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Kelly Moore: Disrupting Science

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CHAPTER 1

Introduction

In 1960, American scientists were *Time* magazine's "Men of the Year," described as superheroes whose powers and social contributions surpassed those of any other group in human history. The "true 20th century adventurers, the real intellectuals of the day," and the "leaders of mankind's greatest inquiries into life itself," scientists were "statesman and savants, builders and even priests" whose work shaped the "life of every human being on the planet."[1] In 1970, after a decade of criticism from environmentalists, antiwar activists, and members of the counterculture, *The Nation* declared that science had become a "war/space machine." As a result, some citizens had grown "hostile to science, identifying it with war, pollution, and every manner of evil."[2] Philip Abelson, the editor of *Science*, decried the growing "war on scientists," caused, he argued, by unrealistic demands for "relevant" scientific research.[3] Once lauded for their contributions to national security, scientists were now under fire for helping to perpetuate warfare. One of the most interesting aspects of the challenges to the relationship between scientists and the military was that these challenges were not simply waged by "outsiders." Scientists themselves filled the ranks of critics, charging their peers, the government, and industry with a failure to make good on the promise of science to improve human life. Although criticism of science and scientists and doubts about the benefits of technology have a long history in America, by 1970 the criticisms of science and of scientists were more vociferous and diverse than ever before.

Although it is tempting to treat scientists' self-criticism as an aberration, the historical record demonstrates quite the opposite. Throughout the twentieth century, American scientists were involved in varied and visible forms of public political action, especially in efforts against racism and war, often working closely with and inspired by activists who were not scientists. *Disrupting Science* examines the development of scientists' activism against the financial and political relationship between scientists and the military between 1945 and 1975. To do so, the book compares three episodes in which scientists formed organizations that articulated different public political roles for themselves and their peers. In the early 1950s, pacifist scientists formed the Society for Social Responsibility in

Science to convince other scientists to renounce all research that might contribute to war; in the late 1950s, scientists and citizens embroiled in the public debate over the wisdom of above-ground atomic testing developed a method of providing the public with information about the health effects of fallout through the formation of the Committee for Nuclear Information; and in the late 1960s, scientists formed Scientists for Social and Political Action (later known as Scientists and Engineers for Social and Political Action), which eventually came to call itself Science for the People. At first, Science for the People used direct action, public education, and other methods to call attention to and to discourage scientists' association with the military, racism, and sexism. Later, they used a variety of methods to put scientific knowledge into the hands of "the people." Each group represented a different vision of the place of science in public life, shaped by new arrangements between science and the state and by social movements of the day.

Scientists' roles in transforming the political meaning and uses of science raise three puzzles that are the central focus of *Disrupting Science*. Why did scientists engage in activism against the relationship between the military and science, the most radical of which undermined their privileged social position and the ideological foundation of their own work? What forms did their actions take, and why did they differ from one another? How did their efforts simultaneously contribute to buttressing the power of science in American political life and transforming it? The scientists who were involved in these debates grappled with the classical question Max Weber posed in "Science as a Vocation": "What is the value of science?"[4] In more specific form, they asked what the proper relationship between science and politics was and ought to be. None came up with the same answer, but all defined ideals and practices that they believed should govern the normative link between science and public politics.[5]

At the heart of this book are the vibrant efforts of scientists to redefine the relationships between fact and value, between politics and science, and between expert and citizen. Although the most active critics were a small minority of all scientists, they were drawn from many ranks, disciplines, and institutions. Some were highly visible members of prestigious universities and government agencies, and others worked in industry. They ranged in rank from graduate students to Nobel Prize winners. Their strategies for linking—and separating—were equally varied, including the disruption of scientific meetings, letter writing and public speaking, the provision of information to the public, and collaborating with like-minded groups of scientists and other activists. Whatever their tactics, scientists were above all engaged in thoughtful and earnest debates over how to best make good on the promise of science to provide the greatest benefit to the largest number of people. These efforts helped make one of

the most important changes in the place of science in public life in the twentieth century: the authority of *scientists* to make unchallenged claims about nature and about their relationship to public political life, and to mediate the relationship between scientific knowledge and political values, decreased. At the same time, however, the authority of *scientific knowledge* itself increased. In this chapter, I provide an overview of the central arguments in the book and of the structure and content of the chapters to come.

The Military, Science, and Social Movements, 1945–1975

After World War II and increasingly through the 1960s, the idea that science and scientists were uniform forces for progress came under fire. Although criticism of science and scientists and doubts about the benefits of technology have a long history in America, the criticisms during this period were far more vociferous and diverse than ever before. Many were centered around the relationship between scientists and the military. As we will see, those who criticized science drew force from the social movements of the time. Although early challenges took the relatively genteel form of written and verbal debate, by the late 1960s radical critics of scientists and science were targeting the places where scientists worked and lived. They had gone beyond cool professional discourse and cerebral argument to personally identify, ridicule, and in some cases physically attack individual scientists. Some elite scientists fared the worst: jeered and heckled at meetings and forced to walk gauntlets of protestors in front of their homes and workplaces, scientists who considered their military-sponsored research a patriotic act were accused of being as responsible for the war in Vietnam as the generals who directed it. Other critics lambasted scientists for producing racist and sexist research under the guise of scientific objectivity.

