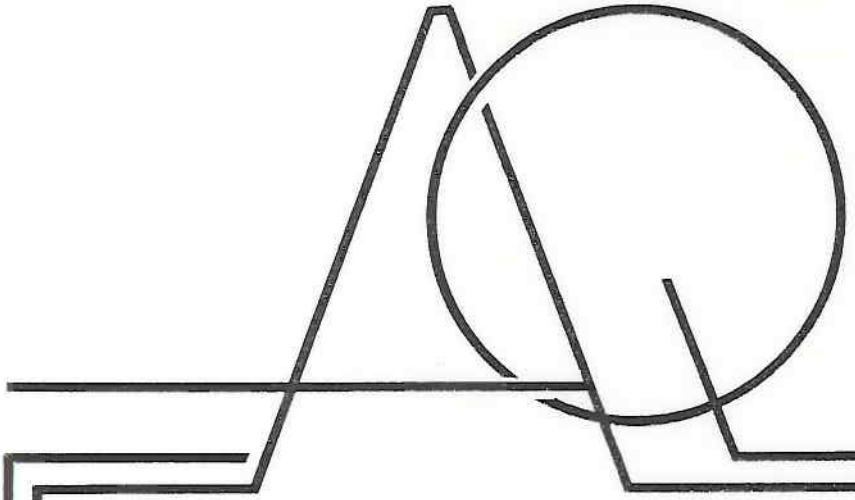

# ANTHROPOLOGICAL QUARTERLY

The Center in American Culture:
Analysis and Critique

RICHARD HANDLER
Guest Editor




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# ANTHROPOLOGICAL QUARTERLY

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## ERRATA

A typographical error occurred in the article "Native and Newcomer" by Jennifer Robertson in the July 1987 issue. Page 132, column 2, lines 21 - 31 should read:

Tochikko parishes and coteries are identified by inscribed drums and shrines, Kodairakko associations and clubs by the signs carried by children. What is emphasized in the parade is the social and status classification of each participating group.

## NOTE TO SUBSCRIBERS

The October 1987 issue of *Anthropological Quarterly* is being prepared for publication. Subscribers to Volume 60 will receive it in the coming weeks.

# STRUCTURE AND PRACTICE IN THE CULTURAL IDENTITIES OF SCIENTISTS: NEGOTIATING NUCLEAR WASTES IN NEW MEXICO

GARY L. DOWNEY
Virginia Polytechnic Institute and State University

*The cultural status of scientists in contemporary American society is both elite and insecure. Although science commands authority as the cultural source of knowledge about "nature," individual scientists must struggle to achieve and maintain "credibility." This ethnographic study examines the strategies of participants in a public dispute over nuclear waste disposal as they negotiated the credibility of competing scientists. I advance the theoretical concept of cultural identity to show how the credibility of scientists in the public domain is at once a culturally-structured and a contextually-variable phenomenon. It may prove fruitful to view cultural identity more generally as a mediating concept between cultural structures and actors' practices. [cultural analysis, American culture, anthropology of science, ideology, nuclear waste]*

In February 1981 John Gofman was giving a talk in Santa Fe, New Mexico, about nuclear wastes. The emeritus professor of physics from Berkeley, discoverer of a radioactive isotope of uranium, and former associate director of Lawrence Livermore Laboratory, had his audience in stitches. He was reciting the federal government's thirty-year history of problems with finding a satisfactory method of disposal. Each technological failure, it seemed, followed completion of a technical study by a high-level committee of scientists and administrative officials. Incompetence had reigned in these committees, he argued, producing political compromises rather than sound scientific judgments. By the time he reached the issue at hand, the disposal facility proposed for Carlsbad down by the Texas border, his rhetorical strategy was clear. "First," he said to widespread laughter, "they appointed a committee. . . ."

The 300 members of Gofman's audience already knew that scientists from the Department of Energy could not be trusted, for they had come to the opening of the state legislature to protest the Waste Isolation Pilot Plant [WIPP]. As Gofman began to describe the proposed facility, his style of presentation suddenly changed. He switched on an overhead projector and began to lecture about his own research on the hazards of radiation. Apparently not surprised by the change, the audience fell silent, listening intently, many people taking notes. They were anxious to hear the facts about nuclear wastes.

Three weeks earlier Roger Anderson was giving a talk in Albuquerque about the geological salt formation that was to host the WIPP facility. Trained in geology at Stanford and now a full professor at the University of New Mexico, Anderson was reporting an investigation he had done under contract with nearby Sandia Laboratories, a federal research facility that DOE had charged with evaluating the disposal site (Anderson 1978). He had found problems. A peculiar distribution of density differences in the salt appeared to indicate that groundwater had dissolved it from below sometime in the recent geological past, perhaps less than ten thousand years. Continued dissolution could threaten the integrity of the nuclear waste repository. Laboratory experiments with a small-scale mock-up of the salt formation seemed to provide supporting evidence that the dissolution could have occurred quickly enough to be geologically recent.

Pointing to slides of the experiments, which had used colored water to enhance visibility, Anderson said, "See the water coming out here?" A group of hecklers in the audience yelled, "Nooooo!" Scrolling to a slide that clearly showed the water, he asked, "Can you see it *now*?" The hecklers answered, "Nooooo, we can't see it," and then giggled among themselves at the obvious pun. They couldn't "see" it for they believed the dissolution process to have ended millions of years ago. The hecklers were geologists from the U. S. Geological Survey.

These two vignettes from the dispute over WIPP offer differing, but typical, images of audiences "framing" scientific speakers in the "public" domain. Responses from the first audience assigned the speaker an elevated status and placed him in a central role as a source of important cultural knowledge, even as both the speaker and the audience cynically mocked another group of scientists. Responses from the second audience ridiculed the speaker himself, denying him privileged status, undercutting the value of the knowledge he communicated, and limiting his ability to occupy an authoritative role. Both deference and disrespect are common orientations

toward scientists in public disputes involving science and technology in American culture.

That the first audience was comprised of laymen while the second was mostly scientists is not significant, for each group can elect to be either hostile or supportive of particular scientists in any given instance. Rather, the combination of these two exchanges points to a systematic ambiguity in the public identities of scientists in American culture. In the first place, science itself is valued as an elite activity providing authoritative cultural knowledge capable of resolving a variety of conflicts. At the same time, however, individual scientists face a perpetual problem of affirming their "credibility" as trustworthy producers of authoritative knowledge. The cultural status of scientists in contemporary American society is both elite and insecure.

