

87. Ashley Mog, “Threads of Commonality in Transgender and Disability Studies,” *Disability Studies Quarterly* 28, no. 4 (2008), <http://dsq-sds.org/article/view/152/152>.

88. “Family Restrooms Make Mall Shopping Easier for Everyone,” *Universal Design Newsletter* 2, no. 2 (1993): 5. Mace later explained such restrooms in terms of Universal Design. See Laura Herbst, “Nobody’s Perfect,” *Popular Science*, January 1997, 64–66.

89. "Unisex Toilets under Review," *Universal Design Newsletter* 2, no. 1 (1995): 5.
90. For a history and evaluation of UD education, see Polly Welch and Stanton Jones, "Advances in Universal Design Education," in *Universal Design Handbook*, ed. Wolfgang F. E. Preiser and Elaine Ostroff (New York: McGraw-Hill, 2001), 51.3–51.24.
91. "Educators Collaborate on Universal Design," *Universal Design Newsletter* 1, no. 2 (1993): 7.
92. Polly Welch, "What Is Universal Design?," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 1–4.
93. Polly Welch and Stanton Jones, "Universal Design: An Opportunity for Critical Discourse in Design Education," in *Universal Design: 17 Ways of Thinking and Teaching*, ed. Jon Christopherson (Oslo: Husbanken, 2002), 205.
94. Charlotte Roberts and Brian Powell, "University of Southwestern Louisiana," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 181. See also Welch and Jones, "Universal Design," 193; Brad C. Grant, Paul M. Wolff, and Michael Shannon, "California Polytechnic State University," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 3.
95. "Educators Collaborate on Universal Design," *Universal Design Newsletter* 1, no. 2 (1993): 7; Welch and Jones, "Universal Design," 196.
96. Mark Chidister, Albert Rutledge, Arvid Osterberg, Robert Harvey, Fred Malven and Harlen Groe, "Iowa State University," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 15.
97. *Ibid.*, 13, 24.
98. John Salmen, "The Differences between Accessibility and Universal Design," *Universal Design Newsletter* 1, no. 7 (1994): 2.
99. Brent Porter, "Pratt Institute," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 99.
100. Salmen, "The Differences between Accessibility and Universal Design," 2.
101. Welch and Jones, "Universal Design," 195–96; Ostroff, "Mining Our Natural Resources," 33–35. See also Lifchez, "Educator in Architectural Access," 89–90.
102. Michael Shannon, "California Polytechnic State University," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 9.
103. Welch and Jones, "Universal Design," 212.
104. Edward Steinfeld, Jason Hagin, Gary Day, Theodore Lowne, Todd Marsh, Ole Mouritsen, and Abir Mullick, "SUNY Buffalo," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 119.
105. Abir Mullick, "SUNY Buffalo," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 133.
106. Edward Steinfeld, "SUNY Buffalo," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 131.
107. Brad C. Grant, Paul M. Wolff, and Michael Shannon, "California Polytechnic State University," in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 4.
108. As disability theorist Tobin Siebers puts it, disability simulations reinforce an association of disability with pity or lack and work against an intersectional understanding of disability

because “the practice of peeling off minority identities from people to determine their place in the hierarchy of oppression is revealed to degrade all minority identities by giving a one-dimensional view of them. It also fails to understand the ways in which different identities constitute one another.” Tobin Siebers, *Disability Theory* (Ann Arbor: University of Michigan Press, 2008), 28–29. See also Valerie Brew-Parish, “The Wrong Message,” *Ragged Edge*, March/April 1997, <http://www.raggededgemagazine.com/archive/aware.htm>; Priya Lavlani and Alicia Broderick, “Institutionalized Ableism and the Misguided ‘Disability Awareness Day’: Transformative Pedagogies for Teacher Education,” *Equity and Excellence in Education* 46, no. 4 (2013): 468–83; Michelle Nario-Redmond, Dobromir Gospodinov, and Angela Cobb, “Crip for a Day: The Unintended Negative Consequences of Disability Simulations,” *Rehabilitation Psychology*, March 2017, 1–10.