That scientists attempted to reorganize their relationships with the public and the state in the period between 1945 and 1975 was not idiosyncratic. Other professionals have organized themselves to include public problems and concerns within their jurisdiction while still leaving a special set of tasks, skills, and responsibilities for themselves. For example, Kristen Luker showed that American physicians in the mid-nineteenth century removed women from decision making about abortion to establish their own professional jurisdiction.[6] Other professionals have taken on new research subjects as a result of their engagement with public political debates, as Lily Hoffman demonstrated in her study of the mobilization of physicians and urban planners in the 1970s, and Scott Frickel has shown in his study of the formation of the field of environmental

toxicology.[7] Still other professions have expanded their jurisdictions to include service to new groups, as Christian Smith's study of the development of liberation theology among Central American Catholic priests and nuns showed.[8] More generally, in the late 1960s, professionals in most Western countries were rethinking their relationships with public political issues and considering how to better use their skills and authority to address immediate social and political concerns.

Before World War II, American scientists were no strangers to political engagement, of course. Engineers in the early twentieth century organized and advocated for "social responsibility" among their peers. In the late 1920s, some scientists who favored teaching evolution over creationism lectured and published to advocate using evolutionary theory and science as a basis for personal and public morality. Many eugenics scientists were active members of a broad movement to "purify" the American "race," working closely with politicians and citizen groups around the nation.[9] In the 1930s, scientists organized groups to fight fascism and racism and to seek ways to use science to end poverty and war.[10]

Yet the mid-twentieth century presents a special case. Some scientists wanted to continue with some of their prewar political activities and, more broadly, to develop a New Deal–style system for science funding that would be based on regional need rather than federal military priorities. Their hopes would not be fulfilled, however, because the promilitary sponsorship of science forces won out in the battles over who would control atomic power production and on what basis federal funding would be delivered.[11] The intensification of scientists' efforts to define the proper relationship among knowledge creation, war, and the public was not simply a philosophic or epistemological dispute, or a matter of intellectual positions. It was a response to the changing material conditions of science and to the political mobilization of Americans from many different political communities and walks of life.

The close association between scientific research and the military began after World War II. Government and military leaders, and some scientists, realized the importance of scientific talent and ideas in maintaining atomic and other forms of military supremacy. As a result, federal funding for scientific research and education swelled dramatically, from fifty million dollars in 1939 to nearly fifteen billion dollars in 1970.[12] Between 1947 and 1960, most federal funding for science came from the Department of Defense. Funding was distributed to a decentralized network of recipients that included universities and federally funded laboratories. New knowledge proliferated and more disciplines and subdisciplines formed, increasing the intellectual diversity of the field of science.

Scientists became important political advisors during the mid-twentieth century, too, providing recommendations on everything from which

weapons to build to what students should learn in school.[13] In the 1940s and 1950s, scientists' contributions to defense were often lauded as contributions to democracy. Scientists were thought to provide the know-how to keep the nation safe, and to contribute to an "informed public," which was considered an important feature of a healthy democracy.[14] As Gerard Piel and Dennis Flanagan, the publisher and editor of *Scientific American* in the late 1940s, wrote, without information about science, "modern man has only the haziest idea of how to act in behalf of his own welfare, or that of his own family and community."[15]

Yet lavish funding, access to the highest levels of government, and association with national defense were not uniformly welcomed by all scientists, nor by the public, intellectuals, or political authorities. The new state-science relationship posed threats to scientists' ability to act on their political beliefs, and shifted funding toward a limited range of subjects. Above all, it raised questions about the extent to which science was an independent community and a force for the improvement rather than the destruction of society.

In the 1940s and 1950s, it was difficult for scientists to speak out on these issues. The national security system, which was intensified in 1947, swept up scientists in high-profile and routine investigations. As Jessica Wang has shown, scientists made up more than half of those investigated by the federal government between 1947 and 1954. The security frenzy included extensive surveillance of scientists who were peace activists, including Albert Einstein, and repeated public investigations of leading scientists such as Robert Oppenheimer and Edward U. Condon, whose reputations were damaged despite the failure of loyalty committees to find them guilty of security breaches. Restrictions on travel and security clearances for federal grants and contracts added to the atmosphere of suspicion and fear.[16] As a result, many scientists—but by no means all—were wary of taking explicit political positions that might be construed as contrary to the military goals of the United States or in any way "political." Part of the story I tell in *Disrupting Science* is of a small group of dedicated pacifist scientists who personally refused military funding and who urged their peers to find ways to use science for "productive" ends, even though they were at great risk for asserting their perspective.

By the late 1950s, as repression had eased, scientists began to raise new questions about the politics of science, this time about the extent to which democratic procedures were being subverted by the failure of scientists to provide the public with facts and information sufficient to allow their full participation in political debates about the wisdom of atomic testing. In the late 1960s, radical scientists went beyond calls to reform the behavior of scientists or democratic procedures; they called for the wholesale restructuring of society.