Attempts to site nuclear waste facilities have stimulated highly polarized evaluations of scientists and scientific groups, throwing this cultural dilemma into sharp relief. The WIPP facility, scheduled to operate in the early 1990s, is to serve as the nation's first deep geologic repository for permanently disposing of nuclear wastes. Scientific investigations of the site officially began in 1975, yet construction was not initiated until 1982. In the interim the project was the object of intense controversy within New Mexico, and discourse claiming scientific status was the principal idiom of dispute. When I conducted fieldwork on the controversy during 1980-81, the future of the project was in jeopardy.

In the analysis below I offer cultural accounts of the authority of science and the credibility of scientists by examining the cultural identities of scientists in the WIPP dispute. On the one side, the authority of science is a structured feature of American culture that was presupposed by the dispute. On the other side, the "credibility" of scientists is a variable relationship with their audiences, the status of which is continually negotiated in specific contexts. The public meaning of scientists' action is both culturally structured and context-dependent, and analyzing scientists' cultural identities provides insight into each of these processes. This finding suggests a more general point for contemporary cultural analysis: that it may prove fruitful to view cultural identity as a mediating concept between cultural structures and actors' practices.

### *Reproducing Identities*

In November 1976 the five organizers of a public meeting on WIPP were astonished when over one hundred people attended. They had been equally surprised two months earlier by a readers' poll in a local Albuquerque newspaper. The story reported that 73% of the 338 respondents had agreed with the statement: "We should not, under any circumstances, permit storage of nuclear wastes in our state." The organizers had then met several times as an informal reading group to educate themselves about the hazards of nuclear wastes, and they were now ready to "go public." There was agreement at the meeting that something had to be done. The group chose a name, Citizens Against Nuclear Threats [CANT], and began planning public actions to oppose construction of the Waste Isolation Pilot Plant.

Initiation of the WIPP project in New Mexico introduced a potentially new social object, a facility for disposing of nuclear wastes, to a collection of cultural actors who were already linked through preexisting relations. These relations established their distinct identities as cultural actors. The existing relations also served as interpretive frameworks in subsequent conflict over WIPP, guiding the actors as they established new relations to the waste disposal facility.

In general terms the cultural identity of an actor or social object consists of sets of relations with other actors and social objects that have meaning in terms of background cultural distinctions. These relations vary in the extent to which they have achieved societal acceptance, generally falling along a continuum between the poles of institutionalized and ideological relations. Identity relations are institutionalized to the extent that they have become both legitimized and routinized in the society in question. Social statuses, for example, consist of sets of highly institutionalized relations. Identity relations are ideological to the extent that they advance noninstitutionalized interpretations of the social world and serve as alternatives to institutionalized relations. An ideology is not an epiphenomenon or reflection of social structural relations, nor does it stand in contrast with rational calculation. Although an ideology may realign or give new meaning to institutionalized relations, it does not necessarily distort or misinterpret those relations, for its epistemological status is an empirical question. A significant implication of the noninstitutionalized status of ideologies is that ideological contributions to an actor's cultural identity are subject to the actor's acceptance or rejection while institutionalized contributions generally are not.[1]

The existing connections among New Mexicans that proved relevant to the WIPP project included both institutionalized and ideological relations. Institutionalized relations contributed "interests" to the actors' identities. For example, local business-

men in Carlsbad and representatives of the nuclear industry had "economic" interests that would be affected by the new activity of nuclear waste disposal. There was also a long-standing ideological dispute in New Mexico over the meaning of the state's connections with the outside world. Much of the conflict over WIPP, in fact, involved a dispute over the project's implications for the cultural identity of New Mexico.

In any given context the ability of existing identity relations to frame new relations derives from the fact that any body of discourse or other communicative action posits meaningful relations in the social world, whether explicitly or through presuppositions. The relations communicated might be "congruent" with the actor's existing identity relations by overlapping with them in cultural meaning. If so, the communicative action can be said to "reproduce" those relations, or provide them with continuity through time and social space. A given communication might also be "incongruent" with some relations or even have no relevance at all to particular relations. Incongruent actions can contradict, and thereby undermine, features of an actor's cultural identity. As we shall see below in the framing of scientists, the presence of incongruencies in actors' cultural identities must be addressed in some way through future actions or the actors involved risk being marginalized as unpredictable and unreliable.

Each relation comprising an actor's cultural identity frames discourse and other communicative action simply by serving a legitimating function: it distinguishes congruent from incongruent possibilities. Certainly, individuals are not limited to choosing only actions that are congruent with previously stabilized identities. In fact, any actor possesses the freedom to undertake any action in any context, and the actions selected might reorganize their identities, thereby opening up new sets of future options. However, despite the freedom that exists in principle, actors' choices are, in fact, usually well-bounded, for the meanings that alternative choices have in contrast with one another are constrained by the presence of background cultural distinctions. In many cases the number of choices that are congruent with an array of existing identity relations can be quite small, which can give the impression that the actors themselves are highly constrained.

That ideological identities played a key role in framing action in the WIPP dispute can be seen most clearly among those groups revealingly called "citizens" groups. Two camps, proponents and opponents, formed around competing accounts of the cultural identity of New Mexico. CANT fell into the opponents' camp. It was soon followed into the conflict by Citizens Opposed to Nuclear Dumping [COND], the Carlsbad Nuclear Waste Forum [Carlsbad Forum], and Citizens for Alternatives to Radioactive Dumping [CARD].

Differing memberships gave these opponent groups somewhat varying arrays of "career" and "residential" interests. CANT organizers were committed "pacifists" who organized every aspect of their lives around a commitment to "nonviolence." COND was formed across the state in Las Cruces with a middle-class membership that made it more interested in reform than radical change. The Carlsbad Forum, located in the city closest to the site, was the least confrontational, sponsoring public discussions of WIPP's potential effects on "community interests." And CARD sought to build a statewide coalition against WIPP, led by two professional organizers who wanted to establish a political constituency for a variety of "people's" causes.

