

BUILDING ACCESS

Universal Design and the
Politics of Disability

Aimi Hamraie



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Chapter 4

Sloped Technoscience

Curb Cuts, Critical Frictions, and Disability (Maker) Cultures

Responsibility flows out of cuts that bind.

—KAREN BARAD, “Intra-actions”

In the late 1960s, disability activists and their allies drove around Berkeley, California, under dark of night, smashing sidewalks with sledgehammers and pouring new curb cuts with bags of cement or asphalt—or so the rumor goes.¹ While those allegedly involved describe the circumstances surrounding activist curb cuts as far more mundane, heroic stories about sledgehammer-wielding activists have taken shape as the primal scenes of U.S. disability activism, securing the movement’s place within the broader memory of civil rights–era direct action and portraying disability as a social and cultural rather than medical category (Figure 4.1). These stories have, in turn, shaped the national narrative about disability rights and U.S. citizenship. The Smithsonian’s National Museum of American History in Washington, D.C., for instance, houses in its permanent collections a concrete fragment from an activist-made curb cut in Denver, Colorado, from 1978 (Figure 4.2). At their core, artifacts and narratives of activist curb-cutting express the central ideas of the 1960s and ’70s independent living movement, through which disabled people rejected their status as objects of knowledge for rehabilitation professionals and architects, asserting disability as a kind of expert knowledge and critical making.² When disabled people enact politics, these narratives suggest, they also design and build new worlds.

“The social life of city sidewalks,” wrote Jane Jacobs in 1961, “is precisely that they are public.”³ The curb cut is often understood as a post–World War II technology of barrier-free design, a design feature enabling access to the public sidewalk. Accordingly, the curb cut has also served as a storytelling device in liberal narratives of inclusion and good design. In 1946 lawyer Jack H. Fisher wrote to the mayor of Kalamazoo, Michigan, arguing that curb cuts and ramps “were instrumental in allowing disabled veterans, disabled non-veterans, aged and infirm persons and mothers with baby carriages more freedom of movement.”⁴ Productive disabled citizenship



Figure 4.1. Flat sidewalks and curb cut at the corner of Dwight and Dana, an alleged site of DIY curb cuts, in the present day. Photograph by author.

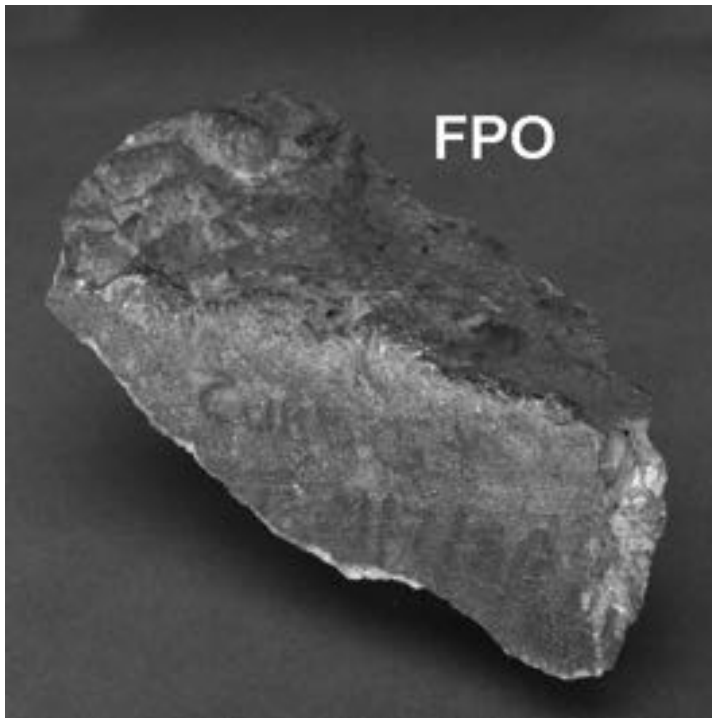


Figure 4.2. A fragment of a concrete sidewalk, which disability activists in Denver smashed as part of a protest in 1978. Courtesy of National Museum of American History, Smithsonian Institution, Division of Medicine and Science.

and the liberal narrative surrounding it were central to these particular user categories and the stories they told. Fisher continued:

These cement ramps in many instances mean the difference between disabled veterans and disabled non-veterans having employment, as with the ramps a person confined to a wheel chair, on crutches or wearing an artificial limb is able to get to a place of employment unaided. The ramps thus enable many so called unemployable persons to become employable persons, and not only benefits the disabled person alone, but benefits the community at large as well.⁵

To suggest that curb cuts reflect the idea that accessibility benefits everyone requires accepting that the universe of users encompasses particular, legible forms. While curb cuts would not appear in most U.S. cities until the 1970s, Fisher's assertion that these features would increase employment for disabled veterans and have added value for others resonates with the claims of rehabilitation experts that barrier-free design benefits "all." Reinforcing the nondisabled, normate status of the "community," Fisher's explanation presents as fact that "everyone" benefits from the curb cut, a fact that dematerializes the racialized, gendered, and classed dimensions of difference—even within the category of disability. And even within the category of disability, this story obscures the diverse physical, sensory, and mental access needs of different disabled users. Much like disability activists' political claims that "every body needs equal access" (Figure 4.3), claims that "everyone" benefits from curb cuts are historically materialized conditions of legibility and illegibility.

Materiality is messy, but the optics of concrete can be misleading. On the surface of Berkeley's streets, curb cuts appeared to materialize en masse after 1973, following high-profile acts of Congress that provided a political mandate and government funding.⁶ A year earlier, however, in 1972, the city of Berkeley adopted an official mandate to install curb cuts at every corner—a major victory that symbolized disabled peoples' legibility as users.⁷ Once integrated into the urban fabric, the curb cut became a material device for securing the place of disability in public space, as well as a metaphor for the smooth integration of misfit users into social, economic, and material life. Yet this victory erased any physical evidence of guerrilla curb-cutting and other crip interventions into the social life of Berkeley's sidewalks. By repaving Berkeley's sidewalks, the official curb cuts rewrote the history and theory of curb cutting.

Reproduced for nearly a century, the liberal curb cut narrative has become a quintessential explanatory device for the claim that accessibility benefits "everyone." As disability rights leader Ed Roberts framed it in the early 1990s,

We secured the first curb cut in the country; it was at the corner of Bancroft and Telegraph Avenue. When we first talked to legislators about the issue, they told us, "Curb cuts, why do you need curb cuts? We never see people with disabilities out on the



Figure 4.3. Disability activists used the term “everybody” strategically. Here, a protester holds a sign that says “Every Body Needs Equal Access.” Raymond Lifchez and Barbara Winslow, *Design for Independent Living: The Environment and Physically Disabled People* (Berkeley: University of California Press, 1979), 10. Courtesy of Raymond Lifchez.

streets. Who is going to use them?” They didn’t understand that their reasoning was circular. When curb cuts were put in, they discovered that access for disabled people benefit[s] many others as well. For instance, people pushing strollers use curb cuts, as do people on bikes and elderly people who can’t lift their legs so high. So many people benefit from this accommodation. This is what the concept of universal design is all about. Now Berkeley is a very accessible city. We [people with disabilities] are visible in the community because we can get around everywhere fairly easily. . . . I look around, and I notice that a lot of us are getting gray. As we get older, we realize that disability is just a part of life. Anyone can join our group at any point in life. In this way, the disability rights movement doesn’t discriminate. So those of us who are temporarily able-bodied and working for access and accommodation now get older, and the changes they make will benefit them as well.⁸

Much like the barrier-free design regime that framed accessibility through its benefits for “all,” Roberts’s narrative of curb cuts as benefiting “everyone” or “many people” reproduces an often-told story about accessible design and disability. In this story, the curb cut’s treatment as a metaphor, historical object, and material frame represents the values of unmarked assimilation into public space and promotes a notion of disability identity and community as indiscriminate, uniform, and united in its goals and needs.⁹ Far from neutralizing the curb cut’s symbolic and material work, however, these valences suggest that the foundational objects and origin stories of the independent living movement, of barrier-free design, and of Universal Design contain manifold ways of understanding disability, varied positions on assimilation and resistance, and wide-ranging approaches to access-knowledge. These complexities require unpacking.

Smooth belonging, the crux of the liberal curb cut theory, contrasts with rumors of guerrilla curb-cutting by dark of night to animate one of the central tensions within twentieth-century access-knowledge: the friction between liberal demands for compliance, productivity, and assimilation and radical, anti-assimilationist, and crip methods of knowing-making the world. This chapter historicizes these frictions by tracing the rise of what I term “crip technoscience.”¹⁰ Emerging from within disability cultures and communities, these experimental practices of knowing-making challenged hierarchies and power relations within the field of access-knowledge by shifting expertise to those with lived experiences of disability and away from the outside experts often designing in their name. Unlike most accounts of assistive and adaptive technologies, which focus on conforming the user to its material environment, I argue that curb cuts are politically, materially, and epistemologically adaptive technologies around which two distinct approaches to disability inclusion—liberal, assimilationist positions and crip, anti-assimilationist positions—have cohered.¹¹ Tilting and reconsidering the historical archive of the curb cut and other disability-made technologies, crip technoscience reveals a field of critical labor, friction, leverage, noncompliance, and disorientation that materialized within access-knowledge as a response to dominant medical, scientific, and rehabilitative ways of knowing the user.

