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DOROTHY NELKIN and ARIE RIP

Distributing expertise: A Dutch experiment in public interest science

Science is an important political resource, often used to legitimate policy choices or to challenge their technical justifications.¹ Industries, environmental lobbies, public interest groups and government bureaucracies all use scientific expertise to support their interests. Science also changes the way we view our environment and has important political repercussions. Environmental studies, for example, have changed political perceptions, raising questions about traditional social and economic relationships as well as legitimate decision-making authority.²

The complex and often contradictory role of science is reflected in ambivalent political analysis. Bernal advocated scientific development as a means to reach an "age of abundance and leisure," but then had second thoughts as he saw the scientific method manipulated to retard social change.³

Science, then, may be used politically in quite diverse ways; but its importance in legitimizing complex policy decisions raises questions about its distribution.

Policy decisions of great social impact depend on technical knowledge, and command of such knowledge contributes to political power. At the same time, the use of expertise obscures responsibility for major social decisions, and weakens the democratic system of checks and balances. For those without scientific expertise, policies framed in technical language may be difficult to comprehend and control. Thus, to effect a reasonable distribution of scientific resources is a major challenge for democratic societies.

Science, in contrast to engineer-

ing, is assumed to be independent of its sponsorship—a freely available resource. Thus, in principle, improving the distribution of expertise is compatible with the norms of science. In practice, however, the distribution of this important resource implies political conflict—abhorrent to many scientists who see politics as destructive to scientific endeavor.

Ambivalence about politics has been, in fact, endemic in the history of modern science. Before the war Bernal observed the dilemma of scientists who extended their skills to the political arena:

"Any attempt on the part of the scientist to think for himself outside his own field exposes him to severe 'sanctions'. . . . It is therefore argued that in the interests of science it would be far better for him not to do so. Nevertheless, things can arrive at such a state that neutrality can compromise the very existence of science itself as a living force."⁴

And scientists still view politics in the most pejorative terms: "Science is great because it aggrandizes man. Politics is tawdry because it belittles."⁵

Such attitudes discourage political involvement. Thus experiments to distribute expertise usually engage ideologically motivated scientists who are often viewed with considerable skepticism by the wider scientific community.

Experiments designed to distribute expertise include educational projects, special television programs, data banks, study groups, exhibitions and demonstrations.⁶ An active "public interest science" or "critical science" movement has developed in the United States and

in Western Europe,⁷ and a "Science for Citizens" program has been created by the National Science Foundation to enable public interest groups to acquire the expertise necessary to deal with public policy decisions. These experiments differ according to the political and cultural traditions of various countries. But they are all complicated by a set of questions reflecting the inherent political dimensions of activities designed to distribute an important resource.

- What are appropriate and workable goals for a program organized to distribute technical information and advice?

- Who should define the problems to be addressed by such a program and what groups should be included?

- How can client groups be made more aware of available technical resources?

- How can scientists be encouraged to communicate their expertise in controversial policy areas?

- How does one keep public interest science groups independent of established ideologies or particular vested interests?

- What can be expected from the influence of public science groups on scientists, citizens and public policy?

The first two questions, defining the activities of public interest science programs, will depend on the goals of the organization or the individuals concerned: radical "Science for the People" groups will draw different boundaries than will a National Science Foundation program. The third and fourth questions define the relationship between the supply and demand of technical information. Once a public science initiative is underway, the last questions be-

come relevant. If public interest scientists are "captured" by an existing institution or environmental lobby, they may lose their legitimacy; their advice and research results may be dismissed as biased. But even if a group remains independent, continuing practice can lead to professionalization and the accumulation of expertise, which might defeat the original purpose of distributing scientific resources.

Some light may be shed on these dilemmas through examining specific experiments. One example is an innovative program called the *Wetenschapswinkels* or "science shops" presently underway in the Netherlands.