The ideological identity that united these groups stressed the distinction between New Mexico and the outside world. It pictured a collectivity of individuals who were linked together by their attachment to the "land" of New Mexico, as well as a monolithic union of industry and government that was dominating these individuals from outside by systematically depriving them of "control" over their lives. Construction of a disposal facility for nuclear wastes would establish a new relation between outsiders and New Mexicans that was clearly congruent with this identity, for radiation could not be seen, heard, or felt and because its effects were both serious and long-lived. Nuclear waste disposal meant permanent external domination for the individual "citizens" of New Mexico.

Discourse produced by each group regularly reproduced this identity. Consider two texts from CARD leaflets that proved to be particularly efficient in assigning New Mexicans to this condition of domination. The first text (Citizens for Alternatives to Radioactive Dumping 1981a) begins by assigning special qualities to the resources of the state. Note how Native Americans and Hispanics are merged together with terrain and mineral resources as "natural" features of the land:

> New Mexico is endowed with many resources—the cultural and spiritual heritage of Indian and Spanish-speaking communities, a diverse terrain of desert, mesas, mountains, valleys and rivers which have sustained its people for centuries, and large deposits of natural resources such as coal, copper, and uranium.

The text goes on to detail the exploitation of these resources by "outside" groups, whose entry into the state disrupts the "cultural integrity" of the New Mexican collectivity and produces a variety of social ills:

> Since the early 1900s, these resources have attracted many from outside New Mexico, including industries seeking to exploit New Mexico's mineral wealth and other resources. This activity threatens the land, water, cultural integrity of many communities. . . Thousands of acres of land every year are being taken over by industry, the military, mining companies, and for other development.
>
> The people of New Mexico, particularly in rural areas, are exploited in the form of cheap labor in dangerous, poorly regulated jobs. New Mexico still ranks 46th in per capita income nationally, with a large segment of the population living in poverty. The social and psychological impacts of "boom towns" disrupt many communities. Alienation and a loss of individual and collective identity lend themselves to increased crime rate, alcoholism, and domestic violence.

The second text (Citizens for Alternatives to Radioactive Dumping 1981b) neatly frames nuclear waste disposal as an extreme form of domination by external forces. For example, wastes will be imported into the state by large corporations:

> We ask you to join us to oppose radioactive disposal in New Mexico. . . . Large out-of-state corporations from California, Pennsylvania, and Massachusetts are working right now to sell this dangerous project to New Mexicans. They have come to New Mexico to dispose of their wastes because we are a politically weak and disorganized state. Only a concerted effort by the people of New Mexico can bring this project to a halt.

Huge amounts will be brought in, yet small amounts produce irreparable damage to the people and the land, and the time scale of these effects dwarfs the connection with the Indian ruins whose age often serves as a reference point authenticating New Mexico's claim to its heritage:

> Radioactive wastes have been accumulating in the U. S. for the past 35 years. More than 600 million gallons of these wastes are stored across the country. The U. S. Department of Energy's plans call for 2,000 truck loads and 1,500 railcar loads of waste to be transported through our state each year. . . . All radioactive wastes are highly dangerous. "High level" wastes are physically hot and require 10 inches of steel to shield people from their harmful effects. "Low level" wastes contain plutonium which is toxic for more than 240,000 years. Compare this to the Indian settlement at Chaco Canyon which was active just 1,000 years ago. Microscopic amounts of radioactive waste can cause genetic defects or cancer like leukemia.

Finally, the permanence of the hazard also invokes kinship relations, for the American conception of blood connections entails that future generations exist in the present in the form of unrealized substance:

> Infants . . . are most affected by radiation. If there is an accident, land, buildings, water, crops and animal life could be contaminated with radioactive waste. . . . The construction of WIPP is likely to lead to changes in the character of New Mexico—into a place of unseen danger and uncertain health. . . .

In short, to allow nuclear waste disposal would be to comply with those who would deprive future generations of control over their lives.

Two months after CANT was formed, Americans for Rational Energy Alternatives [AREA] came into existence to counter the anti-WIPP groups. A founder of AREA described this goal explicitly:

> New Mexicans are the target of a campaign of deliberate deception which is drawing support from the widespread mythology that surrounds this subject [of nuclear waste disposal]. . . . [W]e believe that it is essential to [provide] an aggressive rebuttal of this deception and the underlying mythology.

It was followed into the dispute by New Mexicans for Jobs and Energy [NMJE] and Carlsbad Citizens for Energy Development [CCED]. Members of all three groups had institutionalized "career" interests of various sorts in the project. AREA consisted primarily of scientists and technical professionals from Sandia Labs and the vicinity of Albuquerque. NMJE built membership among labor and other nonscientific groups throughout the state. CCED was established by Carlsbad businessmen. Establishing "citizens" groups provided a legitimate set of cultural actors whose relevant identity relations were not limited to these interests.

Uniting the three groups was an ideological identity with respect to the state of New Mexico that contrasted sharply with the anti-WIPP identity. This ideology merged New Mexico with a larger collectivity, the American "nation," and then drew a sharp distinction between the nation and the "foreign" world outside. The outside world was depriving Americans of control over their lives by making them "dependent" on foreign oil. Nuclear waste disposal had meaning with respect to this relationship as part of a national strategy for achieving "energy independence" and insuring the maintenance of control in the form of "national security." Stopping WIPP would threaten national survival.

Discourse from each group reproduced this ideological identity. Consider two texts from NMJE and AREA leaflets. The first text (New Mexicans for Jobs and Energy 1980) begins by characterizing New Mexico's resources not as distinctive features of the state that bind its citizens together but as distinctive features of the nation that happen to appear in New Mexico. From this point of view, other states are no longer outsiders but become other insiders engaged in a common struggle against "foreigners":

> The common thread that brings us together in NMJE is our

> conviction that economic survival depends on the availability of plentiful supplies of reasonably-priced and safely-produced energy. . . . The consequences [of dependence] will be disastrous if, for any reason, the country is unable to purchase all the oil it needs . . . until it completes a transition to energy self-sufficiency.
>
> Thousands of New Mexicans are employed in the production of our State's vast energy resources and superb research and development of businesses and scientific facilities, earning hundreds of millions of dollars per year. Taxes collected from those New Mexicans and their employers, together with royalties earned from State-owned energy resources, are the largest source of revenues for State government. Those revenues directly benefit all of our citizens and institutions.
>
> New Mexico's production of coal, oil, gas and nuclear fuels ranks it among the leading energy-producing states.

