Theaters of Alternative Industry: Hobbyist Repair Collectives and the Legacy of the 1960s American Counterculture

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Abstract This chapter describes initial results from an ethnographic study of design and engineering engagements in community-operated sites at which hobbyists mend and repair mass-produced goods. We conducted participant observation at seven repair events and two collectives in the San Francisco Bay area where consumer electronics are reassembled, and spoke with approximately eighty repair practitioners. Here we describe surprising connections between repair and social movements that, in turn, reveal deep ties between contemporary hobbyist repair and countercultural design practices of the 1960s. These links, we argue, open new and important areas for design research.

1 Introduction

Errors, omissions, and failures underlie almost everything we do. Our cell phones inevitably break, our software becomes outdated, and our appliances wear out. In response, we fix and maintain what we already have; we upgrade our software and replace broken parts, often in highly creative ways. For example, bookbinders have both restored and transformed books for centuries (Rosner 2012). Likewise, hobbyists have used broken artifacts to spur design innovation (Tanenbaum et al. 2013). One has turned over-wound alarm clocks into a guitar amp (Repplon 2008); another has converted a broken desk lamp into a sleek iPhone stand (Ikeahackers 2012). In each case, the breakdown of one technology created an occasion for making something entirely new.

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Still, breakage and repair tend to be overlooked as important sources of technology design and innovation. We conceptualize repair as the process of sustaining, managing, and repurposing technology in order to cope with attrition and regressive change. Building on our prior investigations of countercultural and hobbyist design movements (Turner 2006, 2009a, b; Rosner and Bean 2009; Rosner 2013, 2014) and a growing body of scholarship on repair (Henke 1999; Jackson et al. 2012; Jackson 2013; Orr 1996; Rosner and Taylor 2011; Suchman 1987), we have conducted a detailed ethnographic study of repair collectives in the San Francisco Bay area. This study has revealed unexpected and surprisingly extensive ties between the repair and redesign of industrial technologies and the ideological legacy of the counterculture. By exploring those legacies here, we hope to show two things: first, that repair, like innovation, is an integral part of the process of technological design and development, and second, that the ideals of the counterculture continue to shape design practices in the San Francisco Bay area, and potentially, far beyond it.

1.1 Why Study Repair? And Why Study Hobbyists?

The study of repair cultures grows out of a body of research in science and technology studies focused on the social contexts of innovation and technology use, particularly in the case of information technology. A small but vibrant ethnographic tradition has emerged around the study of everyday maintenance. For instance, Lucy Suchman, Julian Orr and colleagues have turned to the lives of photocopy machine repair workers to illuminate the limitations of codifying maintenance techniques (Suchman 1987; Orr 1996). Orr's influential accounts of individual diagnoses of machine malfunctions have exposed skilled service work as "necessarily improvised, at least in diagnosis, and centered on the creation and maintenance of control and understanding" (Orr 1996, p. 161). Orr has shown how repair workers not only use manuals and codified organizational knowledge, but also rely on the retelling of "war stories"—personal accounts from the field often shared over lunch or informal meetings. As Orr's work suggests, every repair activity involves situated actions whose intent, in Suchman's terms, "must be contingent on the circumstantial and interactional particulars of actual situations" (Suchman 1987, p. 186).

Beyond IT development, analysts have focused on maintenance work to reconsider features of building reconstruction (Brand 1994), vehicle repair (Crawford 2010; 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). Other studies have considered mending conversational breakdowns as a critical form of repair, as in Garfinkel's (1967) experiments designed to break social norms in order to study how people respond and restore common understandings. Others have studied the arcana of free software through the continuously rewritten fabric of the Internet (Kelty 2008). Most recently, Jackson et al. (2012) has traveled to Namibia to explore

IT repair cultures where programmatic interventions create policy barriers and problems of control that complicate local repair efforts.

Together this scholarship has introduced two views of repair. On the one hand, it has demonstrated a largely unacknowledged connection between repair work and creativity. It has also illustrated how repair leads to different ways of understanding technological change, particularly when reuse and maintenance become necessary (Burrell 2012; Jackson et al. 2012). On the other hand, this work has pointed to a broader blurring of boundaries between leisure and professional labor of which repair is an integral part (Crawford 2010; Sennett 2008). The cases presented in this chapter begin to broaden these perspectives by illustrating what happens when the forms of creativity and labor that arise from repair become entangled with 1960s countercultural ideologies, especially when such ideologies get embedded in contemporary hobbyist design movements and high-technology industries.

