Making Citizens, Reassembling Devices: On Gender and the Development of Contemporary Public Sites of Repair in Northern California

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For the dozens of visitors to the 2012 East Bay Mini Maker Faire, many remarkable experiences were ripe for the taking. They could share in hands-on activities while attending a working group on outdoor mosaics, observing a robot-making demonstration, or sitting in on a make-your-own terrarium class. The activity in Studio One was no different: the energy was high and the action perplexing. Children clamored for a chance to use a Phillips-head screwdriver. Adults cut delicate wires and relayed stories of their latest electronic gadgets. A collection of mechanical odds and ends—soldering irons, spray cans, vacuum cleaner heads, and toaster shells—lay distributed across all surfaces of the room. This cluster of activity at the end of the Studio One hallway was as anarchic as all the rest: fast paced, thrilling, and difficult to digest (tdarci 2012).

To the handful of people facilitating this work, the pandemonium was familiar and somewhat double-edged. It was the thirty-fifth Fixit Clinic, a public venue for facilitated repair often arranged out of libraries, museums, and community centers located east of San Francisco (see fig. 1). Meanwhile, fifty miles south, the inaugural event of the Palo Alto Repair Café, another public site of repair, was taking place at the Museum of American Heritage (see fig. 2). The two events were not planned to overlap, but, as we will see, this arrangement of concurrent yet separate programs prefigured their common practices and divergent cultural aims.

Public sites of repair, such as the Fixit Clinic and the Repair Café, are community-supported events designed to help local residents fix and learn to fix

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Figure 1 Fixit Clinic at the Lawrence Hall of Science, Berkeley, California, on November 18, 2012. Photograph by Peter Mui

Figure 2 A full house at the second Palo Alto Repair Café hosted by the Museum of American Heritage in Palo Alto, California, on February 24, 2013. Photograph by Peter Mui

their broken consumer products. Meeting roughly once a month since 2009, the groups go by a variety of names that reflect their organizational affiliation and geographic location. Amsterdam's Repair Café gave rise to satellite groups in California called the Palo Alto Repair Café and the Pasadena Repair Café, and the East Bay's Fixit Clinic generated a satellite group in Minneapolis termed the Hennepin County Fix-It Clinic. In each case, anywhere from ten to three hundred participants tumble into museums, libraries, and other public venues to receive guidance from a small group of repair-savvy volunteers. The volunteers have engaged in repair work as a part of their weekend leisure pursuits, taking pleasure in the dexterous hands-on tinkering and intellectual problem solving involved in returning heat to broken toasters and volume control to damaged iPods.[1] The vast majority of items brought to events are consumer products with mechanical or electrical components (e.g., vacuum cleaners, sewing machines, amplifiers; see fig. 3); they also range in age, from the latest Apple product to an antique radio. Echoing the archetypal interests of car or motorcycle hobbyists (Crawford 2009; Harper 1987), volunteers attempt to restore function to damaged or discarded goods and bring questions of technology development to the public eye. Despite their wealth of expertise, it is never clear whether volunteers will be able to accomplish their task—either by not conducting the repair themselves or by resolving the original problem and not introducing new ones. Underlying their mission is a common observation: so much manufacturing is now driven by inscrutable circuitry that the idea of home repair has faded from what was once a widespread cultural phenomenon (Gelber 1997).

Figure 3 Peter Mui inspects a digital projector at his home in Berkeley, California, on February 5, 2013. Kristopher Skinner/Contra Costa Times. Reprinted with permission

1. This work is free to the public, with the possible option of a donation. Volunteers do not directly benefit from the work, financially or practically, with the noteworthy exception of the Pasadena Repair Café, where volunteers can also receive "credits" for sharing skills, a "time banking" service initiative in which units of time are used as currency.

Despite shared concerns for dwindling repair skills, members of such groups expose different strategies and rationales for doing repair work. At the East Bay Fixit Clinic, the main organizer asks attendees to introduce themselves and their broken item, followed by an invitation to sit down and begin their own repairs. Clinic volunteers make their way around the room, taking questions and requests as they come. Unlike at the East Bay Fixit Clinic, attendees of the Palo Alto Repair Café sign in at a desk out front, receive a number to wait by a tray of bagels and coffee, and eventually get called to a particular volunteer's desk, encouraging repair work with a helpful volunteer. Repair Café volunteers conceptualize their activities as a service to the community, helping to fix appliances as a way of inspiring attendees to reduce waste and thus care for their environment. The Palo Alto Repair Café is part of a global network of government-funded Repair Café events originating in the Netherlands, a network that received enthusiastic international press in the spring of 2012 (McGrane 2012). Differences in the coordination and mechanics of repair sustain the organizers' goals for repair work and the formulation of gender and geek identity (see Dunbar-Hester 2008).

My interest in these events developed as part of a broader ethnographic examination of craft movements in the Bay Area between 2008 and 2012. Initially focused on the work of knitting and needlecraft, I found that knitters' perceptions of self and their gender identity surfaced in their rejection of particular technologies (see also Corneliussen 2009; Grint and Gill 1995; Edwards 1990; Wajcman 1991). By denying electronic interventions in craft (such as electronic-textiles projects) and learning to produce Orenburg lace knitting, women reclaimed craft competencies associated with domestic labor that had been increasingly marginalized with the rise of Progressive Era do-it-yourself home improvement (Gelber 1997). Steven M. Gelber (1997: 70) suggests that women's role in domestic repair was undermined, in part, by what he calls "the half-pound rule": women's general unwillingness to use heavy tools. Whether metaphorically or practically, I found that particular digital technologies became new kinds of heavy tools for which masculine imagery takes precedence (see Connell 1998; Wajcman 1991; Oudshoorn, Rommes, and Stienstra 2004).

