

## Notes

### Chapter 1

1. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge, Minneapolis, Minnesota, August 1, 2007," November 14, 2008, xiii.
2. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 14–15. Video of the collapse is available at [http://minnesota.publicradio.org/collections/special/2007/bridge\\_collapse/video/](http://minnesota.publicradio.org/collections/special/2007/bridge_collapse/video/) (accessed January 4, 2019).
3. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," xiii, 117–118; Paul Levy, "4 Dead, 79 Injured, 20 Missing after Dozens of Vehicles Plummet into River," *Minneapolis Star-Tribune*, August 2, 2007, <http://www.startribune.com/4-dead-79-injured-20-missing-after-dozens-of-vehicles-plummet-into-river/11593606>.
4. This includes one of the authors (Sims), who grew up in Minneapolis and undoubtedly drove over the bridge and even canoed under it numerous times, and remembers nothing about it.
5. Gray Plant Mooty, "Investigative Report to Joint Committee to Investigate the I-35W Bridge Collapse" (May 2008), 43, [https://www.leg.state.mn.us/docs/2008/other/080513/Investigative\\_Report.pdf](https://www.leg.state.mn.us/docs/2008/other/080513/Investigative_Report.pdf).
6. Christopher R. Henke, "The Mechanics of Workplace Order: Toward a Sociology of Repair," *Berkeley Journal of Sociology* 44 (2000): 55–81. See also Stephen Graham and Nigel Thrift, "Out of Order: Understanding Repair and Maintenance," *Theory, Culture and Society* 24, no. 3 (2007): 1–25; Steven J. Jackson, "Rethinking Repair," in *Media Technologies: Essays on Communication, Materiality, and Society*, ed. Tarleton Gillespie, Pablo Boczkowski, and Kirsten Foot (Cambridge, MA: MIT Press, 2014), 221–239.
7. Oxford English Dictionary, "Repair, n.2," in *OED Online* (Oxford University Press, December 2018), <http://www.oed.com/view/Entry/162629>.

8. Emanuel A. Schegloff, Gail Jefferson, and Harvey Sacks, "The Preference for Self-Correction in the Organization of Repair for Conversation," *Language* 53, no. 2 (1977): 361–382; Emanuel A. Schegloff, "Repair after Next Turn: The Last Structurally Provided Defense of Intersubjectivity in Conversation," *American Journal of Sociology* 97, no. 5 (1992): 1295–1345; Emanuel A. Schegloff, "Third Turn Repair," in *Towards a Social Science of Language: Papers in Honor of William Labov*, ed. G. R. Guy, M. C. Feagin, D. Schiffrin, and J. Baugh (Amsterdam: John Benjamins, 1997), 31–40.
9. The widespread use of this term in science and technology studies goes back at least as far as the essays in Wiebe E. Bijker and John Law, eds., *Shaping Technology/Building Society: Studies in Sociotechnical Change* (Cambridge, MA: MIT Press, 1992). It appears occasionally in the earlier set of essays 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 J. Pinch (Cambridge, MA: MIT Press, 1987).
10. Mooty, "Investigative Report," 22.
11. Mooty, "Investigative Report," 24.
12. Mooty, "Investigative Report," 25.
13. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 49–50; Barry B. LePatner, *Too Big to Fall: America's Failing Infrastructure and the Way Forward* (New York: Foster Publishing, 2010), 9.
14. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 48.
15. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 56.
16. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 53.
17. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 54–55.
18. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 60; LePatner, *Too Big to Fall*, 15–21.
19. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 61.
20. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 23; LePatner, *Too Big to Fall*, 5.
21. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 150–151; LePatner, *Too Big to Fall*, 10.

22. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 32, 63.

23. LePatner, *Too Big to Fall*.

24. David Montgomery, "Many Bridges Found Deficient after I-35W Collapse. Here's How Minnesota Responded," *Pioneer Press/TwinCities.Com*, July 30, 2017, <https://www.twincities.com/2017/07/30/after-collapse-minnesota-fixed-deficient-bridges/>; David Schaper, "10 Years after Bridge Collapse, America Is Still Crumbling," *National Public Radio*, August 1, 2017, <https://www.npr.org/2017/08/01/540669701/10-years-after-bridge-collapse-america-is-still-crumbling>.