The Netherlands has had a long history of conflict and cleavage reflecting religious and regional differences. During the nineteenth and early twentieth centuries, socio-cultural-political blocs, connected with specific religious or political ideologies, were formed to appease and accommodate these conflicts. These so-called "pillars" have functioned in relative isolation, each with its own political party, newspapers, radio programs, schools, sports clubs and health care organizations.⁸ In such a consociational society even technical issues can cause conflict, and matters with little political profile can take on a larger importance: regulations of the broadcasting associations, for instance, contributed to the fall of at least one government.

This political climate has encouraged experiments to achieve consensus through greater public participation.⁹ When the university system became a major source of conflict in the late 1960s, the response was to "democratize" it through expanded representation in university councils.¹⁰ Under the liberal Labor government (1973-77), when social priorities shaping decisions about science and technology became a focus of political discussion, the Minister for Science Policy, Mr.

F.H.P. Trip, developed a new advisory structure to increase public influence over the direction of government-supported science. Sector councils consisting of representatives from science, government and the users of research, including environmental and other citizen groups, were proposed and slowly implemented.¹¹

As a part of these reforms, Trip also proposed increasing public access to science by providing assistance to groups that wanted to distribute scientific information in particular policy contexts. Trip's advisory committee reported that such assistance was essential to informed democratic decision-making.¹² But the matter was left at the proposal stage due to the change to a conservative government in 1977. Later, however, the new Minister for Science Policy decided not to act on the advice of Trip's advisory committee "because it would not be workable in practice," nor, he claimed, would there be sufficient money to implement it.¹³

Trip's proposal was partly a response to the demands of science students in the early 1970s who became involved in disputes over the environmental effects of urban planning, industrial location decisions, and the siting of nuclear power plants. Scientists had organized small working groups throughout the Netherlands to provide technical advice to citizen organizations, labor unions and individuals troubled by technological change. In addition, in 1976, the Scientific Workers League—the Dutch equivalent of Science for the People—proposed the formation of "Institutes for Society Oriented Research" to work exclusively on questions posed by groups lacking normal access to technical resources. These efforts were intended to counter the industrial and governmental control of science and technology. The science shops grew out of these efforts.

"Storefront" science advisory groups now exist at five Dutch uni-

versities: Amsterdam, Utrecht Leiden, Eindhoven, and Groningen. Their purpose is to promote socially relevant research in the universities, to relate this work to the needs of society, and to provide client groups with technical information. Some science shops were explicitly set up for this end; others grew out of teaching projects. A chemistry and society program in one university, for example, encouraged students to do community projects and this work became the basis of a continuing organization.

The science shops also developed different modes of affiliation with the university system. The largest and most institutionalized program is formally connected with the University of Amsterdam.¹⁴ In this instance, the original proposal attracted the attention of the press, and appealed to student activists who sought a more democratically-based research policy. The University council allocated 30,000 Dutch florins (\$15,000) to create the science shop; in 1978 this was increased to 50,000 florins.

The Amsterdam science shop is run by a 24-member committee, equally divided between university representatives (staff and students) and outside representatives from trade unions, the Environmental League, the ombudsman for Urban Renewal, the Socialist Broadcasting Association, the feminist movement and the teaching association. With two half-time paid staff positions, and a regular newsletter, the Amsterdam science shop is the only one securely ensconced within the university structure. In other universities the science shops are more informal. The "shopkeepers" are students and faculty who work on a voluntary basis or sometimes for course credit. University departments assume only the costs of office and laboratory space and, in some cases, telephone and photocopying expenses.

Participants in the various science shops have a range of social and per-

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sonal objectives. Some enjoy the practical policy activities as a change from their more isolated scientific work. But most have direct social action goals, viewing the science shop as a means of creating greater awareness of the impact of their work and of helping people solve environmental and social problems. Some hope to effect basic and long-term political changes in society. Others would like to change the nature of the university and the scientific community by encouraging problem-oriented research directed to immediate social needs.