In turning to local repair movements, I sought to explore this interplay between gender, technology, and craft competencies amid a different set of practices. In particular, I asked how handcraft and engineering activities could live together in the work of maintenance and mending: how fixing damaged blue jeans and replacing broken iPad screens might reveal new relations between technology and craft. Yet, as my work continued, I found that engineering-oriented repair activities rarely took place alongside traditional handcraft. Sewing patches or rebeading

jewelry tended to belong to a delimited female sphere, while the work of fixing consumer electronics largely fell to men. Nonetheless, as repair work moved into the public realm, becoming an object of public debate, organizers of the Fixit Clinic and the Repair Café began to question and disrupt these distinct ecologies of craft and technology repair.

In this essay, I argue that contemporary public sites of repair and their histories (Gelber 1997; Harper 1987; Henke 1999) complicate gendered divisions of labor and shed light on the tensions between craft values and technological competencies. As fixing practices move from homes to libraries and museums, the practices of plaster spackling and hardware tinkering that once occupied back porches and home workshops inhabit new territory in the public attention. In the process, organizers shift masculine pastimes into the public realm and transform what repair work has come to represent—from family responsibility toward societal imperative. Members of the Fixit Clinic promote technical innovation and educational reform, while members of the Repair Café disseminate services for environmental care, changing the stakes of what repair work is meant to achieve. Repair, in this sense, becomes an analytic tool with which to produce and sustain multiple political projects and with which to socially and structurally refigure society. As part of this, the work of event organizers is made publicly accountable, prompting them to question the gendered divisions of labor that occupy organizing on the ground.

In what follows, I discuss this repair movement and its ties to global initiatives. Through their narration in the popular media, repair groups have been associated with countercultural visions taken up by computing engineers in Silicon Valley over the past fifty years, most recently in sites like hackerspaces, Fab Labs, skillshare groups, and other independent or nongovernmental organizations. Mainstream media coverage suggests that the groups facilitate playful and purposeful tinkering both at work and at home to reposition the "garage" in the cultural imaginary as a space of software and hardware incubation ripe for technological configuration. Since the rise of computer clubs in the 1970s, pundits and scholars have revisited the utopian technocratic ideals propagated by hobbyist collectives (Florida 2002; Neff 2012; Turner 2009, 2010) and traced the origins of regional solidarity in Silicon Valley (Adams 2003; Kenney, Breznitz, and Murphree 2013; Saxenian 2007). Others have captured the hacker ethos through an anthropological lens (Coleman 2011, 2012; Kelty 2008) and described alternative conceptions of consumer electronics disassembly in the United States and abroad (Burrell 2012; Henke 1999; Jackson, Pompe, and Krieshok 2012; Orr 1996; Suchman 2006).

This scholarship stems from two intellectual roots: one concerning the social fabric of the institutionalized technocratic worldview and the other the work of the mind and hand. The first perspective poses repair as part of an infusion of bohemian art worlds into Bay Area technoculture (Turner 2009). The second perspective sees repair as an opportunity for what Steven J. Jackson has termed *broken world thinking*, a mode of critical reflection and analysis that offers breakage as an entry point for examining "the nature, use and effects of information technology and new media today" (Jackson forthcoming). By turning to the frailty of our natural, social, and technological worlds, and inspiring a sense of wonder for the maintenance of the stable sociotechnical forms we inhabit, broken world thinking makes claims about the nature of technology and offers a provocation toward doing different kinds of politics in technology studies today.[2]

This essay acknowledges the techno-idealism ascribed to repair events, as well as the social mechanics of repair practices and their resources for rethinking new media and information ecologies. Diverging from these perspectives, it takes public sites of disassembly as a means to explore links between repair work and civic identity, revealing how claims to citizenship complicate the advancement of technical programs and their gendered frames. Drawing on a combination of participant observation, interviews, and archival research, I focus my analysis on the cultural project of repair in the San Francisco Bay Area and its implications for global environmental discourse and technological learning.[3] In doing so, I

2. It is worth noting the small but vibrant ethnographic tradition that has emerged on the study of everyday maintenance in information technology (IT) design. Christopher M. Kelty (2008), for example, has studied the arcana of free software through the continuously rewritten fabric of the Internet. In the decades prior to this work, Lucy Suchman (1987), Julian Orr (1996), and others notably turned to the lives of photocopy-machine repair workers to illuminate the limitations of codifying maintenance techniques. Beyond IT development, scholars have focused on maintenance work to reconsider features of building reconstruction (Brand 1994), vehicle repair (Crawford 2009; Dant 2010; Harper 1987; Van Maanen 1990), electricity procurement (Graham and Thrift 2007), craft practice (Sennett 2008; Rosner 2012), routine workplace activities (Henke 1999), and shared infrastructures (Star and Strauss 1999; Rosner and Bean 2009).

3. Over nine months in 2012 and 2013, I conducted participant observation at six Fixit Clinics and one Repair Café and at those events engaged in informal conversations with roughly sixty participants. I also conducted extensive formal interviews with twenty participants, including leaders of the Fixit Clinic and two Repair Cafés, participants in three Fixit Clinics and three adjacent groups with strong links to Silicon Valley (Fixers Collective, Restart, Pasadena Repair Café, and the Netherlands Repair Café), and leaders of related endeavors such as the Repair Clinic, Partimus, and the Flaming Lotus Girls. Last, I conducted in-depth research in the Fixit Clinic and Repair Café's online archives and in individual participants' collections.

follow the work of Christina Dunbar-Hester (2008) on radio-hardware "geeks" and Dawn Nafus (2012) on open software development, both scholars who have connected gender and geek identity to specific kinds of political performance. In describing the formation and dissemination of two kinds of cultural claims, one about the production of civic virtue and another about the advancement of technological programs, I frame repair work as a political process of self-formation that refigures social, organizational, and technical relations. Before discussing the role that public sites of repair play in the crafting of urban citizens, I first revisit how the repair movements came to be.