25. U.S. National Transportation Safety Board, "Collapse of the I-35W Highway Bridge," 153–155.

26. Judith A. Martin, "Neighborhoods Confront a Disaster Aftermath," in *The City, the River, the Bridge: Before and after the Minneapolis Bridge Collapse*, ed. Patrick Nunnally (Minneapolis: University of Minnesota Press, 2011), 57–75.

27. See the timeline at <https://www.leg.state.mn.us/lrl/guides/guides?issue=bridges> (accessed January 4, 2019) and the account in Patrick Nunnally, "Building the New Bridge: Process and Politics in City-Building," in *The City, the River, the Bridge: Before and After the Minneapolis Bridge Collapse*, ed. Patrick Nunnally (Minneapolis: University of Minnesota Press, 2011), 35–54.

28. Quoted in William H. Batt, "Infrastructure: Etymology and Import," *Journal of Professional Issues in Engineering* 110, no. 1 (1984): 2. Also see Paul N. Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems," in *Modernity and Technology*, ed. Thomas J. Misa, Philip Brey, and Andrew Feenberg (Cambridge, MA: MIT Press, 2003), 185–225.

29. Stephen J. Collier and Andrew Lakoff, "The Vulnerability of Vital Systems: How 'Critical Infrastructure' Became a Security Problem," in *The Politics of Securing the Homeland: Critical Infrastructure, Risk and Securitisation*, ed. Myriam Dunn and Kristian Soby Kristensen (London: Routledge, 2008).

30. Batt, "Infrastructure"; Ashley Carse, "Keyword: Infrastructure: How a Humble French Engineering Term Shaped the Modern World," in *Infrastructures and Social Complexity: A Companion*, ed. Penelope Harvey, Casper Bruun Jensen, and Atsuro Morita (London: Routledge, 2016), 27–39.

31. Batt, "Infrastructure"; Henry Petroski, *The Road Taken: The History and Future of America's Infrastructure* (New York: Bloomsbury, 2016), 11–20.

32. Petroski, *The Road Taken*, 20–27.

33. See the historical summary at <https://www.infrastructurereportcard.org/making-the-grade/report-card-history/> (accessed January 4, 2019).

34. For example, Susan Saulny and Jennifer Steinhauer, "Bridge Collapse Revives Issue of Road Spending," *New York Times*, August 7, 2007, <http://www.nytimes.com/2007/08/07/us/07highway.html>.

35. Emma G. Fitzsimmons, "What Trump, Clinton and Voters Agreed On: Better Infrastructure," *New York Times*, November 9, 2016.

36. Collier and Lakoff, "The Vulnerability of Vital Systems."

37. Susan Leigh Star and Karen Ruhleder, "Steps toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* 7, no. 1 (1996): 111–134; Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999); Susan Leigh Star, "The Ethnography of Infrastructure," *American Behavioral Scientist* 43, no. 3 (1999): 377–391; Stephen Graham and Simon Marvin, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition* (London: Routledge, 2001); Edwards, "Infrastructure and Modernity"; Paul N. Edwards, Steven J. Jackson, Geoffrey C. Bowker, and Cory P. Knobel, "Understanding Infrastructure: Dynamics, Tensions, and Design" (Washington, DC: National Science Foundation, January 2007), <http://www.si.umich.edu/~pne/PDF/ui.pdf>; Benjamin Sims, "Things Fall Apart: Disaster, Infrastructure, and Risk," *Social Studies of Science* 37, no. 1 (2007): 93–95; Collier and Lakoff, "The Vulnerability of Vital Systems"; Paul N. Edwards, Steven J. Jackson, Geoffrey C. Bowker, and Cory P. Knobel, "Introduction: An Agenda for Infrastructure Studies," *Journal of the Association for Information Systems* 10, no. 5 (2009): 364–374; David Ribes and Thomas A. Finholt, "The Long Now of Technology Infrastructure: Articulating Tensions in Development," *Journal of the Association for Information Systems* 10, no. 5 (2009): 375–398; Benjamin Sims, "Disoriented City: Infrastructure, Social Order, and the Police Response to Hurricane Katrina," in *Disrupted Cities: When Infrastructure Fails*, ed. Stephen Graham (Milton Park, UK: Routledge, 2010), 41–53; Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology* 42, no. 1 (2013): 327–343; Ashley Carse, *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal* (Cambridge, MA: MIT Press, 2014); Kathryn Furlong, "STS beyond the 'Modern Infrastructure Ideal': Extending Theory by Engaging with Infrastructure Challenges in the South," *Technology in Society* 38 (2014): 139–147; Sebastián Ureta, *Assembling Policy: Transantiago, Human Devices, and the Dream of a World-Class Society* (Cambridge, MA: MIT Press, 2015); Carse, "Keyword: Infrastructure."

