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"In dreams begins responsibility" William Butler Yeats

We all live with a concrete awareness that one cannot say No to science, technology, and
medicine. Even if one wanted to, one cannot say No to the medical complex that appropriates
one's body, defines one's state of health, and positions one in a continuum of fitness, from the
temporarily abled to the permanently disabled. One cannot say No to the corporate/government
information complex that wires one's social security numbers, drivers' licenses, bank accounts,
credit ratings, tax returns, telephones, radios, televisions, electronic mail, and a variety of other
technological vectors of identity. One cannot say No to the experience of science, technology,
and medicine collectively as a disciplining center that polices other meanings and orders power
relations in contemporary life. But how can we go about understanding and taking account of
these deep and abiding presences in our bodies, our persons, our selves? Further, how are we to
understand our often intense hunger to say Yes?

This volume contributes to a diverse and rapidly expanding set of anthropological projects
that are seeking new ways of locating and intervening in emerging sciences, technologies, and
medicines through cultural perspectives and ethnographic fieldwork. It is one product of a
week-long seminar in October 1993 at the School of American Research in Santa Fe, New
Mexico. These contributors were brought together to map research questions, explore the extent
to which we shared problems, practices, and objectives, and sort out some of the opportunities,
limitations, and commitments in our work.[1] Because emergent relations in science, technology,
and medicine often appear both haltingly strange and seductively familiar, every participant in
the seminar arrived wanting help in exploring these elusive mechanisms of emergence. We still
do. We all want help in thinking through in cultural terms how science, technology, and
medicine participate in everyday life. We want help in understanding our own career and
research trajectories as ethnographic participants in the processes we study. We want help in
figuring out what we are doing, could be doing, and should be doing.

The main images in the title for this volume, "Cyborgs" and "Citadels," point to two related
areas of questioning that concerned us all week. In the first place, we devoted considerable time
to unpacking what seminar participants came to call the Citadel Problem. The Citadel Problem
is a problem of cultural boundaries; that is, it calls attention to the centering effects of science,
technology, and medicine within discourses of objectivity and practices of both legitimation and
sovereignty. The word "citadel" denotes a small fortified city, or a fortress at the center of a
larger city that protects and oversees it. We use the term to highlight the ways in which
prevailing modes of popular theorizing about science, technology, and medicine displace societal
issues and concerns into expert and often expensive technical problems, thereby isolating
participation and discussion while transforming the stakes involved.

One effect is that science often appears as a culture of no culture (Traweek 1988:162). That
is, what Bryan Pfaffenberger (1992) has called the "Basic Story" of science and technology
regularly treats them as developing according to autonomous logics apart from society. In this

model, researchers are characterized as living in specialized technical communities whose deliberations are essentially opaque and presumably free of cultural content. This is also known as the diffusion model of knowledge in society (cf. Latour 1987; Martin 1987) in which knowledge, in the singular, is created by bright, well-trained people located inside the academy and then diffuses outside into the public arena through mechanisms of education, popularization, policy, and the impacts of new technologies. The tests of cultural significance for new knowledge occur out there in the public arena as it is used, abused, or ignored. The outward travel of knowledge preserves the autonomy of creation and separates creators from accountability for their products, even as they exist within, intervene and make demands upon the public. In Johannes Fabian's terms (1983), we tend to understand Western science and medicine allochronically as in our future, ahead of us laypersons because they are the central source of new meanings, while we locate in the past those who are far away in space, repositories of old meanings and, hence, primitive (cf. Harding 1993).

Whether we call something a fact or not makes a great deal of difference to us. Statements such as, "The fact of the matter is . . . ." lay claim to an important source of authority. Even when produced under the banner of "for our own good" (Ehrenreich and English 1973), one effect is to inscribe a boundary between those who achieve authority to speak new truths and those who thereby become card-carrying listeners (Gieryn 1983). Claims to knowledge that fall inside a citadel can gain status, privilege, access to resources and authoritative lines of descent, and the possibility of becoming seated as permanent facts. Claims that fall outside may have to struggle in the nether world of questionable legitimacy, marginal position, subsistence economy, and risk of punishment for committing acts of deviance.

For contributors to this volume, the Citadel Problem is not only about building and maintaining walls but also about flows of metaphors over, around, and through these walls, as well as connections between lives inside and lives outside. By unpacking the Citadel Problem in cultural terms, we hope to understand better how science gains and keeps the authority to direct truth practices and routinely constitute power relations. We also note that the Citadel Problem remains visible and important even as the "hard" sciences and the dominant medicines are increasingly under fire themselves, such as physicists coping with the cancellation of the superconducting supercollider and specialist physicians struggling with the increasing hegemony of managed care.

Second, the image of "Cyborgs" is designed to call attention to ways in which science, technology, and medicine routinely contribute to the fashioning of selves. The cyborg concept originated in Cold War space research and science fiction to refer to symbiotic forms of life that involve both humans and machines. In "A Manifesto for Cyborgs," now a citation classic, Donna Haraway (1985) claimed the cyborg as a feminist icon for identifying new opportunities for analysis and activism in an emerging blend of technoscience and multinational capitalism she calls in this volume the "New World Order, Inc." As hybrid creatures, Haraway pointed out, cyborgs refuse easy origin stories as well as discourses of purity and naturalism, insisting instead on more complicated accounts of the production and mixing of human and nonhuman agencies. Her challenge involved how to be realist about dangers in the New World Order, Inc. while imagining how the future might be otherwise, an imagining that appeared less possible with simpler stories of bodily resistance to oppressive technology. That is, might it be possible to

formulate new strategies for improving the conditions of humans that accepted mutual figurations of human and machine rather than necessarily premising authentic human existence upon a principled and permanent separation?

The SAR seminar followed a double session at the 1992 meeting of the American Anthropological Association (AAA) titled "Cyborg Anthropology I: The Production of Humanity" and "Cyborg Anthropology II: The Empowerment of Technology," followed by an author-meets-critics session with Haraway.[2] One goal of these AAA panels, including the title "Cyborg Anthropology," was to stimulate greater interest among anthropologists in studying emerging sciences, technologies, and medicines, for anthropology in the United States was rather late in embracing science studies. For example, as recently as 1987 and 1988, the AAA rejected sessions jointly proposed by Gary Downey and Sharon Traweek on the anthropology of science and technology on the grounds that such work did not fit within the AAA umbrella.[3] The 1992 panels were indeed successful, attracting standing-room-only audiences in a ballroom setting.

Along with Sarah Williams, a third co-organizer, we speculated that one way to encourage expanded anthropological inquiry in this area might be to call attention to the human-centered foundations of anthropological discourse, extending poststructuralist and posthumanist critiques of the autonomous skin-bound individual to explore other sorts of human experiences with science and technology. That is, following ethnographically how people construct meaningful discourses about science and technology in everyday life could both provide access to emerging power relations -- helping us to understand better how science and technology routinely constitute power relations without a great deal of overt discussion and deliberation -- and provide access to how science, technology, and medicine participate in everyday human experiences -- helping us to understand better how we all, in effect, live as scientists. We thus extended Haraway's concept of the cyborg from a label for specifically contemporary refigurations associated with the New World Order, Inc. to an adjective potentially marking a wide range of anthropological projects that explore how science, technology, and medicine contribute to the fashioning of selves, including the selves of ethnographers. Above all else, we wanted to encourage expanded attention to that concrete awareness that one cannot say No and often desires to say Yes to technoscience and biomedicine while recognizing that our research projects and identities as researchers contribute to constituting and reproducing that awareness. The cyborg image helped by reminding us not to hide or overlook ambiguous or ambivalent human experiences of pleasure in, desire for, and anxiety over sciences, technologies, and medicines, whatever and wherever these might be.

