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The Political Impact of Technical Expertise

Dorothy Nelkin

Technologies of speed and power – airports, power generating facilities, highways, dams – are often a focus of bitter opposition. As these technologies become increasingly controversial, scientists, whose expertise forms the basis of technical decisions, find themselves involved in public disputes. This ‘public’ role of science has generated concern both within the profession and beyond; for a scientist’s involvement in controversial issues may violate the norms of scientific research, but have considerable impact on the political process. As scientists are called upon to address a wider range of controversial policy questions,¹ ‘problems of political choice [may] become buried in debate among experts over highly technical alternatives’.²

This paper will discuss some of the implications of the increasing involvement of scientists in controversial areas. What is the role of experts in public disputes? How are they used by various parties to a controversy, and how do scientists behave once involved? Finally, what is their impact on the political dynamics of such disputes?

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¹ See discussion of the increased demands for expert decision-making in Garry Brewer, *Politicians, Bureaucrats and the Consultant* (New York: Basic Books, 1973). Also, Dean Schooler, Jr., (in *Science, Scientists and Public Policy* [London and New York: The Free Press, 1971]) suggests that in the past, scientific influence has concentrated in government entrepreneurial areas such as space exploration, or in policy areas defined in terms of national security. The participation and influence of scientists has traditionally been rather minimal in policy areas with redistributive implications, e.g. social policy, transportation, and other issues subject to social conflict and competing political interests. As the public seeks technical solutions to social problems, and as scientists themselves become engaged in controversial public issues, this pattern is changing.

² Harvey Brooks, ‘Scientific Concepts and Cultural Change’, *Daedalus*, 94 (Winter 1965), 68.

THE ROLE OF EXPERTS

Scientists play an ambivalent role in controversial policy areas. They are both indispensable and suspect. Their technical knowledge is widely regarded as a source of power.

The capacity of science to authorize and certify facts and pictures of reality [is] a potent source of political influence.³

Yet experts are resented and feared. While the reliance on experts is growing, we see a revival of Jacksonian hostility toward expertise, and of the belief that common sense is an adequate substitute for technical knowledge.⁴

The authority of expertise rests on assumptions about scientific rationality; interpretations and predictions made by scientists are judged to be rational because they are based on 'objective' data gathered through rational procedures, and evaluated by the scientific community through a rigorous control process. Science, therefore, is widely regarded as a means by which to de-politicize public issues. The increasing use of expertise is often associated with the 'end of ideology'; politics, it is claimed, will become less important as scientists are able to define constraints and provide rational policy choices.⁵

Policy makers find that it is efficient and comfortable to define decisions as technical rather than political. Technical decisions are made by defining objectives, considering available knowledge, and analyzing the most effective ways of reaching these objectives. Debate over technical alternatives need not weigh conflicting interests, but only the relative effectiveness of various approaches for resolving an immediate problem. Thus, scientific knowledge is used as a 'rational' basis for substantive planning, and as a means of defending the legitimacy of specific decisions. Indeed, the viability of bureaucracies depend so

³ Yaron Ezrahi, 'The Political Resources of American Science', *Science Studies*, 1 (1971), 121. See also Don K. Price, *Government and Science* (New York: New York University Press, 1954).

⁴ For a discussion of the historical tradition of resentment of experts in the United States see Richard Hofstadter, *Anti-intellectualism in American Life* (New York: Knopf, 1962).

⁵ See Robert Lane, 'The Decline of Politics and Ideology in a Knowledgeable Society', *American Sociological Review*, 31 (October 1966), 649-62, and Daniel Bell, *The End of Ideology* (Glencoe, Ill.: The Free Press, 1960).

much on the control and monopoly of knowledge in a specific area, that this may become a dominant objective.⁶ Recent technological disputes, however, suggest that access to knowledge and expertise has itself become a source of conflict, as various groups realize its growing implications for political choice.

The past decade has been remarkable for the development of 'advocacy politics';⁷ consumer advocates, planning advocates, health care advocates and environmental advocates have mobilized around diverse issues. Key slogans are 'accountability', 'participation', and 'demystification'. These groups share common concerns with the 'misuse of expertise', the 'political use' of scientists and professionals, and the implications of expert decision making for public action. Table 1 presents some statements of these concerns by various groups: radical scientists who have organized to develop 'science for the people'; consumer advocates concerned with corporate accountability; advocacy planners who assist communities in expressing their local needs; and environmentalists and health professionals who demand 'demystification of medicine'.

