ADVERSARIAL DESIGN

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1 Design and Agonism

On a spring day in 2002, a half dozen or so toy robot dogs ambled awkwardly across an overgrown lot, the site of a former glass manufacturing plant in the Bronx, New York. Their translucent plastic bodies rolled back and forth on wheels that were attached in the sockets that once held their translucent plastic legs (figure 1.1). Several young people stood watching. These robot dogs had a purpose, and their movements were meaningful. They were on the hunt, released in a pack to sniff out toxic residue in the environment (figure 1.2).

When one thinks of using robots or other advanced technologies for environmental monitoring, most probably imagine trained professionals using sophisticated and expensive equipment. But these presumptions about the practices of science and engineering are being challenged by Natalie Jeremijenko (2002–present) in the *Feral Robotic Dogs* project. For this project, Jeremijenko hacks toy robot dogs, augmenting them with wheels and sensors so that they can be used as low-fidelity mobile pollution detectors.[1] Working with others, she releases these hacked robot dogs to find exposure risks in selected areas, and each release becomes a media event that draws attention to the concerns of detecting and acting on toxicity in our everyday surroundings. Through the *Feral Robotic Dogs* project, Jeremijenko demonstrates the possibilities of creatively appropriating technology toward new ends and engaging the public in political issues through compelling technological things. In addition to being tools, these hacked robot dogs are also platforms through which to question, contest, and reframe notions of expertise in technology use and environmental monitoring.

The *Feral Robotic Dogs* project exemplifies a kind of cultural production that I call *adversarial design*. This work straddles the boundaries of design and art, engineering and computer science, agitprop and consumer products. It spans a range of audiences and potential users and falls under
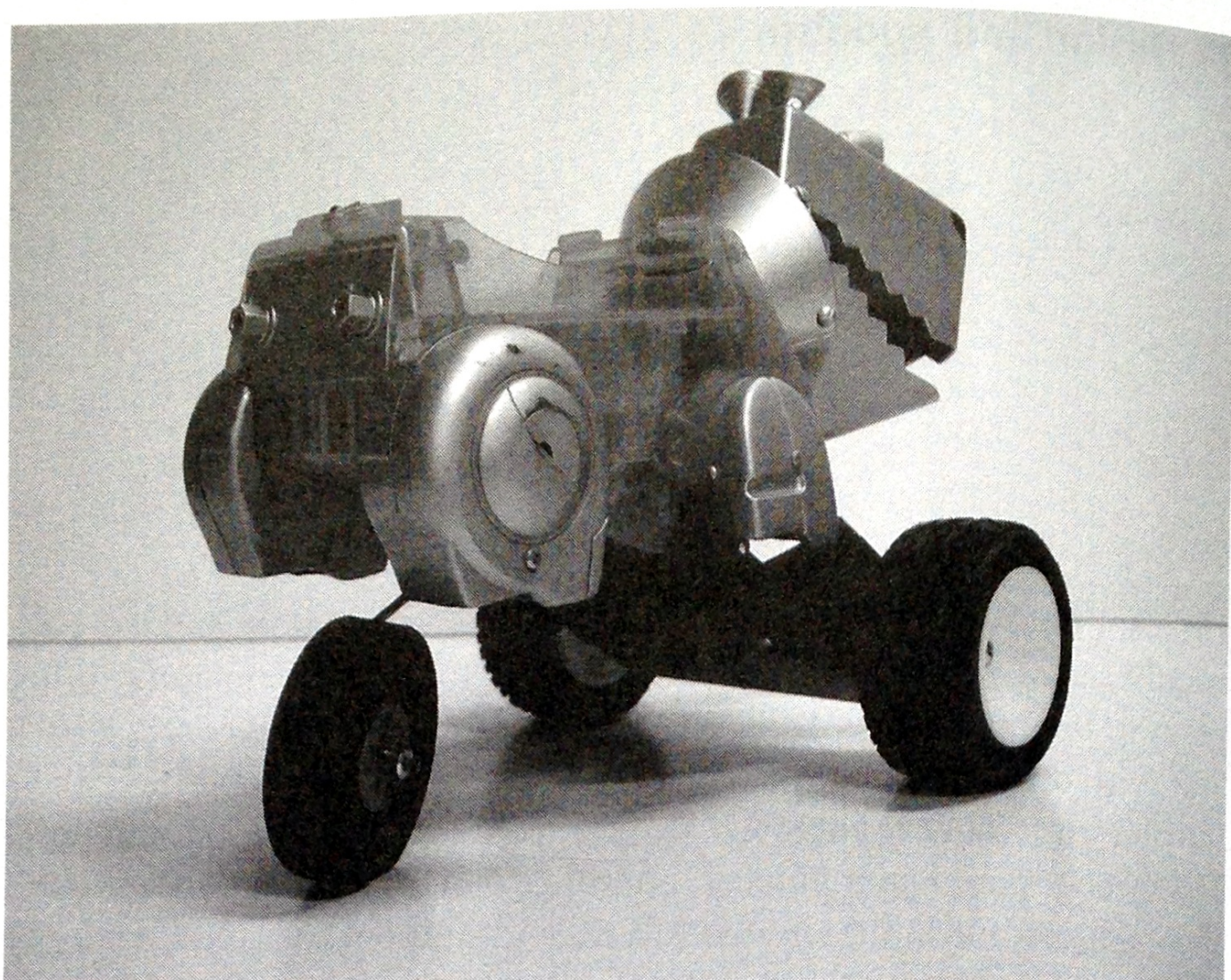
Figure 1.1
A modified robot dog, Natalie Jeremijenko, *Feral Robotic Dogs* project (2002)

various labels, such as critical design and tactical media.[2] But across the differences, there is a common characteristic. Through designerly means and forms, adversarial design evokes and engages political issues. Adversarial design is a type of political design.