THE POLITICS OF SURFACE TEXTURE

Curb cuts (and their close cousins, wheelchair ramps) often signify the notion that disability is a social and environmental construction, produced in the relationship between bodies and built environments, and thus not something innate to the body. Frequently referenced as the “social model” of disability, this idea was central to the regime of knowing-making that I am calling access-knowledge. In the mid-1960s, rehabilitation professionals and medical sociologists developed a notion of “functional limitation” to describe the environmental production of misfit, or the discrepancy between what a body *can* do and what it *ought to* be able to do (by normate

rehabilitation standards).¹² Simultaneously, a growing movement of physically disabled, D/deaf, and blind people challenged the authority of rehabilitation experts and their claims to know disability, offering instead a politicized and cultural understanding of disabled people as resourceful, creative, nonnormative, and interdependent.¹³ Disability activists produced a set of ideas that later influenced an academic theory of the “social model,” which is often taken to argue that disability is a system of disadvantages that societies produce, and not solely embodied pathology.¹⁴ But as disability activists articulated it, the notion of environmentally produced disability was not the social model’s primary contribution. Instead, activists were concerned with creating a new standard of knowledge, offered as an alternative to medicine and rehabilitation. In 1972 the UK-based Union of the Physically Impaired Against Segregation (UPIAS) proclaimed:

We as a Union are not interested in descriptions of how awful it is to be disabled. What we are interested in, are ways of changing our conditions of life, and thus overcoming the disabilities which are imposed on top our physical impairments by the way this society is organised to exclude us. In our view, it is only the actual impairment which we must accept; the additional and totally unnecessary problems caused by the way we are treated are essentially to be overcome and not accepted. We look forward to the day when the army of “experts” on our social and psychological problems can find more productive work.¹⁵

Treating disability as deficit and disqualification, in other words, failed to understand the broader social and cultural contexts of disability, which included lived experiences of oppression and disability communities forged from acceptance of disabled embodiments. This epistemological and political argument appropriated the rehabilitation language of productive citizenship, using it to characterize rehabilitation experts as engaged in the *unproductive* labor of normalization.

As a metaphor for disability’s social construction, the liberal curb cut metaphor often reproduces the rehabilitation notion of body-environment misfit in concert with ideas of equal rights and universal disability. Yet this metaphor says little of the politics of knowing-making disability.¹⁶ For instance, theorists invoke the frictioned dynamic between wheels and stairs to argue, as feminist philosopher Iris Marion Young has, that “moving on wheels is a disadvantage only in a world full of stairs.”¹⁷ Metaphors of “ramping” or curb cutting to a better world suggest overcoming barriers, reorienting values, and achieving broad accessibility through flexible design.¹⁸ Such metaphors circulate beyond architecture in the “electronic curb cut,” a metaphor for built-in accessibility, and even “curb cut feminism,” which explains that everyone benefits from feminism, not only women.¹⁹ Prevalent uses of the curb cut as a metaphor for broad inclusion refer to the historical “fact” of its usability to multiple types of

users, including wheelchair users, cyclists, or people pushing strollers and shopping carts, to emphasize the necessity of unmarked, smooth disability integration into U.S. public space.

Unusual things happen when products are designed to be accessible by people with disabilities. It wasn't long after sidewalks were redesigned to accommodate wheelchair users that the benefits of curb cuts began to be realized by everyone. People pushing strollers, riding on skateboards, using roller-blades, riding bicycles and pushing shopping carts soon began to enjoy the benefits of curb cuts. These facts are good examples of why sidewalks with curb cuts are simply better sidewalks.²⁰

These supposed facts appear as commonsense yet miraculous findings discovered in the process of enacting more inclusive built environments. They attest to the nature of barriers as constructed rather than pregiven. They convey the notion that more thoughtful design can remake the world. Yet, by treating disability as a universal, environmentally produced experience of misfit, curb cut metaphors align more closely with *rehabilitation* models of disability and barrier-free design than with the social model's articulation of disabled peoples' resourceful, interdependent knowing-making as a form of politics.

Like Berkeley's city-sponsored curb cuts, liberal curb cut metaphors pave over the history of crip resistance to the normate template, rehabilitation, and expert logics of environmental knowing-making that guerrilla curb cutting embodied. There is another way to understand the curb cut, however. Illustrating a crip theory of the curb cut, which professes the antinormative work of noncompliant users empowered as makers, Robert McRuer writes,

The chunk of concrete dislodged by crip theorists in the street—simultaneously solid and disintegrated, fixed and displaced . . . marks the will to remake the material world. The curb cut, in turn, marks a necessary openness to the accessible public cultures we might yet inhabit. Crip theory questions—or takes a sledgehammer to—that which has been concretized; it might, consequently, be comprehended as a curb cut into disability studies, and into critical theory more generally.²¹

Curb cutting disrupts, in other words, the concretized status quo through acts of re-materialization. Understood as simultaneously productive and disruptive, cutting and rebuilding, the crip curb cutting narrative suggests that misfitting can be a resource for redesigning not only the *place* of disability in the built world but also our ways of *knowing* disability. Curb cutting, in other words, is crip technoscience.

Seamless, smooth, a cross-cutting plane from point A to point B, paving over physical and attitudinal barriers—these are some of the ways that liberal curb cut theories

understand the materiality of this feature. Liberal curb cuts embody simple, effortless common sense and flexibility. Crip curb cuts, by contrast, are instruments of friction, disruption, and countermaterial rhetoric. They propose access as negotiation, rather than as a resolved, measurable end. Taking curb cuts to signify friction, as opposed to smoothness, has implications for how we understand the strategies and tactics of disability activism. Curb cuts can signify critical labor rather than productive work, explains Eric Dibner, a nondisabled ally of the independent living movement and early ramp designer.

A ramp is a bevel between two elevations. . . . In order to reach something you need location—you might have to move it closer—and ease of operation—it has to turn easily. So you extend it to make it a lever, which gives you greater force and also brings it down closer to you. To me, the ramp is really symbolic, in a way, of how I see proceeding through the system. You're trying to get from point A to point B and you need to figure out how to lever your way—a ramp is a lever—and you need to figure out how to move objects that are blocking your path. . . . People aren't really trying to make a different world; they're just trying to build ramps.²²

Dibner's theory of the ramp as a leverage-producing device references Galileo's notion of ramps as "simple machines" that move objects from one plane to another and thus create a more advantageous mechanics.²³ The operative work of ramps as levers is not an *ease* of use but the generation of *force*. Ramps generate friction and leverage toward particular outcomes or goals. In other words, they materialize politics.

For Galileo, simple machines fell into one of two categories. Frictionless, "ideal" machines required almost no force to set them into motion (relative to what they produced). "Real" machines, however, required some energy to work, producing frictions that reduced their leverage.²⁴ Like the ideal machine, liberal curb cuts are purportedly neutral, smoothing out tensions between users and ramping over the frictioned work of critical knowing-making. Elision, rather than friction, is their surface texture. But apprehending the significance of curb cuts for access-knowledge requires challenging these associations, not because they are inaccurate but because they risk depoliticizing and oversimplifying the material, epistemic, and technological force of designing ramps and curb cuts for disability access.

Crip curb cutting (or ramping) is not assimilation, Dibner seems to suggest, nor does curb cutting remake the world by displacing dominant norms. As a frictioned, leverage-generating device, the curb cut represents noncompliant labor within an existing system, discourse, or built arrangement. As in political struggles for systemic change, critical, interrogative, and "adversarial" design practices leverage material disruption and contention as productive forces.²⁵ In *Slope: Intercept*, designer Sara Hendren captures the "interrogative" work of curb cutting as public noncompliance.²⁶ A series of portable, inexpensively produced plywood ramps can be carried, stacked,

and arranged in urban environments to produce surfaces on which wheelchair users and skateboarders (both urban misfits) can roll, maneuver, and occupy space. The temporary curb cuts require neither productive labor nor assimilation into existing material arrangements, but their presence generates friction and their use multiplies force. *Slope:Intercept* suggests that the political work of curb cuts rests upon the production of friction and disorientation rather than smooth, neutral belonging.²⁷

“Functional estrangement” is a term that critical design theorist Anthony Dunne uses to describe the interrogative work of certain material forms, which can unsettle the user’s experience of the designed world.²⁸ In some respects, critical design resembles so-called empathic simulation exercises, prevalent in rehabilitation education, which enroll nondisabled users in observing impaired experience through temporary use of a wheelchair or blindfold. Often conducted in the name of disability awareness, these exercises presume a user that is normate and open to temporary experiences of estrangement.²⁹ And like the rehabilitation promises that accessibility reduces functional limitation and relieves frictions between bodies and environments, Dunne contrasts functional estrangement with user-centered design, which appears as purely functional and rarely social, interrogative, or agonistic.³⁰ Hence, the critical design theory of functional estrangement takes for granted that disability is a depoliticized experience and that accessibility is a neutral solution to functional limitation.

But power and privilege shape critical design and its means of enactment. My concept of “crip technoscience” takes a different approach, investigating the critical design work of how misfit disabled users, for whom estrangement is already a pervasive experience, draw on the sensibilities of friction and disorientation to enact design politics. Reading the curb cut as crip technoscience centralizes disabled people as critical knowers and makers, extending the work of feminist technoscience scholars, who frame technoscience as an interface between critical ways of knowing and iterative practices of world-making.³¹ Crip technoscience understands ramps and curb cuts as frictioned “real machines,” to use Galileo’s term, often operating in tension with their users, rather than as frictionless, “ideal machines,” integrating seamlessly.

Crip curb cutting is a friction-producing concept through which accessibility materializes “slantedly,” to borrow from Sara Ahmed, through disorienting, tense negotiations of the categories of “knower” and “maker.”³² While disabled people are often imagined as cyborgs with “seamless” relationships to technology, Alison Kafer explains, these relations are often tense, frictioned, and subject to other forms of economic and embodied privilege.³³ Following Kafer, this chapter centers disabled peoples’ “ambivalent relationship to technology,” informed by histories of failure and denials of access, as well as iterative, political design practices.³⁴ Rather than centering assistive technologies that aim to cure or rehabilitate bodies, then, I focus on how disability design and politics co-materialize. If we take a sledgehammer to the seemingly concretized sidewalks of disability rights history, what layered sedimentations of resistance do we find below?

DISABILITY MAKER CULTURES

Ronald Mace half-smiles at the camera (Figure 4.4). He sits in a high-backed hospital wheelchair, one arm in a sling, the other using a tool to tinker with something on the table surface before him. In the background, glimpses of the Central Carolina Convalescent Hospital, where nine-year-old Mace was committed in 1950, are fuzzy but visible. The wheelchair configures him as disabled, a body acted upon in this rehabilitation hospital, but the tool and Mace's gaze suggest that he, too, makes and knows.