Their criticism reflects a dilemma. The complexity of public decisions seems to require highly specialized and esoteric knowledge, and those who control this knowledge have considerable power. Yet democratic ideology suggests that people must be able to influence policy decisions that affect their lives. This dilemma has provoked a number of proposals for better distribution of technical information; expertise, it is argued, is a political resource and must be available to communities as well as to corporations, utilities or developers.⁸ The

⁶ See discussion in Michel Crozier, *The Stalled Society* (New York: Viking Press, 1973), Chapter 3. A vivid example of the 'importance of this tendency to monopolize knowledge occurred during the 'energy crisis' with the realization that the large oil companies had nearly exclusive knowledge on the state of oil reserves.

⁷ I am using this term to describe a phenomenon that Orion White and Gideon Sjoberg call 'mobilization politics', in 'The Emerging New Politics in America', M. D. Hancock and Gideon Sjoberg (eds.), *Politics in the Post Welfare State* (New York: Columbia University Press, 1972), 23.

⁸ Note for example the system of 'scientific advocacy' proposed by John W. Gofman and Arthur R. Tamplin, *Poisoned Power* (Emmaus, Penn.: Rodale Press, 1971). A similar system is suggested by Donald Geesaman and Dean Abrahamson in 'Forensic Science - A Proposal', *Science and Public Affairs (Bulletin of the Atomic Scientists)*, 29 (March 1973), 17. Thomas Reiner has proposed a system of community technical services in 'The Planner as a Value Technician: Two Classes of Utopian Constructs and Their Impact on Planning', in H. Wentworth

protect imperialism. For the sake of the ruling class scientists and engineers have been turned into creators of destruction by the mechanisms of an economic and social system over which they can exert no control.

the technical solutions. . . knowledgeable [person] there is a layman activist. . . In fact, the technologist's training can stand in his way. There is a growing awareness that civilized man has blindly followed the technologists into a mess.

first to identify 'problems' of an urban area, but he puts them on the agenda and plays a large part in defining the terms in which the problem will be thought about — and those terms in effect play a large part in determining the solution.

technical knowledge does not contribute to a particular decision. . . Professionalism is not a guarantor of humane, quality services. Rather it is a code-word for a distinct political posture.

On Expertise and Public Action

An action strategy must embrace the most meticulous understanding of the corporate structure — its points of access, its points of maximum responsiveness, its specific motivational sources and its constituencies.

The importance of the environmental movement's potential rests not only in what tangible results it can accomplish, but in its acting as a catalyst to start people working together. Alliances possible by organizing around environmental concerns stagger the mind of the seasoned community organizer.

Medicine should be demystified. . . When possible, patients should be permitted to choose among alternative methods of treatment based upon their needs. Health care should be deprofessionalized. Health care skills should be transferred to worker and patient alike.

What we can hope is not that scientists can provide the people with an objective approach to build a better world, but built by the people, scientists will be able to work in a more objective fashion, unfettered by elitism and the worst competitive aspects of present-day science.

Sources: These statements are quotations from editorials and the popular literature circulated by such groups as SESPA, Nader's Raiders, Earth Day groups and the Health Policy Advisory Centre.

increasing importance of technical information has also prompted analyses of the behaviour of scientists as they are diverted to applied and controversial work.

For example, Allan Mazur suggests that the political (i.e. non-scientific) context of controversies crucially affects the activities of scientists, the way they present their findings, and thus their ultimate influence on decisions. Despite norms of political neutrality, claims Mazur, scientists behave just like anyone else when they engage in disputes; their views polarize and as a result the value of scientific advice becomes questionable. Thus, disputes among experts may become a major source of confusion for policy makers and for the public.⁹ Guy Benveniste, focusing on the use of scientists by policy makers, suggests that 'technical' decisions are basically made on political or economic grounds. Expertise is sought as a means of supporting particular policy programmes; the selection of data and their interpretation are thus related to policy goals.¹⁰ Similarly, King and Melanson argue that when knowledge is employed in the resolution of public problems, it is shaped, manipulated, and frequently distorted by the dynamics of the policy arena.¹¹

These analyses emphasize the politicization of expertise. Details of two recent disputes in which 'experts' were used by both project developers and critics provide an opportunity to develop these arguments, and then to explore the impact of experts on the political process. One of the disputes concerns the siting of an 830 megawatt nuclear power plant on Cayuga Lake in upstate New York; the other is the proposed construction of a new runway at Logan International Airport in East Boston, Massachusetts.