While, for some, granting membership to the cyborg image as an anthropological concept legitimizes new strategies for excavating and making visible human experiences that blur cultural boundaries between humans and nonhumans, for others it conveys an MTV-like fascination for the technically superficial, a naive, anthropomorphic attachment to the unreal or virtual. It suggests a project dangerously gone native because it appears to accept stereotypic celebrations of new technologies that vest them with causal efficacy as a source, the main source, of human progress. Attending to pleasure becomes part of the threat, for getting caught up with following new developments in high technology threatens not only to reproduce a Euroamerican centrism, but also provides a skewed picture of what is emerging in Euroamerican contexts. Far from a self-critical analytic for mapping and intervening in power relations and

stories of origin, the cyborg risks becoming essentialized as a faddish object of the day. This degeneration of ethnography is all the worse if it comes across as an elitist activity, one that presumes to draw exclusive boundaries over what counts as proper fieldwork, correct writing style, or required citations.

When seminar participants themselves performed a version of this debate, the interaction made visible a collective, shared desire to develop and maintain a welcoming stance that invites collaboration rather than inhibiting it. The passion was clear. This sort of hunger to work together may indeed be quite strong among scholars more generally, even if such is relatively hidden or rendered subordinate in an academy that emphasizes agonistic struggle among competing positions (cf. Downey and Rogers 1995). Might we find greater value in the theoretical differences that separate us and concentrate more on collaborating to make a difference if we made more visible the ways in which disciplines function in society as cultural projects, as intellectual activities that intervene in everyday theorizing?

Like all primates, we cling to the backs of others. Anthropologists have long explored the cultural positioning of forms of knowledge, practices of medicine, and engagements with the human body. They have long theorized relationships among humans and things, labeling those relationships with many names, e.g., tools, artifacts, fetishes, technology, built environment, medicine, and art. In the process, anthropologists have also long carried out these projects both to study worlds of human experience and to participate and make a difference within them.

Even looking beyond important, but underrecognized, work in applied anthropology, a great deal of anthropological theorizing has provided valuable sources of insight for popular theorizing outside the academy, especially by challenging stereotypical images that elevate the West above the Rest. Might distinct theoretical perspectives already be engaging in *de facto* collaborations? For example, just as cultural anthropologies have worked to theorize diversities in human experiences that do not reproduce established hierarchies by race, gender, class, ethnic origin, etc., so have self-described "scientific" anthropologies worked to theorize commonalities among human experiences for a similar end. Both have intervened in Western modes of theorizing superiority, shifting these from the status of nature to the status of cultural assumption or stereotype, i.e., still real but located in time and place and implicit in human action. What sorts of collaborations may have been taking place here? What do these tell us about anthropological projects more generally? When are theoretical differences more or less helpful, valuable, or justifiable? The practice of collaboration is, as yet, undertheorized.

Turning to the question of what might be specific to these times, to the ways in which people today inhabit discourses of science, technology, and medicine, David Harvey (1989), Robert Reich (1983), Fredric Jameson (1984), and other political economists, historians, and culture critics have pointed out that during the 1960s and 1970s, rich countries began to shift away from industrial, manufacturing-based economies into service and knowledge-based economies. Basic manufacturing has been moving to "developing" other countries, markets are becoming both global and highly diversified, and all kinds of labor and capital are moving more freely and "flexibly" around the world. This transition is sometimes likened to that at the beginning of the industrial revolution: that is, we might be participating in a world-wide social, political, economic, cultural, and intellectual transformation. Many anthropologists have been studying

these local, regional, and global transformations from a variety of perspectives, exploring both changes and continuities (cf. Ong 1987, 1991; Tsing 1993; Appadurai 1991; Harrison 1991; Stacey 1990; Escobar 1995). In addition, research by academics and activists has called attention to the myriad ways in which Enlightenment connections between the production of knowledge and human emancipation have been undercut, unrealized, or in some cases, produced further inequalities and divisions (cf. Yanagisako & Delaney 1995; Harding 1994; Penley & Ross 1991; Sheehan & Sosna 1991; ACT/UP New York Women 1990; Shapin & Schaffer 1985; Lyotard 1984; Merchant 1980). But events of emancipation or hegemonic dominance only begin to scratch the surface of human experiences with and participation within the citadels of science, technology, and medicine.

Seminar participants became caught up in the question of what might be *emergent* in the world today. Questioning emergence rather than positing a universal transformation from, say, modernity to postmodernity makes the new/old question especially relevant. What is really new here anyway? In the midst of apparent change, wherein lie ongoing forms of colonialism, racism, sexism, as well as forms of liberation, equality, material abundance, and other continuities? At the same time, what new opportunities for resistance or change might be emerging in the midst of apparent continuities? In exploring emerging sciences, technologies, and medicines, might it prove helpful *not* to presume we know what humanness is all about before going into the field to find out?

Starting out with emergence as a question is also valuable because it does not simply ask what is new or appearing on the horizon, but also suggests that contemporary practices are unfinished, ongoing, continuously maintained, and something in which one's own practices can potentially intervene. As the seminar participants shared stories about citadel boundaries and cyborg selves, we regularly found ourselves talking also about intervention. The "mapping" acts of location built into our ethnographic practices always seem to constitute interventions as well. What roles had we been playing as persons in and out of our field sites? The issue is only in part a question of writing. Although wanting to acknowledge that our work was always positioned, we still found ourselves both writing and speaking with declarative sentences. Even if we desired to avoid representation, the act of "speaking for" someone, "speaking as" their representative in the guise of disinterested objectivity, or "giving them a voice," our work can still be "heard as" joining and participating in contested fields, hence locating ourselves in relation to those fields. (Spivak 1990). Distancing oneself from totalizing representation does not free one from the problem of "speaking as" itself. During the seminar, we found it significant that all of us were trying not to allow ourselves the comforts of either progressivist enthusiasm or oppositional pessimism. Yet the question remains: how do we want to be heard and, perhaps more importantly, by whom?

Putting this in more general terms, we see a transition taking place in critical intellectual work from opposing or praising technoscientific practices to intervention, from necessary entrenchment to ongoing participation. We see a growing desire among academic scholars, whether located in colleges and universities or in other workplaces, to use the analytic tools they have inherited to both analyze and participate in issues involving contemporary science, technology, and medicine. In part, this change may be the product of individual interpellations into worlds normally cordoned off behind "Experts-Only" signs. In part, it may mark a

generational shift from forms of critical analysis to forms of critical participation. And in part, it may indicate a fundamental change taking place in the academy itself. What positions inside, outside, around, and through the citadel walls might researchers, academics and activists occupy at the end of the twentieth century?

Minimally, we find it important to locate activism away from old agencies that made all participation cooptation. What would constitute critical opposition if one is positioned not in a clearly subordinate position outside but somewhere inside? If one is inside, then oppositional politics could shift from being something one accepts as a necessary part of critique to something one can choose or avoid depending on the circumstances.

Beyond that, we want to understand better and theorize the connections in our work between the moments of location and the moments of intervention, for we think the latter deserve as much attention as the former. As a first step, we editors have organized the contributions to this volume to highlight and map approaches to intervention. Although each anthropological project intervenes in more than one way, the sequence is designed to sort out some distinct pathways for intervening in emerging sciences and technologies through research on cultural boundaries, cyborg selves, and the cultural relocation of anthropologists. In providing an overview of the volume, we pay attention to links that methodological choices and theoretical dispositions tend to establish with intervention pathways, and try to identify some of the dangers of each pathway alongside its opportunities. Although our interpretations draw directly from seminar discussions and readings of the papers, this account should be read as the editors' own summary statement rather than a series of self-reports by the fieldworker-authors. There is much room for continued discussion and debate.