Diffuse networks of disabled youth, adults, and their families in the postpolio maker community of the 1940s and '50s practiced "self-help" citizenship, employing do-it-yourself tinkering and engineering to access built environments. Concentrated in white, middle-class communities, for whom the rehabilitation regime sought access to private homes and public universities, the disability maker culture both



Figure 4.4. Ronald Mace tinkering with a tool at the Central Carolina Convalescent Hospital (1950). Courtesy of Joy Weeber.

embraced and resisted the demands of productive spatial citizenship. In “Electric Moms and Quad Drivers,” design historian Bess Williamson captures the postpolio maker community of this era, which designed adaptive technologies as consumer goods and also produced small-scale architectural features such as ramps.³⁵ Through newsletters such as the Ohio-based *Toomey Gazette* (later the *Rehabilitation Gazette*), families shared information gleaned from other sources, including prominent rehabilitation proponents and popular magazines, built their own wheelchairs from spare parts, designed everyday household tools with found materials, and offered techniques for hacking automobiles, beds, and wheelchair ramps (Figure 4.5). One of many postwar disability cultures, the postpolio maker community reflected the white, middle-class norms of the era.³⁶ As Williamson points out, the only people of color apparent in the *Toomey Gazette* were representatives of institutionalized populations.³⁷ Despite opposing institutionalization, Williamson argues, postpolio makers were engaging in “acts of integration, not resistance into the normative roles for men and women of their class and race.”³⁸ Tinkering with homemade tools, automobiles, and the architectures of single-family homes contributed to smoothing out the frictions between physically disabled bodies and compulsory white, middle-class, heteronormative able-bodiedness.

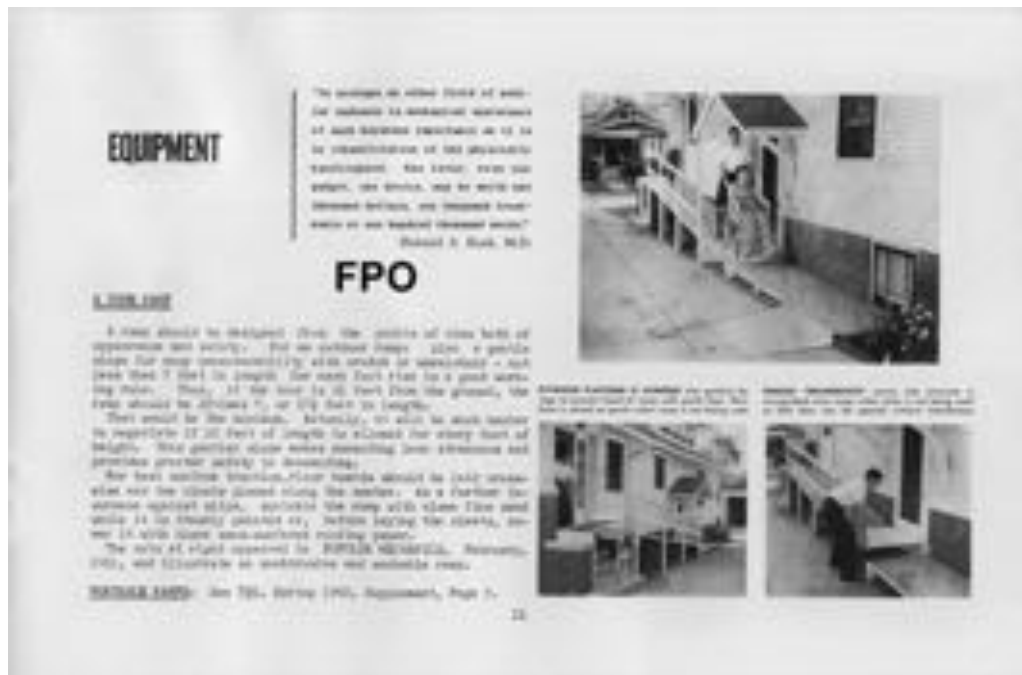


Figure 4.5. Disabled makers shared tips for designing features such as homemade wheelchair ramps. *Toomey Gazette* (Spring 1961): 11. Courtesy of Post-Polio Health International.

Disabled Knowing-Making in Private

Although disabled makers were not engaging in public acts of disobedience, and while their domain was often the privileged white, middle-class home, subtle acts of critical remaking were taking place. The interdependent, networked nature of the postpolio maker culture, wherein disabled people and their families connected to others with similar experiences, made disability a resource for grassroots social networks. Through these networks, postpolio makers shared strategies for creating mundane tools of daily life, and not just technologies that would enhance their productivity. Alice Loomer, a white disabled woman and wheelchair user who had polio as a child, described these activities as “hanging onto the coattails of science” in a time when disabled people were often excluded from schools and had “been given little knowledge of science and technology” but instead “learn[ed] to improvise, invent, supervise, or do more of our own construction.”³⁹ Mace, for instance, created a device for squeezing his wheelchair into a narrower profile so that he could access the restroom of his family home. Loomer developed “all kinds of things: kitchens, hand controls, van lifts, even urinals” over her lifetime by using everyday materials, such as “a paper coffee cup, a small garbage bag, a bunch of Kleenex, and a rubber band.”⁴⁰ While the public face of access-knowledge—rehabilitation experts, legislators, and architects—defined an experimental field of knowledge in public, many disabled makers operated through these nonapparent, distributed networks of knowing-making, remaining unrecognized as engineers or researchers.

Because it operated in the illegibly political sphere of the private home, the postpolio maker culture of the 1940s and '50s did not appear explicitly resistant to rehabilitation norms. But for many postpolio makers, tinkering with and adapting technologies was a way of enacting access, either through disabled expertise or through interdependence with nondisabled allies such as family members. Loomer's first wheelchair, for instance, was an assemblage built from “a kitchen chair and [her brother's] old bicycle.”⁴¹ Another, a rigged power chair, combined a manual wheelchair frame with electrical controls and motorized wheels; “its craftsmanship is deplorable,” she said of the chair, “but it's the only wheelchair that could have kept me away from nursing homes and attendants. . . . I made it. So I know how to fix it. . . . I may have failed almost as often as I succeeded, but I have equipment that fits me.”⁴² This ethos of reinvention was not the individualistic endeavor of single engineering geniuses in their workshops but a product of the interdependent networks of disabled people, families, and assistants who co-materialized a disability maker culture in the mid-twentieth century, often without formal training in engineering or architecture.

While Loomer was not subverting the white, middle-class norms of the mid-twentieth century, she also did not embody the white disabled housewife that rehabilitation engineers and scientific managers sought to transform into a productive worker. Nor was she (or Mace) a disabled cyborg, whose relationship to technology operated as a well-integrated, smooth circuit.⁴³ Loomer's experiences with tinkering

wheelchairs disclose a technological ambivalence, which holds in tension the need for access or function with the frictions, limitations, and failures inherent to technoscientific design processes. Unlike the Cold War–era hopefulness toward technology as a solution to human problems, technologies such as prosthetic limbs, wheelchairs, or canes could nevertheless be awkward or painful to use, ineffective in the absence of ramps and curb cuts, or simply prone to error. Ambivalence toward these technologies, then, is itself a disabled way of knowing-making, born from the iterations of lived experience, technological failure, and ambivalence toward the fantasy of normalization. In this sense, postpolio makers were imagining access as a beginning, what Jay Dolmage calls a “place to start,” rather than a measurable or imaginable outcome.⁴⁴

Disabled Knowing-Making in Public

Public accessibility, through barrier-free design, also contributed to the rise of disability maker cultures. In public, ambivalence toward technology presented opportunities for political friction and contestation. Take, for example, the disability maker culture that materialized around access to public universities. In 1949 the governor of Illinois threatened to shut down an educational program for disabled students at the University of Illinois at Galesburg, intending to repurpose the building as an institution for the elderly, where the state would transfer people housed in other, overcrowded “mental wards.”⁴⁵ The program’s thirteen students and their director, Timothy Nugent, organized a series of demonstrations to protest the move (see Figure 3.1). The first protest took place at the inaccessible Illinois state capitol building. With the support of a local police motorcade, paraplegics drove adapted automobiles (like those created by postpolio makers) from Galesburg to Springfield, where they circled the drive in front of the building and attempted to visit the governor at his mansion before speaking to state officials.⁴⁶ These officials offered students the options of completing “two years of college work by correspondence” or remaining at Galesburg in an “isolated ward’ for paraplegic students in conjunction with the new medical center for the aged and infirm.”⁴⁷ Opposing the options of isolated coursework or reentering a public university-turned-institution, the students organized a second demonstration, this time to put pressure on the University of Illinois’s administration in Champaign. Tactics for the second protest drew upon the resourcefulness of disability maker culture. Some students wheeled around campus to gain public visibility, while others demonstrated access-in-action by placing “two-by-ten planks from a paint scaffolding . . . over some steps to show that these guys in wheelchairs could get into that building.”⁴⁸ Constructed in situ with repurposed supplies from the campus landscape, these informal ramps were material-discursive arguments, which made the case for disabled students’ belonging in mainstream built environments.

At stake in these demonstrations of disabled knowing-making was the admission of students with disabilities, the majority white and male, to a major public university. In one sense, the students resourcefully demanded access to a rehabilitation program

that would extend their normalization into productive citizenship. In another sense, however, the students made their nonuniform belonging legible and demonstrated its value by producing friction. The rough, noticeable presence of disabled bodies, technologies, and design forms in the campus environment was an argument for belonging but not necessarily sameness. While the student protests were not immediately successful, the state government eventually decided to allow a program for physically disabled students to continue at the Champaign campus “as an experiment.”⁴⁹ It was within the context of this disability maker culture (and its relatively privileged location) that the Rehabilitation Education Center and the city of Champaign became experimental sites for access-knowledge.⁵⁰

Physically disabled students, particularly wheelchair users, who attended the University of Illinois at Champaign in the 1950s and participated in the Rehabilitation Education Center would have been enrolled as designers in experiments with accessibility technologies. Some would have lived in adapted dormitories and others in buildings that were “designed and constructed so that they are equally usable by the able-bodied and the physically disabled.”⁵¹ Some would have used an informal ride system, organized through word of mouth, to get to class on time, and others would have helped to design new accessible buses, outfitted with hydraulic lifts resembling machines for loading trucks with heavy materials, which would serve as an alternative transit system in Champaign.⁵² If they were athletes, they would have ridden these buses to nearby wheelchair basketball or cheerleading competitions.⁵³ Some would have been involved in lobbying Emerson Dexter, a vocational rehabilitation counselor and the city’s mayor, to install curb cuts in Champaign, and because few precedents for such features existed, some disabled students would have helped to design them (Figure 4.6).⁵⁴ For the predominantly white, physically disabled students in the program, the new curb cuts would have enabled participation in the surrounding community.