Yet scientists were not the only ones who questioned the new military-science relationship. In the early 1960s, members of Congress began to raise questions about the wisdom of using the majority of federal research funds for military purposes. They called instead for more spending on health and social problems. President Eisenhower's last presidential speech famously warned of the dangers of a "military-industrial complex," and of the dangers to the freedom of university research presented by massive federal funding. Politicians and presidents, however, played a relatively small role in generating the moral outrage that drove scientists to rearticulate their place in American public life. The social movements of the 1950s, 1960s, and 1970s provided some of the pressure and much of the moral argumentation and camaraderie that led to the creation of new means of organizing the relationship between knowledge production and power. The scientists who are featured in this book often considered themselves part of these broader political movements. The intersection of social movements and changes in the organizational, moral, political, and economic organization of science offers a window through which we can observe how scientists created new understandings of the place of science in American public life.

The critiques of science and scientists that scientists and other activists made in the three episodes I examine can best be understood as arguments stemming from two established and dominant American political traditions, liberalism and moral individualism, and one emergent perspective, that of a Marxian-inspired New Left. By political traditions, I do not mean static tools strategically identified and mechanically applied. Traditions are full of currents and countercurrents that people endlessly reconfigure as they creatively integrate them with real political problems. Even as the protagonists in this book drew on political traditions to formulate criticisms of science, they also transformed them in powerful ways. By the late 1960s, scientists' efforts to forge a new relationship with the public and the government were informed by the political analyses of the New Left and by Marxists. Both had roots in earlier American political thought, but compared to moral individualism and liberalism, they were more fertile ground for the development of novel ways of articulating how scientists could use their skills in the service of the public.

The least well known, but earliest, tradition on which critiques of science were based in the thirty years following World War II was moral individualism. In this tradition, transformation of the individual moral conscience is the source of broader social change.[17] Those who drew on this tradition argued that scientists had failed to take personal moral responsibility for the development and use of scientific ideas and products. Unlike liberal scientists and commentators, scientists drawing on this tradition did not turn to the government for solutions to what they saw as

the moral corruption of science and scientists through association with the military. These scientists were inspired by religiously based activists and leaders such as Martin Luther King Jr. and the Fellowship of Reconciliation leaders Brad Lyttle and A. J. Muste. Those scientists who espoused this tradition had little confidence in either the government or organized political groups to effect real transformations in the science-military relationship. They believed that the relationship between science and the military could be decoupled only through the personal commitment and choice of individual scientists to refuse military work.

A second tradition from which ideas were drawn about the proper arrangements among science, the military, and citizens was liberalism. Scientists and other activists working in this tradition assumed that an educated and informed citizenry was the major means for making decisions about the proper role of science in public life. From scientists who called for scientific rather than government control of science after World War II to critics of "technocracy," those who argued from a liberal perspective believed that scientists' proper role was to inform the public of facts that citizens could use to rationally decide among alternatives.

These two traditions were the basis for the criticisms of the science-military connection through the middle of the 1960s. In the mid-1960s new voices were added. Marxists and New Left activists and intellectuals became critical of the relationship between capitalism and science, and feminists and antiracists associated science with the domination of women and blacks. College students were especially important in generating activism among scientists. In 1966, they began to gather information about how the facilities and faculties on their campuses contributed to weapons production. Some who were influenced by Marxism argued that science had been captured by the needs of the upper classes and by what they saw as imperialist goals of the United States bent on the material and military domination of its citizens and those of other nations. Many New Left activists, inspired in part by the ideas of Frankfurt School philosopher Herbert Marcuse, were critical of the ways in which capitalism and instrumental rationality left people bereft of the ability to imagine and create.[18]

In practice, few of the scientists whose activities I examine in this book called themselves "moral individualists," "liberals," or "radicals" when they engaged in challenges and defenses of science. In the episodes in which contradictions in the professed and actual relationships between science and politics were variously uprooted and exposed or vehemently defended, activists, intellectuals, and journalists often wove together elements of different traditions and perspectives. Moreover, the volatile intersections of science and politics were not abstract debates, but involved concrete political events. The arms race, the development of nuclear,

chemical, and biological weapons, and the war in Vietnam were the substantive issues around which scientists struggled to make good on the promise of science to serve all people.

Scientists were ultimately trying to steer a course between two potentially contradictory positions. On the one hand, many asserted that the public political authority of science was based on the strong distinction between scientific knowledge and practices, and the messy world of values and moral concerns. On the other hand, some claimed that the value of science lay in its affinities with and beneficial effects on aspects of social life, including democracy, moral progress, and the economy. Both of these bases would be fundamentally shaken by the close ties between scientists and the military that characterized the mid-twentieth century and by the social movements that condemned that relationship.