Intervening through Cultural Boundaries

In the first contribution, Rayna Rapp tells a fascinating story of how the increasing involvement of sonography in pregnancy is shifting fetal development into fast-forward, increasing the velocity through which the fetus becomes separate from the mother as an independent entity and through which others gain a stake in a pregnancy. Granting authority to the technology as a diagnostic tool funnels everyone's consciousness into highly focused and routinized channels, reducing the clues for which women act as gatekeepers and allowing physicians to bypass women in favor of a technological window to the fetus. Women's generalized concerns about having a healthy baby become specific concerns about Downs' Syndrome and other genetic disorders. Gaining access to "early baby pictures" frequently heightens male involvement. Doctors gain an increased role in the granting of personhood, from personifying the image on the screen to the sexing of fetuses. The narrowing of aperture and sharpening of focus on the fetus also increases the possibility that outsiders can speak on behalf of a fetus as a legal person, thereby contributing to polarization in the abortion debate. Rapp produces her account by going beyond the technologists and genetic counselors to interview pregnant women and their supporters, thereby crossing important boundaries around medical knowledge and expertise.

Seminar participants were struck during our discussions that, despite our diverse backgrounds and trajectories, we tended to share a restlessness with bounded fieldsites in conducting our research. That is, we often begin with a relatively defined group at a specific site. Then we

notice there are leaks, flows of information, people, and resources into and from this place and time. We find ourselves moving to look at groups that were interconnected with our initial groups yet not always acknowledged by them. We are led from laboratory practices to classrooms, from activists to governments, from support groups to magazines and newspapers, from public meetings to laboratories. We follow connections into the past and back to the future.

Recognizing this shared restlessness was important because we realized we could learn as much from methodological issues involved in trying to map the field as from interpreting the material we collected. Which flows seem relatively easy and which more difficult? Who appears accessible or inaccessible? What different sorts of insights and commitments emerge from briefly encountering many people through interviews versus significant participant observation with a relatively small number of people? What insights become available and commitments become reinforced as we show up repeatedly at different sites? The point is that a methodological commitment to crossing boundaries through ethnographic fieldwork can be both an important step in mapping them and a potential source of intervention that troubles and remaps them.

One way of intervening through the concept and analysis of cultural boundaries is thus simply to make these visible, locating them in historical time and place. Rapp's ethnography demonstrates that a cultural boundary between medical expertise and women's experiences in pregnancy is moving into earlier and earlier stages, with potentially dramatic implications for other boundaries as well. Challenging the Basic Story of technological development as advancement earned through progressive impacts, Rapp provides a brief overview of the development of sonographic technologies, making it clear that the technology emerged from a specific history rather than an immanent necessity of technological and human progress. Then she locates the cultural boundary around medical knowledge by tracing the technology's direct involvement in women's bodies and experiences. Images of impact are replaced by images of deep, often ambiguous, personal involvement, and altered boundaries -- between women and physicians, women and fetuses, women and families, women and men, etc. -- do not necessarily follow stereotypic divisions by gender, race, or class. And these new boundaries, for better and for worse, change lives.

Making cultural boundaries visible can help people figure out where they are located or positioned, understand how they got there, and perhaps establish the possibility of imagining how things might be otherwise. Rapp concludes by expressing hope that women seeking sonograms might better articulate and achieve what they want in the midst of enhanced medical and societal participation and surveillance. Medical hierarchy and authority is thus not removed but is relocated from a fact of nature to a negotiated product of history, power and desires. Participating in this shift in interpretation or theorizing can encourage people who desire change to go work for it, and it can help those who are satisfied with existing relationships, for whatever reason, to recognize that changing circumstances may sometimes justify change in this relationship.

In this work, Rapp builds plausibility for her claim that a key cultural boundary is moving by quoting extensively many people who are located differently with respect to the technology and medical knowledge. She does not take us deep into the experiences of any given person to

explore more extensively questions of selfhood. Rather, her work can be heard as speaking to a set of processes of cultural change. Such a stance is not an authoritative pronouncement from nowhere but is historically located within a network of subjects related through technological practices.

Avoiding the danger of sounding all-knowing led Rapp to travel anywhere important, from the offices of geneticists and genetic counselors to the bedsides of pregnant women, historically as well as across class and religious lines, rather than staying in one place for an extended period. Leaving out the history or women's experiences would have limited the value of the work as intervention. Another danger in mapping boundaries lies in limiting oneself to the status of outside observer who notes the presence of a boundary but cannot legitimately intervene in its definition or participate in its direction of travel. Rapp indeed wants to make sure that those participating in this change have both the understanding and resources to make informed choices, but she also preserves a continuing role for herself and her work by emphasizing that every position located with respect to sonography is unstable and likely subject to further change.

A second approach to intervening through cultural boundaries is to make visible types of theorizing that cultural hierarchies have rendered subordinate. For example, the citadel effects of science and technology render subordinate any theorizing that does not emanate from within a protected, neutral citadel of experts and which diffuses outward into the realm of public use or abuse. Such might include experiences of scientists and other experts who do not conform to mainstream science, as well as any experiences or practices of nonexperts that might otherwise count as theorizing or knowledge production. Although Rapp follows this pathway to some extent by making visible the experiences of pregnant women, it is more centrally a focus of the next contribution.

Emily Martin and her co-workers, Laury Oaks, Karen-Sue Taussig, and Ariane van der Straten work to show that nonexperts theorize too. Exploring how clients at an HIV/AIDS clinic theorize the origin of HIV/AIDS, the meaning of AIDS as a disease, the possibilities of a cure, and their faith in physicians and scientists, Martin et al. demonstrate that medical theorizing belongs not only to medical practitioners. In the process, they also want to show that the substance of such theorizing is not random or purely individual, but likely varies with social position. The point in this case is that the former or current injection drug users they interviewed, nearly all lower-class African-American men in the inner city, position the disease, the research, and the institutions in the context of other class-based discrimination. For poor people who regularly experience police intrusions in their lives, it is worth considering how AIDS is a quasi-military attack on the body, that quite possibly some governmental agency or other official organization played a role in the origin of the disease and might inhibit attempts at a cure, that a possible governmental requirement for mandatory testing does not seem to be an especially new or egregious threat, and that one must take significant responsibility for one's own health because one surely cannot depend on others.

Making visible a subordinate mode of theorizing can position the ethnographer as a spokesperson for such theorizing, if one's fieldwork and writing become seen and heard as desiring to grant it enhanced worth. Why work so hard to make something visible, one might

ask, if not to make sure it achieves visibility? Simply by exploring and articulating a subordinate perspective and then locating it with equal or comparable weight alongside a dominant perspective, one messes with the hierarchical cultural boundary that made the dominant perspective dominant in the first place.

By joining the staff of the clinic, Martin, Oaks, Taussig, and van der Straten effectively became unpaid consultants, attached to the staff yet contesting centralizing features of citadel effects on behalf of injection drug users. As their contribution puts it, Martin et al. hope their work "gives conversational voice to people who have been silenced." The intervention lies in showing that, if a perspective articulating discrimination as a feature of the meaning and power of HIV/AIDS exists out there, perhaps other perspectives exist as well. To what extent might official discourses relying on citadel effects actually be missing opportunities to serve their patients? The HIV/AIDS clinic that hosted this ethnography came into existence because its director had stepped out of the Basic Story in an extraordinary act of ethnographic intervention. Wanting to study the progression of HIV/AIDS in an inner-city community, he learned through his own interviews that a good way to attract participants in the study might be to offer them basic health care. Further, Martin et al. helped staff members recognize the deep sense of gratitude felt by their clients by giving a presentation in which they quoted extensively from their interviews. To the extent that the director and staff members could have missed these insights, might narrowing the aperture to citadel effects actually constrain the experiences of medical practitioners in addition to those of consumers? Perhaps not even the experts themselves always benefit from having a sharp boundary drawn around them and their knowledge.