Importantly, the text distinguishes between the state's resources and its "beauty," thus reducing any unique characteristics of the state to purely aesthetic qualities:

> NMJE supports continuing development of those resources, and we believe that resource development can—and shall—take place without sacrificing New Mexico's beauty.

The second text (Americans for Rational Energy Alternatives 1979) frames WIPP in the context of this struggle by first characterizing nuclear waste disposal as a manageable problem of imitating "nature":

> Many people have a vague feeling that radiation is something new and 'unnatural.' Actually, radiation is among the most universal of natural phenomena; it is present everywhere in the known Universe, always has been, and will be until after the last star has grown cold and life has become extinct. . . . Like many potentially-hazardous substances, nuclear wastes can cause serious problems if they are mishandled. They deserve our respect and they are receiving that respect. It is easily shown that the total hazard potential of all the nuclear wastes we will ever produce in nuclear energy programs is small compared with the hazard potential of the natural radioactivity . . . in the ground. By placing the waste in carefully selected geological formations, we can take advantage of the same basic forces that prevent more than a minute fraction of the natural radioactivity from affecting man's environment.

Rather than turning New Mexico into a place of unseen danger and uncertain health, radioactive wastes merge with the vast quantities of natural radioactivity in the ground by means of "Man's" technology:

> The WIPP project is a major step toward meeting that goal. If WIPP only succeeds in isolating its contents from the environment as effectively as the natural radioactivity is isolated, WIPP will have done its job. We are confident that Man's best technology can do at least as well as Nature's disposal technique' . . . .

In short, WIPP would help Americans free themselves from external control without creating internal inequities.

New Mexicans thus made WIPP meaningful by fitting it into existing networks of institutionalized and ideological relations. Any reactions by New Mexicans to the project, as well as to each other, were understood in terms of these relations. To WIPP opponents, for example, proponents were people who put economic "self-interests" before the lives of present and future New Mexicans, or they were naive about nuclear waste disposal. To WIPP proponents, opponents were anti-nuclear, anti-technology, anti-progress, and hence dangerously anti-American, or they were naive about nuclear waste disposal. The conflict between the two groups was a battle for control over assigning the cultural identity of WIPP as a significant social object, and thereby of New Mexico.

### *Scientific Authority*

The one definitive way to resolve this conflict was through pronouncements from a supreme cultural authority, a term that in American culture refers not to the ancestors nor to priests but to the activity of science. In the symbolic organization of contemporary American culture, "science" is understood as a distinct domain of activity, which means that it acquires significance through contrasts with other domains, such as kinship, religion, politics, and economics. This array of domains gives meaning to action by providing a structured scheme of symbolic categories that structures events of both speech and nonverbal action. The categories can be analyzed systematically, for they appear as presuppositions.

Evidence abounds for the distinctions among domains. For example, the spouse of a professor gets angry when a microcomputer appears in the study because its presence confuses "home" and "work." A cut-throat stockbroker serves prominently in church activities without any apparent contradiction because his weekday practices are "just business." A fundamentalist preacher resigns from the ministry just before announcing his candidacy for President in order to avoid mixing "church" and "state." A judge rules against equal time for creation science in the public schools by first classifying it as religion. Finally, at WIPP both proponent and opponent groups pointed to the state government as a crucial locus of decision making, for everyone took for granted that decisions about WIPP would be political judgments.

In this cultural organization of domains, science is structured as the activity that produces authoritative knowledge about "nature." That is, the cultural meaning of scientific activity is premised upon a symbolic classification of "the world" in which the realm of "nature" is opposed to the realm of the

"spiritual." Both of these realms are ordered, in fact perfectly so. Spiritual phenomena are ordered by the conscious action of "God" but the order in nature is "physical." Whereas religion deals with spiritual order, science deals with physical order. We can see the distinction between the natural and the spiritual in the practice of science, for example, in the fact that scientists are not permitted to invoke God as an explanatory force in nature but are permitted to believe in God as a part of their "nonprofessional," "personal" lives. That nature is perfectly ordered can be seen in the fact that "discoveries" of order in nature are hailed as achievements, while discoveries of disorder amount to calls for further research.

This pre-structured cultural authority of science as the source of knowledge about nature made scientific discourse the focus of concern in the WIPP dispute, even for groups of nonscientists. For if it were established scientifically that nuclear waste disposal would *not* pose hazards to health and safety, then it would be difficult to construe WIPP as a source of domination. Alternatively, if it were established scientifically that nuclear waste disposal *would* pose a definite hazard to health and safety, then it would be difficult to construe WIPP as a source of freedom from domination.

Every group involved in the WIPP dispute invoked the authority of science. Remember, for example, that the CANT pacifists spent two full months in reading groups before they felt ready to "go public." Also, the Carlsbad Forum organized "information meetings" and "public lectures" rather than "anti-WIPP" meetings, leaving some local residents in attendance disturbed by its anti-WIPP orientation. CARD published a 150-page collection of *Documents concerning WIPP* (1981c) in order to display publicly "the reasons there is serious doubt that WIPP should be built." John Gofman's audience was not surprised by his change in style because they were anxious to learn about the facts of nuclear waste disposal. Finally, the need for scientific information moved one group, Southwest Research and Information Center [SRIC], to the forefront of the WIPP opposition. As a Carlsbad lawyer active with the opposition told me, "SRIC played an important role because they have the technical knowledge. We couldn't understand all the geology stuff, and without that we had no argument."

Similarly, pro-WIPP groups engaged in many activities to "educate the public" about the facts. For example, AREA regularly held workshops and seminars, such as the 1980 "Nuclear Energy Workshop" whose purpose was to "present factual reports about the nuclear industry and its human effects in order to provide a better working knowledge of this energy source." It had a very active "speaker's bureau" known as the "truth squad," and it spent $4,500 on a "counter-documentary" about uranium mining that disputed the "distorted" claims made in an ABC-TV documentary shown in 1978. NMJE distributed a "bimonthly, informative newsletter," distributed press releases, served as a "clearinghouse" for information on energy issues, and held essay contests for high school students, awarding $100 to the winners in each of seven categories, including nuclear waste disposal. Its director, Frank McGuire, was particularly adept at displaying an overriding commitment to the truth, suggesting even that his claims that nuclear waste disposal was not hazardous might be incongruent with his career interests:

> I'm not making myself very popular with this. I send the letters out because it's the truth. I'm gonna pay for this .... It's a very difficult point to make but it has to be made. . . .