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39. Thomas P. Hughes, *Networks of Power: Electrification in Western Society, 1880–1930* (Baltimore: Johns Hopkins University Press, 1983).

40. Edwards et al., "Understanding Infrastructure"; Jackson et al., "Understanding Infrastructure"; Bowker and Star, *Sorting Things Out*; Martha Lampland and Susan Leigh Star, eds., *Standards and Their Stories: How Quantifying, Classifying and Formalizing Practices Shape Everyday Life* (Ithaca, NY: Cornell University Press, 2008); Star and Ruhleder, "Steps toward an Ecology of Infrastructure"; Lawrence Busch, *Standards: Recipes for Reality* (Cambridge, MA: MIT Press, 2011).

41. For example, Bowker and Star, *Sorting Things Out*; Star and Ruhleder, "Steps toward an Ecology of Infrastructure."

42. Bowker and Star, *Sorting Things Out*, 34; Star and Ruhleder, "Steps toward an Ecology of Infrastructure."

43. Bowker and Star, *Sorting Things Out*, 35; Star and Ruhleder, "Steps toward an Ecology of Infrastructure," 113.

44. Henke, "The Mechanics of Workplace Order"; Christopher R. Henke, *Cultivating Science, Harvesting Power: Science and Industry in California Agriculture* (Cambridge, MA: MIT Press, 2008).

45. Graham and Thrift, "Out of Order."

46. Tim Dant, "The Work of Repair: Gesture, Emotion, and Sensual Knowledge," *Sociological Research Online* 15, no. 3 (2010): 97–118, <http://www.socresonline.org.uk/15/3/7.html>.

47. For example, Joshua A. Bell, Briel Kobak, Joel Kuipers, and Amanda Kemble, "The Materiality of Cell Phone Repair: Re-Making Commodities in Washington, DC," *Anthropological Quarterly* 91, no. 2 (2018): 603–633; Carse, *Beyond the Big Ditch*; Marisa Cohn, "Convivial Decay: Entangled Lifetimes in a Geriatric Infrastructure," in *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work and Social Computing* (New York: ACM, 2016), 1511–1523; Jérôme Denis and David Pontille, "Maintenance Work and the Performativity of Urban Inscriptions: The Case of Paris Subway Signs," *Environment and Planning D: Society and Space* 32, no. 3 (2014): 404–416; Jérôme Denis and David Pontille, "Material Ordering and the Care of Things," *Science, Technology, and Human Values* 40, no. 3 (2015): 338–367; Lara Houston, "Unsettled Repair Tools: The 'Death' of the J.A.F. Box," (paper presented at the Maintainers Conference, Stevens Institute of Technology, Hoboken, NJ, 2016), 1–13, <https://static1.squarespace.com/static/56a8e2fca12f446482d67a7a/t/570e9c8f01dbae9c3322fa7d/1460575376524/Maintainers-Lara-Houston.pdf>; Lara Houston, Steven J. Jackson, Daniela K. Rosner, Syed Ishtiaque Ahmed, Meg Young, and Laewoo Kang, "Values in Repair," in *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (New York: ACM Press, 2016), 1403–1414; Lara Houston and Steven J. Jackson, "Caring for the 'Next Billion' Mobile Handsets: Opening Proprietary Closures through the Work of Repair," in *Proceedings of the Eighth International Conference on Information and Communication Technologies and Development* (New