In all these spaces, technologies, and design features, accessibility was continually being remade. There were not, at this point, any standards for accessible universities, public buildings, or city streets. Nor was accessibility understood as an objective set of circumstances that would benefit all users. The material conditions of access had to be studied, tested, and enacted. But in this space of vocational rehabilitation and productive citizenship, the frictions of access-experimentation channeled into efforts to standardize accessible knowing-making. In 1959 the Rehabilitation Education Center received federal and private funding for the American National Standards Project A117, which would create standards for barrier-free design based on the center’s research and experiments.

Like design, research is an iterative material practice, and like public protest, it involves negotiation, material symbols, and generative frictions. Accessibility research at the Rehabilitation Education Center would not have resembled, on its surface, the protests that, nearly a decade earlier, had enabled the program to continue. In one major study, researchers used well-established methods of rehabilitation and human



Figure 4.6. The city of Champaign-Urbana, Illinois, adopted wide curb cuts (ca. 1956–66). Courtesy of the University of Illinois Archives, image 4022.tif.

factors research, such as anthropometry, to measure wheelchair users' space requirements. But similar to the student demonstrators, who had repurposed scaffolding planks to build ad hoc ramps for a campus protest, researchers repurposed methods, such as anthropometry, and in the process reinvented them. Even their experimental tools were appropriated and remade. A primary apparatus of measurement was a "thirty-four foot long" adjustable ramp with a flexible design: it was "adjustable to length and pitch" and served as an experimental space, as well as a tool for spatial measurement (Figure 4.7).⁵⁵ Bearing little resemblance to anthropometric calipers and rulers, which quantified the body as a discrete unit with standard landmarks, the adjustable ramp measured the body, technology, and space together in the generation of force and leverage. According to Nugent, "hundreds of paraplegics and quadriplegics, men and women, young and old"—in other words, people with varying degrees of strength and stamina—rolled up and down the ramp, their measurements serving as a new evidence base for barrier-free design.⁵⁶



Figure 4.7. An experimental ramp for accessibility research at the University of Illinois (ca. 1950s). Courtesy of the University of Illinois Archives, image 5301.tif.

Although concerned with measures such as energy and fatigue, the researchers approached the ramp as a “real machine,” in Galileo’s terms, a lever operating flexibly in recognition of far-ranging abilities. While the ramp was experimental, flexible, and adjustable, however, the research project required a final set of standards, which would dictate ideal practices for ramp construction. But the researchers acknowledged that their sample, the majority of whom were young, physically rehabilitated wheelchair users, would likely skew the results, and their suggestion for the final ANSI A117.1 standard recommended a modified ramp with a “shallower” slope of 1:12 to account for users with less upper body strength and stamina.⁵⁷ Highlighting the entanglements of legibility and flexibility in the work of experimental access-knowledge, the process of designing ramps and curb cuts for accessibility standards repeated in the Rehabilitation Education Center’s efforts to include students with a broader spectrum of sensory, mobility, and cognitive disabilities and chronic illnesses in coming decades.⁵⁸ Where these efforts to develop access-knowledge remained within the rehabilitation regime, however, disability activists in other locales would soon enter into disoriented relations with this regime.

CRIP TECHNOSCIENCE

“John uses an electric powered wheelchair, writing brace, raised tables, Handihook, specially devised door knobs for radio, television, recorder, etc. Ed uses an iron lung, mouthstick. Both use a microswitch speaker phone with a direct line to the operator; Stenorette with special controls, and keys to the campus elevators.”⁵⁹ The two University of California, Berkeley, students were Ed Roberts and John Hessler, and the account of their commercially available and self-made technologies appeared in a *Toomey Gazette* article on quadriplegic students across the United States, who were accessing public life beyond institutions by enrolling at universities. Although Roberts and Hessler eventually became leading disability activists in Berkeley, the article provides a snapshot of these two disabled men as makers, sharing their experiences and expertise with a community of people with similar disabilities. The optimistic account of Roberts’s and Hessler’s technologies echoed, in some respects, the rehabilitation narrative: with the right technologies, quadriplegic students could attend universities and receive the privileges of education. But the two were also part of emerging opposition to this narrative, through a radical, anti-assimilationist culture sometimes called “crip.”⁶⁰ As one activist put it, the independent living movement sought to “reverse the history of rehab within rehab itself.”⁶¹ Even before the movement adopted its best-known strategies of direct action and public protest, independent living activists made creative use of friction and subtlety as they sought to shift the rehabilitation regime, and the broader field of access-knowledge, from within.

Crippling Rehabilitation

Berkeley’s crip culture shared features of earlier disability maker cultures. According to historical records, the majority of its participants were white and many were middle class.⁶² Some had postpolio disabilities while others had experienced disability since birth or as a result of injuries in late adolescence. This community was also sited in the privileged geography of a university, within which a marginalized residential community of quadriplegic students housed in the campus’s Cowell infirmary became a space from which activism would emerge. Recalling the early days of the University of Illinois program at Galesburg, disabled students at Berkeley lived in the infirmary’s third floor, which was established in 1962 as a “residence program for severely physically disabled students” with funding from the Department of Vocational Rehabilitation.⁶³ Demographically, the Cowell students embodied the imagined demographics of rehabilitation’s focus: most were male and white, a few were (white) women, and there was one disabled man of color as part of the group of nine.⁶⁴

Isolated from Berkeley dormitories and student life, Cowell became a seedbed for crip community and activism through the independent living movement. Although the term “independent living” had originated within vocational rehabilitation to describe rehabilitation for those deemed unemployable, the movement appropriated this term to define a political position against compulsory productivity.⁶⁵ Espousing

principles of self-determination, rather than rehabilitation-oriented self-help, the movement argued that everyone (regardless of their productivity) should have equal access to housing and care in the community rather than in nursing homes or institutions. Despite its title, the movement invested in an ethics of interdependence; personal assistants included nondisabled people hired to help with daily activities, as well as other disabled people who provided one another formal or informal services.⁶⁶ This subtle shift from independence to interdependence challenged dominant rehabilitation norms, which dictated that nonproductive bodies were dependent and dysfunctional misfits in need of correction.

Prior to the movement, options for severely disabled people were bleak: many were institutionalized, placed in nursing homes, forced to rehabilitate, or even sterilized or killed through eugenics programs.⁶⁷ Disability charity organizations confirmed a view of disability as a problem in need of cure. Rather than promoting access or acceptance, organizations such as the March of Dimes portrayed the lives of children with polio as pitiful and used ableist imagery in fundraising marathons promoting cure.⁶⁸ Although disability communities had formed around maker practices and at public universities, a cultural notion of disability was not yet legible within the dominant rehabilitation frame.

Consequently, many of the disabled students entering universities in the 1960s were leaving situations of institutionalization, medical paternalism, or isolation. Independent living intercepted these conditions of confinement, isolation, and normalization by producing a new epistemic culture surrounding disability, centered on experiments in access-knowledge.⁶⁹ Similar to the feminist women's health movement driven by texts such as *Our Bodies, Ourselves*, disabled people organized knowledge and expertise around their independence from medical authority and interdependence with one another.⁷⁰ Knowledge about and by disabled people became the stuff of political friction. Resisting their patient status, the Cowell students formed an activist group called the Rolling Quads. One of their first actions was to "revolt" against Cowell's rehabilitation counselor, whose strict insistence on attending classes did not often account for their access needs.⁷¹ When the counselor was removed, the students became further politicized, advocating for changes to the campus environment.

Numerous historical accounts of the independent living movement, including Ed Roberts's earlier in this chapter, attribute the rise of disability culture to Berkeley's urban infrastructure, with its curb cuts, ramps, and independent living services. Few accounts consider the role of crip technoscience in the *making* of Berkeley's accessible infrastructures or its disability culture. Cowell was a site of crip epistemic culture-in-the-making, where disabled students shared space, formed mutual aid networks, transferred knowledge, and experimented with adaptive technologies of everyday life. Much of this ingenuity manifested in small, ephemeral designs, such as "pips," or rubber grips fitted with levers for turning doorknobs, and "Balkan frames" engineered by students to lift themselves out of bed without the help of attendants.⁷² Through

these experiments, the Cowell students amassed user-generated access-knowledge and advocated for the university to build ramps in new buildings and retrofit older entrances to their specifications.⁷³

Although the disability rights motto “Nothing About Us Without Us” would not circulate until the 1990s,⁷⁴ the independent living movement adopted an epistemology of self-determination that presaged this motto. At Champaign, ramp-invention and barrier-free design research had focused on creating standardized forms of access. At Berkeley, *crip technoscience* centered disabled students’ authority as experts about their bodies and surrounding environments. But the movement did not understand medical, technoscientific, and rehabilitative knowledge as inherently normalizing (as later *crip theories* and some articulations of the social model of disability would do). Nor did it view rehabilitation knowledge and user experiences as inherently conflicting. Independent living activists claimed a kind of “strong objectivity,” which feminist epistemologists describe as the idea that one’s own lived experiences, though situated, are also more objective than the dominant frame.⁷⁵ Put simply, medical and rehabilitation experts did not have a monopoly on objectivity. As John Hessler and Michael Fuss put it in a 1969 proposal for independent living beyond Cowell,

One of the greatest sources of information on self-care will be the disabled themselves. Having been disabled for a long time, they have gained a great amount of invaluable knowledge on self-care that they can pass on to those recently disabled, who in turn can teach valuable information on newer techniques learned at rehabilitation centers.⁷⁶

Thus, the independent living movement’s epistemological claims were grounded in the politics of knowing-making: the problem with rehabilitation, they implied, was the exclusion of disability expertise and agency from the arenas of medical care and decision-making and the consequent exclusion of (what they deemed) *more* objective self-knowledge of disability grounded in life experiences. As Fuss and Hessler make clear, the Cowell residents did not reject liberal autonomous values, such as “self-help.”⁷⁷ Instead, they insisted on disabled peoples’ unique *technoscientific* literacies, with relevance for the politics of everyday life. In their proposal to expand the Cowell program, Fuss and Hessler recalled,