Finally, CCED's most active committee was its Education Committee. Minutes from the June 7, 1979, meeting read: "It was agreed that a simple passing of information to the greatest mass or number of people should be our goal." Also, everyone expressed great enthusiasm for one member's idea to establish "Dial-for-a-nuclear message" on the telephone, as long as "[k]ey questions and answers [are] limited to facts and education—not political, controversial, or emotional."

As any native could have predicted, the many appeals to science did not resolve the conflict. Quite the reverse, the principal outcome was to embed scientists in the ideological dispute. For example, shortly after Citizens Against Nuclear Threats and Americans for Rational Energy Alternatives were formed in late 1976 and early 1977, the two groups held a debate. Interestingly, CANT's representative was Peter Montague, director of Southwest Research and Information Center, even though he considered the group to be "semi-hysterical" and was getting involved earlier than he had intended because he "was afraid that CANT wouldn't do it right." To insure a focus on scientific and engineering issues, Montague gave his own voice to the group for this precedent-setting occasion. AREA was represented by one of its members, a scientist from Sandia Laboratories. Two who attended later reported in interviews that the debate proved unsatisfying, for "It didn't really accomplish anything." Said one, "It deteriorated into a battle between our facts and their facts, and no one could understand them."

This last sentence accurately summarizes much

of the dialogue of the WIPP dispute. Facts were the weapons of choice in this American conflict, but they served in battles between conflicting cultural identities.

*Scientists' Credibility*

As any historian, philosopher, or sociologist of science could readily attest, the cultural account I have presented so far of scientists as representing a distinct cultural domain of activity does not begin to approach a sufficient description of the varying identities of individual scientists. Even if scientific activities presuppose a cultural organization of reality as physically ordered nature, individual scientists do not simply go to the lab, the field, or the office to pursue order. In the first place, they pursue order by participating in and extending historically-specific theoretical and methodological traditions. They also participate in disciplines, subdisciplines, specialties, theory groups, etc., as well as serve as university faculty, present papers, hold offices in professional societies, review peers, advise government, etc. Furthermore, in their nonprofessional lives, scientists might own homes, raise children, vote for elected officials, and watch football.

Despite its inadequacy to account for these variations, a cultural account of science as a structured domain of activity does provide an important reference point from which to examine variations in scientists' identities, for the variations derive from the fact that cultural domains are not isomorphic with types of actors. That is, each actor serves as a potential vehicle for every domain simultaneously, which means that every individual in American culture has a complex cultural identity with relations established along a variety of dimensions. Scientists, for example, are not purely vehicles of science but also serve as vehicles for kinship, religion, politics, economics, etc., all at the same time and through time. Furthermore, the specific forms that institutionalized identity relations take evolve over time through innumerable communicative exchanges. Thus in different historical eras scientists might be natural philosophers and natural historians, or they might be physicists, chemists, and geologists. In the WIPP case it was common for scientists to possess both disciplinary and organizational identities, and over the course of the debate there was little shift in the institutionalized forms of these relations.

An important implication of this complexity in scientists' cultural identities is that the meaning of a scientist's action, particularly a "public" action, may be ambiguous with respect to domain of activity. For example, a geologist who also subscribes to the pro-energy ideology described above might claim that the presence of stratigraphic evidence indicates that water will not intrude into the WIPP repository. This claim could be congruent with the theoretical principles and methodological standards in the discipline as well as with the relations advanced by the ideology, for it could also indicate that DOE is not putting the safety of New Mexicans in jeopardy through nuclear waste disposal. The geologist's discourse could thus be said to convey both "scientific" and "political" content. In a public controversy like the WIPP dispute, in which a technology is introduced into a pre-existing ideological conflict, it is often impossible to determine unambiguously whether a scientist's discourse is communicating a scientific identity, a political identity, or both (which is most frequently the case).

This ever-present ambiguity in scientists' discourse confronts scientists with the cultural identity crisis known as the problem of "credibility." Like other components of a scientist's identity, the presence or absence of credibility involves a relation. It is a relation between a speaker and an audience in which the audience accords the speaker elevated status as the bearer of valued "scientific" knowledge. As a relation between particular actors, the achievement of credibility is a context-specific phenomenon that varies with the cultural identity of the speaker, the cultural identity of the audience, and the content of the communication between them.

In a public dispute over science or technology this generally means that achieving credibility involves a double requirement for scientists. It depends not only on the extent to which audiences accept scientists' discourse as having "scientific" content but also on the extent to which audiences accept it as *lacking* "political" or other nonscientific content. An effect of this double requirement is that much of the dialogue in a public dispute over science and technology takes the form of a negotiation of credibility. On the one side, building the credibility of scientists usually requires attributing scientific content to their communication while eliminating political content. To eliminate political content, one must show that no connections exist between the political identities of scientists and the specific claims that they make. Usually, the best way to achieve this is to find incongruencies between the claims and the political identity. On the other side, undermining the credibility of scientists requires attributing political content to that communication and/or showing it to lack scientific content.

Efforts to build and undermine the credibility of

participants in the WIPP dispute dominated my interviews with proponents and opponents. Twenty-two of the twenty-nine interviews I conducted were with active participants in the dispute. Without exception, each informant recited a virtual litany of events that framed opponents as fundamentally political actors and allies as free from politics.

*Negotiating Credibility at WIPP*

The success of WIPP depended upon the credibility of scientific investigations undertaken by the Department of Energy. Credibility was needed to demonstrate that DOE was working in partnership with New Mexico to solve the problems of the nation. A loss of credibility would assign DOE the identity of an outside authority intent on making New Mexico the nation's dump. DOE was part of a descent line of government agencies whose institutionalized interests had become ambiguous. Beyond its responsibility for cautiously developing a safe method for nuclear waste disposal, DOE's primary job was to develop nuclear power technologies as quickly as possible. This latter task involved a relation to the "public" that was congruent with getting nuclear wastes into the ground at the earliest possible date. Any attempt by DOE to hurry the process of siting WIPP could thus be interpreted as allying the agency with the interests of the nuclear industry. A parent agency, the Atomic Energy Commission, had seemingly established just such an alliance by twice seeking to site storage and disposal facilities despite obvious technical inadequacies.