The choice of methodology in this project helped shape its pathway for intervention. Conducting on-site interviews at the clinic with over forty clients was a key strategy for plausibly establishing discrimination as a shared image among them. In other words, demonstrating the presence of shared meanings helps Martin et al. constitute injection drug users as a social group. This is a crucial step because citadel effects in medicine tends to fragment sufferers into an array of unique, individual patients, each interacting with the whole of centralized medical science. For these ethnographers, establishing the presence of a group through the vehicle of shared perspective becomes a device for increasing the legitimacy of that group and that perspective, helping it to gain standing in public discussions and debates over the diagnosis and treatment of HIV/AIDS.

One danger in working to make visible a subordinate perspective lies in potentially establishing oneself as the de facto patron of the perspective and the people represented. That is, if one helps a voice to be heard, then presumably one could help silence it as well, and assistance shades quickly into domination and denial of the Other. Martin et al. deal with this danger by presenting many long quotations, a writing technique that maximizes the extent to which informants can "speak for themselves" in the text. This allows multiple, personal, heterogeneous perspectives to potentially work against objectifying the group represented. Another danger in this approach to intervention is that one's work can be read as necessarily oppositional, as taking sides, even when one's goal might simply be to make one perspective visible without destroying another. Martin et al. manage this danger by reporting ambivalences in the experiences of drug users themselves. In the midst of interpreting HIV/AIDS through the lens of discrimination, the

clients at this clinic also possess and reproduce a strong faith in scientific research. If it becomes difficult to construe their perspective as oppositional, then what might constitute opposition on the part of the ethnographers becomes more complicated as well.

One final issue raised by this pathway to intervention involves the choice of topic itself. Anthropology's participation in dominant institutions of colonialism, multinational capitalism, foreign policy, domestic policy, and various arenas of political economy has been the subject of much investigation (Marcus & Fischer 1986; Harrison 1991; Said 1989; Fox 1991; Escobar 1995). A set of questions that haunted the seminar involved how to attend to our own penchant to value projects according to contemporary hierarchies of capitalized sciences, technologies, and medicines? Why have we granted disproportionate interest to the "High Technology," high-profile areas of biotechnology, genetics, physics, information technologies, and specialized medicine over and against such less visible areas as routine health care, water supply, agriculture, electrical power, and engineering? Echoing Said (1989), to what extent are our own desires for and choices to study these topics accepting direction from capital, through the availability of money to study some problems and not others, as well as from our own particularly American nostalgia for the new? Even as we critique this nostalgia, are we not also participating in it by identifying prestigious topics as those most worthy of study? Does intervening in concentrated centers of cultural authority provide opportunities to contribute to novel shifts of power, or might we be fulfilling a function of public but ineffective critique? What are we choosing to hide even in the midst of wanting to make alternate modes of theorizing more visible?

Deborah Heath's contribution to this volume emphasizes a third pathway to intervening through cultural boundaries, the mediation of relationships across such boundaries. This ethnography draws directly on extended periods of participant observation among scientists, laboratory workers, clinicians, and activists involved with a disease called Marfan's Syndrome. Through fieldwork as both a DNA sequencing technician and a cell culture technician, Deborah describes how bench workers and principal investigators enact the hierarchical cultural boundary separating mind from body. Novices are given access only to body activities at first, and promotion involves movement into activities that involve greater and greater engagement of the mind, with the mental activities of principal investigator located at the top. Ethnographically working through this hierarchy, Heath focuses on the importance of "good hands," and the value that lab workers also attribute to developing a "mindful body." Although forms of body knowledge might not fit well with the images of science as directed by creative *minds*, these do show up routinely in the daily practices of lab workers as one moves from science to science, lab to lab. Through her extensive field work in the worlds of both bench workers and principal investigators, Heath gained both the experience and authority to stand for or represent each perspective in the midst of the other. Exploring features of body knowledge calls attention to the knowledge contributions of bench workers, and highlighting the struggles of one principal investigator alerts bench workers to the extent to which she values them and treats them with respect. In other words, Heath is able to relocate scientists for bench workers and bench workers for scientists, beyond the terms of science as authoritative knowledge and in ways that reduce differences between the two.

Heath also works to mediate relationships across the boundaries that separate scientists who

do research on Marfan's Syndrome, clinicians who treat the disease, and activists building solidarity among patients and seeking greater recognition for their problems. Not only did she participate directly by organizing a meeting at a national conference that brought representatives of all three perspectives together in one room but her text indicates a routine strategy in both written work and conversations of confronting stereotypic expectations with experiences that belie them. In particular, she helps one scientist confront and challenge her own desires to keep the concerns of clinicians and activists out of her lab.

Participant observation is a crucial methodological choice for Heath in this contribution because it helps her establish credibility on all sides of the boundaries she examines. As a fieldworker physically moving and communicating across standard flows of knowledge – technician and principle investigator, activist and scientist – Heath creates new forms of partner theorizing (see below, Downey and Lucena). This fieldwork strategy demands an investment of time sufficient for one to be heard by each side as, at least potentially, an authoritative member of the other. Interested in the scientific and medical goals of all of the groups in her expanded field, Heath works to allow these goals to cross-cut each other as all relevant to the production of science, technology and medicine. In short, earning the right to mediate demanded an enormous investment of self on Heath's part.

The main danger in mediation lies exactly in the question of membership, for with membership comes commitments that can last. One can gain the opportunity to participate comfortably in a consulting role, offering valuable advice that helps each perspective take account of others. But to what extent does gaining membership make it more difficult to distance one's work and one's self? To what extent does one limit one's role to a consultant politics, stuck in the job of helping others better concoct strategies to fulfill their objectives? Heath makes it clear that she became friends with the scientist who hosted her fieldwork. She handles the danger of friendship and consulting by making sure she never stops moving back and forth across the boundaries that separated this scientist from clinicians and activists. In other words, living constantly on the boundary, however lonely that might be, can preserve the status of insider and outsider simultaneously, keeping one in a position of power as a representative of other groups in the midst of each.

Another issue that inflects the strategy of mediation through cultural boundaries concerns how one conceptualizes cultural boundaries theoretically. If one treats a boundary, as Heath does, as a feature of a dominant mode of theorizing with which everyone has to deal, then mediation can consist of blurring the boundary by making visible all those experiences on both sides that both enact and contest the dominant mode of theorizing. In formulations such as this one, the word "culture" tends to designate the simultaneous identification of meaning and power and the main problem of analysis is to establish the extent to which sharedness and, hence, groupness exists. However, if one treats the boundary as a border between distinct cultures, each of which is internally structured and coherent, then mediation amounts more to getting each side to recognize and accept the legitimacy of the other than in blurring the differences that separate them. In formulations such as this one, the word "culture" tends to designate the shared meanings that constitute each side as a group and power is located in the relationships between the groups that hold such shared meanings.

In sum, anthropological projects that intervene in emerging sciences, technologies, and medicines through cultural boundaries distinguish between relocating the authorities of science and wishing or dissolving those authorities away. Challenging the citadel effects of science and locating scientific practices within cultural narratives need not be the same as practicing a popular theory of anti-science. The label "anti-science" tends to be a rhetorical political tool for devaluing that which cannot be labeled "pro-science" or is otherwise not wanted. The point is not to question science per se, but to characterize the roles of sciences, technologies and medicine in our lives and imagine ways in which our lives might be better.

Intervening through Cyborg Selves

With Joseph Dumit's contribution, the volume shifts theoretical emphasis from identifying and following traffic over, around, and through cultural boundaries to exploring the participation of science, technology, and medicine in the fashioning of selves. Dumit is interested in how facts become incorporated into how people understand themselves. He understands facts as always "facts-in-the-world" to call attention to the specific stories, explanations, and experiences through which we learn facts or, alternatively, through which facts find us, without our ability to pass independent judgment about their truth. Dumit illustrates the role facts play in the formation of persons and categories of personhood by examining the history and everyday uses of a brain imaging technique called PET scanning, or positron emission tomography. PET scanning provides images of a living brain in action, as it thinks and experiences emotions.