The power plant siting controversy began in June 1967, when the New York State Electric and Gas Company (NYSE&G) first

Eldridge (ed.), *Taming Megalopolis*, 1 (New York: Anchor Books, 1967). Based on systems similar to legal advocacy and expert witness in the courts, such proposals are intended to make technical advice more widely available to citizens' groups – usually through provision of public funds to underwrite the cost of expertise.

⁹ Allan Mazur, 'Disputes Between Experts', *Minerva*, 11 (April 1973), 243-62.

¹⁰ Guy Benveniste, *The Politics of Expertise* (Berkeley, Calif.: Glendessary Press, 1972). See also Leonard Rubin, 'Politics and Information in the Anti-Poverty Programs', *Policy Studies Journal*, 2 (Spring 1974), 190-5.

¹¹ Lauriston R. King and Philip Melanson, 'Knowledge and Politics', *Public Policy*, 20 (Winter 1972), 82-101.

announced its intention to build Bell Station.¹² Groups of scientists and citizens, concerned with the thermal pollution of Cayuga Lake, organized themselves to oppose the plant, and demanded that NYSE&G consider design alternatives that would minimize the damage to the lake caused by waste heat. They forced the utility to postpone its application for a construction permit, and to contract for additional research on the environmental impact of the plant. In March 1973, following consultants' recommendations, NYSE&G announced a power station plan that was essentially the same as its earlier controversial design. The company, however, was now armed with data from one and a half million dollars' worth of environmental research supporting its claim that the heat from Bell Station would not damage the lake. Yet once more there was concerted and well-informed public opposition, this time focused on radiation hazards. Four months later the company was forced to abandon its plan.

The proposed new 9200-foot runway at Logan Airport was part of a major expansion plan that had been a source of bitter conflict in East Boston for many years.¹³ Located only two miles from the centre of downtown Boston in an Italian working-class community, this modern convenient airport is a source of extreme irritation, fear, and community disruption. The expansion policies of the Massachusetts Port Authority (Massport) have been opposed, not only by airport neighbours but also by Boston's city government and by state officials concerned with the development of a balanced transportation system. Here, as in the Cayuga Lake power plant siting debate, knowledge was used as a resource both by Massport, seeking justification for its expansion plans, and by those opposed to such plans. Massport's staff was backed by consultants who claimed that without expansion the airport would reach saturation by 1974, and that the new runway would cause no environmental damage. The opponents, primarily from the adjacent working-class neighbourhood of East Boston, used technical advice provided by the city of Boston. Following pressure from the governor as well as from the mayor, Massport eventually

¹² For a history and analysis of this controversy see Dorothy Nelkin, *Nuclear Power and its Critics* (Ithaca, N.Y.: Cornell University Press, 1971); 'Scientists in an Environmental Controversy', *Science Studies*, 1 (1971), 245-61; and 'The Role of Experts in a Nuclear Siting Controversy', *Science and Public Affairs*, 30 (November 1974), 29-36.

¹³ Documentation of this conflict can be found in Dorothy Nelkin, *Jetport: The Boston Airport Controversy* (New Brunswick, N.J.: Transaction Books, 1974).

deleted the proposed runway from the master plan for future airport development.

While this paper will focus on similarities in the dynamics of these two disputes, it is necessary first to point out important differences. The community opposed to the power plant was a college town; the dispute was a middle-class environmental conflict, sustained by expertise from scientists in a nearby university who also lived in the area. In contrast, the opposition to the airport came primarily from a working-class neighbourhood dependent on expertise provided by government officials who, for political and economic reasons, chose to oppose the airport development plans.

The technical aspects of the two disputes were also quite different. The power plant issue was embedded in a set of vague uncertainties and intangible fears about radiation; airport expansion posed the concrete and direct threat of increased noise and land purchase. The main area of technical conflict in the former case was the potential environmental impact of the new power plant and the experts involved were mostly scientists and engineers. In the latter case the controversial issue was the validity of projections – whether the runway was really necessary at all – and the dispute involved economists and lawyers as well as engineers.

Despite such differences, the two cases have a great deal in common: the use of expertise, the style of technical debate, and the impact of experts on the political dynamics of the dispute are remarkably similar.