Brief History: The Rise of Urban Repair Movements

The work of the organizers and repair volunteers at the heart of this essay must be examined in relation to what has been broadly characterized as a contemporary repair "movement," a "grassroots" development, largely urban, that was set into motion by three kinds of initiatives in the United States and Europe. The first development was the strengthening of environmentally focused nonprofit organizations that has sought to facilitate repair and reuse. Though national charities such as Goodwill and the Salvation Army have served Americans since at least the Progressive Era (see Charbonneau 2008), cross-national sites for hands-on do-it-yourself reuse and self-repair—for example, "meetups" for skill sharing and spaces for digital fabrication (Techshop, Fab Lab, hackerspaces)—have achieved new popularity and visibility with the emergence of online mechanisms for sharing resources and coordinating events. In conjunction with these venues, the importance of organizations that refurbish and redistribute old electronics (cell phones, computers) from recycling facilities has been stressed with the increasing prevalence of electronic waste and rising concerns for the (often problematic) "digital divide" (see Jenkins 2009; Wartella, O'Keefe, and Scantlin 2000).

The second class of activity that has energized public sites of repair is the ongoing political activism of makers, hackers, and artists exploring public interventions into urban repair cultures, at least since the 1970s. Artists and art curators in London have recently organized repair-inspired events such as the Mend*rs symposium and the *Fix, Fix, Fix* exhibition at the Victoria and Albert Museum (Heathcote 2013), reflecting liberal framings of hacker practices depicted in recent scholarship (Coleman 2012; Kelty 2008). Writers for the popular engineering publications *Make* magazine and *Wired* have correspondingly adopted the project of repair to emphasize its importance in design. A critical dimension of this

second category has been addressing the mark of "planned obsolescence"—the manner in which many products are built to last for only a few years rather than a lifetime. By highlighting new stakes in engineering practices, artists and hackers acknowledge and complicate the politics of design.[4]

The online information repositories for repair-related documentation and exchange, including freely available reports, guides, and manuals, constitute a third category of activity that has seeded the contemporary repair movement. A range of resources has been developed to encourage the repair of consumer products and further the support for reparability. Startups like Good Guide have provided detailed information on the environmental impacts of computer products, and groups like the Electronics Take Back Coalition have promoted responsible recycling. Other websites have offered instructional video libraries, historical archives of repair guides, and step-by-step instructions. The largest of these online sites is iFixit.com, a for-profit tool distributor that generates and maintains the freely available online archive of repair manuals, or what the founder terms "the *Wikipedia* of repair manuals."

The financial crisis of 2007–8 has been viewed as a major catalyst for these initiatives. In 2008 the New York–based Proteus Gowanus Gallery launched its *Mend* exhibit and the Amsterdam-based art collective Platform 21 began its *Platform21 = Repairing* exhibition, both groups turning to repair in response to mounting financial pressures. Shortly thereafter, the Repair Café in Amsterdam, the Fixit Clinic in Albany, California, and the Fixers Collective in New York City held their first events, without prior knowledge of each other. Since 2008, nearly one hundred public sites of repair have emerged globally, eighty of which align with the Repair Café initiative. Other "pop-up repair shops" have surfaced in New York and San Francisco. For the most part, such public repair venues are limited to Europe and North America, with single Repair Cafés in Brazil and Australia.

4. A number of interventions by artists concerned with issues of repair had been set afoot before the aforementioned community endeavors. For example, from 2005 to 2009, Jonnet Middleton stopped buying new clothing, Miriam Dym began her repair "logo removal service," and Michael Swaine walked the San Francisco streets with his mobile mending cart. Other artistic repair endeavors have been spread through mass media, such as the first issue of *Make* magazine, which highlighted repair in "The Maker's Bill of Rights": "Ease of repair shall be a design ideal, not an afterthought" (*Make* 2009: 31, quoted in Sivek 2011: 195). In a subsequent issue, repair is ascribed nostalgic value: "Makers reuse things. Makers repurpose things. Makers repair things. . . . My hope for a more beautiful future is that we will have fewer things pass through our lives, of higher quality, and love them more" (Griffith 2008: 26, quoted in Sivek 2011: 195). The London-based Fixperts design group has leveraged the romantic value of repair by linking the work of fixing and design entrepreneurism.

Other than the wildly international Repair Café, few groups have set up meetings in more than one city, including the Fixit Clinic's one-off projects at the Massachusetts Institute of Technology (MIT) in Cambridge, the Rogue Hack Lab hackerspace in Medford, Oregon, and a church in Knoxville, Tennessee.

Paralleling recent social and organizational developments, several US legislation reforms have expanded the kinds of policies that enable repair. In July 2012, the Massachusetts electorate voted to enact House Bill 4362, a "right to repair" bill, landmark legislation that requires car manufacturers to provide the same repair and diagnostic information to consumers, mechanics, and franchised dealerships. That same year, California put into effect Assembly Bill 32, legislation that creates the world's largest marketplace for cap-and-trade greenhouse gas emissions. Since 2010, seven states have passed benefit corporation legislation that allows companies to more easily pursue environmental goals.

However, the roots of voluntary repair go back much further to reveal that repair is not only a matter of engaging technological and environmental futures, whether through artistic initiatives or state-sanctioned jurisdiction; repair is also a way of restoring sociocultural dimensions of times past, especially related to gender dynamics in the home. Gelber (1997), for example, has traced the development of do-it-yourself household repair in the United States to highlight the performance of domestic masculinities through home improvement. According to Gelber (1997: 71), postbellum men of the 1800s responded to the degrading artisan/farmer tradition of manual labor by turning outside the home, leaving few men to embrace tools for domestic repair. Office work was seen as "civilizing" and thus a threat to men's sense of manhood. As women entered the workplace, views of manhood were further challenged, leading men to engage in alternative homosocial activities, such as fraternal sporting events (ibid.: 72), and eventually take on domestic jobs that previously went to professional workers. Men carved out an exclusive space of "domestic masculinity" (ibid.: 73), bringing back the romantic aesthetic of the "craftsman" with his leather apron and products of his own making. With the rise of blue-collar house ownership in the first half of the twentieth century, do-it-yourself home improvement became "an activity that transcended class more readily than gender" (ibid.: 82).