Given our emphasis on repair as it relates to design innovation, it might seem more sensible to study professional repair workers rather than hobbyists. Yet, we've found that in many cases, it is hobbyists doing the innovating. Just outside the institutional walls of design consultancies and corporations, a growing number of makers are extending and defying conventional notions of creative production. Whether we call them "geeks," "makers," or "hackers," a new generation of amateur technologists and designers has emerged (Kelty 2008: 35). Moreover, while we often think of repair work as organized by professionals in factories, fabrication labs, and other sites of material experimentation, in these settings we see repair organized by particular interest groups and communication media. Repair activities coalesce around mailing lists and Twitter feeds, hacker spaces and fair grounds, often inspired by a do-it-yourself ethos. Their interests are well represented in the mass media too, especially in *Make* magazine. As Faith Levin and Cortney Heimeri have shown in the film and book *Handmade Nation* (2008), this "new generation" of amateur makers celebrates different facets of everyday creative work. From building circuitry and upgrading software to fashioning shoes and screen-prints, Levin and Heimeri show that makers "are reshaping how people consume and interpret the handmade" (Levin and Heimerl 2008: xi).

1.2 Research Methods

Several overarching questions have guided our study:

1. What are the range of practices, technologies and programs that support or subvert specific repair activities? How do these practices evolve over time?
2. What role does background knowledge of design practice play in makers' repair work? Conversely, how does repair work shape makers' other design practices?
3. What resources do fixers rely on to produce or police the social and technical resources necessary for repair? What adjustments do fixers make in different repair situations?

In order to investigate these questions we took a qualitative, ethnographic approach.[1] We began the study by observing fixers' practices in their own environments and documenting them through a combination of video, audio, photos, and field notes. We participated in and observed a range of repair and maker collectives in the San Francisco Bay area, including an annual convention of Macworld, the East Bay Mini Maker Faire, the San Mateo Maker Faire, and meetings of the Dorkbot collective, a loosely affiliated group of artists, inventors, designers, and engineers. We engaged in informal conversations at these events with roughly 60 participants.

We complemented our ethnographic work with extensive formal interviews with 20 participants whose repair activities have critically informed the development and maintenance of contemporary repair movements. Our interviewees included leaders of pop-up repair groups such as the Fixit Clinic and the Repair Café, participants in public repair workshops and nonprofit collectives with strong links to community-operated workspaces for electronics tinkering, and organizers of related technology development endeavors such as Partimus and the Flaming Lotus Girls. Lastly, we conducted in-depth research in the Fixit Clinic and Repair Café's online archives and in individual participants' collections of artifacts and writings.

2 What We've Learned So Far

Our initial research has revealed a surprising connection between repair work and social movements associated with environmentalism and sustainability. We began our work focusing on the interactions of hobbyists with particular devices, with the assumption that design innovations would emerge out of interactions between the makers and the technologies with which they worked. But we soon saw that our subjects had taken up the practice of repair within a rich conceptual and even political framework. Participants believe that their acts of repair constitute interventions in large-scale social processes and that they can have effects far beyond their local setting.

[1] Qualitative methods characterize causal processes, recognize new phenomena, present auxiliary evidence for existing hypotheses, and identify counterexamples (Burrell and Toyama 2009). Unlike statistical methods, qualitative methods are good at pinpointing what about people's lived experiences of repair is important and why (Bauer and Gaskell 2000). Through long-term observation and interviews we can examine why people choose to repair some possessions and discard others, and how certain artifacts achieve heirloom status. We cannot make representative claims, test hypotheses, reveal trends, or answer questions of how often and how much — aims that qualitative methods are ill-suited to address. Instead, we seek to produce "observable-reportable" (Garfinkel and Sacks 1970: 342) understandings of the practical (and practiced) work of repair.