After sixty years of building a professional field that increasingly centralized the power to make uncontested claims about nature in the hands of scientists, the two decades following World War II at first seemed to continue that pattern, given the lavish funding and the centrality of scientific ideas to the military and security projects of the cold war. Yet the cumulative pattern of scientists' political organizing against this new relationship helped to contribute, ironically, to a weakening of their political authority. The organizations they formed linked science to moral and political projects that called for more citizen and scientist involvement in technopolitical issues. In turn, this call led to a weakening of scientists' political authority, but also led to the greater importance of scientific claims and technologies in structuring and adjudicating political debate. Of course, this was not the only source of the disruption of scientific authority. The growth of the regulatory state beginning in the mid-1960s, especially the regulation of research on human and animal subjects, highly visible problems resulting from scientific technologies (thalidomide, atomic fallout, pollution), intellectual critiques of science, and the growing importance of the market also contributed to these shifts. *Disrupting Science* is an effort to demonstrate the role of scientists in contributing to the "unbounding" of scientific authority from scientists and its "binding" to other decision makers through social movement activity on the part of scientists.[19] In the next section, I turn to a theoretical elaboration of some of the main sociological claims of this book.

Although this book considers three key episodes separately, it will show that each group built on or responded to those that came before it, so that over time different visions of how scientists should act in a moral fashion proliferated and contended. This variation in itself helped to undermine the idea that science was a socially or morally unified field built on facts that could be used to constitute political or social life. Although

concerned specifically with scientists, my analysis is situated in a longer tradition of analyses of contentious moral politics.[20]

I will seek to explain when and why scientists engaged in work that was simultaneously an attempt to redeem science from the moral pollution of its association with the state and a deliberate effort to encourage the values and moral meanings of other communities to affect scientists' behavior. Such action poses a puzzle for most analyses of scientific authority.

Scientific Authority and Political Action

The distinctiveness of science as a specific form of social action, and of scientists as a group, is a major theme in Western culture. Historians and sociologists have understood the emergence of science as a distinctive field in terms of scientists' efforts to limit access to the social and material means of producing credible scientific knowledge. Just as other forms of action were differentiated, so, too, did science come to be a distinctive practice.[21] Sociologists of science have also been concerned with the ways that scientists have established authority using material, and especially linguistic, tools to manage the "boundaries" of science. Such activity is normally considered to be *protective* of the areas in which scientists engage.

As Thomas Gieryn argued in his 1983 foundational article on this subject, "boundary work" is the process by which scientists "attribute certain qualities to scientific claims in order to draw a rhetorical boundary between science and some less authoritative, residual non-science."[22] Other writers have followed Gieryn, elaborating on the causes, processes, and consequences of how scientists contest epistemic claims among themselves and others in ways that reestablish the authority of science and scientists.[23] In contrast to earlier structural-functionalist analyses that assumed that scientific activity was autonomous from other forms of social action and that its authority derived from its objectivity and prima facie social value, studies of boundary work demonstrate that the political authority of science depends in part on scientists' active engagement in discursive, organizational, and material projects.

Although the concept "boundary work" is theoretically able to incorporate actions in which scientists engage in activities that are intended to lessen their control over decisions about science, it has not often been a subject of study. One of the assumptions common to studies of boundary work among scientists and other groups is that professional advantage and monopoly drive most decisions by scientists and others. As Gieryn argues in his analysis of "cultural cartography," or the making of cultural boundaries, "it makes little sense to argue that cultural car-

tographers are indifferent about how epistemic authority is allocated or that they would deliberately prefer tactics designed to lose it."[24] Whether the analysis draws on rational choice theory, Marxism, Bruno Latour's systems-based models of credibility, or Bourdieu's class-based analysis of science, the monopolization of expertise and authority is assumed to trump other motivations.[25]

This assumption is its own kind of boundary work: without allowing scientists to have a broader range of motivations, analysts reproduce the cultural idea of scientists as people who are not "like us." These analysts would grant that scientists may also work toward other goals, but they would not do so if it might cost them cultural credibility or other forms of power. Although this may be true most of the time, there are theoretical and empirical reasons to argue that it is not always the case. Sometimes scientists undertake actions that give others authority, but do not call such actions "political" or explicitly treat them as contentious. They may see them as continuous with routine professional behavior.[26] Scientists, like other people, must be seen as having a range of preferences, from advancing professional interests at all costs to sharing or limiting their own authority. They hold moral and religious beliefs; they are members of organizations outside of science, relatives of people with illnesses, residents of areas with particular kinds of problems, and a host of other identities. Some scientists decry any attempt to bring such identities to bear on scientific issues, of course, but others do not. Even without assuming steady, fixed interests derived from group membership, it is not difficult to imagine that in particular contexts, some scientists may be willing to act on political issues, even if it costs them, or their profession, social prestige. Thus, the flat, one-dimensional caricature of the scientist in the laboratory concerned only with professional advancement is as misleading as the image of the scientist seeking "truth" above all else. Simply put, like other people, scientists have multiple interests, all of which they may enact, or challenge and transform, depending on political, economic, social, and intellectual circumstances. The ways in which scientists experience and engage these circumstances, moreover, is not as individuals, but as members of overlapping organizations and networks to which they belong.[27]

In each of the cases of organizational formation I examine, founders were in organizational settings, such as universities, professional associations, political organizations, and religious groups, in which critical examination of professional roles was taking place. In such contexts, it is possible to see how scientists could conceivably limit their own professional power. Scientists' decisions about how to engage in political debates of the day were thus shaped not by a transhistorical idea of who they were, but by a dynamic, shifting political environment.