Used with increasing frequency to diagnose forms of mental illness, especially schizophrenia, PET scans are understood to provide solid biological facts about otherwise contested behavior. In a society where stereotypic popular theorizing locates all agency in the intentional will of individual human decisionmakers, the presence of new biological facts can shift or rearrange rather dramatically the identities of schizophrenics and those close to them. For example, trial lawyers sometimes rely on PET scans in the sentencing hearings of convicted murderers to portray their clients as not fully responsible for their actions even though not certifiably insane. Also, locating schizophrenia as a fact of nature rather than a product of nurture can provide patients and their families, especially the oft-accused mothers, with great comfort and relief at knowing that it was not their fault. Such changes are examples of what Dumit calls "objective self fashioning," the fashioning of selves through facts.

The main conceptual move in exploring the fashioning of selves is to construe experiences of self as the product of connections and relationships involving science, technology, and medicine rather than as their essential precondition or core substance. That is, this theoretical practice locates human experiences and, accordingly, personhood at any given time and place as something to be found out through analysis rather than asserted or assumed at the outset. Development of a stable, coherent self over a period of time despite new encounters and interactions thus becomes an achievement rather than an assumption. What people come to attribute as distinctively human or nonhuman agency depends upon how and where selves are located in fields of meaning and power. For example, just as the pregnant women interviewed by Rapp found themselves worrying about Down's Syndrome after admitting facts from reproductive technologies into their bodies and selves, so might the mother of a child diagnosed

with schizophrenia by a PET scan find herself transformed back into a good parent after having accepted the facts of the matter. In each case, the transformation of personhood involved people attributing the agencies of personhood to nonhuman sources – self as cyborg. Dumit concludes by expressing hope that learning about and following these circuits of fact distribution might help both laypersons and experts play a greater, even critical, role in their own understandings of themselves.

The methodological strategy of traveling across cultural boundaries is important here. Dumit first works to build a convincing account by linking together seemingly unrelated cases, such as the struggles of anthropologist Victor Turner to incorporate facts from neuroscience and medicine into social theory and stories from the non-fiction best-seller *Listening to Prozac* about how taking this antidepressant alters people's behavior and experiences. He also provides a more extended ethnographic tour through organizations and people involved in PET scan development, mapping internal differences such as between work sponsored by the National Institutes of Health and work sponsored by bank loans in order to preempt interpretations of this story as monolithic technological progress. Thus, in ways that parallel Rapp's methodological travels across cultural boundaries, Dumit's work can be heard as speaking to self-making and meaning-making in participation with technological and medical facts.

The main danger in this approach to intervening through cyborg selves lies in casting the anthropologist as a virtuoso observer and interpreter of human experiences. How is it that some apparently outside observer can gain access to emotional experiences of body and self? Is it not presumptuous for someone who is simply watching people behave to claim to get inside their heads and experiences? This danger is not only a risk to intervention but also a significant methodological entanglement. By locating selfhood theoretically as associated with cultural position and identity, one makes a methodological commitment not to draw a sharp distinction in advance between mind and body, thoughts and emotions, inside and outside, etc., including in one's own practices of fieldwork and writing. Thus, this pathway to anthropological intervention relies wholly upon the ethnographic interpretation of meanings and power relations encountered in fieldwork rather than separating analytically emotional moments of empathy and sympathy from cognitive moments of observation. The ethnographic challenge is to identify, describe, and present such meanings, including the cultural attribution of emotions and thoughts, in ways that readers who live with a cultural distinction between emotions and thoughts would find plausible and convincing. In this contribution, using a best-selling book and overt expressions of comfort and relief as evidence for emotional reactions helps Dumit achieve such plausibility because these suggest a sharedness that is widespread. Such a strategy hopefully reduces the risk that readers might judge the work as arrogant virtuosity rather than solid ethnographic analysis.

A second approach to intervening through cyborg selves is to concentrate on a specific category of scientist self-fashioning over time and across cultures, challenging a specific citadel effect, that scientists are born and not made. Sharon Traweek has followed the lives and selves of physicists for over twenty years, examining everyday practices to identify what she calls "themes" or "patterns" as well as "faultlines" among physicists in the United States, Japan, and other countries. In her contribution to this volume, Traweek explores how images regularly displayed on the walls of physics laboratories, classrooms, and corridors, such as charts, maps, timelines, and photographs, actively serve as indicators and expressions of selfhood, both to

physicists and to outsiders. For example, one poster of Einstein draws on a common iconographic motif in the Christian art of the Catholic Church, using backlighting to suggest a radiated divine grace, while another of Einstein awkwardly riding a bicycle is one of several images that juxtapose intellectual subtlety and simplicity with childlike pleasures and the flaunting of social conventions.   Also, a timeline documenting progress in scientific discoveries with a gap between 530 A.D. and 1453 A.D., the so-called "Dark Ages," demonstrates that knowledge is perishable if society acts to inhibit its development. The associations in these images are especially important in the context of widespread debate over the superconducting supercollider because they locate physicists as individual geniuses whose curiosity should be left alone, i.e., funded, to make discoveries and facilitate human progress. In similar fashion, contrasting layouts of laboratories in the United States and Japan indicate a significant difference in cultural patterns between a "dominating gaze" and a "glance" in the organization of physics knowledge, while the increasing appearance of simulations in place of log books suggests a generational shift in the aesthetics of physicists and physics knowledge, from taxonomies, classifications, and stabilities to complexity, variations, and instabilities.

   Such concentrated attention upon one category of person or self defines a pathway to intervention that can involve helping people understand and assess the different ways they position themselves, even if the meanings involved are contradictory. The main images physicists display for themselves and others tend to locate physics securely within a citadel, locating physicists at the core of autonomous knowledge development that diffuses outward to the rest of us. The superconducting supercollider, however, was not approved. Might acknowledging and examining how they fashion themselves as intellectually subtle but childlike people who live outside of social conventions improve the abilities of physicists to reformulate and adapt their funding strategies to changing national agendas? Might acknowledging and paying more attention to faultlines by ethnicity, gender, age, etc. within and across the boundaries of national physics communities improve the abilities of physicists to work together, both in collaborative theoretical or experimental projects and in mechanisms of professional development? By serving to mediate one category defining someone's personhood in relation to another category, the anthropologist following this pathway could begin to appear as something of a group counselor or management consultant.

   Traweek's choice of methodology, two decades of sustained participant observation, is important to this intervention pathway. Presenting the selves of physicists to physicists confronts her with the dual problem of constituting physicists as a social group and convincing its members to locate her amidst them. Just as Martin et al. demonstrate above, the anthropological finding of shared meanings serves to constitute a social group as well as to represent it. Without long-term participant observation, Traweek might have more difficulty establishing her claims of sharedness. The issue of membership is trickier. Undergoing advanced training as a physicist herself would have been one possible approach for Traweek to help herself become located among physicists. Sustained participant observation is another, for as physicists have come and gone over the years, Sharon Traweek has been there.

   A main danger in this pathway to intervention involves losing the delicate balance between the identities of insider and outsider. Is Traweek an apologist for physicists, a critic of physicists, a patron of physicists, an outsider observer of physicists, or what? The answer is,

roughly, yes. One way Traweek has maintained this ambitious, ambiguous status has been to concentrate her analytic attentions on everything but the mathematics of physics knowledge. She has thus avoided being positioned as a physicist-wannabe, while becoming authoritative on much that is embedded, and often hidden, in physicists' bodies.