109. Mace, “Universal Design Leadership Initiatives Report,” 8–9.

110. Bernie Dahl, “Purdue University,” in *Strategies for Teaching Universal Design*, ed. Polly Welch (Boston: Adaptive Environments Center and MIG Communications, 1995), 109.

111. Ostroff evaluated this approach favorably, comparing it to a simulation approach by saying that it encouraged interaction and empathy. Elaine Ostroff, letter to Brent Porter, May 5, 1994, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

112. John Salmen, “Valuing People with Disabilities,” *Universal Design Newsletter* 2, no. 7 (1996): 2.

113. Edward Steinfeld, Jason Hagin, Gary Day, Theodore Lownie, Todd Marsh, Ole Mouritsen, and Abir Mullick, “Studio Education through Universal Design,” Department of Architecture, SUNY at Buffalo, Universal Design Education Project Report, May 17, 1994, 2, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

114. *Ibid.*

115. “UDEP Update,” *Universal Design Newsletter* 2, no. 1 (1995): 8.

116. “Designing the Future: Toward Universal Design,” *Universal Design Newsletter* 1, no. 7 (1994): 6.

117. Brad Grant, quoted in transcript of symposium, “Designing the Future: Toward Universal Design,” World Trade Center, Boston, November 17, 1994, 45, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

118. John Salmen, quoted in transcript of symposium, “Designing the Future,” 50.

119. Ronald Mace, quoted in transcript of symposium, “Designing the Future,” 61.

120. *Ibid.*, 62–63.

121. *Ibid.*, 63.

122. The title of this section refers to Michelle Murphy, “The Girl: Mergers of Feminism and Finance in Neoliberal Times,” *Scholar and Feminist Online* 11.1–11.2 (Fall 2012/Spring 2013), <http://sfonline.barnard.edu/gender-justice-and-neoliberal-transformations/the-girl-mergers-of-feminism-and-finance-in-neoliberal-times/>. Neoliberalism describes late capitalist ideologies, which rely upon the niche markets to address social problems, often by enfolding (rather than normalizing) difference.

123. My use of the terms “marketing” and “branding” here is quite literal. For a more conceptual exploration of disability as a product of “branding” (that is, as a construction of conceptual and material signification), see Elizabeth Depoy and Stephen Gilson, *Branding and Designing Disability: Reconceptualising Disability Studies* (London: Routledge, 2014). Depoy and Gilson use the

term “branding” much as I use “material-epistemic,” that is, not simply as a semiotic practice but also as a corporeal and material one. Whereas Depoy and Gilson’s projects of redesigning and rebranding disability focus on seamlessness and elegance as features of integrative design outcomes (242–51), my focus here is on parsing the histories and politics of disability marketing particularly in terms of the meaning these practices produce for Universal Design.

124. Pell, “Universal Design,” 40.

125. Linda Broderson, “User-Friendly Design: The New Horizon,” *Arthritis Today*, May–June 1989, 16–21.

126. Pell, “Universal Design,” 41. See also Roberta Null and K. F. Cherry, *Universal Design: Creative Solutions for ADA Compliance* (Belmont, Calif.: Professional Publications, 1996); Steven Winter and Associates, *Accessible Housing by Design: Universal Design Principles in Practice* (New York: McGraw-Hill, 1997); Wilkoff, *Practicing Universal Design*.

127. Access Expo, press release, ca. 1991, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.; Access Expo, “Access Expo Advisory Board Announced,” press release, January 30, 1991, Ronald L. Mace Papers.

128. Access Expo, pamphlet, ca. 1991, 1, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

129. *Ibid.*, 4.

130. DREDF, “Mainstreet—The ‘Readily Achievable Project,’” documentary guide, 1991–92, 1–2, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

131. See Williamson, “Getting a Grip.”

132. Remich, “Universal Design,” 50.

133. Historians of neoliberalism locate the rise of the neoliberal state in the late 1970s. See David Harvey, *A Brief History of Neoliberalism* (Oxford: Oxford University Press, 2005), 9.