The stiffening of gender boundaries is nothing new to the industrial landscape of Silicon Valley. In September 1975, fourteen male Californians set up *Interface*, one of the first computer hobbyist newsletters, to bring together " 'needers' with 'havers' " (*Interface Newsletter* 1975). This parlaying of skills had less to do with exchange than with coordinating a group of technically savvy volunteers. It also

presented challenges to forming a diverse and unified collective. The first article described a recent "bingo card" survey conducted at the previous meeting in which organizers recorded people's expressed interests, tallied demographic data, and reported on who people were and where they came from. Of the 182 people who turned in survey cards, only 5 marked that they were female (or, more accurately, identified as Ms. "as against Mr."). Informed members—predominantly white, well educated, and male—facilitated the hardware hacking of "homebrew" computer systems such as the 8008 computer with 8-kilobyte memory and a 16-level hardware "push-pop" stack. Others helped debug assembly languages, interpreters, and Basic code, anything that might get the computers up and running. Despite early links between women and computation, computational expertise was seen to fall predominantly to men (see Cherny and Weise 1996).

Alongside such technological competencies, Bay Area counterculturalists betray a history of delegating separate and less influential societal responsibilities to women. As media historian Fred Turner (2009: 76) has shown, Californian commune dwellers of the late 1960s and 1970s reaffirmed traditional gender relations as societal leadership was assigned to men and domestic authority was left to women. Women cooked and cleaned while their male counterparts made decisions. Chasing a neoprimitive ideal, they cast aside the political action of Vietnam protestors to embrace the transformative technological ideals of back-to-the-land consciousness. As Turner acknowledges, the American transcendentalists, such as Emerson, Whitman, and Thoreau, who believed in trusting the self, preceded this yearning for self-reliance. In Emerson's words: "Every heart vibrates to that iron string" (1974: 1108, quoted in Healy 1997: 64).

Given this history, it was not surprising that the Fixit Clinic set up shop at the East Bay Maker Faire, an operation run, at the time, by O'Reilly Media, the computer book publisher that also distributed the do-it-yourself *Make* magazine.[5] The company's heavy use of bold primary colors, stark Helvetica type, and brassy, busy graphics reflects an aesthetic of form following function often associated with male Bauhaus figures. Maker Faire and *Make* magazine produce and circulate a host of gendered imagery recently problematized within the media studies literature (see Dawkins 2011; Sivek 2011). At Maker Faire, craftwork reveals feminized appeals to self-improvement and pleasure that validate otherwise exploit-

5. In January 2013, Maker Faire, *Make* magazine, and associated O'Reilly projects related to Do-It-Yourself learning (e.g., Young Makers) became part of Maker Media, an independent nonprofit conglomerate under the leadership of longtime O'Reilly employee and Maker Faire founder Dale Dougherty.

ative manual work. Collective knitting and decorative crocheted cupcakes encode a misplaced domestic femininity amid robotics demonstrations and Power Wheels drag races (Dawkins 2011: 274).

Making the Fixit Clinic

"Okay, guys, we have four victims!" Peter Mui, founder of the Fixit Clinic, called out as visitors to the Lawrence Hall of Science began to fill the room (see fig. 1). The meeting space was buzzing with chatter and took some time to quiet down. Mui stood behind a long table near the back wall surrounded by people with broken things in hand. "So what we're going to do," he continued, "is as soon as people come in I'm going to ask them what they've brought and say hi. We've got four people when you're ready. I'm going to start over here. What's your name?" A middle-aged man with a blue stereo said his name was A. "Okay, [A.], what do you got?" He had a stereo receiver and explained the problem; Mui moved on. "Okay, what's your name? . . . Okay, [N.], what did you bring?" N. brought three items: a watch whose battery she couldn't replace, a portable phone that refused to charge, and a leather boot whose buckle had snapped. She didn't know whether it was okay to bring something that wasn't electronic, she admitted. Not long after delivering this introduction, Mui announced a first sign of success: "Hey, everybody, we have a fix!" People in the room began to clap and cheer as N. held up her chargeable portable phone with a smile, and Mui snapped a photograph.

Modeled after the twelve-step programs at Alcoholics Anonymous, Mui's introduction has a celebratory quality that has become his signature. Mui is an ebullient character. With a combination of nerves and excitement, he moves through the room much the way he speaks, rapid and stochastic. His small frame and sharp East Coast accent accentuate his exuberance, to an almost comical effect. He shifts between determined people and disassembled projects, his focus acute but sporadic, as he dives into a large box of tools only to leave his camera at the bottom of the box.

The repair traffic that day was reasonably slow, giving Mui a chance to observe participants from the sidelines once or twice. Most of Mui's time at the Fixit Clinic is spent in the trenches. He helps diagnose an issue, identifies the location of a critical screw, or suggests easy fixes before and after something has been attempted: "Spray cleaner on the button before taking it apart." He is likely to move between several projects and tends to spread his attention among additional tasks, simultaneously keeping an eye on the pace of repair work, documenting repair work with his camera, discussing organizational issues with available staff,

and engaging in what he calls "triage": ensuring that people who enter have a place to go.

The Fixit Clinics began in December 2009 at the City of Albany Recreation and Community Services, a large open room adjacent to a public library. It took Mui almost four years and countless conversations with local repair practitioners to garner enough interest and find an appropriate venue to host his event. Mui named the clinic for its emphasis on diagnosis, an approach that was largely "aspirational," he admitted. Its tagline—"guided disassembly of your broken stuff"—was also its disclaimer: there was no guarantee what would happen with one's stuff. The goal was to facilitate repair and thus enable technological learning.[6] As Mui told me: "[We] have an orientation toward this educational focus, and this ideal of personal empowerment. And, ultimately, my surreptitious goal, which I conveyed to you from the very first day, is this idea that we're ultimately trying to get people to a place where they can help to make better policy choices. We're demystifying technology so that when technology comes up as a societal issue, people can participate in that dialogue more coherently than they're able to now."

Mui's primary interest was in nurturing technological innovation. By engaging participants in the remixing and kludging (using ill-assorted fragments in production) of electronics, he aimed to educate and inform—ultimately providing members of society with incentives to reconsider impulsively or unknowingly stifling technological advancements such as stem cell research or drone development, work that could be used for societal good as well as societal ill. Though members of the Fixit Clinic did not explicitly raise these issues during events, hands-on tinkering was viewed as a means to "demystify technology" and foster participants' interest in scientific and technological progress.