In formulating the WIPP project, DOE actions exhibited three strategies to eliminate political content from the scientific investigations. The first was to link the project to Sandia Laboratories. The "Sandia Ph.D.'s" had long enjoyed great prestige in mostly rural New Mexico. DOE extended this favorable scientific relationship analogically to the WIPP project by giving Sandia responsibility for conducting the geological investigation of the site. Sandia replaced Oak Ridge National Laboratory, which was an outsider located in Tennessee. Even more tellingly, the relationship was also extended by putting the Lab in charge of "public information" mechanisms, an unusual task for a national laboratory. Reproducing their established identities, the Sandia scientists initiated study with great optimism, wanting above all to "avoid any surprises" and to find a "super-safe place."

A second strategy was to link WIPP to the scientific community as a whole by annexing the prestige of the National Academy of Sciences [NAS]. Committees from NAS, the most distinguished body of American scientists, had long recommended that nuclear wastes be buried in geological salt formations that would be mined specifically for that purpose.[2] The justification was that where there is salt presumably there is no water and that since salt is plastic and flows, it does not fracture easily. DOE regularly framed this recommendation as representative of the scientific community as a whole, and thereby of science itself. For example, a frequently published overview of the project closely linked holistic images of scientific community to WIPP:

> It *has been known by geologists* for many years that there are certain kinds of geologic formations in the earth's crust that remain stable, unchanged and unmoving for literally millions of years. In geologic time, a million years is a fraction of a stable formation's lifetime. Large underground salt deposits are examples of this type of geologic formation. *Scientists reason* that if radioactive wastes were placed within these formations, they would be, for all intents and purposes, gone forever . . . . For many years, *geologic scientists* have been studying various kinds of formations in the earth's crust to test their assumptions . . . . Recently, *the U. S. Geologic Survey and other organizations* have been identifying the location of these formations and have been drilling exploratory holes to examine them in greater detail. This process is continuing.
>
> As one means of putting these theories and studies into practice, the U. S. Department of Energy has proposed to construct a Waste Isolation Pilot Plant, or 'WIPP' [Sandia Laboratories 1979; emphasis added.]

DOE also made WIPP congruent with NAS's prestigious identity by asking NAS to review and approve its scientific criteria for selecting a site (National Research Council 1983).

The third strategy was more subtle. It sought to eliminate political content from WIPP developments by canceling a political difference between DOE and New Mexico. The strategy involved establishing WIPP as a facility solely for the disposal of nuclear wastes produced by the military. The disposal of military wastes would forge a shared institutionalized identity between the local community and the nation as a whole, for all would receive benefits in the form of national security. Many informants on both sides reported that hosting a military repository is a "patriotic duty." Commercial waste disposal would differ because the local community would bear the hazards while only consumers in states with nuclear plants would receive the benefits, in the form of electricity. Burying commercial wastes would establish an institutionalized separation between New Mexico and outsiders. This separation would be congruent with the existing anti-domination ideology, which pictured outsiders making New Mexico their waste dump. A military repository, on the other hand, would be congruent with the relationships established by the pro-energy ideology. Thus the scope of the project became a

strategy for framing DOE as another insider rather than an outsider, which dissolved any political differences between DOE and New Mexico. Significantly, as long as WIPP was a military repository, New Mexicans had little interest in the project. Opposition developed only when it became clear that the scope of the project would be changed to include commercial wastes.

Peter Montague of Southwest Research and Information Center took it upon himself to undercut the credibility of DOE's scientific investigations by displaying their essential political content. The first problem he faced, however, was to establish his own credibility among New Mexicans as the bearer of valued knowledge. Montague's institutionalized career identity was no help in this respect. Although he held a Ph.D., it was not in the natural or physical sciences but in American studies. Every pro-WIPP informant cited this fact to frame Montague himself as politically rather than scientifically motivated. And when Montague appeared in a debate on public television's MacNeil Lehrer Report, a pro-WIPP scientist maintained that this background completely invalidated Montague's case against WIPP.

SRIC's established identity also provided a potential barrier to widespread credibility. The organization had a not-so-hidden political agenda: it sought to effect social change by undercutting Establishment authority. "We were interested in the environment as a way into social issues," said Montague, ". . . for by looking at environmental issues we could better analyze power relationships." This political orientation affected SRIC's attempts to achieve credibility, for it both helped the group to build credibility with other groups so aligned and hindered its attempts to establish credibility with anyone who did not accept the anti-domination ideology. In other words, a similarity in political identities between the group and some audiences threw into relief the scientific content of the discourse, while a contrast in political identities with other audiences threw both the scientific and political content into relief, making them appear interrelated.[3] As a result, SRIC's unique function in relation to other anti-WIPP groups was scientific. Said Montague without hesitation, "We provide technical information to citizens' groups. They use their political clout and our information to get what they want." But to other audiences SRIC's function appeared to be heavily political. In this connection it is significant that, despite his many disciplined efforts at record-keeping, Montague never formalized the group's central political objective in written text. "No," he said, "I don't think that has ever been written up."

Montague compensated for his institutionalized incongruencies with a scientific identity by adopting rhetorically the identities of his opponents, who did carry institutionalized legitimacy. Using a strategy popular among "alternative science" groups,[4] Montague did not produce his own scientific evidence but relied almost exclusively upon DOE documents to make his claims about WIPP. This strategy provided him with credibility because it enabled him to separate his claims from his political orientation. Since he used data produced by DOE scientists, his claims had to be evaluated on a par with DOE claims. And if the data themselves had been found faulty, it would not have reflected negatively on Montague, but would have, in fact, substantiated his case that DOE's investigations were political in the first place. In this fashion Montague went about undercutting DOE's credibility even while using DOE's credibility to legitimize his own.

The primary strategy for undercutting DOE's credibility was to show inconsistencies among separate DOE actions. Logical inconsistencies are an index of nonscientific communication because, since science involves the pursuit of physical order in nature, good scientific communication is held to be internally consistent. My two interviews with Montague included a two-hour summary of inconsistencies at DOE. Never did he identify areas of consistency. Montague was the individual, for example, who collected the documents that CARD had published in a 150-page collection. CARD replicated his strategy in writing in the preface:

> We have found that the DOE reports regularly defend the project with some rationale which is then rejected in some other report. So the reader should try to combine the information presented in one article with that in other articles . . . .