THE USE OF EXPERTISE

Opposition to both the power plant and the airport developed in several stages. The developers (utility manager, airport manager) contracted for detailed plans on the construction of their proposed facility. As they applied for the necessary permits, affected groups tried to influence the decision. The developer in each case argued that plans, based on their consultants' predictions of future demands and technical imperatives concerning the location and design of the facility, were definitive, except perhaps for minor adjustments necessary to meet federal standards.

In the power plant controversy, scientists from Cornell University who lived in the community were the first to raise questions about the NYSE&G plan when it was announced in 1967. By mid-1968, their activity had built up sufficient political support to persuade NYSE&G to postpone its plans, and to undertake further environmental research.

A new sequence of events began in March 1973, when NYSE&G again announced its intention to build the plant and claimed that it was imperative to begin construction promptly. The company's consultants, Nuclear Utilities Services Corporation, had prepared a five-volume technical report. NYSE&G placed copies in local libraries, circulated a summary to its customers, and invited comments. The report supported NYSE&G's earlier plan for a plant involving a General Electric boiling water reactor with a once-through cooling system. The study concluded that cooling towers (which had been recommended by power plant critics in 1968) were economically unfeasible in the size range required for the plant, unsuited to the topography of the area, and would have a tendency to create fog. To develop an optimum design for a once-through cooling system, consultants designed a jet diffuser to provide rapid mixing of the heated discharge with the lake water. With this system, they argued that the plant would have an insignificant effect on the aquatic environment of Cayuga Lake. The consultants only briefly concerned themselves with the issue of radioactive wastes on the grounds that this was not a problem unique to Cayuga Lake; the report only stated that the effect would be substantially below current radiation protection standards.

NYSE&G organized an information meeting attended by 1,000 citizens, and for two hours summarized the highly technical material supporting its plans. This, however, was followed by two and one-half hours of angry discussion, and the utility's president announced that if public protest was likely to cause delay, they would build the plant at another site. He hoped, however, that the decision would be 'based on fact and not on emotion'.

The first organized response came from twenty-four scientists who volunteered to provide the public with a review and assessment of the utility's massive technical report.¹⁴ Their review was highly critical and NYSE&G's consultants responded in kind (see below). Meanwhile, citizens' groups formed and the community polarized, as the company posed the issue in terms of 'nuclear power *or* blackouts'.

The airport case also involved experts on both sides of the controversy. Opposing forces mobilized in February 1971, at a public hearing required by the Corps of Engineers in order to approve

¹⁴ Two hundred copies of the critique were sent to libraries, citizens' groups, faculties at universities and colleges in the area, officials in state and federal agencies, political representatives in local, state and federal government, and newspapers.

Massport's request to fill in part of Boston Harbour. One thousand people attended and for ten hours scientists, politicians, priests, schoolteachers and others debated the priorities which they felt should govern airport decisions. Massport's staff was backed by consultants, who claimed that without the runway the airport would reach saturation by 1974. Consultants provided a brief environmental statement arguing that the new runway would have no direct detrimental effects of ecological significance. The only environmental costs would be the elimination of ninety-three acres of polluted clam flats and two hundred and fifty acres of wildlife preserve – which constituted a hazard in any case because birds interfere with jets. Furthermore, because of the added flexibility, the runway would relieve noise and congestion caused by an expected increase in aircraft operations. Massport's claims were later buttressed by an environmental impact statement commissioned from Landrum and Brown, Airport Consultants, Inc. at a cost of \$166,000. The study documented Massport's contention that the new runway was essential for safety and would be environmentally advantageous; it emphasized the positive contributions of Logan Airport – its economic importance to the City of Boston, and the reduction of noise that would result from increased runway flexibility.

The opposition was organized by a coalition of citizens' groups called the Massachusetts Air Pollution and Noise Abatement Committee. The issues raised were diverse. Neighbourhood people spoke of the discomfort caused by aircraft operations, and of Massport's piecemeal and closed decision-making procedures. Environmentalists feared the destruction of Boston Harbour, and planners related airport decisions to general urban problems. Legal, economic, and technical experts became involved as the Mayor's office and the Governor evaluated Massport's claims. As in the power plant case, the conflict polarized as Massport posed the issue in terms of 'airport expansion *or* economic disaster'.

THE STYLE OF TECHNICAL DEBATE¹⁵

In both cases the technical debate involved considerable rhetorical

¹⁵ Unless otherwise noted, the quotations that follow are from local environmental reports, memos, letters and public hearings. They are statements by the opposing scientists involved in the controversy.

licence, with many insinuations concerning the competence and the biases of the involved scientists.¹⁶ NYSE&G emphasised that the need for a nuclear power plant on Cayuga Lake was 'imperative', that there would be a serious energy shortage if they did not proceed immediately with the plan, and that the impact of the plant on the local environment would be 'insignificant'. NYSE&G insisted on their unique technical competence to make this decision.