One young man, after many years of having to have his leg urinal drained, talked to students at Cowell who were either able to drain their own urinals or who were developing their own methods. They were able to show him how he could wear his urinal bag above his knee so that he could reach it. He added this knowledge to his own—where he had designed a pair of pants where he could open up the seams—and now is able to drain his own urinal. The importance of such an ability can be measured in many ways. What draining his urinal means for this man is that he is able to leave his

living residence and remain outdoors all day long. He can go to classes. When he has to drain his urinal he can go to a public lavatory. This contrasts with what he had to do before—that was, each time his urinal filled (which was every two or three hours), he would have to come back to Cowell Hospital, unless he could find a friend, or was willing to ask a stranger to drain it for him. Also, it means that several times a day he no longer has to ask someone to help him. . . . Another thing that it has done for him is to make him realize that with the appropriate equipment and with the right frame of mind he may even be able to do more things for himself such as fixing his own meals, doing his own dinner tray, and perhaps, even putting himself to bed.⁷⁸

The young man described was not a seamless cyborg with an easy, frictionless relationship to technology. Everyday practices of remaking the world, however, were infused with a disability politics of independence *from* expert medical knowledge and interdependence *between* disabled students. As they moved toward establishing a more permanent and expansive program for disabled students, the Cowell students proposed that the program reserve central leadership positions for disabled people, whose expertise in navigating inaccessible environments and healthcare systems would be an asset.⁷⁹

By the time that Berkeley students proposed a formal Center for Independent Living (CIL) in 1972, they had developed a theory of the user tied to an epistemological critique of expertise, authority, and objectivity.⁸⁰ Activists framed rehabilitation as a hegemonic system of medical expertise, in which biased “‘professionals,’ ‘experts,’ and ‘specialists’” are “‘more likely to be knowledgeable about a person’s limitations than about his capacities.’”⁸¹ As an alternative, the CIL proposed putting disabled people in the role of service providers in order to infuse the system with user perspectives. It proposed an independent living program that was

designed and will be implemented by blind and disabled people who at one time were consumers of rehabilitation services and now, because of the nature of their experiences as consumers, have decided it is time for them to become providers. It represents an effort to create something which at present does not exist, namely client participation in the rehabilitation system.⁸²

The CIL’s early objective was not to reject rehabilitation but to transform its medical expert cultures and paternalistic power from within. These transformations of the rehabilitation regime drove the paradigm shift that the CIL intended to produce.⁸³ For instance, rather than shutting down rehabilitation hospitals, in 1974 CIL members acted as consumers, providers, and social workers in a rehabilitation program at Herrick Memorial Hospital in Berkeley.⁸⁴ At Herrick, disabled people constituted the majority of the hospital advisory board, leading movement leader Ed Roberts to report, “The clinic meets the needs of the disabled because we helped design it. . . .

The doctors learn from us and we receive medical care from them. Here, it is not a superior-inferior thing.”⁸⁵ This political focus on hierarchies of knowledge justified claims to strong objectivity but did not eschew rehabilitative or medical science altogether. The role of nondisabled allies was to provide physical or emotional support to disabled peoples’ leadership.⁸⁶

Visitors to the CIL in the 1970s would have witnessed blind people using Braille typewriters and books, wheelchair users fixing chairs and retrofitting vans with lifts, and many people engaged in sign language, computer programming, and independent living skills courses.⁸⁷ The space became a training ground for other forms of activism. Disabled designer Ralf Hotchkiss, who later won a MacArthur Award for his work with do-it-yourself wheelchair building in developing countries, established a wheelchair and van repair shop (modeled after bicycle self-repair shops) at the CIL.⁸⁸ Computer programming courses, which offered vocational skills, were seedbeds for later computer activism by disabled children and their families, who (in the 1980s) would tinker with and hack computers to create assistive technologies.⁸⁹ These activities could be considered a type of epistemic activism, which sought to transform access-knowledge from within.⁹⁰

Positioning itself “not [as] a political action program” but as an effort to “plug into the operations of the present rehabilitation network and observe the new relationships which are developed in the course of its existence,” the CIL aimed to influence “the greater milieu of which we are a part.”⁹¹ Strategically, the organization appropriated the term “independent living” from the rehabilitation field in order to access funding. Previously, the term “independent living” referred to rehabilitation activities for those who were not eligible for vocational rehabilitation and thus required attendant care.⁹² The CIL’s focus on access, wheelchair repair, and technological training addressed vocational employment, in one sense, but also challenged the imperative for productive citizenship by providing skills that would benefit disabled people regardless of their employment status. Consequently, the California Department of Rehabilitation, on which the CIL had expected to rely for funding, initially objected to the nonvocational nature of access activities.⁹³ Despite philosophical differences, however, the CIL eventually received a \$50,000 grant in 1972 from the regional office of the Rehabilitation Services Administration, initiating a flurry of activity that included connecting disabled people to service providers, finding accessible housing, and doing community advocacy.⁹⁴ Between 1972 and 1979, the CIL served 6,600 people and provided 813 different services, including attendant referral, blind services, computer training, counseling, D/deaf services, legal resources, housing assistance, job assistance and training, mechanical training, technical assistance, architectural barrier-removal, transportation, and wheelchair design and repair.⁹⁵ The approach also created a national model: by 1978, only six years after its establishment, approximately sixty to seventy Centers of Independent Living had been established across the United States.⁹⁶

Intercept Activism

Curb cut and wheelchair ramp experiments materialized the independent living philosophy of gaining access to public life beyond the dictates of rehabilitation and productivity. Between 1969 and 1970, the Rolling Quads lobbied the city of Berkeley to install curb cuts on sidewalks, requesting an annual budget of \$30,000 for “wheelchair ramps in existing curbs” and for adding ramps “in all new construction as a matter of course.”⁹⁷ Although funding was allocated, installation was slow. It centered on the main strip of Telegraph Avenue and did not always cover desired intersections. Consequently, members of the CIL used asphalt to pave some of their own curb cuts as they waited for the city to complete its project.⁹⁸ While these activist-made curb cuts were not forged from activist anger carried out under cover of night, their intervention was no less significant as an experiment in crip access-knowledge, which operated in the spaces where municipal curb cuts had failed to materialize.

Crip technoscience experiments with curb cut materials, sizes, shapes, slopes, and construction methods reveal that in environmental design, as in other forms of technoscience, objectivity and authority are materialized rather than pregiven. Two designers—Hale Zukas and his attendant, Eric Dibner—developed some of the earliest iterations (Figure 4.8). Zukas was a power chair user with cerebral palsy who worked on public advocacy for curb cuts for the CIL. The two met in 1968, when Dibner worked at the Disabled Students Program at Berkeley, which grew from Cowell.⁹⁹ While Dibner was not himself disabled, he had worked for several years as a personal attendant to Cowell residents John Hessler and Scott Sorenson.¹⁰⁰ In 1968 Dibner traveled with Hessler to France, where he crafted ad hoc ramps and experimented with slope and materials such as wood planks.¹⁰¹ When Hessler and Dibner returned from their trip, some curb cuts had appeared in Berkeley and enabled chair users to navigate the streets “without needing assistance at each curb.”¹⁰² Consequently, Hessler and Dibner lived together in an apartment in the community, where Dibner built a ramped entrance to the door.¹⁰³ It was by supporting the leaders of the CIL as an attendant, rather than by acting as an expert architect, that Dibner became interested in accessibility.¹⁰⁴

Initial curb cut experiments addressed issues such as slope and materials. Zukas developed a curb cut prototype that Berkeley used for a decade until curb cuts entered building codes.¹⁰⁵ This prototype, initially created with plywood and duct tape, was “four feet deep by eight feet wide, which in a standard six-inch curb is obviously much steeper than the one in twelve [1:12]” standard developed by research at Champaign.¹⁰⁶ While fairly simple, the prototype allowed power chair users access to Berkeley sidewalks and streets. The rough, do-it-yourself nature of these curb cuts suggests a crip understanding of access as a critical project in inaccessible cities but also as an always unfinished effort requiring further iteration.

Activist-made curb cuts introduced critical frictions into built environments. Beyond their functional value, they also drew attention to the failures of existing

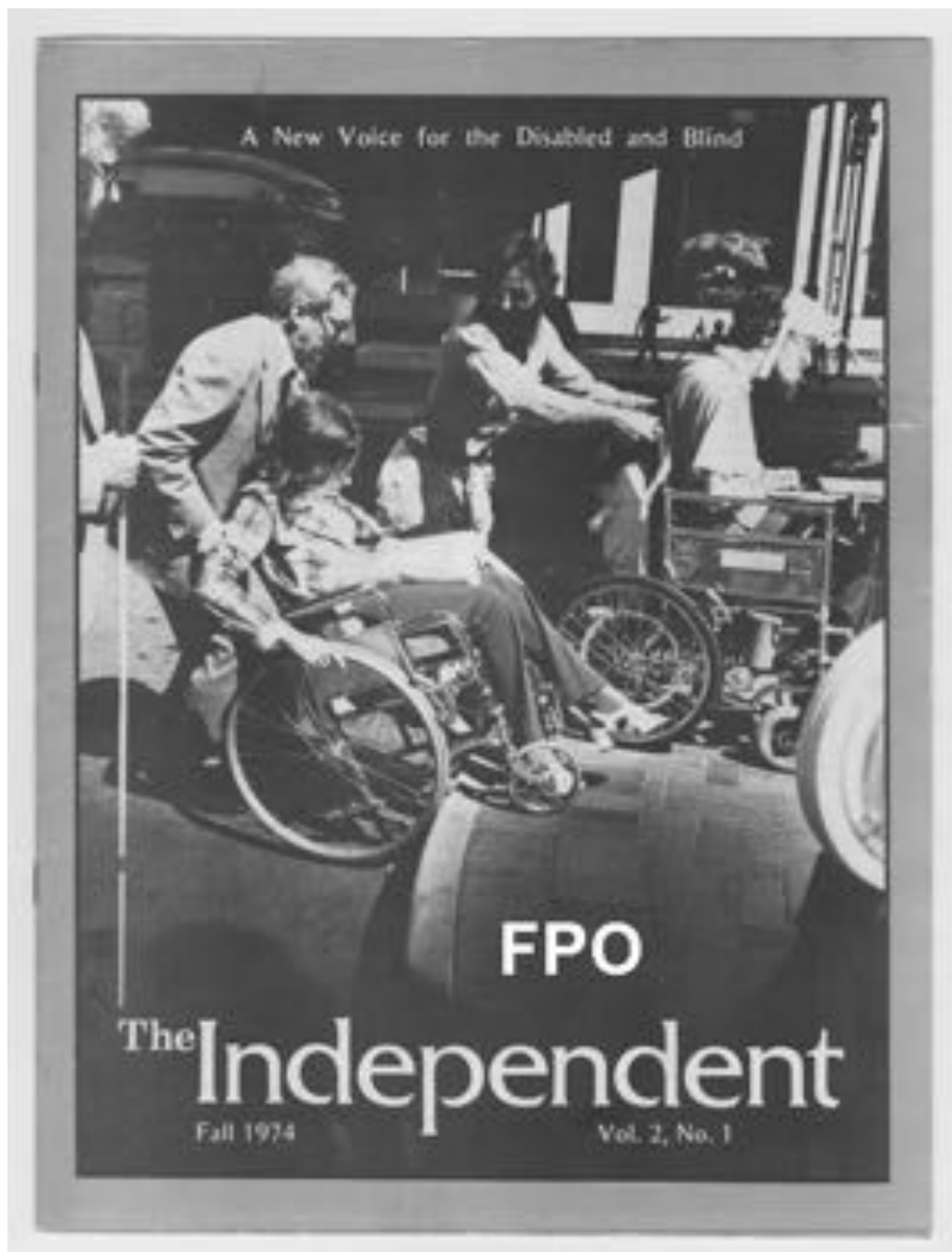


Figure 4.8. Four disability activists, including Hale Zukas and Eric Dibner, along with two unidentified people in the foreground, roll up Berkeley's first official curb cut, which maintained a high lip. *The Independent* 2, no. 1 (Fall 1974). Courtesy of the Bancroft Library, University of California, Berkeley, and the Center for Independent Living, Berkeley.

