2008

The multiple discourses of science-society engagement

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Publication Details

This article was originally published as Motion, J & Leitch, S, The multiple discourses of science-society engagement. Australian Journal of Communication, 35(3), 2008, 29-40.

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A meta-analysis of the changing science –society discourses that played out in New Zealand after the lifting of a moratorium on applications for the release of genetically modified organisms is provided in this article. It highlights the tension between the scientific focus on knowledge and societal values, beliefs and emotions and the need for a democratized discursive space for societal engagement with science. A key contribution of the article is identification of the role of altruistic discourses in societal considerations of controversial scientific innovations.

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The multiple discourses of science society engagement

The complex challenges of communicating across science-society boundaries are not easily addressed. It is not simply a matter of providing more information about scientific processes so that the public will understand (and therefore consent) to potentially controversial innovations (Wynne, 2008). Consideration needs to be given to the different worldviews and discourse contexts that influence and frame the perceptions of scientists and other citizens in regard, firstly, to new areas of science and technologies and, more specifically, to particular innovations such as genetically modified food.

In this article we conduct a meta-analysis of the research originating from a five year research project that investigated 'Socially and Culturally Sustainable Biotechnology'. This research project examined the socio- cultural and economic impacts of medical, food and fibre related biotechnology developments in New Zealand. The institutional discourses of science and commerce along with popular or public discourses, which we characterised as social, cultural, religious/spiritual, were analysed.

Research projects investigating the relationship between science, industry and society have tended to adopt an empirical and descriptive approach. In contrast, in our research we adopt a critical perspective and analyse the discursive boundaries between science, industry and society. The article begins with a theoretical overview of the discourse approach adopted in the project, followed by a brief background to the socio-political context and our analysis of the discursive strategies and practices in play. We conclude by exploring possibilities for communicating and engaging across the discourse boundaries of science and society.

Discourse framework

A discourse, at the most simple level, may be defined as a set of statements (Foucault, 1972) that constructs how we understand and talk about the world. These sets of statements convey ideas, values, and knowledges (Fairclough, 1992). They also create identities or subject positions, frame the way we talk about objects or concepts, and provide strategic options for action and change (Foucault, 1978). In this article, we distinguish between discourses that originate from formal, institutional domains and those that are more informal, personal and conversational. These discourse types have many shared characteristics. For example, the highly institutionalised, medical discourse may form the identities of doctors, nurses and patients; categorise physical and mental symptoms as diseases, syndromes and disabilities; and prescribe pharmaceutical or surgical methods for addressing these defined conditions. Similarly, the everyday informal discourse of a community may form the identities of people as, for example, insiders or outsiders, define local knowledge, and prescribe certain rituals and traditions. However, informal discourses generally contain an emotional dimension that is central to the identity of discourse participants. For example, while resistance to new technologies may be expressed within legal intuitional discourses, emotion is generally proscribed. In contrast, emotion is an integral component of the informal discourse of resistance located within conversations and blogs.

Discourses are imbued with power relations (Foucault, 1980), such as the differential power between doctor and patient or the differential status of medical and lay knowledge or folklore. Various discourses may compete to be recognised as the normal or legitimate way of understanding the world (Brown 1998, 2003; Clegg 1989; Clegg et al. 2006; Golant and Sillince, 2007; Humphreys and Brown 2002; Vaara et al. 2006). For instance, within society there may be a democratic discourse

that calls for consideration of cultural, religious or spiritual implications of scientific innovation and public decision-making in science based on the notion of science as a public good. Alternatively, there may be an economic discourse of commercialisation that emphasises economic return, entrepreneurship, business models and product development. These discourses each have their own language, their own rules and regulations for how science should be conducted and may co-exist or be mutually exclusive.

In this article we are concerned with interactions that cross the discourse boundaries between science and society. Discourse boundaries establish strategic demarcations for particular sets of statements, knowledges, or ways of viewing the world. They delineate what is true and what is not true in particular discourse contexts and thus privilege particular ideas, values and knowledge. Crossing or expanding discourse boundaries poses a number of challenges because discourses do not function in isolation; through a process known as interdiscursivity (Kristeva, 1986; Fairclough, 1992) they draw upon, interrelate, and compete with other discourses in the struggle to represent and constitute knowledge. In order to open up or close down meaning, particular communication strategies and resources are deployed that challenge, reconcile and invoke discourses.