Montague put it somewhat more succinctly: "We publicized things whenever we found something."

A first collection of inconsistencies concerned site selection. Among the criteria for site selection that DOE sent to the National Academy of Sciences NAS, for example, was a provision that the site fall no closer than one mile from any borehole that had been drilled for geological sampling. The purpose was to avoid pathways through which water might reach the repository. According to Montague, the criterion was political *rather than* scientific because previous texts had reported a two-mile limit:

> [T]hey couldn't find anywhere two miles away, so they changed it to one mile. . . . If you change it at will, then what's the value of criteria. . . . They left out the biggest criterion, which was political acceptability.

A second set of inconsistencies concerned the

transportation of wastes. Scientists from Sandia Labs had produced videotapes of crash tests in which rail cars carrying nuclear waste canisters crashed head-on into a concrete wall at eighty miles per hour. Widely broadcast on New Mexico television, these tests destroyed everything but the waste canisters. Montague found other texts in Sandia's monthly reports, however, which indicated that 90% of the wastes going to WIPP would come not in these canisters but in double-walled steel boxes. Furthermore, DOE had approved the use of these boxes even after receiving the negative results of drop tests. When one of the boxes was dropped forty inches onto a steel spike, providing an impact less violent than that likely in a train or truck accident, the spike had penetrated both walls. From Montague's standpoint the political content was obvious: "It's one thing to be incompetent [that is, no political content *or* scientific content], and quite another to be aggressively out to lie, cheat, and steal in order to get this stuff in the ground."

By far the most significant area of inconsistency was the planned scope of the facility. In early 1977 Montague had been reticent to enter the WIPP dispute because he had no textual evidence that DOE would expand WIPP's scope to include commercial waste. He found what he needed in a report by the project's director later that year: "The potential site area is sufficient to accommodate all [military] and commercial wastes, should that ever be required, that will be generated well into the 21st century." Not only did the statement shift DOE's status back to that of an outsider, the apparent inconsistency suggested that DOE's attempt to forge a connection with New Mexico was sheer political manipulation. This quotation figured prominently in virtually all anti-WIPP discourse.

A final body of discourse important to the anti-WIPP groups was Roger Anderson's 1978 report on the dissolution of the salt bed from underlying ground water. As a University of New Mexico geologist who had devoted his career to investigating the formations in which WIPP would be sited, Anderson possessed the institutionalized credibility that Montague lacked. Anderson did not participate in the public dispute, yet his report argued that over half of the salt bed had already dissolved and that dissolution could be continuing at a rapid rate. The congruency between these findings and the anti-WIPP identity, combined with the report's institutionalized legitimacy, made it a powerful tool for framing DOE's identity.

We can now see why the scientists from the U. S. Geological Survey had heckled Anderson during his public lecture. They disagreed with his assessment and had evidence to support their own views, but they could not show Anderson's conclusions to be directly inconsistent with established geological principles and standards. Furthermore, his institutionalized credibility and nonparticipation in the dispute provided his public discourse with no obvious political content. The other scientists therefore sought to undercut Anderson's public credibility by responding *as if* his arguments contained no scientific content. In other words, by behaving as if he did not deserve the respect of the established community of geologists, they found a creative way to assign him the status of an incompetent in the public domain.[5]

Since the Department of Energy was to represent the public as a whole, DOE officials and Sandia scientists could not legitimately attack Montague's credibility, for such attacks would frame DOE/Sandia as allied politically with a subset of New Mexican citizens. One informant complained bitterly that DOE had "gagged" its scientists. The pro-WIPP citizens' groups thus stepped in specifically to promote WIPP by undercutting the credibility of anti-WIPP groups.

Pro-WIPP informants regularly attacked anti-WIPP activists by classifying them as outsiders, after, of course, authenticating their own connections to the land of New Mexico through birth or long-term residence. Walter Gerrells, the mayor of Carlsbad and a supporter of Carlsbad's Concerned Citizens for Energy Development, had memorized short critiques of every significant WIPP opponent, which he rattled off in rapid fire:

> Southwest Research was a front for a bunch of outside environmental groups. We know that they were well funded. . . . They advertised very heavily on the radio, and then paid off through a check from an ad agency in Los Angeles. . . . Peter Montague was one of the experts for Southwest Research, but he really had his degree in architecture [sic]. . . . Charles Hyder a SRIC employee had a half-baked theory on waste disposal. He held a minor job with NASA but billed himself as an expert from NASA. . . . Tony Carasco [supporter of the Carlsbad Forum] is a young man who had been out in California. He's pretty smart, but he's a dyed-in-the-wool Communist in his thinking . . . .

Similarly, Frank McGuire of New Mexicans for Jobs and Energy framed WIPP opponents as outsiders with "extreme" politics:

> We were a little slow in getting the drift of the opposition. There are basic differences in attitudes here. We are for a balanced relationship between government and industry. Environment is no longer the issue. These people want a general shakedown; this is a political issue . . . .
>
> I'm not one who looks under rocks for people that have hidden motives because I've been accused of being an ultraliberal and radical, and I don't like that. I don't feel very

> comfortable with it. But I've seen enough, and heard enough, and been close enough to the people who show up at these hearings over and over again and I've seen the literature they've handed out with clenched fists and barbed wire, and it says 'Smash capitalism.'

Finally, David Williams of Americans for Rational Energy Alternatives wrote a 16-page line-by-line critique of CARD television and newspaper advertisements:

> The CARD campaign against WIPP does not represent a scientific controversy or even ordinary stupidity and ignorance. It represents deliberate malice. . . . WIPP is a project of great national significance, especially for the future of nuclear power, and that is precisely why the national anti-nuclear movement has taken such an interest in stopping it. (According to the N. M. Independent [a newspaper], 10/27/78, California money appears to be backing the CARD campaign) . . . (Williams 1978).

In sum, the public dispute over nuclear waste disposal at WIPP was a negotiation of the cultural identities of participating scientists. Since scientific credibility involves a relationship between a scientific speaker and an audience, the appropriate strategies for establishing or undermining credibility were context-dependent, varying with the cultural identities of speaker and audience along with the content of their communication. But in each case success or failure with any particular audience depended upon an ability to establish whether or not the communicative action of scientists and scientific organizations both included appropriate scientific content and lacked political or other nonscientific content.