Given that most Fixit Clinic participants were adults, it may seem strange that Mui's core demographic was the "precocious middle schooler": the eleven-year-old child who was resourceful, curious, and always taking broken things apart, much like Mui had done as a child. Mui had formulated a life plan by the time he turned sixteen: to complete his undergraduate degree by the time he was nineteen, finish his master's by twenty-one, and gain his PhD by twenty-three. At twenty-five he would become a junior faculty member, and at thirty he would be awarded a Nobel Prize in physics. But "freshman physics put the kibosh on that," he explained. In a welcome speech during his first week at MIT, the dean of admissions asked Mui's freshman class to look around them; they each came

6. See also Uchitelle 2012.

from the top 10 percent of their high school class, but in four years 50 percent of them were going to drop into the bottom 50 percent of their graduating class, if they were still at MIT at all. Mui felt that this "harsh reality" presented him with an ultimatum: specialize or get out of the academic game. In response, he and his colleagues developed unique and narrow skills at which they could excel, and excel alone. Mui's roommate became an expert at playing with the Rubik's Cube. Mui worked at the yearbook and honed his photography skills. In Mui's words, this was an attempt to "maintain some status among people that were all otherwise overachievers." His attempt at specialization seemed to inspire his work at the Fixit Clinic: "Well, I think that for us as nerds it's kind of an insight into people's personal lives that we otherwise don't get. It's the way for us to be the alpha males in a society that doesn't normally value that sort of a skill set, right? We were never the high school quarterbacks. We were the ones relegated to science club or debate club. We want positive affirmation as much as anyone else, I bet."

Through repair work, Fixit volunteers rehearse their gender identities and achieve "positive affirmation" of their masculine competencies (and "alpha male" status). Here we see several parallels between contemporary repair groups and Gelber's (1997) suburban do-it-yourself repairmen. As discussed, Gelber (1997: 73) shows how domestic repair work became a source of "domestic masculinity" as houses increased in size and workplaces integrated women and men. Carving out a gender-specific role within the home "gave men a sense of special ability that may well have compensated for some loss of masculine affirmation" (ibid.: 81). During Fixit events, repair work evoked for male volunteers the satisfaction of doing a job well (see Crawford 2009; Sennett 2008) as well as a way to counter any "ambiguous sources of masculine identity" (Gelber 1997: 68) in other aspects of their lives.

This affirmation of geek identity is further reflected in the kinds of volunteers Mui recruits. Much like Mui, Fixit volunteers are curious and technical and take up the notion of "making as

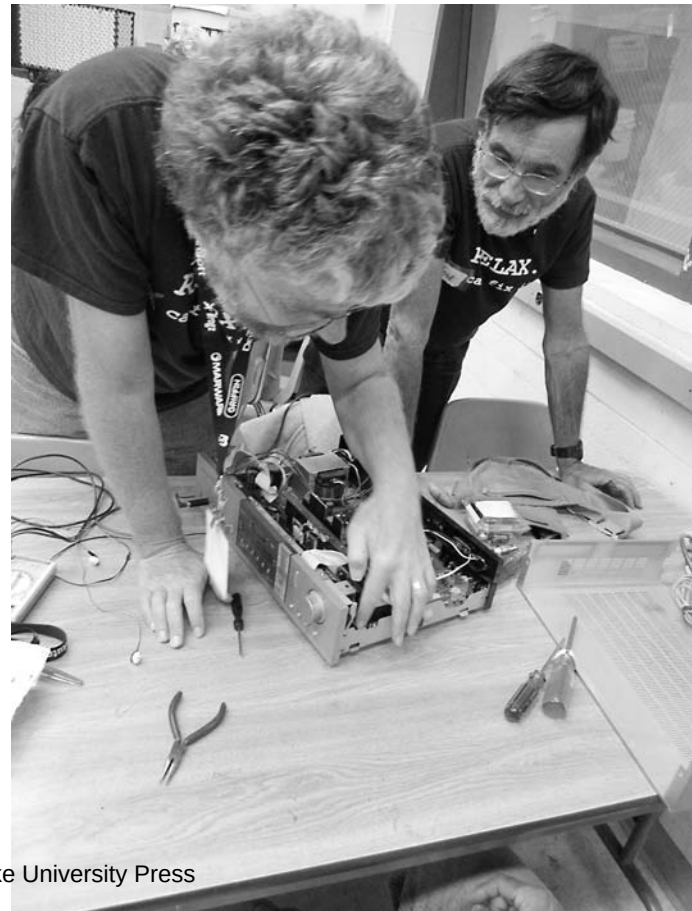

Figure 4 Fixit Clinic coaches S. and C. collaboratively inspect a faulty switch on a compact disc player at a Lawrence Hall of Science, Berkeley, California, event on November 10, 2013. Photograph by Daniela K. Rosner

connecting" (Gaunlett 2011), wherein repair work serves to foster intimate social relations and shared expertise (see fig. 4). Though Mui is the product of a Cantonese father and a Caribbean mother and represents an ethnic profile different from that of his fellow organizers, Mui does not, in his words, "fit into traditional stereotypes." Mui grew up in a Jewish and Italian neighborhood in the Bronx, where he learned more Yiddish than Cantonese and attended more bar mitzvahs than any other event. Like Mui's classmates from grade school through college, the active Fixit volunteers are white, and most are male and over the age of fifty and have engineering backgrounds.

Fixing, in this sense, takes a backseat to the intellectual curiosities and social affirmation seen to emerge from a repair. By exposing participants to technical problem solving, the volunteers exhibit their talents while concurrently nurturing other people's interests in technical work. This process carries with it a vision for how technological advancements, well documented by media studies scholarship, have the capacity to fundamentally transform childhood education (Hoffman 2003) and cultivate liberal democratic ideas of economic freedom and procedural equality (Coleman 2012; Turner 2009; Morozov 2012). It also contrasts with the work of the Repair Café.