Our study is the most comprehensive study ever made on the lake. Opponents can create delays but are not required to assume responsibility.

However, the Cornell critics called NYSE&G's data 'inadequate', 'misleading', 'non-comprehensive', and 'limited in scope and inadequate in concept'. Some of the critics provided data from other research that contradicted NYSE&G's findings. They emphasized that there was simply not enough known about deep-water lakes to assess the risks.

NYSE&G consultants countered by claiming that Cornell critics were unfamiliar with the scope and requirements of an environmental feasibility report; in particular, that the critics' review failed to distinguish between the goals of pure and applied research.

From an academic position a complete ecological model that predicted all possible relationships would be desirable, but this was neither feasible nor necessary for assessing the minor perturbations caused by one plant.

In fact, each group used different criteria to collect and interpret technical data. The two studies were based on diverse premises which required different sampling intervals and techniques. NYSE&G consultants, for instance, claimed that their water quality studies focused on establishing base-line conditions to predict the changes caused by the power plant; Cornell studies focused on limiting factors, such as the impact of nutrients on lake growth.

Scientists attacked each other with little constraint. Cornell reviewers accused NYSE&G consultants of value judgments that led to 'glaring omissions', 'gross inadequacies', and 'misleading interpretations'. Consultants referred to the Cornell report's 'confusion resulting from reviewers reading only certain sections of the report', and 'imaginative, but hardly practicable suggestions'. The NYSE&G president accused the Cornell reviewers of bias:

¹⁶ Mazur, *op. cit.* note 9, also documents the use of rhetoric in technical debates.

It is of some interest that many of the individuals who participated in the Cornell review have taken a public position in opposition to nuclear plants. Philosophical commitment in opposition to nuclear generation may have made it difficult for these reviewers to keep their comments completely objective.¹⁷

A similar style of debate characterized the technical dispute over the airport runway. Expansion of Logan was recommended by consultants as 'the best opportunity to realize a reduction of current social impact'. Failure to expand the airport as proposed would cause delays, increase air pollution, reduce safety margins and have a 'drastic' and 'immeasurable' impact on the local economy – 'an impact which the Boston area could not afford'. Massport's environmental report described and rejected, one by one, alternatives proposed by airport opponents. Banning specific types of aircraft 'interferes with interstate commerce'. Limiting maximum permissible noise levels is 'legally questionable', since the airport functions as part of a coordinated national system. A surcharge for noisy aircraft would be 'useless' as economic leverage, since landing fees represent a negligible percentage of total airline expenses. Setting night curfews is 'precluded' by the interdependence of flight schedules and aircraft utilization requirements: it would relegate Boston to a 'second-class' airport and have 'disastrous effects' on service to sixty five percent of the 267 cities served by Boston. Moreover, seventy percent of the cargo business would be 'negatively affected'. Soundproofing neighbouring houses and building would be 'economically prohibitive' and have little effect. The *only* feasible solution to noise and environmental problems, according to the consultants' report, was an expanded runway system that would permit increased flexibility. Massport insisted on the validity of its expertise:

We are closer and more knowledgeable than any other group no matter what their intention may be, on what Logan Airport . . . what Metropolitan Boston, what the entire state of Massachusetts and New England needs.¹⁸

And Massport consultants suggested their agreement with their client when, in a technical analysis of the airport's economic impact, they

¹⁷ William A. Lyons, 'Recommendations of the Executive Offices of New York State Electric and Gas Corporation to the Board of Directors' (13 July 1973).

¹⁸ Edward King, Massport Executive Director, Testimony at U.S. Corps of Engineers' 'Hearings on the Application by the M.P.A. for a Permit to Fill the Areas of Boston Harbour' (Boston, 26 February 1971), mimeograph, 101.

stated:

It is inconceivable that an enterprise of this magnitude can be treated other than with the most profound respect.¹⁹