Reflecting their diverse goals, the science shops engage in various activities. Occasionally, scientists testify on behalf of their clients in court or at public hearing boards. Some scientists engage directly in political actions; in one instance, students helped organize asbestos workers to apply pressure for an industrial reform. For the most part, however, scientists limit their activities to providing their clients with technical advice. This is not just a reflection of traditional scientific attitudes: some science shop personnel argue that clients must be self-reliant to avoid creating new dependencies. The most politically active science shops have become caught up in ideological differences; one, in fact, has been cut off from all university resources as a result of this involvement.

Client groups usually come directly to the science shops, having heard of them from newspaper announcements¹⁵ or from other groups who have used the service. When an environmental group, a union, or even an individual citizen requests information, the core members of the science shop meet to decide whether to provide it. The shops share similar criteria for accepting projects: clients must have no commercial aims; they must be unable to pay for the research themselves; and they must be able to use the results of the work to improve their situation or the situation of those they

represent. Furthermore, the science shops must be able to deal with the problem. (Most are staffed by either chemists or physicists.)¹⁶

One request—to analyze Caribbean seawater—was rejected because the goal was to promote a commercial tourism venture. Most requests, however, come from people with health and safety problems who do not fully trust official studies and prefer to seek their own source of information.

Most in demand are the chemistry shops, which answer many questions about the health effects of toxic chemicals, paint-spraying and wood-preserving chemicals, soil contamination by lead, and chemical wastes. Requests come to the chemistry shops from workers, factory committees, unions, and community groups. Other science shops concentrate on practical projects such as traffic safety research, the development of instruments to measure the speed or noise of passing vehicles, or the effect of construction on ground-water levels. Sometimes the science shops organize general education or information programs on subjects like nuclear safety or air pollution.

Once a project is accepted, science shopkeepers help clients to formulate their problems as researchable questions. If the problem is technical, the science shop will sometimes act as a reference service or library. But more often it plays an intermediary role, routing the problem to scientists in the university who are doing relevant technical work. The Amsterdam science shop advertises all requests in the university's weekly newspaper in order to attract researchers.

A case handled by the Amsterdam shop suggests their procedure. An environmental group requested a study of the feasibility of introducing glass containers in the city. The issue was whether the population would be willing to separate garbage in order to recycle the glass. This

problem was routed to researchers in the Department of Environmental Studies at the university. They examined the problem and wrote a pessimistic report, pointing out the obstacles to such a program. However, they also proposed an alternative action for recycling paper. Their recommendations were followed and another group became involved as the substantive report provoked discussion in the press. The role of the science shop here was simply to make the initial contact, after which its activities were minimal. Yet this initial contact resulted in a continuing relationship between a group of researchers and the environmental groups in Amsterdam. Most client requests are straightforward and relatively noncontroversial, but some require counter-expertise in order to challenge an official report.

Where there is conflicting data, science shops vary in the way they present information. The more overtly political organizations act as advocates; others are careful to include in their reports a discussion of different opinions and alternatives. In the end, however, much of the work involves gathering and summarizing existing technical information and translating it into lay language so that client groups can use it effectively. At times, the scientists must clarify the political dimensions of a problem by pointing out the limits of technical information.

The science shops face several inherent problems. First, they must sustain the interest of client groups to insure a continuing set of serious projects. Second, they must sustain the interest of the scientific community so that they may respond effectively to client requests. All these groups seek to maintain visibility. Their novelty initially attracted press attention, but publicity and, therefore, visibility soon declined. Consequently, some shops have less business than they would like. People do not always perceive science as useful, having greater need

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for professional advice available through "legal shops."¹⁷ Sometimes those needing technical advice do not know the science shops exist.

Attracting scientists willing to work on applied and immediate problems is also difficult. The practical work is often routine and technically unchallenging. Unless ideologically committed, scientists are unwilling to volunteer their efforts. Thus, it is mostly students who are involved. But they too find that science shop activities conflict with their professional work and some must seek more remunerative activities in their spare time.

The experiments also face criticism from both the political left and the right. The left criticizes science shop activities as incremental, supporting existing capitalist-directed science and technology, or maintaining "philanthropic" and paternalistic relationships between scientists and citizens. From the right, science shop activities are criticized as threatening the autonomy and objectivity of science, and encouraging "left-wing" political activism.