One of the results of these explorations of new science-politics relationships is that, at present, scientists act in a surprising variety of ways to give citizens the power to make better decisions about sociotechnical issues. These include the provision of information, and an understanding of how scientists work, to the public or to specialized groups such as patients or people living in contaminated areas. Consensus conferences, the use of amateurs to carry out research projects, "town meetings" on scientific issues, "participatory design" programs, scientist-citizen collaborations on health and environmental problems, and service on public information and communication committees in professional associations are other ways that scientists engage with the public, over and above the work they do in public interest groups. Although few, if any, scientists hope to give up all the benefits that expert knowledge can confer in debates over sociotechnical issues, there is clearly a range of preferences among scientists, shaped by historical events.[28]

Scientists who organized themselves into groups that took on issues that bridged the "purely professional" organizations and "purely political" organizations during the mid-twentieth century did so in the context of political and religious communities that were engaged in self- and group criticism that encouraged sacrifice for a greater good. In the 1940s and 1950s, pacifists in the United States, organized in the civil rights and the antinuclear movements, emphasized the need to take risks that might, in the short run, lead to personal or group harm but would ultimately lead to a greater social good. This same idea was adopted by New Left groups as well. In the late 1960s and the 1970s, political groups on the left, often inspired by the "new Marxism," especially Maoism, were critical of their own interests and agendas, and sought ways to bring them more in line with the interests of less powerful groups. In such contexts, limiting one's own or one's group's power is understandable.[29]

It need not be the case that willingness to give up professional power comes from immersion in political groups that hold values distant from mainstream politics. Scientists with more mainstream political views may also aspire to provide other groups (patients, the public, or people living in contaminated areas, for example) with access to scientific information and an understanding of how scientists do their work. These scientists use many of the methods noted above, such as establishing collaborative relationships with nonscientists or participating in public information sessions. They also offer individual-level testimony and assistance to advocacy groups. All of these are ways in which scientists have helped and continue to help empower nonscientists, and all bring to mind issues about the balance of authority between science and scientists.

Understanding the intersections of public political debates and the actions of scientists is part of the "new political sociology of science." This body of work is institutional in its approach and organized around questions of how interactions among scientists and other groups shape not only knowledge itself, but also the rules and resources that scientists and others have for creating such knowledge. Allowing for a wide range of situated motivations, it emphasizes the ways that existing formal and cultural rules, including those of states, economic relationships, and organizational forms, matter for understanding the power of science and scientists.[30]

The State as Catalyst and Constraint

The creation of and forms of action embodied in new kinds of scientist-based organizations in the mid-twentieth century were shaped by the state and by social movements. The state is examined here as a differentiated system, whose power is exercised in material, bureaucratic, and cultural forms.[31] Three key features of the American state are centrally important in this analysis. The first is its capacity for developing knowledge, equipment, and personnel for the creation of weapons and a war-ready military. This capacity developed rapidly after World War II. Scientists were not in a simple sense "captured" by the state; many scientists, especially physical scientists, were actively and willingly engaged in science advising and the development of weapons. As Patrick Carroll has demonstrated, scientists and engineers have long provided the material basis of state making, including maps, roads, bridges, public health systems, and policing techniques.[32] Yet some scientists in the mid-twentieth century were deeply unhappy about the entire relationship between science and the military, or some specific aspect of it. For some, it was the lack of autonomy scientists had in choosing projects; for others, it was secrecy constraints and the lack of public information; and for still others, it was the perception that science was now associated with destructive rather than constructive research. All asked whether the military-science relationship was serving broad social and scientific goals or narrow military ones.

In addition to generating dissent among those unhappy with the military-science relationship, state surveillance and repression shaped not only the extent to which scientists engaged in political action but, equally important, the content of their action. Historians of science and scholars of social movements have demonstrated the effects of surveillance and the restriction of civil liberties on the capacity of groups to dissent from the state.[33] Direct repression played a critical role in generating some of the opposition to the closer relationship between science and the military, between 1947 and 1955 in particular. But just as important, the *fear* of

red-baiting in the 1950s and early 1960s shaped scientists' claims that their actions to reform the military-science relationship were "apolitical." As Christian Davenport, Gilda Zwerman, and Patricia Steinhoff have demonstrated, political repression may have little dampening effect on extremist groups and make them more committed to their cause.[34] In the analysis put forth in this book, repression played all three roles: it dampened the amount of dissent, shaped the "apoliticism" of scientists' actions, and spurred other groups to intensify their commitment.

The variation in forms that scientists' actions took were also shaped by the state. The decentralized system of scientific work and training in the United States meant that scientists in the mid-twentieth century were working and living in settings ranging from heavily policed federal research laboratories to research universities, to small liberal arts colleges, and to industry. Disciplines proliferated during the mid-twentieth century, and so too did the organizations to support them. This system was established after World War II, after a long series of debates about whether and how the federal government would support scientific research. Funding for research, while heavily focused on the military and a small number of research institutions, was never entirely centralized. This variation helped to create different communities of scientists who were exposed to and helped to create different visions of the relationship between scientists and citizens.