This ideological framework represents a blending of the legacy of the counterculture of the 1960s (Turner 2006, 2009b) and of the practices traditionally found in craft communities (Rosner 2012, 2014). More specifically, it echoes a design ideology that permeated the New Communalist wing of the American counterculture: Buckminster Fuller's "comprehensive design" (Turner 2009b). First articulated in a 1949 essay that was reprinted and widely circulated in Fuller's 1963 volume *Ideas and Integrities*, the doctrine of comprehensive design solved a problem for the young adults of the 1960s. To the post-war generation, technology presented two very different faces. On the one hand, large-scale military technologies such as fighter planes and aircraft carriers and above all, the atomic bomb, threatened to destroy the planet. On the other hand, consumer technologies produced by the same military industrial complex such as transistor radios and automobiles and even LSD, provided extraordinary individual freedom and personal satisfaction. To the young longhairs of the counterculture, a question hung in the air: How could a person embrace small-scale technologies and at the same time, turn away from mass industrial processes and the threat of war?

Buckminster Fuller offered an answer. Technology itself was not the problem, he explained. On the contrary, the problem was one of design and resource allocation. Too many of the world's natural and technological resources were concentrated in military hands, he said. Yet, independent individuals could act to reshape the world system by taking the technologies developed in the industrial sphere and putting them to work in their own lives, on behalf of a more egalitarian way of living. In short, they could become "comprehensive designers" of their own lives, and of a better world (Fuller 1963: 173). Between 1966 and 1973, thousands of young counterculturalists took up Fuller's vision. They built geodesic domes on the plains of Colorado out of old car tops and transformed industrial plastic sheeting into windows on everything from houses to cribs. They saw their work as simultaneously material and symbolic. By repurposing the products of industry, they would remake their own lives and show others how to change the world.

2.1 Comprehensive Design and Repair

In many ways, today's repair practitioners are following in the New Communalists' footsteps. To see how, consider the case of artist and activist Miriam Dym. In December of 2011, she founded *Dym Products*, an eccentric enterprise dedicated to celebrating (and questioning) re-use and repair. The business came to life in a series of unusual and largely unviable product design initiatives bearing such names as the *Suboptimal Object Project* (a collection of abject, incomplete works), the *Logo Removal Service* (a service for replacing logos on tee-shirts, hats and bags with colorful textile shapes and contrasting stitching), and the *Infinite Stripes Project* (an upcoming performance of continually painted stripes on fabric).

Dym developed each project to explore the relation between meditative, considered craftsmanship and strained manual labor, and did so in several ways.

By including half-spun baskets and an incomplete set of lamps in the *Suboptimal Object Project*, she drew links between the well-made and the unprofessional. While preparing to dye endless stripes on old upholstery and other used fabrics for the upcoming *Infinite Stripes Project*, she troubled notions of domesticity, manual labor, and convenience ("a bit of a joke on buying a painting to match your couch," she explained). Dym described the *Suboptimal Object* and *Infinite Stripes* projects as both art (e.g., painting) and utilitarian (e.g., textiles), a framing she used to unsettle longstanding distinctions between the two production processes and raise questions around the visibility of manual labor.

The *Logo Removal Service*, on the other hand, served to challenge the aesthetics of branding, a slightly different political project. Low on clothing, Dym was delighted when a friend gave her an extra tee shirt from the launch of a local start-up. She wore the shirt and visually appealing logo until reactions to the shirt began to change. The company took off, and the logo became instantly recognizable, leaving Dym feeling rather uncomfortable: "I didn't have a strong enough opinion to back up the claim I had across my chest" ("*Logo Removal Service*," 2013). To preserve the utility of the shirt, but remove the corporate affiliation, Dym cut out a shape around the logo, and replaced it with a scrap of colorful fabric. "That new shape held something in a way than an abstract shape can," she explained (Dym 2013). It held a critique, both of the aesthetics of branding and the process that would someday lead the fabric to the landfill and pave the way for obsolescence.

Dym believed that mass produced goods could help people imagine a more human manufacturing scale. While stitching her son's tattered jeans at an exhibition of her repair work, Dym commented on the irony of being a middle-class woman with three Ivy League degrees willing to spend hours mending her son's cheaply produced H&M trousers. She described the resulting mend as of higher quality than the original manufacturing job: "It's a kind of statement about expensive labor provisionally fixing something made cheaply" (Dym 2013). In manipulating a mass-produced object and highlighting her intervention in brightly colored thread, she slowed down the production process to draw attention to the artistry and manual labor with which it was made. She felt that by reducing the production volume in favor of what is produced, people could become accustomed to repairing or repurposing what they have.