Socio-political context

Controversy over Genetic Modification (GM) science in New Zealand had escalated so rapidly that, in 2000, the New Zealand government announced a Royal Commission of Inquiry into Genetic Modification. The Royal Commission recommended a precautionary approach involving "a strategy of preserving opportunities and proceeding selectively with appropriate care" (Royal Commission

on Genetic Modification, 2001, p. 331). An outcome of the Royal Commission was the establishment of a multi-million dollar fund to investigate the role of biotechnology in society. In 2003 our research team (see acknowledgements) was funded $2.5 million for five years to investigate the socio-cultural and economic impacts of biotechnology.

At the same time, the imminent lifting of a Government imposed moratorium on applications for the release of genetically modified organisms (GMOs) led to intense public protests. A number of advocacy groups were active during this period, most in opposition to GM and the lifting of the moratorium, but one, the Life Sciences Network, lobbied for the moratorium to be lifted (Motion & Weaver, 2005). The moratorium was lifted in October 2003 but an extensive regulatory system was established as a safeguard. Public protest subsequently declined but a number of significant issues for science and society emerged which our research programme has investigated and analysed: lifting of the moratorium, sustainability, commercialization, decision making frameworks and science-society engagement. It is the final issue that we address in this article, focusing on science, societal and media discourses.

Science discourses

The public controversy over GM science motivated and compelled scientists to discuss their work publicly. Scientists' efforts to communicate and engage with the public were dominated by the discourse of sound science and its emphasis on evidence and reason. However, the critical, commercialization and democratization sub-discourses of sound science constructed significant boundaries for science-society engagement. Critical sound science was a type of self-surveillance regime in which

scientists critiqued science that they perceived was lacking rigor. Commercialization of science was focused on generating saleable scientific knowledge and products. Democratization of science was predicated on the notion that public value for science and society is generated by the inclusion of the public in scientific decision making. The discursive interplay of these sub-discourses of sound science complicated public understandings and engagement with science.

Scientists who drew upon the critical sub-discourse of sound science identified public distrust as a communication boundary. Before communication with the public could be effective, there had to be a foundation of trust. However, trust shifts according to different discourse contexts and boundaries and is not automatically transferable across discourse boundaries; it has to be established. Within a scientific discourse, trust and legitimacy emerge from sound science. A fundamental principle of sound science is the need for peer review and scrutiny yet disagreement and critique of each others work by scientists was a dimension of the critical sub-discourse that increased uncertainly, doubt and distrust. For the public, the common understanding of science was that it was factual - so how could scientists disagree? When scientists publicly argued, the public were unsure who or what to trust. In contrast, when scientists engaged in societal discourses, in the absence of recognized legitimacy and knowledge, the public referred back to their personal experiences and values to make decisions.

Critiques of sound science usually focused on commercial imperatives and the political expedience that was considered to undermine the integrity of scientific processes, and emphasized the lack of fundamental sound science, commercial imperatives that overtake sound science and funding applications that accelerated research projects before they were ready. Commercial imperatives were considered to

politically drive some scientists to ‘manufacture’ or communicate claims about new technologies that would be acceptable to the public because they wanted funding. For example, one scientist described an event that took place where he considered that in fact a colleagues' work was ‘bullshit’, that there was no science underlying the hype to get funding (Motion and Doolin, 2007). When marketing or public relations approaches were used in order to promote science, not necessarily with a strong scientific basis, issues of trust intensified. Authentic communication and engagement was considered absolutely essential.

In order for commercialization to succeed and deliver public value, scientists need to understand what the public values. However, the elusive nature of public values and opinions made it difficult for scientists to understand what the public values. Scientists asked, for example, whether public opinion was represented by activists or whether activists were in fact a small minority. Scientists were curious to know what the silent majority thought of GM science and whether there was a 'middle ground' that may be acceptable to most New Zealanders in relation to controversial advances in science.