134. Center for Public Communication, *Whirlpool Home Life Issues Report: The American Home as Service Environment* (New York: Center for Public Communication, 1991), Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C. The report cited issues such as household demographic diversity, affordability, and functionality as posing challenges and creating opportunities for more functional homes.

135. Ronald Mace, “Comments on Whirlpool Home Life Issues Report,” April 8, 1991, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh, N.C.

136. On “human capital,” see Murphy, “The Girl.”

137. Mervyn Kaufman, “Universal Design in Focus,” *Metropolis* magazine, November 1992, 39–53; “Access: Special Universal Design Report,” *Metropolis* magazine, November 1992: 39–67; Calmenson, “Accessible for All”; Cohen, “Student Work.”

138. Joyce Krisko, “Universal Design: Accessible to Everyone,” *St. Louis Park Sun Sailor*, July 7, 1993; Jo Werne, “A Barrier-Free Design for Living,” *Chicago Tribune*, May 12, 1992; Patricia Dane Rogers, “Getting a Handle on Good Design: Catalogues; New York’s Museum of Modern Art Assembles a Collection of Tools that Make Life Easier for People with Disabilities,” *Washington Post*, November 8, 1992.

139. Kate Rorbach, letter to Ronald Mace, February 12, 1991, Ronald L. Mace Papers, MC 00260, Special Collections Research Center, North Carolina State University Libraries, Raleigh,



N.C.; Center for Public Communication, *Whirlpool Home Life Issues Report*; Whirlpool, *The Less Challenging Home* (Benton Harbor, Mich.: Whirlpool Corp., ca. 1992); Jane Lehman, "Universal Design for Easier Living," *Washington Post*, December 30, 1995, E1; Cynthia Ingols and James Mueller, *Leviton Manufacturing Company, Inc.: Universal Design Marketing Strategy* (Boston: Design Management Institute Press, 1997).

140. James Mueller, "'Real' Consumers Just Aren't Normal," *Journal of Consumer Marketing* 7, no. 1 (1990): 51–53; James Mueller, "Toward Universal Design: An Ongoing Project on the Ergonomics of Disability," *American Rehabilitation* 16, no. 2 (1990): 15–33.

141. Mueller, "Toward Universal Design," 15–16.

142. *Ibid.*, 17–18.

143. Mueller, "'Real' Consumers," 51; Mueller, "Toward Universal Design," 16.

144. James Mueller, "If You Can't Use It, It's Just Art: The Case for Universal Design," *Ageing International* 22, no. 1 (1995): 19–23.

145. Ingols and Mueller, *Leviton Manufacturing Company, Inc.*, 9.

146. The reasons for this transition are described in chapter 7.

147. *Ibid.*, 4.

148. *Ibid.*, 13.

149. *Ibid.*, 11.

150. My framing of post-disability ideologies builds on critical race theory's challenges to "post-racial" ideologies, which insist that racism is no longer a significant system of oppression because civil rights laws have ended material manifestations such as segregation. In the aftermath of the civil rights era, as Michelle Alexander has shown, race-neutral policies merely hide racial inequality within new institutions of mass incarceration. See Alexander, *The New Jim Crow*. For an earlier version of this argument, see Hamraie, "Universal Design and the Problem of 'Post-Disability' Ideology."

## 7. Entangled Principles

1. Denise Levine, *Universal Design New York* (Buffalo, N.Y.: Center for Inclusive Design and Environmental Access, 2013), 8.

2. *Ibid.* These ideas reflect arguments that Mace himself began to make in the late 1990s.