In this regard, Dym's repair work echoed the practices of the 1960s New Communalists. Like them, she worked to transform the products of a mass-industrial production system into tools for personal and collective transformation. Unlike them, however, she also blended concerns for visual aesthetics with the idiosyncrasy of "expensive labor." She even posited repair as an entrepreneurial interest as well as a conceptual framework for her artistic practice. She explained, "I feel like if I'm going to be in business I need to acknowledge the mass production. And if I'm going to be an artist I need to acknowledge the mass production *and* I need to try to compete with machines in the way that chess players compete with an IBM machine… So it's completely quixotic" (Dym 2013). To compete with machines meant trying to "become the factory," a project without end and without

direct practical impact. Dym's material interventions produced a paradox of time and material investment that transformed the work of repair into something commercially less-than-effective but symbolically powerful.

Though it may seem odd that a woman would want to challenge the global economic system by stitching her child's pants, Dym's ideas were not new to California, nor even the surrounding art world. In fact, it was during the 1998 Los Angeles MOCA exhibition "Out of Action: Between Performance and the Object, 1949–1979," that Dym discovered the elusive power of public-facing performance art, work that integrated object production with a political agenda. Struck by how effectively a performance could convey a political message through subtle, often indirect means, Dym began shifting her art practice toward the performative—and in the late 1990s she decided to stop throwing things away. Following process artists of the 1960s and 1970s, she celebrated the beauty of waste by composting orange peels and stitching old shoes.

Yet, this philosophy of activism was not identical to what had come before. Dym described herself as the descendant of those who took to the communes 40 years ago and as what she called a "proto-hippie": "Someone who's a hippie now, and not a hippie like it was in the 1970s. They know about marketing and have a website ... availing themselves with the latest technologies, they weren't trying to go back to the farm to change the world" (Dym 2013). Dym saw her efforts to interact and engage with the public as an entrepreneurial and environmental act. In building a business around dying and stitching, she critiqued industrial processes of planned obsolescence and made these arguments known to the world at large. As we will see in other pop-up sites for repair, it is in this semiotic, ritualized display that practitioners orient repair toward a countercultural conceptual framework for social change.

2.2 Beyond the Individual: Repair as Conceptual Framework

As a practitioner invested in the meeting of art and engineering through repair, Dym embodied a philosophy shared by many actively participating in what we call public sites of facilitated repair. These sites include "pop-up" events like the Fixit Clinic and Repair Café in which repair-savvy volunteers help local residents disassemble and fix their broken things: toasters that no longer heat, iPhones with shattered screens, and electronic games that cease to play. Since 2009, the events have occurred at museums, libraries, community centers, and the like, roughly once a month in the San Francisco Bay area. They engage people in repair at no cost, though visitors can sometimes offer a donation.

We first saw links between repair and the politics of sustainability in the East Bay Fixit Clinic and neighboring hackerspaces such as Noisebridge, a community-operated workspace in the San Francisco Mission District, where activities focused on motivating reuse through electronics tinkering. Members raised questions of electronic waste ("e-waste") in particular. They wondered how devices should

persist as they became no longer usable, serviceable, trendy or desirable. Their questions framed and sometimes motivated volunteers in their repair efforts. At a meeting of the Post-Waste Nexus, a collective launched at Noisebridge, members discussed their project as "techno-activism," circumvention through consensus decision-making to promote the re-use of broken and abandoned hard drives, cell phones and the like. For Chris Witt, a Fixit Clinic volunteer, participation at the Fixit Clinic was part of "being nice to the world that give us life." It makes more sense, he explained, "to fix or alter or somehow reengineer an existing resource than it does to chop down a whole new resource and mine it and create all the toxic—in all the senses of the word—aftereffects or side effects that come with new construction. It makes more sense to me to use what we've got instead of throwing it away and creating a new one" (Witt 2012). For his part, Witt saw the work of repair as advancing environmental stewardship in addition to fostering an alternative relationship with the factory floor.

Yet, the Fixit Clinic organizers were initially skeptical of their interventions. As Peter Mui, the founder of the Fixit Clinic explained, "the first time we had one [a Fixit Clinic] I thought we'd have a big pile of e-waste in the corner" (Mui 2012). Yet, no such pile emerged. Instead, volunteers helped participants replace fused and bonded batteries in electronic toothbrushes and oil sewing machine gears. As trained and amateur engineers, they saw their work to repair and tinker with electronics as par for the course—or as Mui explained, "I personally don't know anybody who became a maker who wasn't a fixer first." ("Open Make @ The Hall: Cities 1/19/2013," Google+ video, 2013). The Fixit Clinic provided a means for members of the public to unearth how designers and engineers have contributed to the world by making the products they use on an everyday basis and prompting them to figure out how engineers achieved what they set out to make. The volunteers viewed repair, in this sense, as an integral part of industrial design and engineering.