York: ACM, 2016), 10:1–10:11; Steven J. Jackson, Alex Pompe, and Gabriel Krieshok, “Repair Worlds: Maintenance, Repair, and ICT for Development in Rural Namibia,” in *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work* (New York: ACM Press, 2012), 107; Daniela K. Rosner and Morgan Ames, “Designing for Repair? Infrastructures and Materialities of Breakdown,” in *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work and Social Computing* (New York: ACM, 2014), 319–331; Benjamin Sims, “Seismic Shifts and Retrofits: Scale and Complexity in the Seismic Retrofit of California Bridges,” in *Retrofitting Cities: Priorities, Governance and Experimentation*, ed. Mike Hodson and Simon Marvin (London: Routledge, 2016), 13–33; Benjamin Sims and Christopher R. Henke, “Repairing Credibility: Repositioning Nuclear Weapons Knowledge after the Cold War,” *Social Studies of Science* 42, no. 3 (2012): 324–347; Anissa Tanweer, Brittany Fiore-Gartland, and Cecilia Aragon, “Impediment to Insight to Innovation: Understanding Data Assemblages through the Breakdown-Repair Process,” *Information, Communication and Society* 19, no. 6 (2016): 736–752; Sebastián Ureta, “Normalizing Transantiago: On the Challenges (and Limits) of Repairing Infrastructures,” *Social Studies of Science* 44, no. 3 (2014): 368–392. See also the papers collected in Lara Houston, Daniela K. Rosner, Steven J. Jackson, and Jamie Allen, eds., “R3pair Volume,” Special issue, *Continent*, no. 6.1, 2017, <http://continentcontinent.cc/index.php/continent/issue/view/27>; Ignaz Strebel, Alain Bovet, and Philippe Sormani, eds., *Repair Work Ethnographies: Revisiting Breakdown, Relocating Materiality* (Singapore: Palgrave Macmillan, 2019).

48. Jackson, “Rethinking Repair.”

49. Jackson, “Rethinking Repair,” 221.

50. Jackson, “Rethinking Repair,” 222.

51. Jackson, “Rethinking Repair.”

52. See <http://themaintainers.org/> (accessed January 4, 2019).

53. Andrew Russell and Lee Vinsel, “Let’s Get Excited about Maintenance!” *New York Times*, July 22, 2017.

54. Andrew Russell and Lee Vinsel, “Hail the Maintainers,” *Aeon*, 2016, <https://aeon.co/essays/innovation-is-overvalued-maintenance-often-matters-more>; David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (New York: Oxford University Press, 2007).

55. Russell and Vinsel, “Hail the Maintainers.”

56. See Sulfikar Amir, ed., *The Sociotechnical Constitution of Resilience: A New Perspective on Governing Risk and Disaster* (Singapore: Palgrave Macmillan, 2018).

57. Charles Perrow, *Normal Accidents: Living with High-Risk Technologies*, 2nd ed. (Princeton, NJ: Princeton University Press, 1999).

58. Ulrich Beck, *Risk Society: Towards a New Modernity* (London: Sage, 1992); Ulrich Beck, Anthony Giddens, and Scott Lash, *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order* (Cambridge, UK: Polity Press, 1994); Anthony Giddens, "Risk and Responsibility," *Modern Law Review* 62, no. 1 (1999): 1–10; Anthony Giddens, *Runaway World: How Globalization Is Reshaping Our Lives* (New York: Routledge, 2000).

59. Bruno Latour, *We Have Never Been Modern* (Cambridge, MA: Harvard University Press, 1993).

60. Schegloff et al., "The Preference for Self-Correction in the Organization of Repair for Conversation"; Schegloff, "Repair after Next Turn"; Schegloff, "Third Turn Repair."