To assess the experiment's impact is difficult. In a few cases, science shop activists have directly influenced public policy. Some government support was given to a factory to control air pollution. Certain materials using formaldehyde were taken off the market. Construction changes were made in an apartment to reduce noise. A few of the participating science students claim to have gotten jobs as a result of their policy-related work. But most science shops activists are pessimistic about meeting their major objective of promoting university research related directly to immediate social needs.

Financial support for the science shops remains tenuous: only in Amsterdam has there been any major commitment by a university. Open resistance, however, is rare, in part reflecting the ambivalence among even the most skeptical sci-

entists and university administrators who sense that the prevailing political climate supports the principles underlying the shops. Furthermore, the development of science and society courses in several universities, suggests a growing interest in action research that is likely to sustain the program for the short term.

At the government level there is also considerable ambivalence. Minister Trip enthusiastically defended the science shops, but his successor has not agreed to fund the experiment. The Minister of Higher Education tried to prevent the University of Amsterdam from supporting its science shop, and tensions over the decision persist. But the Science Policy Advisory Council, the highest governmental advisory body for science policy in the country,¹⁸ is seriously concerned about the distribution of scientific resources. This reflects its continued interest in directing science to social priorities and in representing non-institutionalized users of science in the sector councils.

In a 1978 report,¹⁹ the Council argues that too little is known about the needs for science among so-called weak or underprivileged groups (community and workers' groups, aged people, patients). Thus the Council has proposed to inventory these needs and develop a science shop to bring out latent concerns. Others, however, question whether the government should support such "political" activities among scientists, suggesting that government funds should be limited to advancing conventional scientific research. And there is some concern about science shops acting outside of organized science and its system of review and control.

Science shop participants are themselves ambivalent about accepting government or university funding. Their present tenuous position has allowed them a certain freedom. Affiliation with particular environmental groups, professional soci-

eties, or governmental interests could bring restrictions and lessen their legitimacy. Freedom to accept projects, flexibility, and the ability to maintain a critical stance could be seriously compromised by greater institutionalization.

The Dutch experiments have tried to deal with the problems of distributing scientific expertise. It is difficult to generalize from this experience because of certain features specific to the Dutch situation. But the activities of these science shops, like those of the Health Hazard Groups in Great Britain²⁰ and of various public interest organizations in the United States, suggest that they may stimulate creative approaches to solving serious social problems. For example, their experience with action research—that is, working with their clients instead of just for them—shows that workers and community residents, too often merely treated as passive victims, can themselves contribute to the analysis of the hazards posed by technology. And their activities demonstrate that counter-expertise can be used to convince government institutions to function more equitably. But the very fragile nature of the science shops, their difficulties, and the concerns about their political role also suggest the resistance in contemporary industrial society to maintaining a critical attitude toward the development and the social impact of science and technology. □

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1. Dorothy Nelkin, "The Political Impact of Technical Expertise," *Social Studies of Science* 5, 1975, pp. 35-54.

2. Wolfgang van den Daele, Wolfgang Krohn and Peter Weingart, "The Political Direction of Scientific Development," in Everett Mendelsohn, Peter Weingart and Richard Whitley, eds., *The Social Production of Scientific Knowledge* (Dordrecht and Boston: Reidel, 1977), p. 225.

3. J. D. Bernal, "After Twenty-Five Years," in Maurice Goldsmith and Alan

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ton group's more idealized assumptions do lead to the different conclusion they state—that once-through advanced converter reactors could not save as much uranium as fast breeders could over the next century or so, though they would still be *cheaper* than the breeders.