Social Movements

Scientists' ties to politically active groups of nonscientists were also critical in explaining scientists' desire to reform the science-military-public relationship, and the claims and actions that they created. The mid-twentieth century was one of the most active periods of social and political protest in American history. Peace, environmental, gay liberation, civil rights, feminist, and "power" movements—as well as their numerous branches—flourished. The critiques of American society that they posed went beyond economic demands or calls for personal moral reform. By 1970, there were few aspects of American social life, from its schools to its supposedly shared values, personal relationships, to the environment, that were untouched by political critique. What was perhaps unique in this period in American history was the totality of the targets of activism. Scientists were no different from other groups in organizing to transform different aspects of social life.

Scientists, like other contemporaneous political actors in the mid-twentieth century, took aim at a variety of targets. Some focused on the state, others on the hearts and minds of individuals or the reform of personal

relationships, cultural values, or professions. The scientists who were collectively responding to the state-military relationship directed their attention to the public, to their peers, and to larger systems of scientific production that included the state and economic, race, and gender systems.

To understand the aspects of science that scientists thought were properly subject to moral and political scrutiny, it is necessary to attend to the process of organizing. Most of the analysis of social movement organizations has drawn attention to the important issues of how field-level resources are defined, competed for, and mobilized, and how broader political contexts shape the possibilities for the development of movements.[35] A new body of scholarship, some based on symbolic interaction theory and the sociology of religion, has focused attention on the interpretive activities of social movement organizations to understand how groups come to articulate grievances, create new forms of action, and project their futures.[36] By interpretive activities, I mean the processes by which groups come to identify who they are, what their interests are, and what kinds of actions and claims are viable. As Elisabeth Clemens has argued, the question of "how shall we organize" proves to be consequential for the development of actors as activists and the prospects for further organized collective action.[37] Organizing is the process of adapting traditions and cultures in ways that provide activists with ways of thinking about problems, notions of enemies and targets, probable strategies, and ideas of what the future might look like.[38] In the organizing process, groups come to *identify* interests and preferences as much as they *express* preexisting stable preferences. Opponents and potential allies are critical in shaping "who we are" in any organization, for their actual and expected responses shape what kinds of images and ideas are viable. The discussions that take place can be called "rim talk," in the words of Erving Goffman. "Rims" are the imagined edges of what kinds of things are possible.[39] Groups that are inventing new forms of action cannot know what might work ahead of time, so they engage in the work of identifying what might satisfy group members, allies, and targets. As James Jasper argues, "much of what protestors do can be understood as experiments aimed at working out new ways of living and feeling."[40] By examining these processes, it is possible to observe the creativity that is at the heart of vibrant democracies.

Organizational disruption and rebuilding is one important way that social movements undermine the economic and symbolic reproduction of their targets. As analysts of institutions have demonstrated, organizations are loci through which formal and informal rules, communication systems, images, material things, and social relationships are reproduced.[41] Although a law may have an effect because it is known to exist, its social durability is powerfully shaped by the collective, organized actions that

are taken in response to it. To challenge such systems helps to symbolically disrupt the cultural order and values that underlie all organizations. The relationships among people, things, and ideas represent particular values, which are routinely reproduced through organizational action. When such routine work is disrupted, so, too, are the values and assumptions that undergird it. Because social movements are treated in this book as attempts to deconstruct and reconstruct an organized moral order as much as to redistribute resources, the disruption and rebuilding of organizations is a central concern here.

Most analysts of social movements are ultimately interested in the question of whether the movement made a difference in some way, often as examined through changes in laws, rules, and policies. Such a question is appropriate for movements that have such actions as their goal. But other movements, as noted earlier, are interested in transforming the actions of individuals, providing new norms, or changing institutions outside states or formal policy systems. The attention to policy alone, moreover, fails to account for the ways in which earlier "failures" are used as models and antimodels by later activists.

Scientists' collective attempts to respond to the military-science relationship have helped to culturally "un-bound" the making of moral claims about science from scientists, and "re-bound" it into networks of citizens, intellectuals, and government. During the period of scientists' professionalization in the United States between 1880 and the early 1930s, scientists consolidated their authority over claims about the natural world by building a professional field that allowed them considerable control over how they treated their subjects, and to claim approbation for their contributions to economic, social, and political life. In the twenty-five years following World War II, these claims to authority became "unbounded" in the sense that scientists consistently lost full control over their research subjects, and lost the capacity to claim that their work ultimately contributed to progress. Rather than seeing social movement in terms of beginnings and endings, here I examine the ways in which groups that were focused on a similar substantive concern cumulatively questioned ever-broader aspects of the scientific endeavor, resulting in a crisis of authority that has helped to shift the authority of scientists in political life.

