
Introduction—Nanotechnology and the Public

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This article introduces the special issue of Science Communication on “nanotechnology and the public.” It argues that studies of “nanotechnology and the public” are important not for themselves, but for their ability to shed light on more general social theories, especially those that help illuminate the interweaving of science and society.

Keywords: *nanotechnology; public participation; public engagement; public understanding; framing; public opinion*

Why should we begin examining “nanotechnology and the public”? One could argue that nanotechnology is simply the latest scientific fad (or “re-search area,” if you prefer), following on space exploration, the war on

Author’s Note: The articles in this issue were solicited for a panel at the February 2005 annual meeting of the American Association for the Advancement of Science in Washington, DC. As the original advocate for the panel, I would like to thank Susanna Hornig Priest for stepping in as active co-organizer and discussant and especially for her role in soliciting and editing this collection of articles. I want to acknowledge the participation in the panel of Jane Macoubrie; unfortunately, we were not able to include a paper on her work combining public opinion and public deliberation in this collection (Cobb and Macoubrie 2004; Cobb, Macoubrie, and Hamlett 2004). My thanks also to the individual authors, reviewers, and editors who worked diligently to quickly produce this special issue of *Science Communication*. Please address correspondence to: Bruce V. Lewenstein, 321 Kennedy Hall, Department of Communication, Cornell University, Ithaca, NY 14853; phone: 607-255-8310; fax: 607-254-1322; e-mail: b.lewenstein@cornell.edu.

Science Communication, Vol. 27 No. 2, December 2005 169-174

DOI: 10.1177/1075547005281532

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cancer, nuclear power, genetic engineering, biotechnology, genetically modified organisms (GMOs), stem cells, and so on, and so on, and so on. From research traditions that go back to the 1950s, we know a great deal about media coverage and public opinion on these topics (e.g., Anon. 1958; Bauer and Gaskell 2002; Davis 1958; Friedman, Dunwoody, and Rogers 1986, 1999; Gamson and Modigliani 1989; Krieghbaum 1967; Mazur 1981; National Science Board 2002; Nelkin 1995; Priest 2001), and the general outlines of a standard position are clear: The media cover stories that are “new,” often are focusing on controversy, and provide far fewer details than scientists would like to see. The “general public” does not know much about the details of science in general, or the particulars of these specific areas. But it does generally support development of science and technology. Questions of risk and uncertainty are often more important than questions of scientific detail, and scientists and journalists often disagree about how those risks and uncertainties should be portrayed. Does not nanotechnology simply fit into this line of research, providing yet another example to confirm what we already know?

Yet over the last twenty years, just as the understanding of the interactions of media, science, and public opinion have become robust, an alternate understanding has developed of what the field of “science and the public” is all about. Less concerned with the mechanics of how the media and public opinion work, this newer research has focused on the relationships of power and activity that link scientific institutions, public groups, and policy makers, often drawing on historical perspectives, focusing on questions of rhetoric, or pursuing detailed case studies (Cloitre and Shinn 1985; Cooter 1984; Cooter and Pumfrey 1994; Irwin and Wynne 1996; Layton et al. 1993). Two major results have emerged from this research tradition: a distinction between “deficit models” of public understanding and more nuanced contextual models, and an interest in participatory models for engaging the public in science, especially in science policy (Wynne 1991; Ziman 1991, 1992). The emphasis on public participation in science has been especially influential in the United Kingdom, where it has been promulgated in official government documents (Council for Science and Technology [UK] 2005; House of Lords 2000).

Indeed, in the United Kingdom, many researchers and activists attempted to use the insights about public participation to address the public controversies associated with the science of GMOs. Public opinion polls were combined with participatory exercises, with the goal of creating consensus for a “GM Nation” (GM Public Debate Steering Board 2003). The outcome? Well, no consensus was reached, and certainly not the support for GM foods that the UK’s Agriculture and Environment Biotechnology Commis-

sion had apparently hoped for. Instead, public concern about GMOs remained strong.