It is easy to make claims about the political qualities and potentials of design, but those claims need a warrant and a means of extending those claims across multiple objects and practices. Specificity is needed regarding the kinds of politics at play and the ways that designerly means and forms do what they do. I use the phrase *adversarial design* to label works that express or enable a particular political perspective known as *agonism*. And I do not limit the term *design* to the profession of design but rather extend it across disciplinary boundaries to include a range of practices concerned with the construction of our visual and material environments, including objects, interfaces, networks, spaces, and events. Adversarial design is a kind of cultural production that does the work of agonism through the conceptualization and making of products and services and our experiences with them.
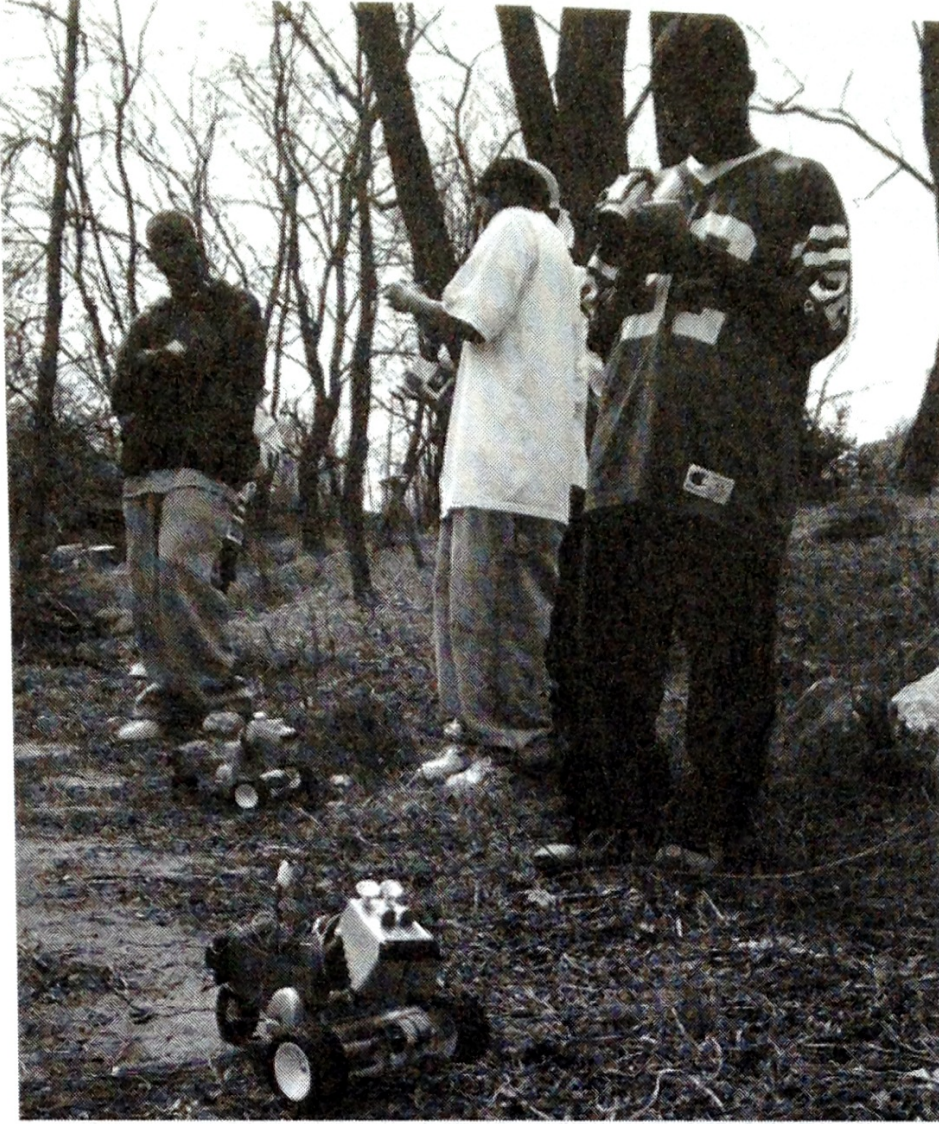
Figure 1.2
The Bronx, New York, release of dog robots, Natalie Jeremijenko, *Feral Robotic Dogs* project (2002)

But do we really need another way to talk about design and about what design can and could do? Regarding design, politics, and the political, I argue yes. Since the turn of the twenty-first century, there has been an increased interest in how the practices and products of design shape and contribute to public discourse and civic life. Evidence of this can be found in a host of conferences and conference themes, trade publications, and reports promoting so-called social design, design for democracy, social innovation, and the like.[3] Much of this work is oriented toward improving the mechanisms of governance and increasing participation in processes of governance: it is design for politics. And much of it works through familiar forms of civic engagement and of design. But not all contemporary design work fits neatly into such forms. Jeremijenko's *Feral Robotic Dogs* is a case in point. It is certainly about participation but not through standard means. And its agenda and its politics are more about a subtle, playful contestation than about consensus. How do we make sense of such projects? How do they contribute to shaping society? This book attempts to

provide an answer to these questions by exploring how political theory, design, and technology might be woven together to create unique opportunities for new forms of political expression and action. Agonism, as a political theory, provides a productive starting point for exploring this question because theories of agonism assert that there are important differences between politics and the political and that democratic civic life and public discourse are grounded in the kind of contestation that characterizes adversarial design.

Agonism in Theory and Design

Taking its title from a chant used by protestors, the documentary *This Is What Democracy Looks Like* captured the 1999 World Trade Organization (WTO) demonstrations in Seattle, Washington, combining video footage from over a hundred individuals with narrations from participants (Friedberg and Rowley 2000). During these demonstrations, thousands of people—including members of labor unions, school teachers, and environmental activists—gathered in the streets of Seattle to oppose the policies of the WTO. The varied forms of demonstrations reflected the varied positions of the people who participated. Some groups organized marches and carried signs, others performed theater in the streets and drum circles in parks, and some engaged in civil disobedience. To declare that such a cacophony of voices and actions "is what democracy looks like" is bold and, to many, confusing and alarming. Such scenes run counter to North American ideas about democracy, which is exemplified by town meetings, party caucuses, and elections. But this chant declares that democracy is not simply order and rationality displayed in voting, structured decision making, and legislating, but that it also and *necessarily* is contentious affect and expression.

Within political theory, the notions of *agonism* and *agonistic pluralism* provide grounding for the idea of democracy as intrinsically contentious and thereby also provide a basis for understanding adversarial design and what it means to talk about design doing the work of agonism. Agonism is a condition of disagreement and confrontation—a condition of contestation and dissensus. Those who espouse an agonistic approach to democracy encourage contestation and dissensus as fundamental to democracy. In this way, an agonistic democracy is different from more formalized practices of deliberative democracy that privilege consensus and rationality. Much of the motivation for theories of agonism is to work against "third-way" and "centrist" politics, which tend to emphasize rationality and consensus as the basis for democratic decision making and action.[4]

Theories of agonism emphasize the affective aspects of political relations and accept that disagreement and confrontation are forever ongoing. For political theorist Chantal Mouffe, this is a consequence of what she calls the "paradox of democracy": we strive for a pluralism that we know can never be achieved. As she states (Mouffe 2000b, 15–16),

What is specific and valuable about modern liberal democracy is that, when properly understood, it creates a space in which this confrontation is kept open, power relations are always being put into question and no victory can be final. However, such an "agonistic" democracy requires accepting that conflict and division are inherent to politics and that there is no place where reconciliation could be definitively achieved as the full actualization of the unity of "the people." To imagine that pluralist democracy could ever be perfectly instantiated is to transform it into a self-refuting ideal, since the condition of possibility of a pluralist democracy is at the same time the condition of impossibility of its perfect implementation.

Agonism is a condition of forever looping contestation. The ongoing disagreement and confrontation are not detrimental to the endeavor of democracy but are productive of the democratic condition. Through contentious affect and expression, democracy is instantiated and expressed. From an agonistic perspective, democracy is a situation in which the facts, beliefs, and practices of a society are forever examined and challenged. For democracy to flourish, spaces of confrontation must exist, and contestation must occur. Perhaps the most basic purpose of adversarial design is to make these spaces of confrontation and provide resources and opportunities for others to participate in contestation.