Scientists made public debates that had previously occurred among scientists in private. The Committee for Nuclear Information, Science for the People, and the Society for Social Responsibility in Science aired their concerns about the moral and political status of science and scientists, with later organizations criticizing more aspects of science. Their actions gave nonscientists access to the political conflicts and debates over what constituted knowledge and how best to justify scientific claims

and the credibility of those who made them. Access was sometimes formalized, as in the case of information provision, and in other cases it was made available through continued media exposure. Since scientists' own political activities were coupled with new rules about research on human and animal subjects, with a growing regulatory state that monitored the problems caused by industrial production and medicine, with feminist and community health movements that were skeptical of medical science's claims about the poor, blacks, and women, and with intellectual critiques by writers such as Herbert Marcuse and C. Wright Mills that condemned instrumental rationality itself, scientists' activities cannot, in some simple sense, be thought to "cause" the unbinding of moral claims-making about science from scientists. I aim, in this book, to tell a piece of this larger story.[42]

The Cases

This preliminary introduction to the episodes of organization creation that are the central empirical focus of *Disrupting Science* introduces the key themes and protagonists in each. As scientists struggled to reconcile the promise of science to improve life with science's relationship to politics, they often began with goals that were quite vague. Scientists wanted to create something new, but were not entirely sure what new organizations might look like, nor were they entirely certain of the practices in which they would engage or the claims that they would make. The organizations I study in this book were created as means of exploring, and in some cases institutionalizing, ideas about the proper relationship between science and politics.

The first organized expression of scientists' opposition to an alliance between science and the military that had developed during World War II came shortly after the end of the war, and is not one of my focused cases here. Physicists and engineers who were participants in the Manhattan Project groups at independent laboratories and at universities in the United States created new organizations at and across their work sites. These organizations engaged in lobbying and public education to oppose the proposed military control of atomic energy and the rapidly developing arms race. Some organizers were motivated by an intense desire to ensure that scientists could freely exchange ideas that were necessary to develop their research. Others were motivated by humanitarian concerns about future use of atomic weapons. Underlying their claims and actions was a belief that scientists formed an international group whose devotion to truth and universalism could and should be the basis of international political relationships. Among them were scientists who

had already been involved in antifascist, antiracist, and New Deal political campaigns in the 1930s. By 1947, national security programs and laws were used against scientists, quickly discouraging their political activities. Within two years, the organizations they had formed were either defunct or had become nominally apolitical groups devoted to promoting science and avoiding hints of partisanship for fear of investigation. This story has been told many times in a number of excellent accounts.[43]

Disrupting Science begins just as this story leaves off. My analysis begins with an examination of the 1949 formation and political views of the Society for Social Responsibility in Science (SSRS). Urged by the pacifist leader of the Fellowship of Reconciliation A. J. Muste and organized by the Columbia University engineer Victor Paschkis, scientists and engineers in the SSRS, some Quakers, refused to participate in professional work that they considered "destructive." The group urged scientists to consider themselves to be like any other individual faced with a moral decision about how to live one's life, and not to consider themselves unique because they were scientists. Of course, the SSRS was in fact a scientist group. To the extent that there *was* something special about scientists, they argued, it was that the new role of the military in fostering scientific research meant that the products of scientists' work were likely, they believed, to be used for destructive purposes. The SSRS rarely undertook collective actions in the conventional sense that social movement organizations or interest groups do. Instead, the group served as a source of support and a forum for discussion of the personal responsibilities that scientists had for their work. Individual members, by sharing their views and decisions with others, hoped to spark other scientists to undertake similar consideration of the consequences of their work.

In contrast, the second organization that I study, the Greater St. Louis Citizens' Committee for Nuclear Information (CNI), held that scientists formed a special community with a unique moral commitment and role to play in a democratic society. Formed in 1958 by scientists from Washington University and members of St. Louis religious, women's, and labor groups who were involved in the Ban the Bomb movement, the scientists of CNI prevailed on other members to focus the group around the provision of information to the public about the health effects of atomic fallout. The group's decision to serve as a conduit for factual information but not to advocate any specific position emerged from the political conditions under which the group was formed. For one, espousing any political position, aside from full support for the government's programs and policies, was politically risky for American scientists during the 1950s because they were heavily targeted by security investigators. Earlier attempts by founders to engage other scientists in taking stands on political issues of the day had failed; few could agree on a position, and others were worried

about whether their views would be taken as evidence of disloyalty. Another reason for the turn toward the "information-provision" model was the controversy that raged among scientists about what, exactly, the health effects of testing were, and what kinds of decisions should be made based on the facts that *were* known. The public, founders of CNI thought, was largely cut out of this decision-making process. For democracy to function in its fullest form, the public would need information unfettered by the partisan interests of government and other scientists, so that ordinary citizens, too, could make well-informed political decisions.

The third major episode of organization formation, in 1968–1969, was characterized by far more dramatic actions by scientist and nonscientist activists, the involvement of scientists as targets of activism, and by the formation of "radical science" groups. Students and faculty, increasingly angry about the war in Vietnam and their own universities' involvement in weapons production, demanded that universities and individual faculty members sever financial and advisory ties with the military. Many participants were already deeply involved in the anti–Vietnam War movement, and as such, they drew on identities as both scientists and antiwar activists in their actions and claims. Activists made demands using a range of methods, from teach-ins to picketing buildings and faculty homes.

Like other professionals during this period, some scientists insisted, with widely varying success, that their professional associations oppose the war in Vietnam. Other science faculty formed organizations devoted to "social responsibility" through information provision and advocacy that did not fundamentally question the meaning of science or the benefits of science-military ties. The Union of Concerned Scientists, a faculty-based group formed at MIT in 1969, for example, revived the older information-provision and advocacy models that were pioneered by CNI.