A third pathway to intervening through cyborg selves involves direct participation in self fashioning, a practice that Gary Downey and Juan Lucena refer to in their contribution as "hiring in." Downey and Lucena explore how undergraduate engineering students experience engineering education as an outside challenge to personhood, as a test of one's ability to integrate the practices of engineering problem solving into one's body and self. Downey and Lucena describe, for example, how solving an engineering problem involves drawing a sharp boundary around the problem, abstracting it out to solve in mathematical terms, and then plugging the mathematical solution back into the original problem. Engineers learn to view this method as rigorous and invariant, and that messing with it in any way by allowing personal interests, desires, or concerns creep in constitutes a serious interruption and violation of sound engineering practice. In contrast with, say, physics problem solving, in which the main challenge is to learn to "think like a physicist" (White 1996) so one can bring that unique genius to bear in a process of discovery, integrating engineering problem solving into one's body involves sharply separating "self" from "work." Downey and Lucena seek not only to make visible and help students understand better the diverse strategies through which they meet or reject this challenge, but also to participate directly in the education of engineers and the ongoing formation of curricular policies for engineering education.

As a metaphor of employment, "hiring in" indicates a willingness to allow one's ethnographic work to be assessed and evaluated in the theoretical terms current in the field of intervention, to become employees in a sense, paid or unpaid. "Hiring in" acknowledges that theorizing within established power relations captures one within those relations (cf. Rapp on abortion and Hess on capturing, this volume). Downey and Lucena conduct their research in the context of significant debate among engineers about engineering education as well as substantial national policy changes in engineering curricula. Whether these fieldworker-authors desire it or not, their written work will become located somewhere in the midst of these debates and changes, unless it is simply ignored as irrelevant. In particular, their work relates to ongoing concerns about the "underrepresentation" of "women" and "minorities" in engineering in the United States. The problem Downey and Lucena face concerns how to have their work received by engineers as participating significantly in the problem of underrepresentation without, at the same time, having to force their data about curricular self-fashioning into artificial, predefined groups of "women" and "minorities." These categories are interesting to Downey and Lucena as cultural categories of persons that people apply to themselves rather than as distinct types or categories of humans designed for analytic purposes.

The strategy Downey and Lucena adopt for hiring into this contested field of education involves experimenting with what Downey and Rogers (1995) call "partner theorizing," which envisions all acts of theorizing as undertaken with their interlocutors in collective, but temporary, negotiations of knowledge production. A practice that Downey and Rogers recommend for academic theorizing in general, partner theorizing involves looking for ways of factoring into one's own thinking the views of those one seeks to convince, without necessarily

seeking the consensus that is often unrealizable. Applied in this case, partner theorizing involves going beyond showing that the strategies engineering students use in accepting or rejecting curricular self-fashioning do not divide up easily according to the demographic categories of gender and race. Yet they try and account for how underrepresentation does occur once people are demographically divided by gender and race, as in the studies that engineers and policymakers use.   Furthermore, partner theorizing involves accepting limits on possibilities for change. Downey and Lucena seek new policies for engineering education, from designing a new course to recommending changes in everyday pedagogy, that take account of the current structure of engineering education and do not demand the resources that would be necessary to redesign curricula from scratch.

As with the previous approach to intervention, methodological strategies in this case involve convincing people to locate one amidst them; however, where one gets located shapes where one can legitimately contribute. In addition to long-term fieldwork, such could include actually accepting employment, as many anthropologists of science, technology, and medicine have done. Fortunately for them, Downey and Lucena can expect some measure of credibility for their work among engineers by having completed undergraduate degrees in engineering. They can also cite active involvement in teaching undergraduate engineering students as well as research support from the National Science Foundation, which has been a major player in reformulating curricular policy in engineering.

The main risk in hiring in is cooptation, allowing ones' work to be subsumed completely by the categories and goals, hence, the power relations that define the field of intervention at present. Downey and Lucena work to reduce its risk by focusing their attention on ways in which engineering curricula contribute to the fashioning of selves, which tends to promote a student-centered perspective on engineering education rather than reinforcing a citadel model of education as knowledge transmission or diffusion. A second, equally dangerous, risk is social engineering, presuming arrogantly that one's expert knowledge grants one the authority to legislate new mechanisms for fashioning the selves of others. Downey and Lucena rely on partner theorizing to avoid this outcome, trying to formulate recommendations in terms that actually might fit current debates over engineering rather than appear to arrive from an elitist position on high.

In sum, these anthropological strategies of intervening in emerging sciences, technologies and medicines begin with very local notions of how selves are fashioned in relations with technologies of education and mentorship, in relations with ongoing medical redefinitions of normality and disease, and in relations with scientific disciplinary divisions. By ethnographically attending to the lives of researchers and managers alongside the lives of students, subordinates, sufferers and activists, these fieldworkers work to produce better accounts of the contingent co-production of selves and hopefully better practices of self-making.

Intervening by Relocating Anthropologists

David Hess' contribution intervenes in emerging sciences and technologies by relocating the position of anthropologist in the interdisciplinary study of science, technology, and society (STS). Cautioning anthropologists who might be moving into this neighborhood that other

researchers already live there, Hess explores how researchers in one branch of STS, the sociology of scientific knowledge (SSK), have regularly used anthropology as a resource in their work, sometimes in ways that cultural anthropologists trained in the United States might not recognize. For example, appropriations of the term "relativism" might blur cultural relativism into epistemological relativism, anthropology might be taken to be synonymous with the practice of ethnography, and ethnography itself might be thought to depend upon maintaining a clear sense of distance from the practices one studies. Hess describes opportunities in STS for incoming anthropologists with a "counternarrative" of STS development that makes visible a diversely organized "wing" he calls "critical STS" and by outlining five different "interrelated strands" that together make up a "distinctive anthropological/cultural studies contribution to STS." Hess then concludes by locating anthropologists provocatively in the midst of STS by identifying ways in which they might use sociology of scientific knowledge concepts, such as "impartiality," "enrollment," and "obligatory passage points," as resources in building anthropological work that is at once political, cultural, evaluative, and intervening. By thus relocating anthropologists and STS researchers simultaneously, Hess hopes to encourage development of an engaged anthropology of science and technology that "not only theorizes but also does more about exclusion, marginalization, hierarchy, and difference."

Relocating anthropologists intervenes by rearranging geometries of relationships both inside and outside of the academy, that is, among researchers and between researchers and nonresearchers. Intervening directly in the practices of one's own colleagues is one way of exploring and changing how they live and intervene in the worlds they study. Intervening ethnographically in the practices of anthropologists involves grappling with cultural boundaries and cyborg selves at the same time, for redrawing the cultural boundaries that define anthropological work refashions the selves of anthropologists in the process. At the same time, participating critically in one's own mechanisms of professional development and practice offers distinct methodological challenges and poses unique dangers to the ethnographer.

Hess' choice of pathway for relocating anthropologists is to reformulate the genealogies that locate them in the present, i.e., redrawing the boundaries around their work in order to make visible what has heretofore been hidden. This approach can help anthropologists not only to recognize they are working alongside others but also to accept their own desires to make a difference through their work. In other words, cultural anthropologists turning to study science, technology, and medicine do not have to play by what appear to be the established rules if such rules hide important opportunities to make a difference.

Hess builds plausibility for his genealogical vision through the methodological strategy of a literature review. Mapping published literatures can be a key ethnographic strategy for identifying boundaries for people who locate themselves professionally through publications, so Hess travels across cultural boundaries through reading and helps people speak for themselves through citations. Although also reporting personal conversations and informal interviews, Hess provides no texts of these encounters since these would likely appear as idiosyncratic opinions rather than disciplined interpretations. Hess' explicit theoretical commitment to a culture-and-power perspective (Hess 1995) also helps locate his methodological priorities, leading him to focus on contrasts among distinctive cultural communities in order to sort out the power relations between them and place less emphasis on the contrasts he finds within each community.