Agonistics: A Language Game is a computational media project by Warren Sack (2004) that illustrates the qualities of agonism by engaging players in a state of agonistic conflict (figure 1.3). In this project, online discussion forums become the shared space in which agonistic conflict takes place. In *Agonistics*, players post messages to online forums with the goal of entering into dialog with other players. In the game or contest, winning occurs by having your own ideas promoted and taken up by others in the discussion forum. In addition to the textual qualities of the project, there is a visual component in which participants are represented as icons on screen, arrayed in a circle. Custom software designed and written by Sack tracks the relative standing of a player's posts in the overall catalog of posts. As a player's ideas and perspectives gain ground in the discussion forum (that is, as others reference them), the player's icon moves away from the periphery and toward the center of the circle. One way to have your idea referenced by others is to take a controversial position, thereby provoking response. In this way, the game and the software that makes it possible
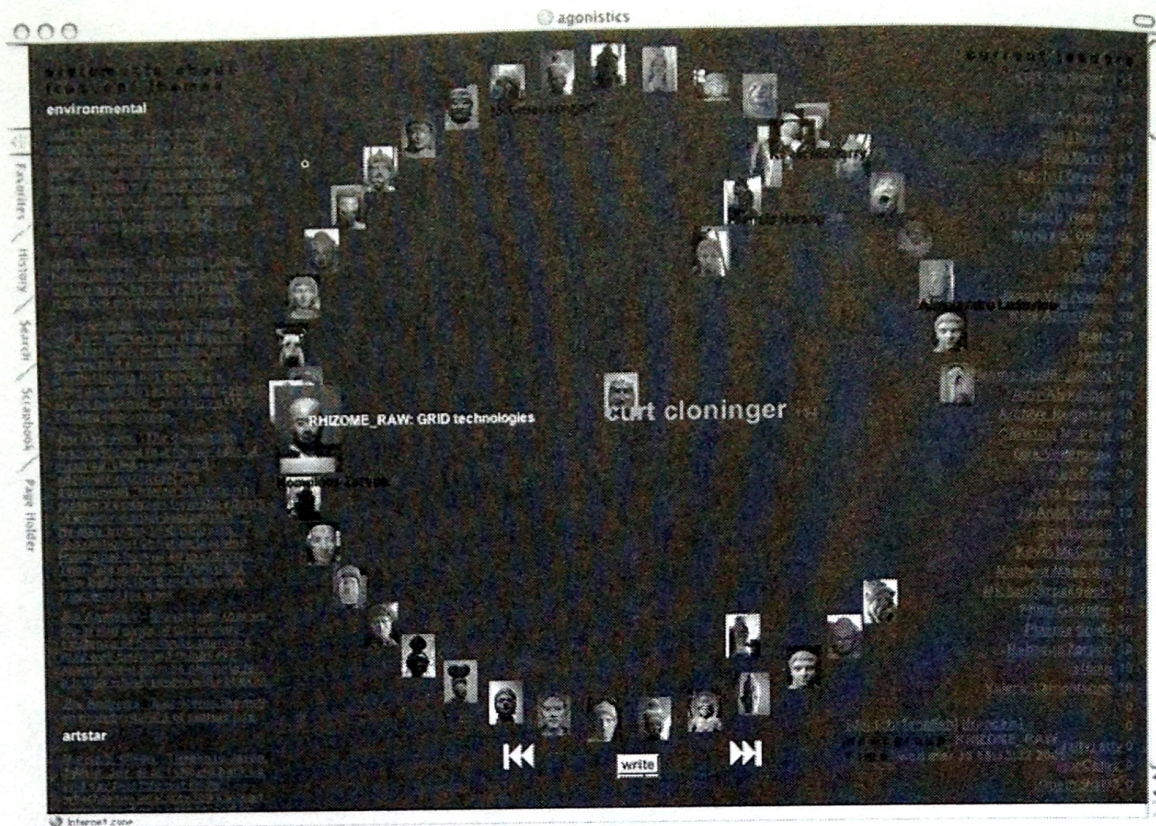
Figure 1.3
Warren Sack, *Agonistics: A Language Game* exhibit, 2002, http://artport.whitney.org/
gatepages/artists/sack

reward the production and maintenance of contestation. A player of *Ago-nistics* cannot destroy other players, and a player does not want to antago-nize the field of discourse so that the exchange ceases, for that would result in a player's standing being diminished. Rather, the game is designed such that a player needs to keep the conflict alive to win. This requires constant and ongoing articulation and expression to produce positions that will sustain the conflictual exchange.

Agonistics: A Language Game demonstrates a key notion of agonism (particularly as developed by Mouffe)—the difference between enemies and adversaries. Mouffe's theory of agonism draws heavily from political theorist Carl Schmitt's formulation of the political as a state of conflict that is based in a distinction between friends and enemies (Schmitt 1996). But rather than framing the conflict as among enemies that seek to destroy one another, the term *adversary* is used to characterize a relationship that includes disagreement and strife but that lacks a violent desire to abolish the other. In this way, agonism reveals its roots in the Greek *agon*: "a public celebration of games; a contest for the prize at those games; or, a verbal contest between two characters in a Greek play" (*OED* 2008). Shared among

the historical and contemporary meanings of agonism is a notion of a particular kind of conflict that is not merely symbolic. It has social, material, and experiential consequences but does not result in the annihilation of the other.

Whereas Mouffe uses the term *adversary* to describe the character of relations between actors and positions within an agonistic democracy, I use that term to describe the character of designed artifacts or systems. In labeling an object as adversarial, I mean to call attention to the contestational relations and experiences aroused through the designed thing and the way it expresses dissensus. Labeling an object as adversarial also shifts the grounds for critique. It requires that the description and analysis of the object bring to the fore the way that its designed qualities enable or model the productive and ongoing questioning, challenging, and reframing that typifies agonism.

Design for Politics and Political Design

Agonistics: A Language Game provides one example of adversarial design as a literal illustration of agonism through game mechanics and the design of game play. Other forms of adversarial design are possible, many of which are less literal and will be taken up in the following chapters. All instances of adversarial design, however, hinge on an understanding of the distinction between *politics* and *the political* and, subsequently, the distinction between design for politics and political design.

The word *political* is often used in a derogatory sense, in phrases such as "It was a purely political decision." On the one hand, such phrases are useful for understanding agonism because they express the conflictual nature of democracy. Yet the derogatory nature of such phrases also signals a belief that conflict thwarts the endeavor of democracy. When people use such phrases, they seem to mean that they want their representatives and leaders to back away from ideological stances and get on to the so-called work of running the city or state or country. But from an agonistic perspective, politics and the political are separate notions that should not be conflated. The distinction emphasizes the difference between ongoing acts of contestation and the administrative operations of government. As Mouffe (2000b, 101) states:

By "the political" I refer to the dimension of antagonism that is inherent in human relations, antagonism that can take many forms and emerge in different types of social relations. "Politics," on the other side, indicates the ensemble of practices, discourses and institutions which seek to establish a certain order and organize

human coexistence in conditions that are always potentially conflictual because they are affected by the dimension of "the political."