Founding the Repair Café

Around the time Mui launched his first Fixit Clinic, another movement was afoot. Some five thousand miles east of the Bay Area, Martine Postma was visiting the art exhibition *Platform21 = Repairing*. Over the proceeding few years, she had acquired a sense of urgency around environmentalist issues: the increasing threat of climate change and the rise of consumerism projected by public media. This concern prompted Postma, herself a journalist, to turn from writing about higher education to writing on environmental sustainability. Yet she no longer wanted to remain an outsider or neutral describer. Though the event highlighted remarkable and anachronistic examples of repair, it did not involve people in the practice. This lack of practical impact inspired Postma to transform this exhibition into a hands-on event.

Some eighty people attended the first Repair Café that Postma arranged in Amsterdam in the fall of 2009. During this launch, it immediately became clear to Postma that repair work struck a chord with local residents; she felt that the project was worth developing further through formal infrastructural support. With the assistance of her journalism contacts, Postma successfully applied for funding from the Dutch Ministry for the Environment, a "subsidy of environmen-

tal activities" aimed at fostering innovative environmental thinking. With these funds, she started the Repair Café Foundation, a nongovernmental organization that provides information and guidance to local groups setting up Repair Cafés in their own neighborhoods. Postma proposed founding eighteen groups, which she expected to accomplish over the course of a few years at the rate of six groups per year. After the first year, however, twenty groups had launched, and after the second year, fifty groups. Now in her fourth year, Postma has observed and helped develop some eighty Repair Cafés running not only in the Netherlands but also across Europe and the United States.

Peter Skinner's Repair Café in Palo Alto is one of Postma's recent projects (see fig. 2). Unlike Mui and his volunteers, Skinner is not a "gear head" or "fixit dude." He did not grow up fixing consumer electronics or enjoy learning how to disassemble mechanical parts. Skinner was interested in the organization of environmental responsibility. He came of age in Michigan in the 1980s, when significant environmental measures were passed to clean up the Great Lakes. His interests further developed as an undergraduate at Stanford University, when he met and befriended J., a talented engineer and conservationist who started the first recycling program at Stanford. As with Postma, sustainable possibilities underlie Skinner's interest in repair.

Skinner majored in international relations at Stanford and finished a master of business administration at the University of California, Los Angeles. After graduate school, he helped found and was involved in six companies, one of which he was set to launch shortly after his first Palo Alto Repair Café. More recently he coordinated a string of Stanford track-and-field events. This interest in environmentalism, combined with his significant managerial experience, prompted him to seek out an organizing role in a global movement addressing the proliferation of consumer electronics disposal ("e-waste"). Even though he was thousands of miles closer to Mui, Skinner learned of Postma's project six months earlier, while reading the *New York Times* (McGrane 2012).

Postma's goal was to ensure consistency. To do so, she provided new Repair Cafés with organizational materials, such as lists of necessary tools and posters that she had translated from Dutch into local languages. In exchange for their use, she requested that organizers use the Repair Café name and logo, link to its website, and file for nonprofit status, a process that has cost Skinner over $400 and several hours of paperwork. Skinner was initially skeptical, as he explained: "My first reaction was: screw you. But then I thought what I'd really like to do is be a part of a larger movement rather than—no offense to Peter [Mui]—but a

small [one]. . . . So I committed to becoming a Repair Café and the corporation process."

Skinner viewed Mui's initiative as too limited and individualistic: "[Mui's] got a narrow view of what he wants to achieve and that's teach a man to fish." In Skinner's view, Postma's project offered the possibility of becoming part of a "global network" of environmental activity that was much larger than a single person. Indeed, soon after Skinner launched the Repair Café website, dozens of other local repair enthusiasts and organizers, in places as far as New Zealand and Calgary, contacted him via e-mail, asking to get involved and to receive more information. Following this online interaction, the volume of traffic at the first Palo Alto Repair Café was roughly ten times that of an average Fixit Clinic affair, and the corresponding number of volunteers was just as impressive: thirty people, including a man from the local hardware store who would shuttle back and forth on a bike to fulfill requests. At the second event, roughly two hundred people showed up, with some sixty volunteers helping with the repairs. While Skinner initially found Postma's requirements off-putting (and "empire building"), he soon saw her work as bringing commonality across sites and thus cultivating a broader sense of environmental, social responsibility.

Here care work presents a different framing of repair work from the practices of Fixit volunteers associated with men. Offering a theory of care to question the nature of women's morality, Joan C. Tronto (1987) argues that care work is often diminished because of its feminized and invisible character, posing male morality as normative and separate from female morality. She suggests, instead, viewing care as a social condition generated by modern circumstances of subordination (ibid.: 646). The environmentalist goals of Skinner's and Postma's projects have an affective component that has much in common with Tronto's ethic of care. While connecting women with the devalued material practices of textile mending reinforces a gendered ethic, the care work that goes into tinkering and disassembling electronics fails to implicate repair practices in this reinforcing of female inferiority. The environmental goals of Skinner's and Postma's projects thus complicate gendered practices by blurring distinctions between repair work and care work.

Gendering Subjects of Repair

Despite the motivations to, in a sense, politicize repair and reposition it within progressive programs (both small- and large-scale), some of the long-held structures persist, particularly with regard to gender. Throughout my fieldwork, I

observed that the kind of work given to women volunteers is subtly different from that given to men. At both Palo Alto Repair Cafés, women direct the work at the sewing machines and lead the station for jewelry repair. Though few sewing projects come to the Fixit Clinic, at the Lawrence Hall of Science event, female Fixit Clinic volunteer E. was asked to fix the broken boot buckle, the one non-electronic item that came to the clinic. After careful examination, E. suggested that the participant, N., buy a new part at a craft store and affix it to the boot with a needle and thread. Her fix constituted simple sewing advice. At this and subsequent events, she also helped repair sewing machines (see fig. 5). This palpable relation between sewing and female volunteers undergirds a parochial view of female competencies. As Mui put it:

> If two or three women come to each Fixit Clinic—you know, women, because that's what they are [*laughs*]. And they repair fabric things there, and broken sewing machines come in, they take the lead in trying to repair those. And, if not, we know the other Fixit coaches will just come in. And so the idea is that, over time, I could see that Fixit Clinics could have a very strong fabric repair and sewing component to them. I'm all for that.