The intersection of campus-based activism and professional commitments to science also led to the development of radical science groups, including Computer People for Peace, the Committee for Social Responsibility in Engineering, and the student-based Science Action Coordinating Committee. But by far the most important radical group to emerge during this period was the national, decentralized, and nonhierarchical group Scientists and Engineers for Social and Political Action, known more commonly as Science for the People (SftP). The group demanded that science be used to benefit the poor, women, and other disenfranchised groups, rather than for militarism and the benefit of wealthier classes. Rather than identifying themselves primarily as scientists, many members saw themselves as scientists who were also involved in radical political action around the war in Vietnam and, to some extent, the black power and women's movements. They rejected the liberal model of information provision that CNI had established, and wanted scientists to go beyond gen-

eral expressions of responsibility that the SSRS had pioneered, even as some of their peers were rediscovering and building on those models. Instead, SftP wanted scientists to work on projects to help ordinary people, especially the poor, blacks, and women, who had suffered, members argued, at the hands of scientists.

SftP's challenge to how science was used to benefit the powerful might have been marginalized had the group not used dramatic means to convey their ideas early in the group's history. SftP disrupted many of the public rituals that had traditionally provided science with public demonstrations of unity around shared rules for social action, such as professional meetings and awards. They disrupted the meetings of professional associations by demanding that the speakers discuss the political implications of their work, and by using political theater to dramatize their point of view. They refused professional awards, and sometimes used the receipt of awards as occasions to forcefully argue that science had been corrupted by its associations with capitalism and militarism, and helped to perpetuate gender and race inequality. Meetings and honors are processes by which boundaries of social groups are reaffirmed. By undermining these processes, SftP members catapulted themselves into the midst of a growing debate over the proper role of science in public life.

If disruptions of ritual were one of the ways that SftP called into question the political relationships among scientists, the state, and citizens, SftP chapter activities explored ways of reorganizing these same relationships. These included carrying out public debates with sociobiologists, working with the Black Panther Party, sending scientific instruments and books to Vietnamese scientists, and assisting Central American farmers in designing new systems for growing crops.

Organization of the Book

The remainder of *Disrupting Science* is structured around building an argument that shows how states and social movements shaped the timing and form of scientists' postwar antimilitary activity, demonstrating connections among the three main organizations that I have described. As a historical narrative, the book is structured around explaining how and why radical science emerged in the 1960s as a reaction against earlier attempts by liberals and moral individualists to end the relationship between science and military. It is not a history of each organization, but an analysis of how the intersections of scientists, social movements, and the state produced different forms of scientists' political action. The book moves from the efforts of scientists in the 1940s and 1950s to have their peers take responsibility for avoiding harmful work, to the development

of the "public interest" liberal information-provision organization, and then to the emergence of radical science groups. Chapter 2 examines changes in the science-state regime between 1955 and 1970, and presents an overview of the major arguments that activists and intellectuals made in their critiques of science. The first part of the chapter examines the growing interdependence of science and the state, and the simultaneous increasing organizational, intellectual, and demographic diversity in the structure of science, between 1945 and 1970. The second part examines how liberal and moral individualist political traditions shaped science criticism.

Chapters 3, 4, 5, and 6 examine the three historical episodes in which the intersection of science and activism produced new organizations. Rather than treat them as radically distinct, I show the relationships among them as scientists understood them and at a more theoretical level. Chapter 3 studies the origins and development of the moral individualist group Society for Social Responsibility in Science, founded in 1949, in the context of a renewed pacifist movement and the dramatic increase in the surveillance and political control of scientists in the early cold war era. I show that the group was never able to move beyond its structure as a forum for discussion, and became increasingly less visible as other scientist groups took bolder steps to challenge the science-military relationship. In chapter 4, I offer an analysis of the development of the Greater St. Louis Citizens' Committee for Nuclear Information, founded in 1958, in the context of the Ban the Bomb movement and the lessening of political repression in the late 1950s. The emergence of the group was dependent on increased public and scientific concern over the health effects of atomic fallout.

In chapter 5, I examine a more contentious episode of scientists' public engagement with issues concerning the military, which took place in 1968 and 1969. The war in Vietnam drew scientists into activism, both as targets and as active participants in social movements. I chronicle the role of two MIT groups—the student-based Science Action Coordinating Committee (SACC), founded in 1968, and the faculty group Union of Concerned Scientists, founded in 1969—in mobilizing American scientists to engage in debates over the role of science in the war in Vietnam. I show how SACC's style of organizing and political arguments began to undermine the liberal model of science activism that CNI had helped to popularize. The second part of this chapter chronicles the development of radical science activism through an analysis of the formation of SftP.

Chapter 6 traces the activities of three local chapters of SftP. Here I show how the multiple intellectual and political commitments of SftP members, and their diverse locations, shaped the development of many different versions of "science for the people."

The final chapter of the book summarizes the main conclusions of this analysis and situates them in the debates over how and when scientists engage in public political action and the role of social movements in shaping scientists' actions. The book concludes with an elaboration of how scientists' mid-twentieth-century political activities "unbound" scientists' authority over public claims about the veracity of their work and the contributions of science to a broader public good.