The dispute over whether or not to build WIPP came to an end without a clear resolution of the scientific issues. DOE's surprising decision to expand the project's scope to include commercial wastes greatly escalated the political battle. DOE became an outsider to New Mexico rather than its partner and state officials began to devise ways of delaying the project. After three more years of conflict DOE returned WIPP to its original scope in 1982. The negotiation of nuclear wastes in New Mexico was resolved by reassigning the identity of the project so it no longer pitted the anti-domination ideology against the pro-energy ideology. WIPP once again became the patriotic responsibility of New Mexicans without direct implication for the cultural identity of New Mexico.

### *Conclusion*

This study of scientists and their audiences in the WIPP dispute shows the cultural identities of scientists to be phenomena of both structure and practice. The authority of science is a structured feature of American culture. As a distinct domain of activity, science provides authoritative knowledge about physical order in "nature." One set of contributions to a scientist's cultural identity consists of institutionalized relationships to nature which the scientist reproduces through actions that are consistent with pre-existing theoretical principles and methodological standards. Scientific principles and standards are historically specific, and they evolve over time through communicative interactions among scientists and between scientists and "nature." Other institutionalized and ideological components of a scientist's identity are also historically specific. Yet in any given event of communication, the scientist's identity with respect to pre-existing science, to pre-existing societal forms, and to pre-existing ideologies all serve as interpretive frames that together constrain the meanings given to new discourse and nonverbal action. That is, pre-existing identities structure new relationships.

But the cultural identities of scientists are also continually re-negotiated. The relationship of credibility between a scientific speaker and an audience is a consummately context-specific phenomenon. In any given event of communication, discourse and nonverbal action serve as tools or resources for speakers and audiences to assign and reassign credibility and other cultural identities both to themselves and to others. Hence, communicative actions by and about scientists in American culture potentially both reproduce and reconstruct the cultural identities of the scientists, and through them, of structured symbolic categories. What varies is precisely the nature and extent to which particular interactions do reproduce and/or reconstruct identities, and the nature and extent to which they reproduce and/or reconstruct cultural structures.

That cultural identities linked the cultural domain of science to context-specific negotiating strategies in the WIPP dispute suggests that it may prove fruitful to view cultural identity more generally as a mediating concept between cultural structures and actors' practices. The decade of the 1980s has witnessed a dramatic shift of interest in cultural accounts of action. Earlier questions about how actors realize, enact, or execute pre-established symbolic structures have been replaced by inquiries into how actors manipulate symbolic structures as resources in pursuit of context-specific ends. I share the concern that Ortner (1984: 150) has expressed, however, in asking "whether the critique of enactment or execution may not have gone too far."

Elsewhere I argue that accounts of actors' practices supplement, but do not replace, accounts of

cultural structures, for practice-oriented analysis typically inverts the strengths and limitations of structure-oriented analysis (Downey 1988b). Whereas structure-oriented analysis was good at accounting for structural continuities but poor at accounting for structural change, practice-oriented analysis has been good at accounting for change but poor at accounting for continuity. What is needed now are approaches that mediate structure and practice in ways that enable analysts to account with equal facility for how both continuities and changes in cultural structures occur by means of actors' practices.

The concept of cultural identity meets some of the requirements of this objective. On the one side, using it recognizes that actors always possess the freedom to manipulate features of the context of action, without demanding access to actors' psychological motivations or intentions. The concept also enables one better to understand historical processes of constructing social objects by showing that acts of construction always involve establishing meaningful relations to those objects. On the other side, the analysis of cultural identities provides insight into why most action is highly ordered, despite the freedom that actors possess in principle, by providing a mechanism through which pre-existing relations frame new ones. It also advances a view of the relation between interests and ideologies that does not privilege either one analytically and allows for historical transformations of each into the other Finally, the analysis of cultural identities depends upon accounts of background cultural distinctions, the identification of which remains a crucial first step in all cultural analysis.

The case of WIPP was a negotiation of the cultural identity of nuclear wastes and, through them, of the cultural identity of New Mexico and its people. There was much manipulation of identities, and in the process political power was won and lost, careers built and terminated, battle lines drawn and dissolved, scientists praised and criticized, and a waste disposal facility fitted into the land of New Mexico. Yet the dialogue as a whole also functioned to reproduce a range of established identities and structured categories of meaning. No one challenged the argument that individuals should have control over their lives. No one challenged the view that present generations bear responsibility for future generations. And despite the fact that individual scientists and science groups were verbally brutalized on a regular basis, the debate actually amounted to a ritual celebration of science as the supreme cultural source of authoritative knowledge about nature.

## NOTES

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1 For further discussion of the concept of cultural identity, see Downey (1986a, 1986b, 1988a).

2 To handle the problem of credibility, NAS avoids communicating a political identity by limiting itself to assessing "the current state of knowledge" in any field and by adopting a balancing strategy when choosing members. That is, when it conducts a study, it actively insures that both sides of any given issue are adequately represented. During 1980-81 I served as a Mellon postdoctoral fellow attached to the Committee on Radioactive Waste Management and observed this problem firsthand. Susan Downey, my wife, was the staff officer responsible for crafting the committee's membership to maximize its credibility. A problem developed when a committee study began with a member from the electric utility industry but with no representatives of the environmental community. She located an additional member from Friends of the Earth. Despite these attempts to achieve neutrality, NAS committees frequently struggle with the problem of being identified as representatives of "Establishment science."

3 In the opening vignette John Gofman's thumbnail history of failures with nuclear waste disposal achieved the same rhetorical effect. He established credibility with his audience by showing that he shared their political orientation.

4 See Downey (1988a).

5 It is unlikely that this strategy would have worked as well in the "private" domain of a scientific meeting, where disagreements among scientists are expected. In that context neither the speaker nor the audience can invoke the geological community as a whole, for establishing a disciplinary consensus is precisely the object of interaction. In 1983 the National Academy of Sciences formally disagreed with an updated version of Roger Anderson's 1978 hypothesis (National Research Council 1983: 22). In late 1987 one informant close to the WIPP project reported that Anderson became, and still remains, a staunch critic of the repository. He speculated that Anderson adopted an anti-WIPP alignment in response to criticisms of his hypothesis and has since been seeking to vindicate himself.

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