Airport opponents called the Massport technical reports 'the logical outcome of efforts directed toward narrow objectives'. City consultants contended that authority to restrict aircraft noise was in fact limited neither by the FAA nor by the Massport enabling act, and that the FAA actually encouraged airport operators to restrict airport noise independently. They argued that Massport's assumptions concerning anticipated demand for increased airport capacity were questionable and in any case were subject to modification by consolidating schedules and dispersing general aviation flights. Massport's own raw data suggested that with a reasonable adjustment Logan Airport could accommodate a considerable increase in actual business, for aircraft were operating at an average of just under half capacity. Moreover, projections were based on the growth pattern of the 1960s. The decrease in air travel demand in 1970 could have been regarded either as a new data point or as an anomaly. Massport chose the latter interpretation, ignoring the 1970 slump. Their projections also ignored the possibility of competitive alternatives to air travel.²⁰

Massport's figures concerning the economic impact of expansion and the consequences of a moratorium on expansion were debunked by critics as 'blatant puffery'. As for Massport's contention that the new runway would be environmentally advantageous, city representatives concluded that an expanded airfield would only expose new populations to intolerable noise. Instead, they recommended measures to increase capacity at Logan through scheduling adjustments and efforts to distribute the hours of peak demand by economic controls such as landing fees.

Differences were to be aired at a second round of public hearings scheduled for July 10, 1971. However, on July 8, following a task-force study that recommended alternatives to expansion, Governor Sargent publicly opposed the construction of the new runway. Under these circumstances, the Corps of Engineers was unlikely to approve the

¹⁹ Landrum and Brown, Inc., *Boston-Logan International Airport Environmental Impact Analysis* (11 February 1972), section ix, 3.

²⁰ A systematic critique of Massport's data was made by a commission chaired by Robert Behn (Chairman of Governor's Task Force on Inter-City Transportation), 'Report to Governor Sargent' (April 1971).

project, so Massport withdrew its application for a permit and temporarily put aside its plans for the runway. A year and a half later, in February 1973, Massport deleted the proposed runway from the master plan for future airport development. Citing projections that were close to those used by airport opponents two years earlier, the Port Authority claimed that re-evaluation of future needs indicated that the new runway was no longer necessary.

Both disputes necessarily dealt with a great number of genuine uncertainties that allowed divergent predictions from available data. The opposing experts emphasized these uncertainties; but in any case, the substance of the technical arguments had little to do with the subsequent political activity.

THE IMPACT OF EXPERTISE ON POLITICAL ACTION

In both the airport and power plant controversy, it was the *existence* of technical debate more than its *substance* that stimulated political activity.²¹ In each case the fact that there was disagreement among experts confirmed the fears of the community and directed attention to what they felt was an arbitrary decision-making procedure in which expertise was used to mask questions of political priorities.

This relationship between technical disputes and political conflict was most striking in the power plant case. Cornell scientists assessed the NYSE&G report with the intention of providing technical information to the public. They focused almost entirely on the issue of thermal pollution – the effect of the plant's heated effluent on Cayuga Lake. The citizens' groups, however, were most concerned with the issue of radiation. They had followed the considerable discussion in the press and in popular journals about the risks associated with the operation of nuclear reactors – risks that had not been as widely publicized at the time of the first controversy in 1968. Thus, the thermal pollution issue (which had dominated earlier controversy) became, in 1973, a relatively minor concern. Citizens, in contrast to the scientists who were advising them, focused on problems of transporting and disposing of nuclear wastes, on the reliability of reactor safety mechanisms, on reactor core defects that would allow the release of radioactive gases, and on the danger of human error or sabotage.

²¹ For further discussion of this point, see Nelkin, 'The Role of Experts in a Nuclear Siting Controversy', *op. cit.* note 12.

When the citizens' committee first met to establish a position on the issue, its newsletter concentrated entirely on the reactor safety issue.²² This set the tone of subsequent discussion, in which three possible courses of action were considered: that the committee oppose construction of any nuclear plant on Cayuga Lake until problems of reactor safety and disposal of radioactive wastes were resolved; that it take up its 1968 position and oppose only the *current design* of Bell Station; or that it support NYSE&G plans. The first proposal, one of total opposition, won overwhelming support. The emphasis of citizens' groups thereafter was on the risks associated with nuclear power, despite the fact that the technical debate dealt mainly with the problem of thermal pollution.

The disputes between scientists, however, served as a stimulus to political activity. In the first place, the criticism by Cornell scientists neutralized the expertise of the power company. Simply suggesting that there were opposing points of view on one dimension of the technical problem increased public mistrust of the company's experts, and encouraged citizens to oppose the plant. Second, the involvement of scientists gave moral support to community activists, suggesting that their work would be effective. The citizens' groups called attention to NYSE&G's statement that if there were concerted opposition, the company would not go ahead with its plans. The ready support of local scientists led to substantial expectation in the community that the effort involved in writing letters and going to meetings would not be wasted.