Women are viewed as capable of repairing garments and boots but less likely to know how to take apart and fix a sewing machine. When in need, their male counterparts will help. At a crowded Albany event, I once suggested that a participant clean out her broken radio with an air-duster spray can. Before she successfully mended the radio with the air-duster, the woman told me that she would rather wait to speak with someone with more technical expertise. This framing of female competencies as trivial and nontechnical is produced and maintained through routine interactions among volunteers as well as by the participants themselves. When I raised this possibility to Mui, he responded: "I actually don't care if Fixit Clinics kind of bifurcate into two areas. . . . Honestly, if it ends up being kind of like a synagogue on Saturday morning, that may be okay."

Mui has reconciled his ambivalence toward gendered divisions by trying to recruit female volunteers at hackerspaces and the like. From his group of ten female volunteers, he managed to enroll two who were capable of electronics repair, a reasonable ratio relative to other repair groups. Echoing Mui, Postma attributes gendered distinctions to what she terms "tradition": "The tradition that men like electricity or men like technique and women, well, like smaller chores like mending clothes—that's more the traditional aspect that I refer to. . . . I think that is just the fact. Not my idea."

Much like Mui's reference to "women" at the sewing table ("that's what they

Figure 5 The sewing table: Fixit Clinic coach E. helps women clean the inside of their sewing machines at the Albany Community Center in Albany, California, on March 10, 2013. Photograph by Daniela K. Rosner

are"), Postma seems to naturalize gendered divisions of labor, describing such distinctions as "just the fact." This interpretation differs from Nafus's (2012: 677) description of female programmers in open-source communities, wherein women tended to "diminish the realness of gender." While Postma views gender as very real, she does not appear to hold herself accountable for the reproduction of gendered norms and does little to explore its possibility for change. She is concerned, instead, with the enactment of gender to the extent that it limits the diversity of participation: ensuring that a diversity of people is able to attend and benefit from their repair events. She seems to understand the binary performance of gender as an immutable and mundane fact of life, complicating an understanding of identity as enacted in and through practice (Butler 1990).

One exception to this general acceptance of gendered divisions is Janet Gunter, a cofounder and organizer of the London Restart Project. As part of this work, she actively attempted to recruit technical female volunteers but found the female tech industry impenetrable, as she explained: "I don't have a technical background,

but I've been to a number of events trying to recruit women. A lot of these events for women and tech I find really—the 'lean in' thing: 'Let's all become powerful and successful!' And I feel uncomfortable even standing up in that environment" ("Reclaiming Repair" workshop, Conference on Human-Factors in Computing Systems [CHI], Paris, France, April 28, 2013).

Gunter recognizes an incompatibility between her activist views and those of the female hackers she meets at technology events. She associates their desire for power with *Lean In* (Sandberg 2013), the recent best-selling self-help book by Facebook's CEO, Sheryl Sandberg. In making this link, Gunter problematizes recent attempts to assign social qualities often associated with masculinity to women, qualities such as corporate drive and aggression. This view resonates with Nafus's (2012: 679, 680) recognition of the "pushyocracy" among open-source coders, wherein a pushyocracy, in contrast to a meritocracy, requires women to put up with or contribute to aggressive discussion, or "flame wars," as a means of advancement. Nafus describes this process as a gendering of success metrics, a performance of liberal hacker ideas of self-sufficiency and freedom that appear—similar to Gunter's struggle to recruit technical female volunteers—less fluid than has been depicted in prior work (i.e., see Coleman and Golub 2008; Nafus 2012: 677). Gunter's struggle to recruit technical female volunteers was similarly revealing of the rigidity of gendered conditions.

While Nafus's argument has some continuity with the practices of organizers at repair events, Gunter's description of female technicians suggests something more: a discomfort with the universalizing language around female empowerment. In her view, masculine labor conditions challenge the assumption that all women desire the same form of success. Indeed, though female volunteers are less technically confident in their repair skills, tending to ask for help rather than exchanging skills, they often take pride in their ability to facilitate repair. Citing her experience teaching, E. feels self-assured in her ability to make participants feel comfortable with their repair work, even when such social contributions to repair are invisible or misdiagnosed. While working with a male participant, for instance, I once overhead someone call us "lovebirds." Our collaboration was not primarily associated with the work of repair, rendering my contribution to the work null. One Restart Project participant put this succinctly when she explained to me at a repair event, "Public crafting is a lot like breast feeding." Craft competencies, like women's work, are not meant to be seen. Mirroring Tronto's (1987) discussion of the ethic of care, women's roles in repair activities became devalued when their work was associated with less perceptible skills.

We thus find different modes of gendering take hold within and through repair

activity. Postma's position at the helm of the Repair Café initiative challenges male hierarchies of repair reinforced by Mui and Skinner. Yet her work is not unproblematic. Her depiction of gender as fixed and natural removes any sense of female agency, denying possibilities to refigure the social or organizational structure of the Repair Café. Further, her position as an organizer rather than a "doer" (Nafus 2012: 676) parallels Gelber's (1997: 99) description of the 1950s "honeydew," or "honey-do," syndrome, in which women cemented their role as marginal to repair but central to ordering their husbands about ("honey do this, honey do that"). Though Gunter is also positioned as peripheral to the work of repair, her performance of gender is more nuanced. Her founding role in the London Restart Project gives her a political platform with which to contest the opposition of gendered competencies. As such, she views her work as part of a political process of what she terms "post growth," changing how she and others behave with regard to consumerism and the environment.