material arrangements to account for the presence of wheelchair and power chair users. Design considerations regarding materials and slope were important for disabled users because the curb cut served as a lever, moving wheeled technologies between street and sidewalk. But the process of developing curb cuts also produced frictions when it became evident that access needs are not uniform across users. Blind people, in particular, pointed out that when a curb cut smoothly intercepted the street and the sidewalk, it disoriented their learned sense of the city's layout. These concerns had not been legible when the focus had been on chair users and walking people, both presumed to be sighted.

Objections to the curb cut's universality disoriented the movement's presumption of chair users as the prototypical disabled body. Activists reiterated the curb cut through a growing "cross-disability consciousness."¹⁰⁷ As Zukas explained it, the initial solution was to create curb ramps "outside the crosswalk. So there would continue to be a curb in the regular path of travel to alert blind people that they were about to step into the street."¹⁰⁸ But where gutters, parking meters, or fire hydrants interfered with placing curb cuts immediately to the side of a street corner, they had to appear in the middle of a block.¹⁰⁹ This compromise created navigation problems for chair users, who were faced with the choice of navigating street traffic to reach a crosswalk or crossing at an offset location where drivers may not see them. Getting the curb cut right for both chair users and (walking) blind people required several more iterations.

Rather than opting for a smooth curb cut to resolve tensions between chair users and blind people, activists experimented with materials that would produce more friction on curb cut surfaces. Tactile paving, such as the yellow dots that appear on contemporary curb cuts, had been a subject of experimentation around accessible housing (see Figure 4.1). Nondisabled ally and Cowell attendant Charles Grimes recalls a steep ramp attached to an apartment building.¹¹⁰ The plywood ramp's steep slope and two-by-four beams of wood made it difficult to climb and dangerous to egress. In response, Grimes added tactile paving by spreading a mixture of cat litter and paint on the ramp to "giv[e] the tires some purchase."¹¹¹ These material frictions made using the intercept possible. The tactile paving eventually became a technology with cross-disability application, slowing down wheelchairs on steep ramps and indicating changes in surface and slope to blind or visually impaired people.

Through the CIL's experiments with tactile paving, slope, and curb cut placement, the organization became a recognizable source of expertise for accessibility standards. In 1976 California state architect Edwin Shomate requested feedback from the CIL on the state's accessibility code. The CIL's thorough response, written by Zukas, detailed suggestions related to the organization's experience and research. One recommendation translated experiments with rough surface textures into the design of concrete ramps.

We recommend specifying grooving the final 36 inches of the surface *only* and eliminating a “substantially more rough” surface as an option. Our experience indicates that the commonly used methods of roughening surfaces almost always fail to produce a texture that is sufficiently differentiated to be readily detectible by the blind.¹¹²

Zukas also recommended adding language to the code that would read, “Wherever possible, curb ramps should be located outside the main stream of pedestrian traffic so as not to present a hazard to blind persons.”¹¹³ Other recommendations emphasized the broad scope of disabilities that the new guidelines should include in addition to blind people and wheelchair users, such as people with hearing impairments and “those with limited arm movement” who may not easily reach control panels at elevators.¹¹⁴ Although focused on impairment categories, Zukas’s suggested technical specifications went beyond the typical treatment of functional limitations (as isolated in the body). Instead, Zukas infused the technical specifications with the independent living movement’s broad understanding of disabled users and disability culture. Zukas’s recommendations to Shomate ended with a strong suggestion that “in the final version of the regulations, copious use be made of diagrams and graphic illustrations. It may be an exaggeration to say that one picture is worth a thousand words; nevertheless, illustrations can be a tremendous aid to understanding.”¹¹⁵ Accompanying the letter, Zukas attached a page from Ronald Mace’s *Illustrated Handbook of the Handicapped Section of the North Carolina State Building Code*. This emphasis on the optics of accessibility disclosed another CIL strategy of using drawing, mapping, and visualization to make arguments for access, particularly for normate sighted architects.

As the independent living movement grew, activists devised new methods of producing access-knowledge in addition to designing technologies and products.¹¹⁶ Collaborating with university faculty, the CIL created courses based on the independent living movement’s user-led approach to disability. Courses on “Unhandicapping Design” were offered at the CIL, while Berkeley faculty taught “Barrier-Free Design for Disabled Persons” in the Department of Architecture, “Independent Living Arrangements” (in the Department of Environmental Design), “The Disabled in Society” (in the Department of Education), “Legislation for the Disabled” (in the School of Law), and independent studies for field work conducted while working as an attendant (a joint independent study course of the departments of Architecture, Environmental Design, and Social Welfare).¹¹⁷ Of these courses, those focused on architecture had perhaps the greatest impact, serving as training grounds for a more general practice of accessibility auditing.

Accessibility audits were a design methodology through which independent living activists challenged dominant ways of knowing disability. These surveys of existing buildings used predetermined metrics to determine their accessibility. Participants in

the CIL's architecture courses conducted building audits, which taught students to detect and design accessibility features.¹¹⁸ CIL audits "identifying buildings as accessible or rampable"¹¹⁹ utilized experimental standards and guidelines from research conducted elsewhere, including ANSI A117.1 research in Champaign, the North Carolina accessible building code developed by Ronald Mace, disabled UK architect Selwyn Goldsmith's influential *Design for the Disabled*, and early research from Edward Steinfeld, an architect and gerontologist who would later become involved in Universal Design.¹²⁰ Throughout the 1960s and '70s, teams of wheelchair users and non-disabled architecture students conducted massive environmental audits under the auspices of a new type of architectural survey method called "performance testing" to gather data about building accessibility at Berkeley.¹²¹ By recording architectural barriers on the campus and surrounding community, disability activists grew the practice of "performance evaluation" and helped to refine protocols for future audits as forms of citizen survey work. This work entailed "critical assessments" of the built environment alongside establishing the terms of these audits' validity through conversations between users and designers.¹²²

Accessibility audits drew from the existing ANSI A117.1 guidelines as well as other tools in human factors and ergonomics research, such as the use of time-lapse cameras, to study the built environment.¹²³ Although time-lapse research originated in scientific managers' "time motion" studies, the focus of accessibility research was not bodily movements alone but how bodies move through the environment. Researchers mounted cameras to each users' wheelchair at eye level.¹²⁴ Photographic documentation created an evidence base of legible inaccessibility, such that architects and facilities managers at Berkeley could "analyze each building from the perspective of the user, and not simply from a manual, a checklist."¹²⁵ Crip technoscience thus enabled a crippling of access-knowledge itself, as a regime otherwise focused (at the time) on rehabilitation and normalization. Experiments in architectural education became part of the CIL's work when the organization collaborated with Berkeley professor Raymond Lifchez and designer Barbara Winslow to bring disabled "user-experts" into the design studio.¹²⁶ CIL members acknowledged these efforts as building architects' knowledge base through a more accurate study of user-environment relations.¹²⁷

Based on experiences with disabled experts in the design studio, Lifchez and Winslow conducted ethnographic research for their 1979 book, *Design for Independent Living: The Environment and Physically Disabled People*. The book studied disabled people as a resourceful maker culture, translating the authors' observations of the independent living philosophy into potential design applications.¹²⁸ Its depictions of diverse disabled people went far beyond the trope of the white, disabled housewife to portray both white and nonwhite disabled people of many genders adapting domestic spaces and engaging in all manner of political, social, and cultural activities, including protesting, wheelchair dancing, having meetings, engaging in intimacy, and

socializing. The book was the first to distinguish between rehabilitative and crip cultural approaches to environmental design. Provocatively, Lifchez and Winslow concluded the book by asking,

Is the objective to assimilate the disabled person into the environment, or is it to accommodate the environment to the person? . . . Currently, the emphasis [in barrier-free design] is on assimilation, for this seems to assure that the disabled person, once “broken-in,” will be able to operate in a society as a “regular person” and that the environment will not undermine his natural agenda to “improve” himself. . . . This assumption can be counterproductive when designing for accessibility. It may serve only to obscure the fact that the disabled person may have a point of view about the design that challenges what the designers would consider good design. Many designers have, in fact, expressed a certain fear that pressure to accommodate disabled people will jeopardize good design and weaken the design vocabulary. Though certain aspects of the contemporary design vocabulary may have to be reconsidered in making accessible environments, one must also look forward to new items in the vocabulary that will develop in response to these human needs—ultimately leading toward more humane concepts of what makes for good design.¹²⁹

By emphasizing disabled people as experts about their own lives and needs, Lifchez and Winslow challenged an implicit assumption that accessibility will harm the aesthetics or form of “good design.” They also contested the assumption of barrier-free design advocates that good design should seek to eliminate disability and assimilate disabled people into the mainstream. These arguments made disabled people’s “non-conforming uses” of built environments legible as political practices that could challenge designers’ and rehabilitation experts’ assumptions about disability.¹³⁰