This distinction between politics and the political shapes the purposes of adversarial design, and highlights the difference between design for politics and political design. Politics are the *means* by which an organization, municipality, or state is put and held together. Politics are a series of structures and mechanisms that enable governing. These range from laws and regulations to unspoken but observed habits of interpersonal interaction and performances of beliefs and values. Different from these means, the political is a *condition* of life—a condition of ongoing contest between forces or ideals. This condition is expressed and experienced in the dealings between people and organizations in a multiplicity of ways, including debate, dissensus, and protest. This condition can also be expressed and experienced through design.
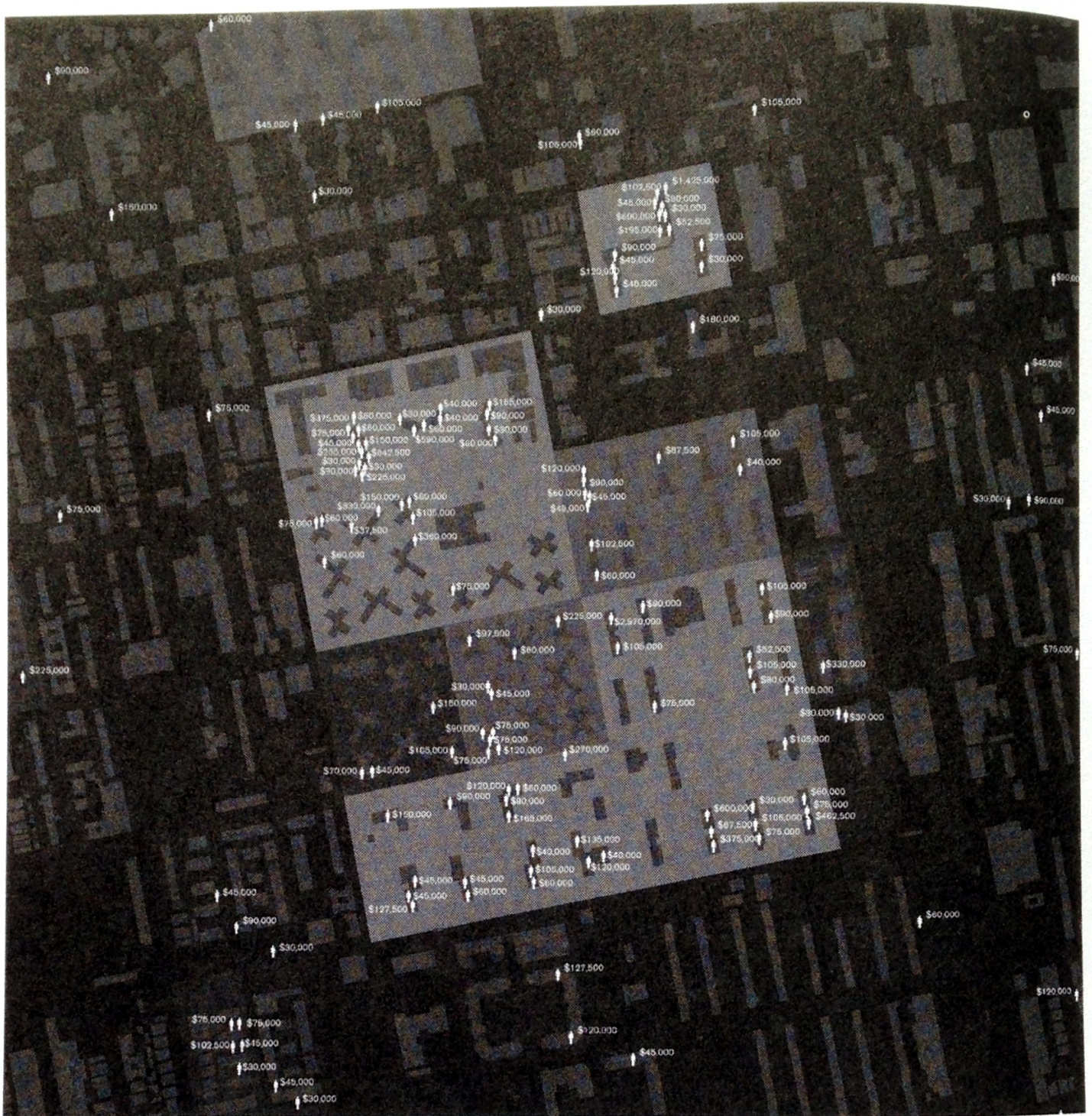
Most contemporary design projects that purport to support democracy do so in the realm of politics and not the political, and so we can differentiate between design for politics and political design. Design for politics most often works to improve access to information (such as public health information or information regarding organizations and candidates) or to improve the access to various forms of ordered expression and action (such as petitions, balloting, and voting). As used in projects that *apply design to politics*, it emphasizes techniques of merging form and content in aesthetically compelling and functionally appropriate ways to support the means of governance—the mechanisms by which a state, organization, or group is held together. Such work is imperative but is not inherently political in an agonistic sense. Perhaps the best way to understand the difference between design for politics and political design is through a comparison of two contemporary projects.

The Design for Democracy (DfD) initiative within the American Institute of Graphic Arts (AIGA) is emblematic of design for politics. According its Web site, DfD "applies design tools and thinking to increase civic participation by making interactions between the U.S. government and its citizens more understandable, efficient and trustworthy" (AIGA 2008).[5] The programs within the DfD initiative are broad reaching. The *Get Out the Vote* program solicits nonpartisan graphic design to promote voter registration and participation; the *Government Officials: Get Help* program provides design services to "make government more accessible, transparent, and efficient" (AIGA 2008); the *Polling Place Project* solicits and presents citizen journalism documenting the voting experience in the United States;

a design advocacy program promotes the importance of design in government; and the *Ballot and Election Design* program strives to improve the experience and increase the efficacy of voting through the redesign of ballots, polling place signage, instructional materials, and poll-worker training materials (Lausen 2007). The efforts of DfD have had direct, measurable, and laudable effects. In 2007, the U.S. Election Assistance Commission accepted the AIGA guidelines for ballot and polling place information design; the *Polling Place Project* has garnered significant participation with thousands of photos submitted and presented; and the *Get Out the Vote* project has produced dozens of compelling posters, replicated in the thousands. This work is exemplary of design for politics in that its purpose is to support and improve the mechanisms and procedures of governance. This is clear in the positioning of the work and the stated motivations, such as increasing voter participation, making government more transparent and efficient, and increasing the efficacy of voting through design.

As a counterpoint, the *Million Dollar Blocks* project provides an example of political design. This project is implicitly contestational and strives to investigate an issue and raise questions concerning that issue. In doing so, it demonstrates one notion of what design for democracy might be like from the perspective of agonism.[6] Developed by Laura Kurgan at the Spatial Information Design Lab at Columbia University (Kurgan 2005), *Million Dollar Blocks* uses geographic information systems to map crime-related data. Rather than taking the common approach to crime mapping and asking, "Where does crime occur?" or "Who are the victims of crime?," Kurgan began her project with the question, "Where does the prison population come from?" The primary product of the project is a series of maps of four cities (Phoenix, Wichita, New Orleans, and New York) that graphically depict the distribution of the home residences of prison inmates (figures 1.4 and 1.5). In addition to the maps and related information graphics, Kurgan and her colleagues have produced an exhibition; two self-published books documenting the process and issues, *The Pattern* and *Architecture and Justice*; and a scenario-planning workshop with design professionals and community, civic, and social justice organizations and individuals.[7]

The *Million Dollar Blocks* project is political design because it reveals, questions, and challenges conditions and structures in the urban environment; it opens a space for contestation; and it suggests new practices of design in mapping and urban planning. Unlike DfD, *Million Dollar Blocks* does not work directly to support or improve existing means of

BROWNSVILLE, BROOKLYN

IT COST 17 MILLION DOLLARS TO IMPRISON 109 PEOPLE FROM THESE 17 BLOCKS IN 2003. WE CALL THESE MILLION DOLLAR BLOCKS. ON A FINANCIAL SCALE PRISONS ARE BECOMING THE PREDOMINANT GOVERNING INSTITUTION IN THE NEIGHBORHOOD.