3. Josh Safdie, quoted in Szenasy, "Accessibility Watch."

4. *Ibid.*

5. Kafer, *Feminist, Queer, Crip*, 83.

6. John Salmen, "Defining the Universe," *Universal Design Newsletter* 4, no. 3 (1999): 2.

7. Center for Universal Design, "The Principles of Universal Design," Version 2.0.

8. These proliferations were, for the most part, post-1997 phenomena. On Universal Design in education, see Frank G. Bowe, *Universal Design in Education* (Westport, Conn.: Bergin and Gavey, 2000). In feminist theory and philosophy, see Ackerly, *Universal Human Rights in a World of Difference*; Laura Davy, "Philosophical Inclusive Design: Intellectual Disability and the Limits of Individual Autonomy in Moral and Political Theory," *Hypatia* 30, no. 1 (2015): 132. In queer theory, see Monika Myers and Jason Crockett, "Manifesto for Queer Universal Design," *SQS: Journal of Queer Studies in Finland* 6, nos. 1–2 (2012): 58–64. In disability studies, references to Universal Design and its underlying theories are frequent, particularly in reference to the social model of disability. See Susan Wendell, *The Rejected Body: Feminist Philosophical Reflections on Disability* (New York: Routledge, 1996), 55; Lennard Davis, *Bending over Backwards: Disability*,

*Dismodernism, and Other Difficult Positions* (New York: New York University Press, 2002), 31; Anita Silvers, "Formal Justice," in *Disability, Difference, and Discrimination*, ed. Anita Silvers, David Wasserman, and Mary Mahowald (Oxford: Rowman and Littlefield, 1998), 129; Michael Davidson, "Universal Design: The Work of Disability in an Age of Globalization," in *The Disability Studies Reader*, 2nd ed., ed. Lennard J. Davis (New York: Routledge, 2006), 117–18.

9. Barad, *Meeting the Universe Halfway*, 817.

10. *Ibid.*, 30.

11. My narrative draws on several accounts of the process of writing the "Principles." Molly F. Story, one of the authors, offers a few accounts of the process. Molly F. Story, "Is It Universal? Seven Defining Criteria," *Innovation* (Spring 1997): 29–32; Molly Follette Story, "Maximizing Usability: The Principles of Universal Design," *Assistive Technology: The Official Journal of RESNA* 10, no. 1 (1998): 4–12; Story, Mueller, and Mace, *The Universal Design File*, 32–33; Molly F. Story, "Principles of Universal Design," in *Universal Design Handbook*, 2nd ed., ed. Wolfgang F. E. Preiser and Korydon H. Smith (New York: McGraw-Hill, 2011), 4.3; Molly F. Story, "Principles of Universal Design," in *Universal Design Handbook*, ed. Wolfgang F. E. Preiser and Elaine Ostroff (New York: McGraw-Hill, 2001), 10.4. I cross-referenced these accounts with interviews and correspondence with several of the authors. James Mueller, interview with author, October 10, 2011, Atlanta, Ga.; Abir Mullick, interview with author, October 21, 2011, Atlanta, Ga.; Edward Steinfeld, interview with author, October 4, 2011, Buffalo, N.Y.; Jon Sanford, interview with author, June 5, 2011, Atlanta, Ga.; Elaine Ostroff, interview with author, August 11, 2016, Westport, Conn.; Mike Jones, e-mail to author, September 14, 2011. I also cross-referenced these events to the extent available with print documents from the collections of Mace's work in his private home (from the personal collection of Joy Weeber), in collections of Mace's materials at the National Museum of American History (from the personal collection of Katherine Ott), and at the Special Collections of North Carolina State University. All characterizations of these events that are not my own appear in quotation marks.

12. For a detailed history of these cases, see Adam A. Milani, "'Oh Say Can I See—And Who Do I Sue if I Can't?': Wheelchair Users, Sightlines over Standing Spectators, and Architect Liability under the Americans with Disabilities Act," *Florida Law Review* 3 (2000): 523–99.

13. Sanjoy Mazumdar and Gilbert Geis, "Architects, the Law, and Accessibility: Architects' Approaches to the ADA in Arenas," *Journal of Architectural and Planning Research* 20, no. 3 (2003): 203.

14. *Ibid.*

15. *Ibid.*, 205.