Scientists’ working within a sound science discourse deployed information management, persuasion and public engagement approaches in their attempts to identify public opinion and values. Many scientists believed that an informed public would come to understand the science and therefore be more opening and accepting of new technologies. This approach is commonly referred to as the information-deficit model and widely recognised within social science as an ineffective technique for science communication and decision making. Another communication approach that scientists deployed was attempting to persuade the public that the science was safe and/or beneficial. Other scientists actively engaged with the public, attempting to

understand concerns about the science. In doing so, scientists developed an understanding that communication is much more complex than informing the public about scientific processes (Zorn, Roper and Motion, 2005). More information is not the solution. Instead, the importance of understanding the attitudes, emotions and values that underpin communication and decision-making processes was crucial for meaningful engagement with the public. While some scientists actively engaged with the public to increase their understanding of the science, others were not permitted to discuss GM publicly - cautious or anti-GM comments were silenced. Organisational public relations efforts were viewed by scientists as a communication boundary. For example, organisations that were part of the Life Sciences Network actively discouraged scientists from public communication (Motion and Doolin, 2007; Motion and Weaver, 2005). The silencing of scientists in this way is deeply problematic in terms of scientific processes, where peer review and debate are crucial.

Scientists considered that the issue of public benefits was deeply problematic for the commercialization of science. They asked why citizens would be interested in new scientific technologies if there were no benefits for consumers and why consumers would buy GM food if the benefits were all for the producers and biotechnology companies. According to one scientist, only if there was a benefit for the public, if GM was healthier, cheaper or in any other way more beneficial to the consumer than convention-grown crops, would they accept it.

A third, complicating, sub-discourse concerns the democratization of science. Scientists or citizens who deployed this discourse advocated for public involvement in science. However, it was not clear what it may mean to democratize science - how and when could the public be involved? Science is a factual, not opinion-based,

discourse and the public were not considered to be equipped to engage because they did not understand the science.

The questions that scientists were starting to grapple with included: what exactly should be the public's role in science? If we moved to a more democratized form of science, what might that mean? How do we ensure a fair representation of community groups? How do we decide what should be funded? Should the public decide, for example, whether we go ahead with research into breast cancer? Or is it in fact more important that we look at prostate cancer? Should the public be involved in the democratisation of policy issues, for example, concerning which technologies to use and avoid?

The interrelated boundary issues that emerged from the sub-discourses of sound science were epistemic in nature and related to scientific integrity, science-society engagement and the democratization of science.

Societal discourses

The multiple meanings, sense making practices and concerns of New Zealanders about GM science and biotechnology innovations were communicated by drawing upon everyday, conversational discourses. These discourses focused on the need for caution, scepticism about scientific claims, hope for others, altruistic choices and the democratization of science.

When we talked to participants about GM in the early stages of our project a common response was a discourse of caution. Many participants explained they could not understand why New Zealand would need to get involved in GM science and expressed concern that it may jeopardise New Zealand's clean, green image and the economic benefits of such an image. A second concern was safety. New Zealanders

wanted to know whether long-term tests had been conducted to ensure GM was safe and urged precaution. There is extensive literature on the precautionary principle (see, for example, Maguire & Hardy, 2006) but in essence it is the notion: 'better safe than sorry'. For the public, risk was not acceptable and safety had to be proven, whereas for scientists risk was unavoidable.

Concerns about safety were linked to a strong sense of scepticism about science and scientific claims amongst the majority of the focus groups. Discourses of scepticism usually focused on the motivation of business and their influence over scientific findings. The vested interests that work in scientific decision-making were a cause of public concern, along with a more general scepticism about scientific claims and the 'marketing hype' for GM science. For example, although claims that GM food could help those who are starving had been successfully communicated, the politics of starvation and the way it was used to push the GM cause were certainly a cause for scepticism and critiqued by our focus group participants. However, even though there is little research to support claims of eradicating starvation, our focus group participants accepted that GM food may be appropriate for other nations and did not want to hinder the opportunities of those who might need GM food science.

Thus, even though discourses of concern and scepticism prevailed, at the same time a discourse of hope or optimism that GM science may potentially offer significant benefits emerged. Discourses of hope were predicated on knowledge of how biotechnology has significantly improved lives. In particular, focus groups we worked with hoped that scientific research would help the environment, people with disabilities, and couples with hereditary genetic diseases. They were generally more supportive of medical and environmental science that involved genetic research, rather than GM food research.