• I agree that the initial-inventory problem is much worse for fast breeders than for advanced converter reactors, especially the best-case heavy water reactor assumed in the comment. I meant the problem was "analogous" in structure, not similar in severity. Yet it is not entirely trivial, and the timing of making enrichment and thorium-fuel reprocessing capacity available would need careful attention. Table 1 of the Princeton group's admirable *Science* article, for example, shows that changing from once-through uranium to closed denatured uranium-thorium cycles increases the uranium ore needed for the initial core and "pipeline" inventory by a factor of 2.9 with light-water and 4.3 with heavy-water reactors, and by 2.5 with a switch from the former to the latter.

Just as the Princeton group considers my paper largely peripheral to

their main arguments, so their comments are largely peripheral to mine. Though I am grateful for those comments, and think they usefully clarify my article, they deal with parts of the article quite independent of its central argument: namely, that denatured thorium cycles are not a technical fix for proliferation and appear to be more proliferative than once-through uranium cycles. On this point and on the concluding arguments in the comment—that denatured thorium cycles are probably less proliferative than plutonium cycles, and that advanced converter reactors, offering the option of efficient once-through cycles, are a cheaper and less proliferative basis for nuclear policy than fast breeders—we are fully agreed. My own conclusion that no form of nuclear power is acceptable (from the viewpoint of economics, safeguards, safety, wastes, political impacts, and other problems) is not incompatible with the Princeton group's implicit and much more specific finding that fast breeders, in Marvin Goldberger's phrase, are "spherically senseless"—they make no sense no matter which way you look at them. □

(continued from page 23)

MacKay, eds., *The Science of Science* (Harmondsworth: Penguin, 1966), p. 288.

4. J. D. Bernal, *The Social Function of Science* (London: Routledge and Regan Paul, 1939; MIT Press reprint, 1967), p. 403.

5. From the address of the President of the International Union of Pure and Applied Chemistry, as reported in IUPAC Information Bulletin, 1978, No. 1, p. 5.

6. See Dorothy Nelkin, *Technological Decisions and Democracy* (Beverly Hills: Sage Publications, 1977).

7. Joel Primack and Frank von Hippel, *Advice and Dissent* (New York: Basic Books, 1976).

8. See Arend Leiphart, *The Politics of Accommodation: Pluralism and Democracy in the Netherlands* (Berkeley and Los Angeles: University of California Press, 1968); William Z. Shetter, *The Pillars of Society, Six Centuries of Civilization in the Netherlands* (The Hague: Martinus Nijhoff, 1971).

9. See Nelkin, *Technological Decisions*.

10. An analysis, somewhat biased by its focus on the social science departments, has been given by H. Daalder, "The Dutch Universities between the 'New Democracy' and the 'New Management,'" *Minerva* 12, 1974, pp. 221-57.

11. *Planning and Development in the Netherlands* 8, No. 2, 1976, whole issue.

12. Egbert Boeker, "Public Information on Science and Technology, the Dutch Case," *Science and Public Policy* 4, 1977, pp. 558-62.

13. *Wetenschapsbudget 1979*, Tweede Kamer, 1978-79, 15301, 1 & 2 (The Hague: Staatsuitgeverij, 1978), p. 18.

14. Some of this information on the Amsterdam Science Shop summarizes a mimeographed document circulated by the organization in April 1978.

15. The Amsterdam group puts out a bulletin every two weeks to disseminate information about its activities to both customers and researchers.

16. Biologists do not participate extensively in the science shops, but have well-established links with environmental groups; no mediating organization is necessary.

17. These legal shops are volunteer storefront law school organizations created in the late 1960s to provide advice and assistance in legal matters for those individuals and groups that cannot easily contact lawyers' offices.

18. See Ronald Brickman and Arie Rip, "Science Policy Advisory Councils in France, The Netherlands and the United States, 1957-1977: A Comparative Analysis," *Social Studies of Science* 9, 1979.

19. Raad van Advies voor het Wetenschapsbeleid, *Wetenschap voor Zwakke Groepen* (Science for Weak Groups), ('s Gravenhage: Fall, 1978).

20. See, for instance, *Nature* 270, 1977, p. 293; the *Hazards Bulletin* published by the British Society for Social Responsibility in Science "Work Hazards Group."

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