And that leads to nanotechnology. As momentum built at the turn of the millennium for a major commitment to funding nanotechnology research and development around the world, many scientists in the field looked uneasily at the public concerns about biotechnology, GMOs, stem cells, and other areas of “emerging technology.” They became concerned that development of nanotechnology might be impeded by public objections to a field of science that had, in one of its founding documents, references to “grey goo” that might take over the world (Drexler 1986). They worried about strongly argued magazine articles that objected to the development of nanotechnology before its risks were known (Joy 2000), and they feared the effects of *Prey*, a thriller written by *Jurassic Park* author Michael Crichton that featured a swarm of nanobots threatening to take over the world (Crichton 2002). They began to schedule conferences and issue reports on the “societal and ethical implications” of nanotechnology (Roco and Bainbridge 2005 (in press); Roco and Bainbridge 2001; Royal Academy of Engineering and Royal Society 2004). Building on the model of support for “ethical, legal, and social issues” funding that was part of the Human Genome Project, they built funding for research on social and ethical issues into the funding streams for nanotechnology (Radin 2003).

Though the initiative to fund research on social and ethical issues was often a defensive one, sometimes based on the same assumptions as the “deficit model” (“if we just get people to know more about the science, they will not object”), the outcome is a welcome departure from the tradition of scientific groups unthinkingly promoting their work without regard to public interests. Instead, the outcome has been a steady stream of funding for serious social science research about media coverage, public opinion, public participation, and related topics.

The articles collected here are some of the first fruits of this research (and I stress the word “first”—these are preliminary studies, at the beginning of an emerging research tradition). Far from being simple apologies for nanotechnology, or mere repetitions of previous research on science and the public, these articles address general issues of social, political, and media theory. We increasingly have good social science theories that help shape our understanding of the interactions of science and society, and nanotechnology is a useful case for applying those theories. Because social and institutional activity involves so many variables, we cannot expect that any one theory will explain all of that activity, but by applying multiple approaches to the same case, we can begin to see how various theories interact and shed light on each other’s perspectives.

So, for example, the papers by Lee and colleagues and Cobb both examine questions of public opinion, seeking to establish baselines of current attitudes toward nanotechnology. But where Lee and colleagues are exploring the role of information in the formation of opinions, Cobb uses deliberate manipulation of public opinion questions to ask how the frames or perspectives in which information is embedded will shape opinion. Stephens also uses frames as an analytical tool, but looks at media presentations—one of the areas that Lee (to circle back) explicitly identifies as an area needing further explication. Showing the complexity of the topic, Anderson and colleagues' report on media coverage of nanotechnology in the United Kingdom takes yet another approach, highlighting the importance of cultural tropes such as metaphors and other literary devices in shaping the presentation of nanotechnology information. Macnaghten and colleagues are also concerned with cultural issues, especially the political cultures in which science and democracy interact.

None of these articles claims to make definitive statements about nanotechnology. Nor do they resolve the differences between the approaches to science and media and science and public described at the beginning of this article. But they are written with recognition of those differences and thus will help future researchers as they integrate the perspectives. Moreover, these articles do claim to make contributions to broader areas of social theory, using nanotechnology as an exemplar. For that, we should be grateful (though, again, we should also be generous in our understanding that these articles are only preliminary and partial attempts to limn those contributions).

I do not want to suggest that research on nanotechnology and the public is valuable only if it contributes to core research questions of disciplines such as political science, sociology, or communication, or to less-confined questions of social theory. Clearly, the scientific community is still concerned about public perceptions, the concern that led to the funding of research on social and ethical issues in nanotechnology. There is a long tradition in social research that says it is useful only if it leads to action. But the findings of research that is well grounded in social science and humanistic disciplines is likely to be more robust, and thus ultimately more useful, when it recognizes and contributes to deeper discussions about how science and society interact, and, indeed, about how society itself operates.

These articles are just a beginning. Others are also publishing work on social and ethical issues in nanotechnology (see, for example, special issues of the journals *Hyle: International Journal for Philosophy of Chemistry and Techné: Journal of the Society for Philosophy and Technology* published in

2004 and 2005, as well as many individual articles appearing in a variety of nanotechnology, science studies, communication, and other journals). The challenge will be to integrate this research into understandings drawn from other studies of science and society.

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