As for the details of the technical dispute, they had little direct bearing on the dynamics of the case. Citizens trusted those experts who supported their position. People who supported NYSE&G voiced their trust in the consultants employed by the power company:

Let us allow the professionals to make the decisions that they get paid to make.

And power plant critics used expertise only as a means to bring the issue back to its appropriate political context. The case was one of local priorities, they claimed; it was not a technical decision:

²² CCSC (Citizens Committee to Save Cayuga Lake), *Newsletter*, 6 (April 1973). This newsletter reprinted in full a selection of well-informed articles – notably those by Robert Gillette in *Science*, 176 (5 May 1973); 177 (28 July; 1, 8, 15 and 22 September 1972); and 179 (26 January 1973).

To say that our future is out of our hands and entrusted to scientists and technicians is an arrogant assumption. . . We suggest that the opinions of area residents who care deeply about their environment and its future are of equal if not greater importance.²³

In the airport case, the technical arguments served primarily to reinforce the existing mistrust of Massport among those opposed to airport expansion, and they were virtually ignored by those who supported Massport. Opinions about the necessity of the runway were well established prior to the actual dispute. In East Boston, Massport employees and local sports clubs which were supported by an airport community relations programme defended the Port Authority's plans for a new runway and maintained their trust in Massport's competence.

In terms of efficient and competent operation, Massport is head and shoulders above other agencies.

Airport opponents, while benefitting from the advice provided by experts from the City of Boston, claimed the issue was a matter of common sense and justice. They defined the problem in terms of values (such as neighbourhood solidarity) which are not amenable to expert analysis.

We need no experts. These people will verify themselves the effect of noise. . . Massport is extremely arrogant. They do not have the slightest conception of the human suffering they cause and could not care less.²⁴

Airport critics pointed out various technical errors and problems of interpretation in Massport's predictions and environmental impact statements; but this simply re-confirmed the community's suspicion of Massport, and further polarized the dispute. Later, these same experts who were sympathetic to East Boston's noise problem failed to convince the community to accept a Massport plan for a sound barrier. Despite advice that this would help to relieve their noise problem, the community chose to oppose construction of the barrier. Local activists

²³ Statement by Jane Rice cited in the *Ithaca Journal*, (14 May 1973), 1.

²⁴ These statements are from testimony at U.S. Corps of Engineers' Hearings, *op. cit.* note 18. The ultimate expression of this kind of sentiment was, of course, the remark alleged to have been made by former vice president Spiro Agnew, responding to the report by the U.S. Presidential Commission on Pornography and Obscenity: 'I don't care what the experts say, I *know* pornography corrupts!'

feared that this was a diversion, and that if they accepted this project the community would somehow lose out in the long run. Thus, they disregarded expert opinion that this was a favourable decision, and the old mistrust prevailed.

SUMMARY AND CONCLUSIONS

The two conflicts described above, over the siting of a power plant and the expansion of an airport, have several aspects in common. One can trace parallels, for instance, in the way the developers used expertise as a basis and justification of their planning decisions; how experts on both sides of the controversy entered the dispute and presented their technical arguments; and how citizens affected by the plan perceived the dispute. Similarities are evident in public statements, as developers, experts and citizens expressed their concerns about various aspects of the decision-making process. These are compared in Table 2. These similarities, especially with respect to the use of scientific knowledge, suggest several related propositions which may be generalizable to other controversies involving conflicting technical expertise:

First, *developers seek expertise to legitimize their plans and they use their command of technical knowledge to justify their autonomy.* They assume that special technical competence is a reason to preclude outside public (or 'democratic') control.

Second, *while expert advice can help to clarify technical constraints, it also is likely to increase conflict,* especially when expertise is available to those communities affected by a plan. Citizens' groups are increasingly seeking their own expertise to neutralize the impact of data provided by project developers.²⁵ Most issues that have become politically controversial (environmental problems, fluoridation, DDT) contain basic technical as well as political uncertainties, and evidence can easily be mustered to support or oppose a given proposal.

Third, *the extent to which technical advice is accepted depends less on its validity and the competence of the expert, than on the extent to*

²⁵ For further discussion of the tactics of using expertise within the fluoridation controversy, for example, see Robert Crain *et al.*, *The Politics of Community Conflict* (Indianapolis: Bobbs Merrill, 1969); and H. M. Sapolsky, 'Science, Voters and the Fluoridation Controversy', *Science*, 162 (25 October 1968), 427-33.