61. Sims, "Seismic Shifts and Retrofits."

62. Larkin, "The Politics and Poetics of Infrastructure."

63. Star and Ruhleder, "Steps toward an Ecology of Infrastructure." Bowker uses *infrastructural inversion* to describe an analytical approach that seeks to foreground normally invisible aspects of infrastructure. We see little purpose in distinguishing the analyst's experience of this phenomenon from users' similar experiences during breakdown, repair, and maintenance, and prefer to use *infrastructural inversion* to cover both (see the text box in chapter 3). Bowker and Star, *Sorting Things Out*, 34–37; the term is originally from Geoffrey C. Bowker, *Science on the Run: Information Management and Industrial Geophysics at Schlumberger, 1920–1940* (Cambridge, MA: MIT Press, 1994).

64. Everett C. Hughes, "Work and the Self," in *Social Psychology at the Crossroads*, ed. John H. Rohrer and Muzafer Sherif (New York: Harper and Brothers, 1951), 313–323; Blake E. Ashford and Glen E. Kreiner, "'How Can You Do It?' Dirty Work and the Challenge of Constructing a Positive Identity," *Academy of Management Review* 24, no. 3 (1999): 413–434. On the invisibility of technicians generally, see Steven Shapin, "The Invisible Technician," *American Scientist* 77 (1989): 554–563; Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994), 355–407.

65. See Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge & Kegan Paul, 1966).

66. On "infrastructural bypass," see Graham and Marvin, *Splintering Urbanism*, 168–177.

67. See Chandra Mukerji, *Territorial Ambitions and the Gardens of Versailles* (Cambridge: Cambridge University Press, 1997); Chandra Mukerji, *Impossible Engineering: Technology and Territoriality on the Canal Du Midi* (Princeton, NJ: Princeton University Press, 2009); Carse, *Beyond the Big Ditch*.

68. Larkin, "The Politics and Poetics of Infrastructure," 336.
69. Benjamin Sims and Christopher R. Henke, "Maintenance and Transformation in the U.S. Nuclear Weapons Complex," *IEEE Technology and Society Magazine* 27, no. 3 (2008): 32–38; Sims and Henke, "Repairing Credibility."
70. Edwards, "Infrastructure and Modernity," 192–194.
71. Edwards, "Infrastructure and Modernity," 193.
72. Julian Orr, *Talking about Machines: An Ethnography of a Modern Job* (Ithaca, NY: Cornell University Press, 1996); Henke, "The Mechanics of Workplace Order."
73. See the essays on Hurricane Katrina in a special section of the journal *Social Studies of Science* (February 2007), collected and introduced by Sims, including Christopher R. Henke, "Situation Normal? Repairing a Risky Ecology," *Social Studies of Science* 37, no. 1 (2007): 135–142; Sims, "Things Fall Apart"; Benjamin Sims, "'The Day after the Hurricane': Infrastructure, Order, and the New Orleans Police Department's Response to Hurricane Katrina," *Social Studies of Science* 37, no. 1 (2007): 111–118.
74. Sims and Henke, "Maintenance and Transformation in the U.S. Nuclear Weapons Complex"; Sims and Henke, "Repairing Credibility."
75. Christopher R. Henke, "The Sustainable University: Repair as Maintenance and Transformation," *Continent* 6, no. 1 (2017): 40–45.
76. E. Summerson Carr and Michael Lempert, *Scale: Discourse and Dimensions of Social Life* (Berkeley: University of California Press, 2016).
77. Benjamin Sims, "Layers of Abstraction and the Organization of Repair in High Performance Computing" (paper presented at the Society for Social Studies of Science Annual Meeting, New Orleans, LA, 2019).
78. Benjamin Sims, "Concrete Practices: Testing in an Earthquake-Engineering Laboratory," *Social Studies of Science* 29, no. 4 (1999): 483–518.
79. Edwards, "Infrastructure and Modernity."
80. Ureta, "Normalizing Transantiago."
81. Benjamin Sims, "Making Technological Timelines: Anticipatory Repair and Testing in High Performance Scientific Computing," *Continent* 6, no. 1 (2017): 81–84. On the temporality of repair, see also Cohn, "Convivial Decay"; Marisa Cohn, "'Lifetime Issues': Temporal Relations of Design and Maintenance," *Continent* 6, no. 1 (2017): 4–12; Brittany Fiore-Gartland, "Technological Residues," *Continent* 6, no. 1 (2017): 25–29; Lara Houston, "The Timeliness of Repair," *Continent* 6, no. 1 (2017): 51–55.