Yet, for the volunteers, returning functionality to devices also did something more. It saved the devices from the landfill and minimized motivations for further consumption, which could eventually lead to more waste. To do this, they used their own tools and supplies as well as digital resources: online hobby shops such as iFixit.com that distribute tools, parts, and video instructions for fixing consumer electronics from the web. Using these physical materials and online resources, the volunteers searched for spare parts, identified the requisite instruction manuals, and dove into repairs. Their work made new purchases less necessary by offloading some of the purchasing (or "conspicuous" consumption) on the hunt for replacement parts.

As the repair efforts of the Fixit Clinic and the Repair Café sent people home with working devices, they received new attention from an international community concerned with ecological waste. Traces of success circulating on dedicated websites and social media outlets like Facebook and Twitter enabled pundits and media outlets to follow fixing events on the ground. As Peter Skinner, the founder of the Palo Alto Repair Café, noted, "it was more about being part of this global network. I got contacted from New Zealand asking about starting one of these, and

someone up in Calgary. And other people locally about how to kick off something like this. I don't know what they found on our website... but it's nice to be part of this larger [movement]" (Skinner 2013).

In addition to connecting engineering and art practice, Mui saw his Clinic as a call for social change:

> I really want to demystify science and technology. And my alternate surreptitious goal is that I'm hoping at some point we'll be able to make better policy choices as a society. And so the classic example I give is, and it may be apocryphal: In Japan right now, if you buy and you make an appliance, the manufacturer of the appliance you're getting rid of has to come to your house and remove it and recycle it properly. So they truly have cradle-to-grave ownership of the device. It certainly changes their incentives about how they manufacture something. They don't want to get back [the device] prematurely (Mui 2012).

Mui first became interested in repair while doing "goofy things" with his father's train set (Mui 2012). Now however, he believed that tinkering and disassembly could challenge the cultural apparatus of electronic waste and reveal the mechanisms underpinning technical progress. His curiosity had become political and he hoped that his repair work would serve as an example for others.

3 Repair as a Social Movement: Insights for Design Researchers

Beyond device-level design, we found the extent to which the Fixit Clinic and the Repair Café participants connected their repair practices back to social movements rather striking. For many, repair was not only appealing as a manual process of manipulating wires and screws, but also as a mode of political action. In that sense, we believe that the amateur repair communities offer a powerful reminder that design is shaped by historical forces that swirl far beyond the interactions of designers and their materials. In this case, we saw repair workers such as Miriam Dym turning the products of global industry into displays of potential alternatives to that industry. Like the New Communalists of the 1960s, Dym and her cohort are actively seeking to redesign not only goods, but their lives. In the process, they too hope to rebalance political and ecological forces they believe have gone out of whack. The work itself matters only in small part for the goods it produces. It matters much more as a performance of an alternative mode of industry and a more person-centered way of life.

At the same time, unlike the New Communalists, today's repair workers are not heading back to the land. On the contrary, they are creating temporary arenas in which to gather and work together. Like the communes, these clinics are in some sense cities on a hill. They are meant to demonstrate the power of creative re-manufacturing to change the world—here and now for the moment, but over time perhaps, everywhere. They are in fact theaters of alternative industry.

What then is likely to become of their performances? In the 1960s, the New Communalists failed to transform the American political landscape. Yet, they went

a long way toward helping Americans re-imagine design as a simultaneously material and political practice. Today's makers and fixers are once again asking critical social questions: How can devices become the centers not only of individual creativity, but egalitarian community? How can designers help make not only things but whole societies work better? What role should aesthetics play in shaping collective action? And what roles should our collective ideals play in shaping our designs?

It's too early to tell if the citizens of the Fixit Clinics and repair collectives will succeed in answering these questions. For now however, we are confident that participants have gained a new awareness of the political potential of small-scale design by tinkering with industrial devices. They have also begun, however quietly, to integrate the contemporary work of design and engineering into the San Francisco's Bay area's longstanding pursuit of social change.

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