In contrast to disability simulation exercises, research methods such as mapping and environmental surveys made the distribution of accessible and inaccessible spaces in the city more legible in aggregate. In 1973 Ruth Grimes, a planning student at Berkeley, created a map of the city’s curb cut route on Telegraph Avenue and parts of Shattuck Avenue.¹³¹ The following year, Grimes, Dibner, and others collaborated on a survey of accessible housing for the city’s Master Plan.¹³² In accordance with the independent living philosophy, these surveys integrated disabled people into the evaluation process, even when nondisabled people were involved.¹³³ Once sites for improved access were identified, the CIL wrote letters offering ramp design services to businesses and homeowners at the rate of fifteen dollars per hour.¹³⁴ A local carpenter built most ramps for approximately \$200.¹³⁵ Design drawings (informed by the ANSI standards and Mace’s North Carolina code) showed homeowners and businesses that wheelchair accessibility in their space was possible (Figure 4.9a, b, and c).¹³⁶

Although they referred to existing accessibility standards, the CIL’s ramp designs and drawings experimented with the optics of architectural representation. For

a

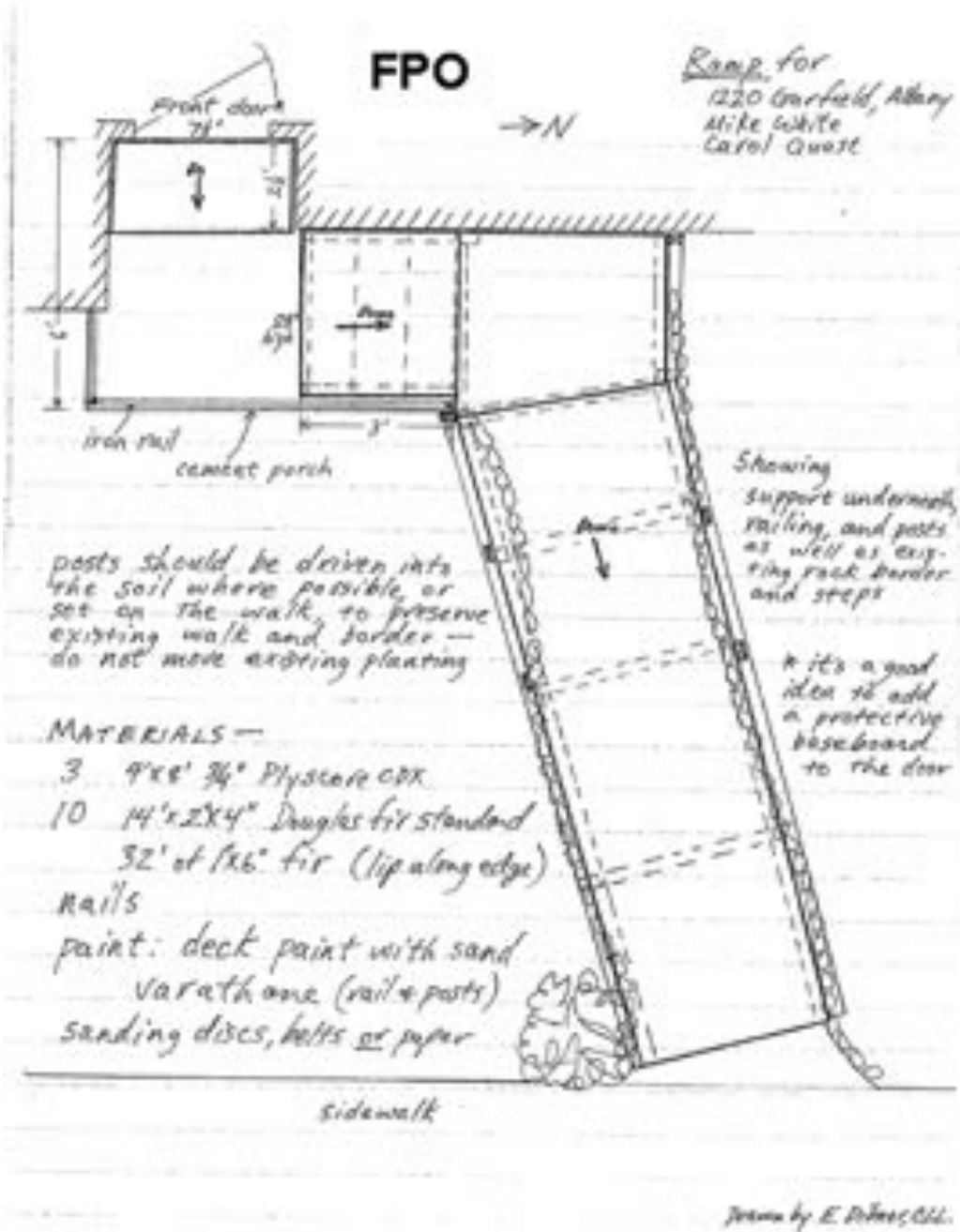


Figure 4.9a, b, and c. Wheelchair ramps for private homes and businesses, drawn by Eric Dibner as part of a CIL initiative (ca. 1978). Courtesy of the Bancroft Library, University of California, Berkeley.

instance, they shifted the visual and technical norms of architectural drawings in order to make accessibility imaginable for owners, designers, and builders. In some cases, these illustrations defied the standardized architectural representations, notations, and handwriting that texts such as the *Architectural Graphic Standards* prescribed. Dibner, who had formerly taken architectural drafting courses but shifted his focus to disability and design issues when he began working as a personal attendant, drew a series of architectural ramps to accompany the CIL's evaluations of potential accessible housing and public spaces. These drawings obeyed few of the conventions of architectural drawing. Many materialized on lined paper, drawn with a ballpoint pen. Casual handwriting, rather than standard capitalized letters, appeared on each plan. Each drawing illustrated the ramp in enough detail to establish its function and internal workings. In place of an architect's professional seal, Dibner signed each drawing, "Eric Dibner, CIL."¹³⁷ In material and textual form, the ramp drawings made crip technoscience legible as a visible credential, field of work, and source of expertise. No doubt, the signature also raised questions and invited interrogation.

Dibner's ramp illustrations, their dimensional and material notations, and drawings of the surrounding landscapes disclose the experimental nature of ramp design, particularly in spaces with unusual constraints that would prevent a standard, 1:12 slope.¹³⁸ Private residences, for instance, received designs that specified supports, structures, and materials for a relatively small California front yard (see Figure 4.9a). A directive to include "deck paint with sand" for traction recalls Grimes's earlier paint and cat litter mixture, and possibly others that were part of a slow accumulation of knowledge and best practices around ramp design.

For public spaces, such as community centers and grocery stores (see Figure 4.9b and c), where illustrating the possibilities of access required more of a rendering than a technical drawing, the ramps acquire more detail. One proposal, for the Oakland community center, appears made of concrete. Existing steps, along with interior and exterior features, are visible, and specifications for plywood siding held up with external supports and filled with rocks and gravel make visible the ramp's interior frictions. Shifts in materials—from wood to concrete—suggest the emerging solidity of ramp designs within the built environment, as well as the improvised and accumulated knowledge of plywood structures as supports for concrete and gravel surfaces. The tactic of mixing sand and paint to create surface friction on an inexpensive plywood ramp translates directly into the choice of concrete as a material that maintains a pebbled surface while allowing the user the benefit of a longer ramp with a landing for rest, and reinforced side railings. Together, the assemblage of proposed materials and structures illustrates the material and metaphorical work of friction in producing leverage for CIL activists seeking access to public resources such as the community center.

Playing with ideas of public and private, the proposed ramps suggest that accessibility is necessary in domestic space, and not only the public life of street commerce.

Other designs suggest the necessary presence of disability within Berkeley's radical political milieu. Ma Revolution, a local Berkeley co-op grocery store aligned with anti-racist prison activism, was located at the corner of Telegraph Avenue and Dwight Way, on the same block as the CIL and just a block away from one of the sites at which activists allegedly created do-it-yourself curb cuts (see Figure 4.1). The store primarily hired people of color and former prisoners and supported the San Francisco People's Food System, an alternative to corporate food distribution.¹³⁹ A proposed ramp for the store's interior was a simple plywood intercept without a landing (see Figure 4.9c). Its three-dimensional representation appears the most solid of the three illustrations shown here, with geometric proportions, solid lines indicating the foreground, and dashed lines marking structures behind a section cut. The ramp appears to address internal structures of the store, connecting itself to the floor and surrounding shelving. The proposal of a ramp for Ma Revolution's interior was part of a campaign to remove sidewalk signs and turnstiles at grocery stores in Berkeley, beginning in 1976.¹⁴⁰ But placed in the broader context of public space in Berkeley, the proposal highlights the possibility that chair users could be grocery store shoppers, as well as supporters of food justice and prison abolition, which shared an anti-assimilationist politics with advocates of deinstitutionalization and independent living. Disabled peoples' lack of access to these and other activist spaces underscored a frequent claim that disability was not recognized as a civil rights issue. Visualizing the possibilities of ramp design in such spaces, then, was a way of emphasizing disability activism as a radical political force.

KNOWING-MAKING DISABILITY HISTORIES

Relations of knowing-making, these iterative design processes suggest, are sites of activism, leverage, and friction. Subtle, mundane projects of crip technoscience served as a training ground for later, more public and legible disability protests. On April 5, 1977, disability activists began a twenty-five-day occupation to protest the federal government's failure to enforce Section 504 of the Federal Rehabilitation Act of 1973 and its mandates of barrier-free programs and services. Protesters sought the enforcement of measures that would ensure ramps, Braille materials, accessible bathrooms, sign language interpreters, and other forms of access in buildings housing federally funded programs and services. A cross-disability coalition, made up of majority-white disability activists who included chair users, D/deaf people, and blind people, staged "the longest occupation of a federal office by protesters in U.S. history" with support from black civil rights and labor activists.¹⁴¹

A turning point for U.S. disability activism, the protests made the resourcefulness and collective power of disabled people more public and visible. Although the 504 sit-in has been memorialized as an overt display of power, however, more subtle forms of crip technoscience and ingenuity created structures of support and survival

within the space of the sit-in. As activist Corbett O'Toole recalls it, "Somebody went out and scrounged an old refrigerator box, and taped it to the director's air conditioning machine to create a refrigerator for people that had medications that needed to be refrigerated."¹⁴² When phone lines to the building were cut off, D/deaf people would sign from windows to friends below on the street.¹⁴³ These strategies recalled crip experiments with repurposing materials, building alliances, and working within existing constraints, often behind the scenes of what is legible as politics, to produce social change.