## Chapter 2

1. Tim Dant, *Materiality and Society* (New York: Open University Press, 2005), 111; Paul N. Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems," in *Modernity and Technology*, ed. Thomas J. Misa, Philip Brey, and Andrew Feenberg (Cambridge, MA: MIT Press, 2003), 185–225.
2. There are good reasons for this history, including the danger of explaining gender or racial inequalities as material and genetic differences. Similarly, as noted in work in environmental sociology, there is an inherent assumption of "human exceptionalism" in mainstream sociological analyses, where humans are treated as though they do not exist within a system of material resources and constraints. See William R. Catton, Jr., and Riley E. Dunlap, "Environmental Sociology: A New Paradigm," *American Sociologist* 13, no. 1 (1978): 41–49; Riley E. Dunlap, and William R. Catton, "Struggling with Human Exemptionalism: The Rise, Decline, and Revitalization of Environmental Sociology," *American Sociologist* 25, no. 1 (1994): 5–30. Even where the term *material culture* is used to describe the place of objects, the focus, as Dant, *Materiality and Society* notes, is more frequently on the symbolic frames that human culture uses to understand its stuff.
3. Dant, *Materiality and Society*, 111–115. Design and human factors researchers similarly use the term *affordances* to describe how material artifacts allow users to take certain actions while restricting others; see Don Norman, *The Design of Everyday Things: Revised and Expanded Edition* (New York: Basic Books, 2013), 10–23, 123–161.
4. Bruno Latour, *The Pasteurization of France* (Cambridge, MA: Harvard University Press, 1984); Bruno Latour, "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts," in *Shaping Technology/Building Society*, ed. Wiebe E. Bijker and John Law (Cambridge, MA: MIT Press, 1992), 225–258; Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, MA: Harvard University Press, 1999); Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay," in *Power, Action, and Belief: A New Sociology of Knowledge?* ed. John Law (London: Routledge, Kegan, and Paul, 1986), 196–233; John Law, "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," 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 J. Pinch (Cambridge, MA: MIT Press, 1987), 111–134; John Law, *Organizing Modernity* (Cambridge, MA: Blackwell, 1994); John Law, *Aircraft Stories: Decentering the Object in Technoscience* (Durham, NC: Duke University Press, 2002); Donna J. Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991); 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): 801–831; Edwin Sayes, "Actor–Network Theory

and Methodology: Just What Does It Mean to Say That Nonhumans Have Agency?" *Social Studies of Science* 44, no. 1 (2014): 134–149.

5. Latour, "Where Are the Missing Masses?"

6. Latour, "Where Are the Missing Masses?"

7. Christopher R. Henke, "The Mechanics of Workplace Order: Toward a Sociology of Repair," *Berkeley Journal of Sociology* 44 (2000): 67–68.

8. Douglas Harper, *Working Knowledge: Skill and Community in a Small Shop* (Berkeley: University of California Press, 1987).

9. Harper, *Working Knowledge*, 121.

10. Harper, *Working Knowledge*, 126.

11. Henke, "The Mechanics of Workplace Order," 64.

12. Henke, "The Mechanics of Workplace Order," 63; Susan Leigh Star and Karen Ruhleder, "Steps toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* 7, no. 1 (1996): 113; Tim Dant, "The Work of Repair: Gesture, Emotion, and Sensual Knowledge," *Sociological Research Online* 15, no. 3 (2010): 97–118, <http://www.socresonline.org.uk/15/3/7.html>.