Figure 1.4

Map of the Brownsville neighborhood in Brooklyn, New York, showing prison expenditures (in U.S. dollars) by census block, 2003. From the *Million Dollar Blocks* project. Images provided courtesy Spatial Information Design Lab, Graduate School of Architecture, Planning and Preservation, Columbia University, 2006. Architecture and Justice project team: project director Laura Kurgan, Eric Cadora, Sarah Williams, and David Reinfurt.

Figure 1.5
Map showing high-incarceration-rate blocks in Brooklyn, New York, 2003. From the *Million Dollar Blocks* project. Images provided courtesy Spatial Information Design Lab, Graduate School of Architecture, Planning, and Preservation, Columbia University, 2006. Architecture and Justice project team: project director Laura Kurgan, Eric Cadora, Sarah Williams, and David Reinfurt.

governance. Rather, by asking, "Where does the prison population come from?" and producing a series of designed objects to explore that question and its implications, Kurgan reframes the discussion of crime and the built environment. As she states (Kurgan 2008):

By focusing solely on [crime] events, the human underpinnings of crime were left largely unaffected. When we shift the maps' focus from crime events to incarceration events, strikingly different patterns become visible. The geography of prison differs in important ways from the geography of crime.

A key question for Kurgan is, "Is there a pattern in the data that reflects a pattern in an underlying condition?," and if there is, "How might the recognition and interrogation of that pattern bring to light inequalities as they are manifested in the urban environment?" The title of the project—*Million Dollar Blocks*—comes from the amount that the government is spending annually (more than $1 million) to incarcerate residents of certain street blocks. The discovery and articulation of this pattern raises further questions such as "Who lives on those blocks?," "What are those blocks like?," and "How might that money be otherwise spent and perhaps to better effect?"

Making this distinction between design for politics and political design is important because it helps to make sense of how projects such as *Million Dollar Blocks* and Jeremijenko's *Feral Robotic Dogs* project fit into a broader endeavor of using the practices and products of design to shape and contribute to public discourse and civic life. We are familiar with design for politics but less familiar with political design. We have fewer ways of describing and analyzing what the political is doing and how it is doing it. One value of adversarial design is that it provides a way of framing and discussing a broad range of projects and their effects. Adversarial design is both a way of doing the work of agonism through designed things and a way of interpreting designed things in terms of their agonistic qualities.

Doing the Work of Agonism

The foundation of agonism is a commitment to contestation and dissensus as integral, productive, and meaningful aspects of democratic society. To claim that adversarial design does the work of agonism means that designed objects can function to prompt recognition of political issues and relations, express dissensus, and enable contestational claims and arguments. In the case of *Million Dollar Blocks*, the maps document patterns of incarceration

and urban development and serve as objects that raise questions and proffer implicit judgments about the allocation of capital and social resources within cities. By revealing the conditions of political issues and relations, adversarial design can identify new terms and themes for contestation and new trajectories for action.

For example, beyond the literal naming of a condition (as million-dollar blocks), the *Million Dollar Blocks* project reveals previously obscured configurations in the cycle of crime and incarceration, making them available for debate, further investigation, and as leverage positions in future actions. In subtle ways, the designed artifacts and activities of the project challenge the common understanding and use of crime statistics and practices of mapping, and they raise questions concerning the facts, understandings, and implications that are often left out of analyses and representations. This, in turn, provides an opportunity for productive dissensus concerning the relationships between crime, the built environment, and policy and the political effects of maps as artifacts and mapping as a process. Kurgan (2008) herself seems well aware of this, when she states,

With this map, we stop talking about where to deploy police resources or how to track individual prisoners for institutional purposes; instead we begin to assess the impact of justice on a city, even a city block, and start to evaluate some of the implicit decisions and choices we have been making about our civic institutions.

The purpose of design in *Million Dollar Blocks* (and of adversarial design more generally) is not to achieve a readily identifiable form or instance of change but instead to prompt debate and serve as a kind of material evidence in political discourse. Whereas design for politics strives to provide solutions to given problems within given contexts, political design strives to discover and express the elements that are constitutive of social conditions. For example, whereas the DfD *Ballot and Election Design* program works to resolve problems in the process of voting, the *Million Dollar Blocks* reveals and documents correlations between imprisonment and qualities of the urban environment.

Although not an exhaustive review of contemporary design projects, this comparison of the AIGA DfD initiative and *Million Dollar Blocks* outlines distinctions between design for politics and political design and makes a case for them as different endeavors. In doing so, it also provides insights into what it means to do the work of agonism. With this bit of background into agonism, it is worth returning to design to contextualize adversarial design within fields of contemporary practices.

The Pluralism of Design

One challenge with discussing design is that design is simultaneously familiar and elusive. It refers to activities that involve all people and also to formalized activities that are done by people who identify professionally as designers. Since the early 2000s, there has been a reinvigoration of the design fields and of the general public's awareness of and interest in design, as evidenced by an increase of popular design journalism. One outcome of this increased interest is that the distinctions between professional and nonprofessional design are becoming increasingly vague. In the past, a distinction could be made between professional and nonprofessional design based on tools, an artifact's technical complexity, or aesthetic consideration of an artifact. But such distinctions are eroding. Everyone can use desktop publishing and media software to create and orchestrate images, text, sounds, and motion. Books such as Ellen Lupton's *DIY: Design It Yourself* (2006) introduce professionals and nonprofessionals to the basics of form and composition to heighten the aesthetic considerations of a range of artifacts. Even the technical complexity of electronics and batch-manufacturing projects are tamed and popularized in a new breed of magazines such as *Make* and *ReadyMade* and Web sites such as *Instructables* that provide resources for independent designers who often have not been professionally trained.

At the same time that nonprofessional design is proliferating, the professional boundaries of design continue to expand. Educational programs are growing, and dozens of professional design organizations and scholarly journals are published regularly. Design-related activities and subjects include familiar forms such as fashion, industrial, interaction, and graphic design as well as less familiar forms such as service and organizational design. As new fields of design emerge regularly and the range of practices within the fields of design constantly change, more and more people identify themselves or are identified by others as designers.

So what are we talking about when we talk about design?

The renowned social scientist Herbert Simon was one of the early thinkers to place design in a broad context relevant to contemporary practice. For Simon, there were two key aspects of design. First, it was a hallmark of any professional activity: medicine, policy, management, engineering, and architecture all engage in design. Second, it was concerned with the artificial (how things might be) and not with the natural (how things are), which concerned prior sciences. In *The Sciences of the Artificial*, Simon (1996, 111) offers this now classic definition of the activity of design:

"Everyone designs who devises courses of action aimed at changing existing situations into preferred ones." As the practice of design and design studies has matured, so too has our thinking about what design is. More recently, design studies scholar Richard Buchanan (2001, 191) has offered the following definition of design: "Design is the human power of conceiving, planning, and making products that serve human beings in the accomplishment of any individual or collective purpose." Like Simon's definition, Buchanan's definition of design allows for the discovery and assertion of a wide range of activities under the rubric of design. And both definitions emphasize design as action-oriented.