Table 2. Perspectives on Decision Making and Expertise

	<i>Power plant dispute</i>	<i>Runway dispute</i>
<i>Developers</i>		
On responsibility and competence for planning	Our study is the most comprehensive study ever made on the lake. Opponents can create delays but are not required to assume responsibility.	We are closer and more knowledgeable than any other group no matter what their intention may be, on what Logan Airport . . . what Metropolitan Boston. . . what New England needs.
On public debate	We have adopted a posture of no public debate.	We have competent staffs . . . I can't see any sense in having a public hearing. . . If it is to be by consensus that the authority operates . . .
<i>Experts (consultants)</i>		
On impact of project	Alternate approaches would have undesirable effects on the human environment . . . the proposed design should produce no significant impact. Actual individuals would be exposed to much lower doses than that due to normal habits.	Adverse environmental impact will result from failure to undertake this project as contrasted with the impact if the Authority proceeds. Noise measurements of typical urban noise conditions . . . show that street level background noise overshadows taxi-way noise.
On planning	Although an ecological model might be desirable from an academic viewpoint it is not felt to be necessary to provide an adequate assessment of the impact of the minor perturbation introduced by the proposed plant.	A master plan would be nothing more than an academic exercise . . . a study of this magnitude could never be justified for a small project of this nature.
<i>Experts (critics)</i>		
On developers' data	Statements and conclusions were not justified and must therefore be regarded as nothing more than guesses. . . The data base is not only inadequate, but misleading.	Analysis of the economic impact of Logan Airport shows demonstrated 'blatant puffery' in the figures appearing in the report.

Table 2 contd. Perspectives on Decision Making and Expertise

Citizens (project supporters)

On decision-making responsibility

Let us allow the professionals to make the decisions that they get paid to make.

In terms of efficient and competent operation, Massport is head and shoulders above other agencies.

Citizens (project opponents)

Citizens (project responsibility

To say that our future is out of our hands and entrusted to scientists and technicians is an arrogant assumption. . . We suggest that the opinions of area residents who care deeply about their environment and its future is of equal if not greater importance.

We need no experts. These people will verify themselves. . . Massport is extremely arrogant. They do not have the slightest conception of the human suffering they cause and could not care less.

On decision-making process

Were they using the power the people gave them to support their own feelings or those of private concerns? There is representative government in our country, but it sure isn't in our county.

What is really on trial here is not just the Port Authority, it is really the American system. Will it listen to spokesmen for the people and the people who speak for themselves?

Sources: These perspectives are direct quotations from public hearings, letters or transcripts of meetings.

which it reinforces existing positions. Our two cases suggest that factors such as trust in authority, the economic or employment context in which a controversy takes place, and the intensity of local concern will matter more than the quality of character of technical advice.²⁶

Fourth, those opposing a decision need not muster equal evidence. It is sufficient to raise questions that will undermine the expertise of a

²⁶ The relation between beliefs and the interpretation of scientific information is analyzed in S. B. Barnes, 'On the Reception of Scientific Beliefs', in Barry Barnes (ed.), *Sociology of Science* (Harmondsworth, Midx.: Penguin Books, 1972), 269-91.

developer whose power and legitimacy rests on his monopoly of knowledge or claims of special competence.

Fifth, *conflict among experts reduces their political impact*. The influence of experts is based on public trust in the infallibility of expertise. Ironically, the increasing participation of scientists in political life may reduce their effectiveness, for the conflict among scientists that invariably follows from their participation in controversial policies highlights their fallibility, demystifies their special expertise and calls attention to non-technical and political assumptions that influence technical advice.²⁷

Finally, *the role of experts appears to be similar regardless of whether they are 'hard' or 'soft' scientists*. The two conflicts described here involved scientists, engineers, economists and lawyers as experts. The similarities suggest that the technical complexity of the controversial issues does not greatly influence the political nature of a dispute.

In sum, the way in which clients (either developers or citizens' groups) direct and use the work of experts embodies their subjective construction of reality — their judgments, for example, about public priorities or about the level of acceptable risk or discomfort. When there is conflict in such judgments, it is bound to be reflected in a biased use of technical knowledge, in which the value of scientific work depends less on its merits than on its utility.

²⁷ See discussion of how controversy among scientists influences legislators in Barnes, *ibid.*