Identifying shared meanings is a strategy for constituting each collection of researchers as, roughly, a social group.

The stakes in reformulating an academic genealogy become quite high when one's professional identity as a scholar figure in the analysis. Where is one located as an ethnographer? Is one an outsider to a particular group and an insider in another? If so, then on what grounds can one claim to map anything but one's own space, and is one's work necessarily opposed to that in other categories? Furthermore, what if those one defines as members of one's own group do not see themselves in the categories? Having worked for several years as an anthropologist in an academic STS department, Hess manages these risks by locating himself as both an insider and a stranger to STS. His account offers detailed reflections indicating many years of patient, systematic observation and interpretation in both anthropology and STS. The important point is that one does not have to be just one thing. Hess thus distances himself from the critiques that schools of STS scholars make of one another and seeks ways for anthropologists to collaborate with researchers in these other groups rather than reject them.

A second pathway for intervening by relocating anthropologists is to make visible writing and conceptual practices that might otherwise be hidden. In her contribution to this volume, Sarah Williams examines the presence and power of "fetish objects" among anthropologists, including participants in this seminar. Similar to the Arunta's sacred Churinga described by anthropologist Michael Taussig, the fetishes of anthropological researchers are "unrepresentable" objects whose presence can be "strenuously noted yet not reflexively recognized." The key example in this case is the prominent anthropological concept of "cultural diversity," which not only reifies isolable cultures as objects of empirical knowledge and elevates anthropological interpreters as authoritative, expert knowers but also inhibits anthropologists from acknowledging "the complicities of knowledge and power that cannot be spoken yet empower the force of research itself." In other words, reflexivity in theory does not translate easily into reflexivity in practice. A New Zealand archaeologist with Maori ancestry, for example, finds himself unable to reconcile being Maori with treating Maori culture as an object of study. Similarly, seminar participants found it difficult to acknowledge and discuss senses of vulnerability in the field, the ethical complexities involved in taking money, and nagging pressures not to do fieldwork "the wrong way." They also had difficulty recognizing ways in which their concepts establish new fetish objects, and, most revealingly, trusting easily the presence of an ethnographer in their midst. In other words, seminar participants may be doing a better job of theorizing a new game than living it themselves.

By confronting one contribution to anthropological selfhood with another, making their practices more visible can help anthropologists to understand and assess the ways they position themselves, even if the meanings involved are contradictory. For example, to the extent that anthropologists find themselves struggling to move beyond the concept and politics of cultural diversity just as it has gained currency outside the discipline, perhaps understanding the ways in which this concept still shapes their academic practices might help anthropologists reformulate those practices and relocate their discipline. That is, how might anthropologists be able to live without setting themselves up as the experts of Otherness? Achieving such change will have to involve more than theoretically sophisticated meta-anthropology, for the practices of anthropology will have to be meta-anthropological as well.

It is important to this pathway that Williams' main ethnographic strategy is participant observation, revealing the practices that literature review alone would hide. Her account of the New Zealand anthropologist draws both on her experiences as a colleague and a taped interview, while her account of SAR seminar participants draws both on her experiences as a participant herself and a taped, on-the-record session in which she served as interviewer. In addition, structuring her article explicitly in terms of a traditional scientific paper allows Williams to adopt an ironic stance vis-a-vis the fetishes of academic research and finesse the problem of moving reflexivity from theory to practice. This saves her from having to elaborate in significant detail how her work itself produces or avoids producing fetish objects.

A key danger in trying to make visible anthropological practices lies in maintaining a tension between insider and outsider. How can one live powerfully on the margins of a group with whose members one competes for employment and funding? What are the implications of offering either affirmation or critique? That Williams manages these issues in several ways illustrates the extraordinary risks one must assume in undertaking an anthropology of anthropology. Beginning with a description of her fieldwork experiences in Africa establishes her credentials as an anthropologist while also showing how these experiences shifted her interests from the Turkana to the anthropologists studying them. Also, the contribution displays an understanding of orthodox genealogies in anthropology even as it draws theoretical inspiration from the work of Michael Taussig and Homi Bhabba, who have positioned their work around the margins of the discipline.   Relying extensively on direct quotes allows her to reduce the extent to which anthropologists might read her as a presumptuous outsider, even while offering interpretations with which her informants might not agree. Using a formal research protocol in both experiments (New Zealand and the SAR seminar) also maximized the extent to which her work would be interpreted as legitimate research rather than muckraking journalism. Finally, Williams acknowledges that the authorship of her text itself is ambiguous, and that she lives with the risks of membership and/or estrangement.

Paul Rabinow's contribution illustrates a third pathway to relocating anthropologists, reformulating anthropological practices themselves. Although Rabinow seeks in part to "reinvent" some anthropological practices by making these "more visible" and, hence, "more available," this work goes beyond excavating the daily practices of anthropologists to reformulate key notions of practicing science. Its main objective is to retheorize practices in the human sciences, including anthropology, by articulating and exploring possibilities in their "ethical" dimensions. Rabinow distinguishes two ideal types of ethical scientist, locating these in two different "sites." The first type, the "vigilant virtuoso," is the archetypical scientist of citadel science who keeps himself [sic] out of his work. Pierre Bourdieu serves as a key sentinel for this approach to mastery through knowledge, and the academic conference serves as its main site. The second is the "attentive amateur," whose main site is the relationship among friends and whose features Rabinow articulates through Michel Foucault's "framework for analyzing ethics." For Foucault, ethics is "the kind of relationship you should have with yourself," and ethical self-constitution has four distinct aspects. Rabinow uses the first, "ethical substance," to call attention to reflective curiosity in human science, which he thinks is both valuable and underrecognized in recent science studies. The "mode of subjectification" in this ethical type involves serving as something of a philosophic observer who problematizes the world rather than

mystifying it. The "ethical work" involves the challenges of participant observation rather than participant objectivication, and the "telos" involves accepting the limitation of attentive engagement rather than seeking mastery.

This pathway to intervention lies in identifying new, theoretically possible, patterns of conduct and then working to convince others of their value. Going beyond participant observation to make alternate practices more visible, it involves the refashioning of scientific selves by retheorizing their contents. Similar to Downey and Lucena's approach to participating in engineering education, this pathway indicates a willingness to allow one's work to be assessed and evaluated in the theoretical terms current in the field of intervention. The difference in this case is that the field of intervention is one's own professional home.

Rabinow's ethnographic methodology combines participant observation with philosophical exegesis. Attendance at a professional conference becomes fieldwork to identify the vigilant virtuoso's dominant mood of indifference, and systematic fieldwork in a biotechnology corporation identifies the site of friendship for the attentive amateur. At the same time, Rabinow rereads and relocates the classics, especially Aristotle, to relocate "virtue" as an epistemological practice. In other words, not only does the alternative type of human scientist Rabinow identifies live in the present, but it embodies a tradition every bit as pervasive and as long-lived as the tradition of scientific mastery.

A main danger in reformulating anthropological practices lies in defining and maintaining the ambiguous position of leadership, avoiding both pedestrian short-sightedness and elitist self-centeredness. Having already earned senior status in disciplinary anthropology, Rabinow can feel secure that his reformulation will be read and cited. If he writes it, they will come. Rabinow signals this status implicitly by locating himself with Foucault in a debate with Bourdieu, a relationship that intrigues and interests anthropologists. Someone with less-established credentials would likely not be able to rely on first-person accounts but would need additional fieldwork strategies to attribute patterns to the community of human science as a whole. Rabinow avoids the dangers of elitism through ethnography, shifting the spotlight from him to us. Perhaps he is reinventing us, but only by showing us what was there all along.