Buchanan and Simon represent two opposing positions in contemporary design: those who assert that design is or should be a science, and those who do not. It was important for Simon to consider design as a science and the study of design as a scientific endeavor. The emphasis in such an approach is on the decision-making processes of the designer, the empirical study of the effects of design activity and outcomes, and the identification of the factors that produce such effects. The purported benefit of such a scientific approach is that it allows practitioners of design to be more precise and effective in design activity and research and to make claims that are based in fact, not assumption. In contrast to Simon's scientific approach, Buchanan (2001) considers design to be a liberal art and roots understanding and discourse about design in the humanities, not the sciences. Buchanan's primary interest is in casting design as a contemporary form of rhetoric, its concern being the communication of belief and the incitement to action through argument. According to Buchanan, this notion of design as rhetoric assumes that designers are "agents of rhetorical thinking in the new productive sciences of our time" and that the discipline of design "employs rhetorical doctrines and devices in its work of shaping products and environments" (Buchanan 2001, 187). The implication of casting design as rhetoric is that "In approaching design from a rhetorical perspective, our hypothesis should be that all products—digital and analog, tangible and intangible—are vivid arguments about how we should lead our lives" (Buchanan 2001, 194). Given such a position, design practice and scholarship should focus on the means of constructing and analyzing the arguments enacted or embodied in design process and products.

In this book, design is discussed as a liberal art with an emphasis on the rhetorical aspects of design. But even across those contrasting positions, there are shared qualities of design. Regardless of whether one considers design as a science or a liberal art, three general characteristics of design

bind together multiple design positions and practices. Its first characteristic is that *the practice of design extends the professions of design*. Anytime a deliberate and directed approach is taken to the invention and making of products or services to shape the environment through the manipulation of materials and experiences, this is design.

Its second characteristic is that *the practice of design is normative*. It is how things could or ought to be. As a normative endeavor, design stands in contrast to disciplines or practices that produce descriptions or explanations alone. Design attempts to produce new conditions or the tools by which to understand and act on current conditions. In the process of doing so, designers and the artifacts and systems they produce assert claims and judgments about society and strive to shape beliefs and courses of action. Claiming and asserting that things should be other than they are and attempting to produce the means to achieve that change are not neutral activities. Positioning design as a normative endeavor has consequences: it opens the practice and products of design to ethical, moral, and political critiques.

Its third characteristic is that *the practice of design makes ideas, beliefs, and capacities for action experientially accessible and known*. For example, even when information is expressed to an audience by text alone, the text is taken as visual material to be manipulated and sculpted to provoke specific patterns of reading, association, and meaning making through the practices of graphic and information design. Such treatment of textual data can be traced through early twentieth-century examples of book, poster, and newspaper design through to contemporary forms of computational media. The visualization work of designer Ben Fry provides salient examples. Fry uses information design to sculpt data with the basic of elements of type, line, shape, and color. The goal is to increase understanding of scientific information and make new connections and perhaps even new scientific discoveries. His creative expression of data extends the standard forms of documentation and communication used by scientists in truly novel ways. For example, when Fry (2001a) presents the 13 million letters from the genetic code of human chromosome 21 rendered in a 3-pixel font into an 8-foot by 8-foot image, the resulting image can be considered an attempt to make the data of that chromosome experientially accessible and known so that we might viscerally understand it as information and come to a greater appreciation of the complexity and vastness of human genes. More directly associated to action is Fry's *Isometric Haplotype Blocks* (2001b) interface, which presents a set of genetic data in six views, allowing the user to navigate among the views and produce a new perspective of comparison

and contrast, ideally for the purpose of advancing scientific discovery.[8] Such an emphasis on the production of experiential forms extends nearly all design fields, from industrial to organizational design. With each field, the materials that are rendered for experiential effect change to reflect the traditions of that field and the skills of the designers, but the emphasis on making ideas, beliefs, and capacities for action experientially accessible and known remains consistent across all varieties of design.

In terms of the range of activities (from fashion to medicine) and of perspectives (from scientific to humanistic), design covers a broad swath of contemporary cultural production. What we are talking about when we talk about design is both a field and practice. It includes the professional fields of design such as graphic, information, industrial, and interaction design and the products produced within these fields. It also includes the work of nonprofessionals who draw from or reference design fields and products in their work—the work of those who engage in the practices of design but might not identify themselves as designers. This practice of design is an implicitly normative endeavor of conceiving and producing experiential forms—artifacts, systems, events—to shape beliefs and courses of action. What distinguishes adversarial design is that it works to shape beliefs and courses of action in regard to political issues.

Critical Design and Tactical Media

Adversarial design does not exist in a vacuum of cultural production, and instances of it span different fields, subjects, styles, and movements. In fact, one motivation for this inquiry is to provide a broad and coherent framework for describing and analyzing a range of contemporary designed things that seem to do the work of agonism. Critical design and tactical media are two modes of cultural production that exemplify many qualities of adversarial design and warrant attention. They also raise important issues concerning the confluence of art and design and provide an opportunity to clarify the role of adversarial design as a theoretical construct—a tool to think and make with—rather than as a means of naming a movement.

Anthony Dunne and Fiona Raby coined the term *critical design* in the mid-1990s to describe a practice of design that uses products to ask questions and raise issues in society and culture. Critical design is now an established body of work that originates and operates from within the professional fields of design and expresses a critical, if not always political, stance through designed things. As Dunne and Raby (2001, 58) describe it:

Critical design is related to haute couture, concept cars, design propaganda, and visions of the future, but its purpose is not to present the dreams of industry, attract new business, anticipate new trends, or test the market. Its purpose is to stimulate discussion and debate amongst designers, industry, and the public about the aesthetic quality of our electronically mediated existence. It differs too from experimental design, which seeks to extend the medium, extending it in the name of progress and aesthetic novelty. Critical design takes as its medium social, psychological, cultural, technical, and economic values, in an effort to push the limits of the lived experience, not the medium.

Early instances of Dunne and Raby's critical design work focused on information technology. Products within the *Hertzian Tales 1994–1997* series (Dunne and Raby 1997) explored the implications of increased radio and magnetic waves in the environment as a consequence of the increasing numbers of digital and electronic devices. The prototype products in these series took a decidedly dark tone, embodying what Dunne and Raby referred to as "design noir" to explore issues of product development and use often unaccounted for in the mainstream design festivals and product press releases (Dunne and Raby 2001). For example, the *Faraday Chair*, which appears like a human-size amber aquarium, is designed to provide a respite from the otherwise ubiquitous presence of radio waves and their unknown effects on the body, offering "a retreat, a new place to dream, away from the constant bombardment of telecommunication and electronic radiation" (Dunne and Raby 1997). More recent work by Dunne and Raby has focused on the future uses and implications of biotechnology and robotics and continues to use the design of prototype products to prompt questions about the kinds of experiences and lives we are or may soon be encountering through technology. The project *Is This Your Future?* (2004) explores the possibilities of home bioenergy production, including the harvesting of energy from dead animals and the recycling of human waste, and *Technological Dreams Series: No.1, Robots* (2007) explores alternate forms of human-robot interaction, such as neurotic or needy robots.[9]