16. Department of Justice, "Memorandum of *Amicus Curiae* United States in Support of Plaintiffs' Application for a Preliminary Injunction and in Opposition to Defendants' Motion to Dismiss," United States District of Columbia Court, Civil Action No. 96-1354, 1996; Milani, "'Oh, Say, Can I See,'" 589. See also Elizabeth Savage, "Lobbyist for the Epilepsy Foundation: The Passage of the Americans with Disabilities Act," oral history conducted by Ann Lage in 2004 (Oral History Center, Bancroft Library, University of California, Berkeley, 2010).

17. Mazumdar and Geis, "Architects, the Law, and Accessibility," 206–7.

18. Center for Universal Design, "Introduction to Universal Design," *Universal Design Exemplars*, <https://design.ncsu.edu/openjournal/index.php/redlab/article/view/127/72>.

19. NIDRR is part of rehabilitation research funding that emerged after World War II to support civilians. Civilian rehabilitation research has been supported primarily through the Office of

Vocational Rehabilitation (OVR), established in 1954 under the Department of Health, Education, and Welfare. The OVR began funding research centers called Rehabilitation Research Training Centers (RRTC) in 1962 and Rehabilitation Engineering Research Centers (RERC) in 1972. Following the restructuring of federal agencies in 1979, the RRTC and RERC programs came to be funded by a new program, the NIDRR, under the Department of Education's Office of Special Education and Rehabilitation Services. In 2015 NIDRR was renamed the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) and moved to the Department of Health and Human Services.

20. Edward Steinfeld, interview with author, October 4, 2011, Buffalo, N.Y.; Greg Vanderheiden, letter to Katherine Seelman, April 28, 1998; Trace Research & Development Center, "Some Notes on Universal Design," 1998. Prior to working at NIDRR, Seelman had worked with Mace, Ostroff, and others in the late 1980s and early 1990s to expand accessible housing practices to account for D/deaf and hard-of-hearing people. Katherine Seelman, letter to Ron Mace and Graeme Hardie, July 29, 1991; Katherine Seelman, "Final Report: Housing Accessibility for Deaf and Hard of Hearing People," unpublished report submitted to the Center for Accessible Housing, July 29, 1991. All documents cited in this note are from the personal collection of Joy Weeber unless otherwise noted.

21. Center for Affordable Housing. "CAH Meeting Minutes," 1995, from the personal collection of Joy Weeber; Center for Universal Design, "Draft copy of Mission Statement," from the personal collection of Joy Weeber.

22. Story, "Maximizing Usability," 7.

23. Many others were involved with the CUD during this time. Jan Reagan, a historian, archivist, and librarian, disseminated information and developed pamphlets for the organization.

24. The Trace Center moved to the University of Maryland in August 2016.

25. Story, "Principles of Universal Design," 10.5.

26. I use the qualifier "apparently" here to indicate that I am describing the optics of this group, not necessarily their private identifications.

27. Story, "Maximizing Usability," 7.

28. Story, "Principles of Universal Design," 10.5; Story, Mueller, and Mace, *The Universal Design File*, 32.

29. Ingols and Mueller, *Leviton Manufacturing Company, Inc.*, 9.

30. Story, "Principles of Universal Design," 10.5.

31. *Ibid.*, 10.5–10.6.

32. *Ibid.*

33. Story, "Maximizing Usability," 7.

34. Center for Universal Design, "The Principles of Universal Design," Version 1.1 (12/7/95), from the personal collection of Joy Weeber.

35. John Salmen, "Evaluating Universal Design," *Universal Design Newsletter* 2, no. 5 (1996): 2.

36. *Ibid.*

37. Peter Orleans, "Comments on 'Principles of Universal Design,'" fax correspondence with Ronald Mace, March 28, 1996, from the personal collection of Joy Weeber.