While the protest embodied these frictions, activists involved in the 504 sit-in framed their intervention as a sort of ramp or curb cut, which would transition disabled people from their presumed, stigmatized status as patients or wards of the state to full citizens under law. They derived this legibility from the black civil rights movement tactic of the "sit-in." Kitty Cone, a white disabled woman activist who organized the 504 protest in Berkeley, later recalled,

A sit-in was a tactic of the civil rights movement, and it was a way of drawing parallels between the issue [of disability rights] and the civil rights movement of the sixties. People all over the country were not thinking of people with disabilities as an oppressed minority or deserving of civil rights; they were thinking of people with disabilities as objects of charity, objects of pity, probably a group of people who were very weak. So a sit-in was a really good tactic to show that we were a civil rights movement and part of the whole history of struggling for progress for our community.¹⁴⁴

Legibility involved visual and conceptual parallels between disability rights and black civil rights struggles against spatial segregation, but by treating ableism and racism as parallel structures of oppression, the sit-in (and the discourse surrounding it) ramped over the presumed whiteness of disabled people as a neutral dimension of disability community. Parallels cast black civil rights as a thing of the past while disability rights remained a present concern.

In disability activism, the notion of "cross-disability consciousness" marks awareness of power and privilege within disability communities such as the CIL. The cross-disability coalition of activists understood that as "descendants of the [black] civil rights movement of the '60s, we learned about sit ins from the civil rights movement, we sang freedom songs to keep up morale, and consciously show the connection between the two movements. We always drew the parallels. About public transportation we said we can't even get on the back of the bus," Cone recollected.¹⁴⁵ These claims were strategic: they borrowed and appropriated from one movement's successes to frame another, and even made comparative claims to establish the uniqueness of disability as an experience of spatial misfit, evident in Cone's insistence that "we can't even get on the back of the bus." Yet the shared focus on desegregation or access to space did not necessarily mean that these movements recognized the collective

stakes of spatial oppression (such as making the racial desegregation of cities a disability rights issue or the deinstitutionalization of disabled people of color a racial justice issue related to mass incarceration).¹⁴⁶ The pervasive but unmarked whiteness of disability leadership reinforced the notion that invoking civil rights tactics and strategies was a neutral practice. Despite highlighting the frictions of nondisabled belonging as a resource for activism and protest, the sit-in also obscured the frictions of racialized nonbelonging in public space.

In the 1970s, white disability rights advocates drew frequent parallels between ableism and racism to justify the need for “a Federal Civil Rights Law, with appropriate sanctions, directed against the discriminations which are daily practiced against the physically handicapped, and whose effects are every bit as demeaning and as incapacitating as they are when directed against other citizens because of the color of their skin.”¹⁴⁷ The term “civil rights,” like “barrier-free” or “citizenship,” was neutral toward the identities of marginalized people it sought to strategically include or exclude. Disability was termed a “civil rights” issue, however, in reference to racial equality. The implied argument was that racial antidiscrimination laws had not addressed disability as a civil right, and that the time had come to recognize disability within regimes of liberal democratic protection afforded to “all” others. This narrative, however, presumed that the fight for black civil rights was not a disability rights issue and that the struggle for black equality had reached completion. Claims that the time for disability rights had finally arrived, then, embodied a “post-racial” assumption that framed disability rights as the agenda of the future, a seamless integration of disability into existing civil rights narratives.

Temporal distinctions have been central to liberal disability rights narratives, which presume the smooth functioning of rights regimes more generally. Consider, for instance, Joseph Shapiro’s claim:

In the black civil rights movement, people put their lives on the line to assert their moral claim to laws that guaranteed their inclusion in society. When public attitudes about race changed, African-Americans won civil rights protections. Disabled Americans got their civil rights protections before the same kind of sea-change in public understanding.¹⁴⁸

These comments suggested that the struggle for black civil rights had ended when rights were won but that disability rights were a continuous, more difficult, continually frictioned struggle. Framing this perception, civil rights legislation had offered the palliative effect of obscuring ongoing white supremacy in material environments. The neutral and unmarked status of whiteness as a presumed norm engendered the perception that civil rights laws had cured the racial disparities of cities.¹⁴⁹ But despite the Fair Housing Act of 1968 and other federal legislation directed at addressing the harms of racial segregation for black communities, barriers to accessing housing,

education, and work in fact ballooned in the 1970s.¹⁵⁰ Few U.S. cities saw meaningful decreases in segregation in that decade. As Douglas Massey and Nancy Denton have argued, a “distinctive feature of spatial organization in American cities” remained in the 1970s, as it does today, the pervasive (yet unmarked) isolation of black communities, with all of the attendant barriers to education, work, and public life that result from residential segregation.¹⁵¹ Where segregation appeared to decrease, the causes were sometimes in service of antiblack racism. For example, in the San Francisco Bay area where the 504 protests took place, white movement back into the city resulted in an early wave of “white-black displacement through gentrification rather than a true move toward integration” and left African American people disproportionately isolated from resources compared to Latino and Asian people.¹⁵²

Parallels, like smooth, frictionless curb cuts, tell us little about the intercepting, frictioned work of intersections. In the same year as the 504 sit-in, the Combahee River Collective, a group of black socialist feminists, articulated an idea that legal scholar Kimberlé Crenshaw would later term “intersectionality.”

The most general statement of our politics at the present time would be that we are actively committed to struggling against racial, sexual, heterosexual, and class oppression, and see as our particular task the development of integrated analysis and practice based upon the fact that the major systems of oppression are interlocking. The synthesis of these oppressions creates the conditions of our lives. As Black women we see Black feminism as the logical political movement to combat the manifold and simultaneous oppressions that all women of color face.¹⁵³

Intersectionality called attention to the particular and situated perspectives that constitute what appears as neutral and accordingly made it possible to think and speak about the tensions and overlaps between these systems.¹⁵⁴ The point was to affirm that racism and sexism, among other systems of oppression, were not discrete and that the intersections of these systems had material effects on the oppressions faced by women of color. But like 1960s civil rights laws focused on race, the discourse of intersectionality would not acknowledge disability as a category of oppression for some time.

One reason that the concept of intersectionality has been generative for scholars and activists is that by pointing out that systems of oppression overlap, this concept debunks the liberal idea of a postoppression world. Accordingly, this concept asks us to think about how disability activism in the late 1970s was relating to the concept of race, to antiracist movements, and to disabled people of color. While activists’ narratives about 504 often gave the impression that the struggle for racial civil rights had ended, and that a new era of disability rights was thus beginning, more recent historical accounts have explored the often discounted and overlooked presence of disabled people of color in the movement, as well as the disability movement’s

relationships to black and Chicano activist organizations. These narratives also inform a more racially accountable narrative of crip technoscience in the 504 sit-in.

The Black Panthers, who had recently allied themselves with efforts to remove disabled and elderly people of color from nursing homes, and a Chicano group, the Mission Rebels, both provided food to sustain the 504 occupiers.¹⁵⁵ It is very clear that this support was crucial to sustaining the occupation through its twenty-five days. Yet accounts of the coalition between the Black Panthers and CIL activists sometimes reiterate the parallels or analogues between anti-ableist and anti-racist struggles to explain the emergence of this coalition.¹⁵⁶ Recall that liberal curb cut theories insist upon the “interest convergence” of wheelchair users, parents pushing strollers, and cyclists while ignoring the potential intersections and shared identities between these categories. Similarly, accounts of parallel struggles against spatial segregation often fail to produce intersectional analyses of power and privilege within and across disability and racial justice movements.¹⁵⁷ Complicating the liberal curb cut theory that disability design benefits “everyone” by providing a smooth transition to an equal future, the racial histories of the 504 sit-ins and public displays of crip friction suggest that “everyone” continued to be a majority-white designation.

Black crip activist and scholar Leroy Moore argues that disabled activists of color did more than serve food at the occupation, yet their leadership and presence has been largely ramped over in disability histories (and, I would add, histories of barrier-free design).¹⁵⁸ What I am proposing here as a crip curb cut theory provides a different way of understanding the sit-in and the roles of activists of color: not as interest convergence but as leverage and boundary work. Disability historian Susan Schweik has analyzed the coalition between the CIL and the Black Panthers as a “frame extension,” which captures the internal tensions between the two groups (around issues such as ableism within Black Panther discourses and whiteness in disability rights discourses) while accounting for the work of overlapping membership.¹⁵⁹ Dennis Billups, a young blind Black Panther, called for black activists to support the sit-ins: “We need to do all we can. We need to show the government that we can have more force than they can ever deal with—and that we can eat more, drink more, love more and pray more than they ever knew was happening. . . . We shouldn’t have to fight for our rights, . . . they should already be there.”¹⁶⁰ Billups emphasizes the ongoing, frictioned struggles of disabled and black communities to gain legal recognition of their rights. Similarly, Schweik argues, disabled Black Panther Bradley Lomax and his caregiver Chuck Jackson (also a Panther) were unacknowledged leaders in 504. Whereas disability was not initially part of the Black Panthers’ consciousness, Lomax influenced an emerging intersectional analysis that then led to the Panthers’ support for the sit-in. Based on these accounts, black activists appeared to believe that the ongoing, tense, and difficult work of racial justice was being enacted through disability activism, contra the post-racial understanding of racial justice as a thing of the past and disability rights as the struggle for the future.

The significance of the 504 sit-in for disability rights to accessible transportation, government buildings, and other public spaces cannot be overstated. Successful sit-ins across the United States initiated a new era of barrier-free design, which focused on reiterating accessibility standards and compliance strategies. Once Section 504 became enforceable in the late 1970s, the messy, experimental practices of crip technoscience were slowly eclipsed by a new form of objectivity, premised upon standardized and quantified accessibility. The CIL began consulting on accessibility with organizations such as the Oakland Housing Authority, Bay Area Rapid Transit, the Urban Land Institute, and local museums and hospitals.¹⁶¹ In the following decades, Zukas, Dibner, and others involved with crip technoscience experiments would lend their expertise to the emerging barrier-free design compliance regime. Along with these successes remained questions of frictions, disorientation, and elision: What are the perceived stakes of accessibility? What issues count as accessible design issues? How can designers know?