Tactical media is a term used to describe diverse works and practices that manipulate technology to produce artifacts, systems, and events that critique contemporary society. Tactical media is an example of a practice within the arts that engages in the practice of design and the production of designed things. As described by media theorists David Garcia and Geert Lovink (1997), "It is about a form of art that meets activism with a positive attitude towards contemporary digital technology." In contrast to critical design, in which a political stance is not explicit and the political aspects of the work are often unaccounted for, tactical media put forth an overt

and unambiguous political, often agonistic, perspective. This is political action of a certain kind, as Rita Raley describes in her book *Tactical Media* (2009, 1): "These projects are not oriented towards the grand, sweeping, revolutionary event; rather, they engage in a micropolitics of disruption, intervention, and education." These micropolitical works cross media and technology boundaries, taking a variety of forms from performance to software to workshops. For instance, the collective Critical Art Ensemble (CAE) has produced several installations and performance events about issues surrounding biotechnology. In collaboration with artists Beatriz da Costa and Claire Pentecost, CAE produced the installation *Molecular Invasion* (2002–2004) on the subject of genetically modified organisms—corn, soy, and canola plants engineered by the Monsanto Corporation. The installation consisted of various stands of the plants on display in a grow-room environment, interpretive materials (wall texts and an interactive computer kiosk), and participatory science-theater events in which the artists worked together with students in the gallery space to attempt to reverse engineer the Monsanto plants.[10] As another example, the Institute for Applied Autonomy (IAA), a collective, created the software application *iSee* (2001), which maps all of the known surveillance cameras in New York City. It allows users to mark starting and ending points and then generates a "path of least surveillance" through the city.[11] Leveraging the capabilities of interactive maps, *iSee* provides a clear and familiar function (route planning), raises awareness of the ubiquity of surveillance, and also provocatively provides a means for attempting to circumvent this surveillance.

Critical design and tactical media provide incentives for developing ways of articulating agonism through design to better understand, describe, and analyze the political qualities of such work. Critical design and tactical media also surface art as a potential issue. For some, critical design veers close to art, and it certainly draws from art practices and history. And as tactical media is art, can it be spoken about from the perspective of adversarial design?

There is a long-standing tension between art and design. Since the inception of modern design, the two fields have regularly drawn from each other, while also endeavoring to maintain distinctions. The term *designart* has been put forward to describe works that operate in the interstices of the fields, which, as art critic Alex Coles (2007, 10) notes, "form[s] more of a shifting tendency than a fixed movement or category." Rather than trying to carve distinctions between the fields of art and design, however, it is more productive to allow their practices to overlap and intermingle, as seems to be their character in contemporary culture (Coles 2007). Within

this book, works of art—works described by either their makers as art or placed within the cultural category of art by critics and theorists—are woven into the exploration of adversarial design, just as these works themselves incorporate design practices. Likewise, works from within the field of design that draw from art will not be shown any prejudice. Directly stated, the issue is not whether a work is categorized as art or design proper but rather how works employ design in an adversarial manner.

Adversarial design is a theoretically informed construct for understanding, describing, and analyzing a range of objects and practices. Critical design and tactical media are two contemporary practices that produce some work that could be characterized as doing the work of agonism. But not all work falls within these categories. For instance, *Million Dollar Blocks* would not be readily characterized as critical design or tactical media. Thus, adversarial design does not just name (or rename) a movement or genre. It provides a means of characterizing and discussing practices and objects that brings to the fore the agonistic qualities of the work across a multitude of movements and genres. Asserting the claim that some designed things do the work of agonism, the charge of this inquiry is to elucidate how they do so. But getting at more precise descriptions of how adversarial design does the work of agonism requires more specificity in analysis. One way to achieve that specificity is by focusing on a particular medium, and computation is a timely and robust medium to explore.

Computation and Adversarial Design

Examples of adversarial design can be found across mediums and forms. Silkscreen posters, celluloid films, and steel sculptures are just as capable of doing the work of agonism as are computer animations, digital photography, and virtual worlds. A history of twentieth-century agonistic work would include examples from all forms and mediums of aesthetic expression in design and the arts—from the collage work of the Dadaists and Futurists, to the sculptural manipulations of the everyday by the Surrealists, to the posters of the Grapus collective in the 1960s, 1970s, and 1980s, to the contemporary architectural, artifact, and performance-based works of Krysztof Wodiczko.[12] Just as agonism argues for a pluralism of political positions, so too does adversarial design manifest in a pluralism of mediums and forms.

Although the defining quality of adversarial design is the way it functions and not its form or medium, the mediums and forms of design are central to the activities of design and the experience of designed objects.

Attending to these mediums and forms of design is imperative for insightful descriptions and analyses of artifacts and systems. In some ways, this is a commonsense notion, particularly regarding discussions of art and design. Few scholars would expect a painting and a sculpture to be perceived in the same way and have the same effect on viewers, even if they share subject matter. Likewise, although a common hammer and an air hammer share a general functionality of driving nails, the process of designing each product, the experience of use, and the capabilities they provide vary in nontrivial ways. In a similar manner, although the work of agonism can be done in any medium, the kinds and qualities of work done shifts from medium to medium.

My focus is on designed artifacts and systems that make use of the qualities of computation as a medium. The purpose of focusing on a single medium is to develop a kind of medium particularity in description and analysis. This attention to medium grows from a diverse but coalescing body of scholarship, and the choice of computation as the focus is grounded in the contemporary practices and objects of design. Both of these subjects—the focus on computation and medium particularity—deserve a brief discussion before proceeding, as they frame this inquiry into adversarial design.

Why a Focus on Computation?

Three factors in contemporary design motivate a focus on the medium of computation. First, although design extends the realm of technology, there is a defining affinity between design and technology; second, computation is a lively contemporary technological domain that spans practices and forms; and third, the artifacts and systems produced via computation have particular characteristics and deserve close readings. Each of these is addressed briefly here, leaving for the following chapters the full discussion of these factors and the ways that they combine together and intersect with the political.

In large part, the focus on computation is a continuation of a historical trajectory within design to explore technological possibilities in the making of products and services and the experiences they provide. Although technology is not the only site of design, throughout the history of design there has been a defining affinity between design and technology. The practices of design and varieties of designed form often develop in concert with the prevailing technologies of an era. This relationship between design and technology is reciprocal: design is a way of experimenting with

and domesticating technology, and the capabilities and limitations of technology often set the scope and challenges of design activity. This defining affinity between design and technology can be traced back to the origins of what we know today as contemporary design in the beginnings of the twentieth century. For the Constructivists and those at the Bauhaus, the mechanical automated machine that enabled mass production was the defining technology of the time and set the character of then contemporary design.[13] To do design was to work with and reflect an informed consideration of the mechanical automated machine. Attention was paid to the machine as a device for the generation of forms and to the machine as an organizing principle for then modern culture.

The pattern of treating technology as simultaneously an instrument and subject of design continues today. At the turn of the twentieth century, the mechanical machine or mechanization constituted the dominant technology of concern for design, but today the computer or more accurately the medium of computation is the dominant technology. At this historical moment, the medium of computation is salient to design studies because it shapes design practice and constitutes a distinctive site of design invention. The medium of computation encompasses a multiplicity of components, including algorithms, languages, protocols, hardware, software, platforms, and products. To understand computation as a medium requires exploring the ways those components can be used to endow artifacts and systems with distinctive qualities. One fundamental task for contemporary design studies is to understand what it means to do design with computation as a medium that, like any medium, has particular characteristics. The Bauhaus designers strove to understand the automated machine as providing distinctive expressive capacities and limitations, and today designers, artists, and scholars attempt to understand computation as a medium.