38. Story, "Maximizing Usability," 10.

39. Story, "Principles of Universal Design," 10.6.

40. Dreyfuss, *The Measure of Man*, 4.

41. See chapter 6.

42. Americans with Disabilities Act (ADA), 42 U.S. Code § 12101(a)(7).
43. See Center for Universal Design, "The Principles of Universal Design," Figure I.5.
44. Simi Linton, *Claiming Disability: Knowledge and Identity* (New York: New York University Press, 1998), 14.
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47. David Harvey, *The Condition of Postmodernity: An Enquiry Into the Origins of Cultural Change* (Cambridge, Mass.: Blackwell, 1990), 145–47.
48. David Harvey, "The Right to the City," *New Left Review* 53 (September–October 2008): 31–32.
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50. Story, "Maximizing Usability," 12.
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52. World Institute on Disability, "Universal Access Project Description," 1995, World Institute on Disability Records, BANC MSS 99/148 z, Bancroft Library, University of California, Berkeley. WID was a Berkeley-based organization founded by activists Ed Roberts, Judy Heumann, and Joan Leon in the early 1980s.
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60. Center for Universal Design, “The Principles of Universal Design,” Version 2.0.

61. Mueller, interview with author, October 10, 2011.

62. Donald Norman, *The Design of Everyday Things* (1988; repr., New York: Basic Books, 2002), 188–89.

63. *Ibid.*, 2–4.

64. Story, “Maximizing Usability,” 6.

65. In this sense, Mace was adopting “flexibility” as resistance to or co-option of existing spaces, similar to strategies that Henri Lefebvre describes in *The Production of Space* (Oxford: Wiley-Blackwell, 1992), 388.

66. Norman, *The Design of Everyday Things*, 199.

67. I do not necessarily attribute these strategies and interventions to authorial intent. While I find patterns in the authors’ strategies over time, it is possible that they were unaware of these patterns. Nevertheless, my close reading reveals these patterns as possible modes of knowing-making, with strategic outcomes for accessibility advocacy.

68. See chapter 1.

69. See chapters 1, 2, and 3.

70. Rob Imrie, “Universalism, Universal Design and Equitable Access to the Built Environment,” 876.

71. Edward Steinfeld, *Hands-On Architecture*, vol. 3, part 1, *Executive Summary* (Buffalo: Department of Architecture, State University of New York, 1986), 20.

72. Edward Steinfeld, Victor Paquet, Clive D’Souza, Caroline Joseph, and Jordana Maisel, *Final Report: Anthropometry of Wheeled Mobility Project*, Report of the Center for Inclusive Design and Environmental Access for the U.S. Access Board (Buffalo, N.Y.: Center for Inclusive Design and Environmental Access, 2010). On the history of these refashioned practices, see Hamraie, “Universal Design Research as a New Materialist Practice.” More recently, Steinfeld and his colleague Jordana Maisel have also proposed new Universal Design guidelines. Edward Steinfeld and Jordana Maisel, *Universal Design: Creating Inclusive Environments* (Hoboken, N.J.: John Wiley & Sons, 2012), 88.

73. Edward Steinfeld, Clive D’Souza, and Jonathan White, “Developing Evidence-Based Standards: A Case Study in Knowledge Translation,” in *Universal Design 2014: Three Days of Creativity and Diversity* (Washington, D.C.: IOS Press, 2014), 89–98.

74. Steinfeld and Maisel, *Universal Design*, 97.

75. On Universal Design as a science, see Jordana Maisel, ed., *The State of the Science in Universal Design Research: Emerging Research and Developments* (Sharjah, UAE: Bentham Science, 2010).

76. On fat oppression, see Lori Don Levan, “Fat Bodies in Space: Controlling Fatness through Anthropometric Measurement, Corporeal Conformity, and Visual Representation,” *Fat Studies* 3, no. 2 (2014): 119–29; Erin Pritchard, “Body Size and the Built Environment: Creating an Inclusive Built Environment Using Universal Design,” *Geography Compass* 8, no. 1 (2014): 63–73. On design and size considerations related to dwarfism, see Amanda Cachia, “The Alterpodium: A Performative Design and Disability Intervention,” *Design and Culture* 8, no. 3 (2016): 1–15. Deaf-Space architecture has sought to create spatial envelopes that support sign language communication and D/deaf culture. See Hansel Bauman, “DeafSpace: An Architecture toward a More Livable



and Sustainable World,” in *Deaf Gain: Raising the Stakes for Human Diversity*, ed. H-Dirksen L. Bauman and Joseph J. Murray (Minneapolis: University of Minnesota Press, 2014), 377.