A final pathway to intervening in emerging sciences and technologies by relocating anthropologists is by setting an example oneself, that is, by locating one's work and, hence, one's self, as something for readers to assess and then, if all goes well, to emulate. Every anthropological study adopts this pathway to the extent that it seeks to be cited and used in subsequent work. The pathway is much trickier when one tries to convince members of another discipline to read and find value in one's work, including its dreams. This is the task Donna Haraway takes up in what is appropriately the final contribution to this volume. If pedagogy can be understood as a practice of leading people somewhere, then Haraway has much to teach.

Characterizing herself as applying for "a visa for an extended stay in the permeable territories of anthropology," Haraway's challenges anthropologists moving to study science, technology, and medicine to examine and reconsider their fundamental assumptions about whom they are and what they are doing as researchers. She locates anthropologists in the midst of emergent relations she calls the New World Order, Inc. by adopting the position of anthropologist herself. At first glance, this anthropologist is located not in a human body but in the bodies of laboratory

mice, whose "mutated murine eyes give me my ethnographic point of view." After a while, however, the separation between human and animal dissolves away as we learn that their genealogies are the same, together experiencing the "force of implosion" through technoscience that brings together the "technical, textual, organic, historical, formal, mythic, economic, and political dimensions of entities, actions, and worlds." She outlines an interpretative framework that calls attention to figures and stories, examines mechanisms of "materialized refiguration," explores science as both "practical culture and cultural practice," and analyzes the "tangle of sticky threads" in nuclear and genetic worlds. In the process, she challenges anthropologists to find theoretical insight in science and technology studies, to find symbolic significance in the messy details of contemporary corporate life, and to recognize *how* one's work is always located. Perhaps by recognizing their participation in the New World Order, Inc., anthropologists might be more motivated to explore and contest what counts as "rational," "natural," and "technical," accepting full engagement in the contemporary worlds of technoscience.

Haraway's main methodological strategy is to perform anthropology for anthropologists, demonstrating a thorough understanding of the cultural position of anthropologist by performing and playfully parodying it at the same time. After a sense of familiarity has been established, Haraway introduces the foreign, the strange, to disrupt the familiar and challenge the assumptions that locate the position of anthropologist. Anthropologists are not just students of culture but also contribute to the emerging New World Order, Inc. Fortunately for her, Haraway is able to stand for the New World Order, Inc. in the midst of anthropologists because she was trained as a biologist, became an accomplished historian of biology, and is a renowned culture critic. Nevertheless, if the "anthropologist" as a cultural identity can be separated successfully from the human substrate in which it resides, then possibly human readers who call themselves anthropologists might be more likely to redefine what that means.

The main danger in this pathway is marginalization, the act of locating oneself irretrievably on the margins of the field of intervention. Clearly, such a position might be risky for a less-established scholar but, in addition to having long demonstrated a willingness to stake her career in the pursuit of her dreams, Donna Haraway is a public intellectual, who is at risk only if everyone marginalizes her from their work. Not only does this seem unlikely to happen, Haraway also manages this danger herself by avoiding direct critique of or oppositional confrontation with anthropology, which might have made it easier for some anthropologists to reject her message without listening.

Making Intervention Visible

Taken together, the contributions in this volume challenge readers to ask: What if researchers devoted half of their research time to theorizing and practicing intervention? While desires and concerns about intervention are likely present in every step one takes in a research project, from sorting out the right questions to pursue to making sure that a written product sounds right, the Basic Story researchers tend to tell themselves have often hidden these desires and concerns or devalued them as the "applied" implications of good work. Might we be able to share, discuss, and debate more openly the sorts of differences we hope to make through our work and how we go about achieving those differences? Might sorting out research projects according to how

these intervene make it easier for each of us to accept the value of other perspectives and to conceptualize and practice collaboration?

Although certainly amounting to an idiosyncratic array of anthropological pathways to intervening in emerging sciences and technologies, the papers in this volume do suggest, regardless of the area of study, that theoretical dispositions, methodological strategies, and the identities of researchers as persons together scope out fields of intervention and available pathways for participating critically in those fields. Theory matters, for it locates one in relation to the forms of theorizing prevalent in the field of intervention. The opportunities to intervene that contributors identified depended not only on how they conceptualized culture or self within the study but also on the relationship between these academic formulations and the concept(s) of culture or self encountered in the field. Methodology matters, for it establishes the steps through which one becomes located in a field of intervention. Just as extended participant observation establishes different steps than a series of taped interviews or the analysis of documents, so might entirely different methodological choices or configurations of choices establish still different pathways. For example, the analysis of quantitative data locates one especially well in fields of intervention that call themselves "populations," such as the polling of electorates. Finally, one's identity as a researcher matters, both shaping one's initial location with respect to a field of intervention and establishing what might be necessary methodologically. For example, being able to claim prior membership in the field can open many doors, but not without also adding special burdens. In this case, the question of positioning sometimes shifts from figuring out how to get in to figuring out how to get out.

In this volume, each anthropological project seeks to make visible lives and practices hidden by features of the Basic Story of knowledge creation, diffusion, and utilization. This commonality derives from a shared commitment to cultural perspectives and ethnographic fieldwork. Take away either one of these and the pathways to intervention change. An important responsibility in recognizing our participation in that which we study involves working on limitations in our own fields of vision. Seeing through our work how good communities can be at inhibiting or preventing self-reflection, we want to be careful in trying to recognize what our perspectives ignore, silence, or make invisible. Seminar participants repeatedly expressed interest in investigating and critiquing the desires, values, and assumptions built into our projects. We want to work on our own Euroamerican centrisms by trying to notice and name the vehicles through which these live in our work. Through the limits of the organizers' egocentric networks, an explicit desire to focus on connections between analysis and intervention, and biased attractions to the lives and practices of big sciences, technologies, and medicines, this volume does not venture into questions of environmental justice, public health, or popular epidemiology, third and fourth world issues of technological equity and survival, and a range of other arenas that would make Euroamerican centrism a more central and sustained focus of discussion. As privileged first worlders studying privileged first-world science, we must each figure out ways of questioning such practices and, hopefully, troubling them.

The seminar week was intense and instructive. It did not answer all the questions nor satisfy all the desires participants brought to the exchange. We were acutely aware of the people not present and the variety of perspectives not represented in our small group. At the same time, experiencing several days of sustained collaboration awakened and nurtured in each of us a

profound sense of the challenges and potential importance of locating and intervening in emerging sciences, technologies and medicines through cultural perspectives and ethnographic fieldwork. We hope here to share that sense of challenge and opportunity, and to ask for your help. In work begins responsibility.

1. Seminar participants included Gary Downey, Joseph Dumit, Donna Haraway, Deborah Heath, David Hess, Emily Martin, Paul Rabinow, Rayna Rapp, Sharon Traweek, and Sarah Williams. Co-authors who were not present include Juan Lucena, Laury Oaks, Karen-Sue Taussig, and Ariane van der Straten.

2. Participants in these three sessions included Gary Downey, Joseph Dumit, Michael Fischer, Deborah Gordon, Donna Haraway, Deborah Heath, David Hess, Emily Martin, Constance Penley, Paul Rabinow, Rayna Rapp, Allucquere Rosanne Stone, Lucien Taylor, Sunera Thobani, Sharon Traweek, Sherry Turkle, and Sarah Williams.

3. Prior to 1992, there was evidence of growing interest. For example, the 1991 AAA meeting included an invited session on "Cultural Perspectives on Information Systems Development," organized by David Hakken and Linda May; a panel on "The Ethnography of Scientific Practice," organized by Alan Stockdale; a panel organized by Allen Batteau and Elizabeth Brody on "Anthropology and Engineering"; and another invited session on "Nation, Culture, and Power in Science and Technology," organized by Gary Downey. Also, in 1991 Joseph Dumit presented the paper, "Cyborg Anthropology: Brain-Mind Machines and Technological Nationalism."