Remaking Local and Global Citizens

In the remainder of this essay, I consider why and how repair has become something to be politicized and entangled in wider political dialogues. We have so far observed that repair organizers not only extend domestic work to the public sphere; they also politicize it. They use repair practices to instigate transformation—a political "movement." Yet, through this activism, they enact repair as something of an indulgent pastime: a voluntary effort largely limited to the United States and Europe. For example, Mui's and Postma's projects stand in stark contrast to the labor conditions of skilled repair technicians in Kampala, Uganda, where repair workers apply hair-thin beads of solder to intricate circuit boards, as depicted by Lara Houston (2012), or to the e-waste scavengers in Ghana who retrieve spare parts and pieces from secondhand mobile phones, as described by Jenna Burrell (2012). Houston's and Burrell's subjects cannot be typecast as tinkerers (Kelty 2008; Coleman 2011) or *bricoleurs* (those who make use of tools and materials at hand) (Turkle and Papert 1990). Their imagery resists any reading of repair as hobbyist hacking or environmentalist activism. Their projects, instead, suggest a dystopian disparity: between forms of necessitated labor brought on by changing technological landscapes and the voluntary tinkering presented by "global" appeals to repair. How did Postma and Mui come full circle to repair but at the same time enact its value so differently? Why should repair be politically mobilized and situated within activist projects of environmental and pedagogical change?

In confronting these questions, I turn to what distinguishes the work of repair organizers in these groups from members of hackerspaces, Fab Labs, and the like. Members of repair groups do certain work to configure their participants (Oudshoorn, Rommes, and Stienstra 2004) and thus the public at large. The kind of participation they seek is reminiscent of Nelly Oudshoorn, Els Rommes, and Marcelle Stienstra's discussion of "design for all," wherein software designers attempt to support egalitarian participation yet ultimately inscribe their software with masculine values. In their processes of "I-methodology" and "configuring the user as 'everybody' " they identify "important constraints in the development of technologies that aim to reach users in all their diversity" (ibid.: 33). From Madeline Akrich (1995), Oudshoorn, Rommes, and Stienstra (2004: 41) conceptualize the I-methodology as the process of imagining the user in the image of the designer, making use of the designer's personal experience. In this view, Postma's attempt to, as she said, "add something to the world" by designing a global initiative reflects her background covering environmental politics through international journalism. Similarly, Mui's efforts to engage the "precocious" middle schooler by crafting a program for educational reform involve an attempt to replicate his experience as a young male *bricoleur.*

Though their efforts to configure participants align, organizers' precise goals remain distinct. The Repair Café, initially sanctioned by the Dutch government, posits equality among participants, serving all citizens in the same ways. As Postma explains: "[Necessity] can be a motivation to come to the Repair Café, but for us it's not a goal. It's not for poor people, as far as I'm concerned. I think repair is for everyone and not only people who don't have the money to buy something new. So it's very good if people come to the Repair Café if they don't have money, but I would not focus [on that] especially."

Postma welcomes underprivileged participants but emphasizes first and foremost a broad cultural agenda for social and environmental reform. Mui, by contrast, views his work as tailored to particular community members' needs and wonders if, over time, he might want to shift more of his focus to "people who really can't afford to replace the item." Each organizer faces distinct concerns for civic duty at a local level, but their perceived duties are shaped by globally defined democratic ideals and their cultural stakes.

Repair, in this sense, reveals an apparent gap between US and Dutch national character, raising questions about what civic identity and "citizenship" as a common theme might mean. Due to its claims to legal authority, *citizenship* is a highly politicized concept that has been problematized by a wide range of scholars, including urbanists and cultural anthropologists (see Appadurai and Holston

1999; Appadurai 2003; Rosaldo 1994). Legal definitions pose *citizenship* as a designation of whether an individual "is or is not a citizen and where all citizens should receive equal treatment and enjoy" (Rosaldo 1994: 402). Other formulations turn away from individual social contracts associated with a nation-state and toward concerns for group membership and political identification based on ethnicity, geography, or environment (Purcell 2003; Walzer 1989). They characterize citizenship by membership in a political community.

In public sites of repair, members' conceptions of citizenship appear grounded in concerns for egalitarian group membership: they believe that society must include a diversity of people and no one group should be allowed to dictate another group's sense for what constitutes well-being (see Rosaldo 1994: 410). These sites expose a pervading notion of *cultural citizenship*, as discussed by Renato Rosaldo (1994: 402), wherein members believe in "the right to be different and to belong in a participatory democratic sense." Cultural citizenship proposes that, as Rosaldo (1994: 402) explains, "in a democracy, social justice calls for equity among all citizens, even when such differences as race, religion, class, gender, or sexual orientation potentially could be used to make certain people less equal or inferior to others." By articulating democratic ideals that conflict with members' intersecting social identities, such claims to citizenship trouble the parochial development of technical competencies and their gendered frames.

Conclusion

Within public sites of repair, participants not only inhabit a distributed space—dispersed among libraries, museums, Facebook accounts, and Google Hangouts—but they also inhabit a practice and the way of life it represents. Even as they find new ways to broaden and advance technological and sustainable opportunities, repair events turn participants toward traditional gender relations and age-old modes of hands-on production. Returning to Jackson's (forthcoming) formulation of "broken world thinking," repair is figured both as a way of interrogating a "maker ethos" through the ongoing reinvention and readjustment of technologies and as a mode of recognizing frailty and that which is on the brink of collapse. This stance enables repair organizers, coaches, and volunteers to complicate gender politics and forms of material practice through claims to progress and global responsibility.

This essay has attempted to present the work of repair as a political problem, emerging at local and global levels. As such, it has taken the politics of repair as a frame within which to consider different ways of articulating technologi-

cal practices and their subjects. Drawing out examples of politics-in-the-making, both small and large, I have attempted to paint a vivid picture of the tightly bound character of repair events. Within public sites of repair, engineering and craft are intertwined yet always in tension: they do not sit comfortably side by side but are woven into the same networks of cultural production. In the fashioning of political interests through domestic leisure pursuits, such sites expose the entangled nature of gender politics and technological development, realigning their cultural stakes. Repair becomes an active agent, changing the costs of performing gender relations in relation to technical skill sets.

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