77. Ronald Mace, “Determinations of Exemplary Universal Designs,” February 6, 1996, from the personal collection of Joy Weeber.

78. Japanese aging experts and designers began connecting with Universal Design experts in the United States in the early 1990s and offered useful critiques. See Ishi Masaaki Shiraishi, “Population Aging and Universal Design: An International Look,” *Universal Design Newsletter* 2, no. 6 (1996): 2. The *Universal Design Newsletter* inaugurated an ongoing “World Update” column, written by Ostroff, in 1999. See Elaine Ostroff, “World Update,” *Universal Design Newsletter* 4, no. 3 (1999): 7.

79. Story, “Principles of Universal Design,” 10.8; Story, “Maximizing Usability,” 6.

80. Edward Steinfeld and Beth Tauke, “Universal Designing,” in *Universal Design: 17 Ways of Thinking and Teaching*, ed. Jon Christophersen (Oslo: Husbanken, 2002), 165.

81. *Ibid.*, 167.

82. John Salmen, “U.S. Accessibility Codes and Standards: Challenges for Universal Design,” in *Universal Design Handbook*, 2nd ed., ed. Wolfgang F. E. Preiser and Korydon H. Smith (New York: McGraw-Hill, 2011), 6.1.

83. Donald Norman, “Opening Remarks,” Designing for the 21st Century conference, Hofstra University, New York, June 18, 1998, 8, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

84. *Ibid.*, 13.

85. In recognition of the large community of disabled users and experts in attendance, the conference provided print materials in multiple formats and required attendees to avoid the use of scented products in order to create access for people with chemical sensitivities. Designing for the 21st Century conference program, Hofstra University, New York, June 17–21, 1998, Ronald Mace Collection, National Museum of American History, Smithsonian Institution; Roberta Null, *Universal Design: Principles and Models* (Boca Raton: CRC Press, 2014), vii.

86. Null, *Universal Design*, vii; Jim Davis, “Design for the 21st Century Starts Now,” *Ragged Edge Online*, November/December 1998, <http://www.raggededgemagazine.com/1198/a1198ft1.htm>; “Universal Design Conference, Part I,” *Universal Design Newsletter* 3, no. 8 (1998): 4–5.

87. Elaine Ostroff, “Awards Ceremony,” Designing for the 21st Century conference, Hofstra University, New York, June 19, 1998, 9–10, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

88. Molly Story and James Mueller, “Measuring Usability: The Principles of Universal Design,” in *Designing for the 21st Century: An International Conference on Universal Design of Information, Products, and Environments*, ed. J. Reagan and L. Trachtman (Raleigh, N.C.: Center for Universal Design, 1998), 126–29.

89. Edward Steinfeld, “Universal Design as Innovation,” In *Designing for the 21st Century: An International Conference on Universal Design of Information, Products, and Environments*, ed. J. Reagan and L. Trachtman (Raleigh, N.C.: Center for Universal Design, 1998), 121.

90. Ruth Lusher, “Awards Ceremony,” Designing for the 21st Century conference, Hofstra University, New York, June 19, 1998, 10–11, Elaine Ostroff Universal Design Papers, Archives Center, National Museum of American History, Smithsonian Institution.

91. Davis, “Design for the 21st Century Starts Now.”

92. Simi Linton and Rosemarie Garland-Thomson, “Disability Studies: Theoretical Underpinnings of Universal Design,” in *Designing for the 21st Century: An International Conference on*

*Universal Design of Information, Products, and Environments*, ed. J. Reagan and L. Trachtman (Raleigh, N.C.: Center for Universal Design, 1998), 50–51.

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96. John Salmen, “Saying Goodbye to Ron Mace,” *Universal Design Newsletter* 3, no. 8 (1998): 2.

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## Conclusion

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