As informatics scholar Paul Dourish (2001, 163) notes, when engaging computation as a medium rather than just a tool, "Meaning is conveyed not simply though digital encodings, but through the way that computation enlivens those encodings with semantic and effective power." Examining computation as a medium thus requires an understanding and elucidation of how this "enlivening" occurs—that is, how designers employ and exploit the capacities and limitations of the components of computation (such as algorithms, languages, protocols, hardware, and software) to make certain distinctive expressions and experiences come about. For adversarial design, the task is to identify and describe how the qualities of computation are used for political ends and what political issues they bring forth. The questions to be asked are "What modes of political exchange,

expression, and argument are particularly enabled or enacted by the medium of computation?" and "What does it mean to do political design with computational technology?"

Medium Particularity

Although the focus on computation is motivated in part by computation's place in contemporary design, it is also motivated by a desire to develop a medium particularity in scholarly accounts of design. Since the late twentieth century, there has been a turn toward objects across many scholarly fields, and along with this, an interest in practices and products of design. Politics and political issues are often present, sometimes at the forefront of this turn. This suggests an opportunity for more exacting analyses of designed objects to reflect how a given medium figures into the political qualities and affects that designed objects express or are endowed with.

The works of Langdon Winner and Bruno Latour in science and technology studies and of Jane Bennett in political theory outline a series of issues and opportunities for an interdisciplinary approach to investigating the political qualities of objects and design. In his influential essay "Do Artifacts Have Politics?," the philosopher of technology Langdon Winner (1980) sparked a course of inquiry concerning the relations between design, power, and the built environment. In this essay, Winner suggests that highway overpass bridges designed by New York urban planner Robert Moses enforced a racist doctrine. According to Winner, the bridges were designed with a height that would not permit buses to pass underneath, thereby barring people of color (who depended on public transportation) from accessing beaches near the city. Since the essay's first publication, scholars have debated Winner's claims and position on multiple grounds, questioning the empirical validity of Winner's claim by noting that the bridges did not block all of the public transportation routes to the city beaches. And they have resisted Winner's theoretical position as one of technological determinism (Joerges 1999). These fundamental debates about the relationship between design, power, and the built environment continue today, extending beyond the question of bridges to all manner of designed artifacts and systems. The essence of these debates tends to be about where power is located—in the intention of the designer, in the object itself, or across a network of material and social relations.

More recently, science studies scholar Bruno Latour (2005) has proffered the notion of an "object-oriented democracy" as a way to describe and

analyze the contemporary political condition. In such a democracy, objects become a means and medium through which politics and the political are enacted. As Latour (2005, 15) states, "Each object gathers around itself a different assembly of relevant parties. Each object triggers new occasions to passionately differ and dispute." For Latour, objects are one way to engage in and experience politics and the political. This may sound similar to Winner's position, but Latour extends Winner's assertion in a simple but important way: artifacts may have politics, but these politics change. The politics of artifacts are determined relationally by their engagement with other objects and discourses, all of which are subject to variation over time and across contexts. Thus, unlike Winner's position, which requires recourse to the intention of the designer, Latour's position expresses a more distributed notion of agency and effects as the forces and capacities of objects are dynamic and contingent. Objects and design still have political significance and effect, but that significance and effect are always shifting.

In her book *Vibrant Matter: A Political Ecology of Things*, political theorist Jane Bennett (2010) draws together Latour and Gilles Deleuze to investigate the agency of assemblages, both human and nonhuman. Like Winner and Latour, Bennett draws objects in a discussion of politics, noting that objects have been too long absent from political theory. She examines the capacities and effects of a range of assemblages, from the power grid to potato chips, discussing the ways that such assemblages figure in the exertion and experience of power, influence, and consequence. For Bennett, such a move toward objects and materiality is necessary to change how we critically make sense of and respond to the contemporary political condition. As she states, "a politics devoted too exclusively to condemnation and not enough to a cultivated discernment of the web of agentic capacities can do little good" (Bennett 2010, 8). In a sense, this inquiry into adversarial design complements Bennett's: this inquiry is motivated by a desire to bring political theory into the discourses of design more fully and to develop a design criticism characterized by a "cultivated discernment" of the political qualities of artifacts and systems.

The work of scholars such as Winner, Latour, and Bennett provides a theoretical backdrop for a turn toward objects and their political qualities and potentials. But these authors do not directly engage the medium of computation. To investigate how design does the work of agonism through the medium of computation requires drawing from the field of digital media studies. This scholarship examines software and hardware and provides inroads to investigating what it means to do design with the medium

of computation. For example, canonical texts such as Janet Murray's *Hamlet on the Holodeck* (1997) and Lev Manovich's *The Language of New Media* (2001) identify distinctive qualities of computation and computational objects that define the medium. These texts lay the foundation for the development of software studies, which take computer code and applications themselves as subject of inquiry. Moving beyond software, in *Racing the Beam: The Atari Video Computer System* (2009), Nick Montfort and Ian Bogost advance a notion of platform studies as a way of getting even closer to understanding computational machines and how the qualities and affordances of circuits and hardware affect the design of computational cultural artifacts. For example, they explore the ways that the hardware of the Atari 2600 gaming platform managed sprites in memory and how that particular configuration of capacities and limitations affected game design and players' subsequent experiences and expectations of video-game play.

These diverse yet complementary discourses signal a renewed attention to the significance of objects and mediums and their relations to understanding politics and the political. But more work needs to be done in synthesizing and extending these discourses. To call for an object-oriented democracy is the right first step, but it simply sets the trajectory for a course of inquiry. There is a need to attend more closely to the designed qualities of artifacts and systems and the varieties of political expression and enactment. Adversarial design, both as a way of doing the work of agonism through artifacts and systems and also as a way of interpreting artifacts and systems in terms of their agonistic qualities, is an attempt to do just that.

The Structure of the Inquiry

In this book I analyze a series of designed computational artifacts and systems in order to better understand their political qualities and how the medium of computation is used in novel ways to express political issues. To do this, I have organized these artifacts and systems into three categories—information design, social robots, and ubiquitous computing. Although within each of these categories there is a diversity of forms and functions, each category also highlights a fundamental quality of the medium of computation and brings to the fore distinctive attributes for political design. For example, information design highlights procedurality, which is the way that software generates representations and enables new forms of political images and interactive visual expressions. Social robots highlight embodiment, or the dynamic coupling of objects with

the environment, and in the process raise issues concerning our future relations with intelligent artifacts. And ubiquitous computing highlights connectedness and the ways in which everyday objects become networked computational things, enabling new possibilities for participation in political expression. The purpose of making such categorical distinctions is to move closer to a medium particularity in design scholarship. In addition, the computational qualities of each category lend themselves to different tactics of adversarial design—revealing hegemony, reconfiguring the remainder, and articulating collectives. By exploring these categories and tactics together, my aim is to detail the ways that computational artifacts and systems can be understood as doing the work of agonism through design.