13. John Hannigan, *Environmental Sociology: A Social Constructionist Perspective*, 2nd ed. (New York: Routledge, 2006), 36.

14. Henke, "The Mechanics of Workplace Order," 65.

15. W. I. Thomas, *The Unadjusted Girl* (Boston: Little, Brown, 1923); W. I. Thomas, *The Child in America* (New York: Knopf, 1928); Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (Harmondsworth: Penguin, 1971).

16. Henke, "The Mechanics of Workplace Order," 70.

17. Henke, "The Mechanics of Workplace Order," 65–66.

18. Boris Kingma and Wouter van Marken Lichtenbelt, "Energy Consumption in Buildings and Female Thermal Demand," *Nature Climate Change* 5 (2015): 1054–1056.

19. Julian E. Orr, *Talking about Machines: An Ethnography of a Modern Job* (Ithaca, NY: Cornell University Press, 1996).

20. Orr, *Talking about Machines*.

21. Orr, *Talking about Machines*, 143.

22. Mona Chalabi, "Dear Mona, How Many Flight Attendants Are Men?" *FiveThirtyEight* (blog), October 3, 2014, <https://fivethirtyeight.com/datalab/dear-mona-how-many-flight-attendants-are-men/>.

23. Arlie Russell Hochschild, *The Managed Heart: The Commercialization of Human Feeling* (Berkeley: University of California Press, 1983); Amy S. Wharton, "The Sociology of Emotional Labor," *Annual Review of Sociology* 35 (2009): 147–165.

24. Hochschild, *The Managed Heart*, 119.

25. Erving Goffman, "On Face-Work: An Analysis of Ritual Elements in Social Interaction," *Psychiatry* 18 (1955): 213–231; Erving Goffman, *The Presentation of the Self in Everyday Life* (New York: Doubleday, 1959); Erving Goffman, *Interaction Ritual: Essays on Face-to-Face Behavior* (New York: Pantheon, 1967).

26. María Puig de la Bellacasa, "Matters of Care in Technoscience: Assembling Neglected Things," *Social Studies of Science* 41, no. 1 (2011): 85–106; María Puig de la Bellacasa, "'Nothing Comes without Its World': Thinking with Care," *Sociological Review* 60, no. 2 (2012): 197–216; Annemarie Mol, Ingunn Moser, and Jeanette Pols, "Care: Putting Practice into Theory," in *Care in Practice: On Tinkering in Clinics, Homes, and Farms*, ed. Annemarie Mol, Ingunn Moser, and Jeanette Pols (Bielefeld, Germany: Transcript Verlag, 2010), 7–26; Lara Houston and Steven J. Jackson, "Caring for the 'Next Billion' Mobile Handsets: Opening Proprietary Closures through the Work of Repair," in *Proceedings of the Eighth International Conference on Information and Communication Technologies and Development* (New York: ACM, 2016), 10:1–10:11.

27. Evelyn Nakano Glenn, "Creating a Caring Society," *Contemporary Sociology* 29, no. 1 (2000): 84–94. See also Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge and Kegan Paul, 1966.). Duffy's analysis of labor statistics shows that in the United States, this work has been disproportionately done by women and persons of color. Mignon Duffy, "Doing the Dirty Work: Gender, Race, and Reproductive Labor in Historical Perspective," *Gender and Society* 21, no. 3 (2007): 313–336.

28. Mol et al., "Care."

29. Edwards, "Infrastructure and Modernity."

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### Chapter 3

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2. Although we are aware *Chicano* is a gendered term and may be considered outdated by some, we use it here when appropriate as part of the name of Chicano Park and to describe related political movements, reflecting the use of the term by many of the activists and artists who are central to the events described in this chapter. When referring to the neighborhood, we use the term *Mexican American* as a more precise description of the community's historic demographics than the broader *Latino/a/x*.

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#### Chapter 4

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## Chapter 5

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**By: Christopher R. Henke, Benjamin Sims**

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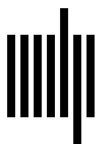
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