A significant finding was the identification of an altruistic discourse of choice for decision-making about scientific innovation. Altruism, empathy and compassion ultimately guide the 'silent majority' decisions about science because New Zealanders generally wanted others to have potential opportunities and benefits derived from biotechnology even if they did not want them for themselves (with the exception of GM food which they did not want available in New Zealand). This discourse of altruism is in fact a vindication of the Royal Commission on Genetic Modification recommendation that New Zealand proceed with caution to ensure that opportunities are preserved (Royal Commission on Genetic Modification, 2001).

New Zealanders were, however, mystified by the decisions being made about GM. Their view was that although they lived in a democracy and nobody wanted GM food, it was going to happen anyway; they asked ‘how can this be?’ A political discourse of democratization was evident; the GM issue was fundamentally about democratic decision-making processes and issues of power. The New Zealanders who participated in focus groups were puzzled about how it was that they came to be seen as a type of enemy, as the opposition, when in fact they believed that their role, as part of a democracy, should be to influence decisions about the acceptance of GM science. The finding that the public do not consider that their views are taken into account has important implications for democracy. It is not enough to simply state that there is a representative democracy. In a discourse domain such as science that is so fundamental to everyone’s lives, citizens want a voice and decision-making influence. Serious consideration needs to be given to how to democratize science and the role that the community should play in scientific decision-making. A typical justification for not including the public in scientific decision making is that they lack knowledge but is there in fact a need for more knowledge or information? A lot of information

about science and particular technologies is available. Scientists, science organisations, government, interest, advocacy, and activist groups have worked in many ways to provide copious information. People have not, in fact, actively gone out and sought information. What is really happening is that people know that their opinions are uninformed by scientific knowledge.

When people are challenged to talk about complex scientific information, they draw upon ontological discursive resources, in particular, their beliefs, values and emotions to make decisions about controversial issues. An understanding of the implications of scientific advances for society rather than knowledge of science processes is more salient for decisions that involve human, moral or ethical dimensions of science. Acknowledgement that it is not simply a matter of evidence-based decision-making versus emotional or uninformed decision-making has important implications for communicating across discourse boundaries. The public draw upon ontological discourses characterised by concern for humanity that complement the epistemic evidence-based scientific approaches. These public discourses may be more relevant when scientific issues become what Wynne (2008) terms 'public issues' or issues about ontological societal challenges, not science per se.

Media discourse

Media had a central role to play in communicating across science- society discourse boundaries. Within the research project journalists discussed the complexity of science and explained that they drew upon the views of both pro- and anti-GM groups because it was difficult to ascertain what the facts were due to their lack of scientific expertise. In their view, this approach offered both sides a semblance of objectivity,

accuracy and fairness. However, journalists concerns with truth and facts favoured science and privileged an epistemic approach to communicating science.

Journalists explained that they were interested in stories based on factual statements and backed up with evidence. They also tended to favour the status quo. For example, journalists agreed with the Royal Commission's recommendations regarding GM science in New Zealand and believed that all of the arguments had been considered. Thus, journalists rarely examined the contested nature of scientific claims or the vested interests that science organisations have in promoting advances in science.

However, there were also news values that favoured activists or those who were opposed to the science. Commercial imperatives, the need to sell papers and advertising space, functioned as the ultimate determinant of what is news. Although journalists seek factual stories that are evidence-based, sub-editors and editors made the decisions about what would be published. So on the one hand, news has to be factual. And on the other, editors want news to be characterised by emotion and drama and result in higher sales. One journalist told us that emotion gets a story on the front page.

This dialectical tension between acting as a credible news source and providing news that is interesting and marketable is a dilemma for those seeking media coverage of controversial issues. Scientists and activists have to comply with the expectations of credibility and at the same time must provide emotion and interest (Motion and Weaver, 2005).

For both science and society, the media act as an intermediary constrained by the tension between the commercial imperatives of drama and emotion and the journalist values of evidence and credibility.

Discussion and conclusion

This analysis of the complex challenges in communicating across science-society boundaries has highlighted the seemingly incommensurable nature of the societal ontological discourses and scientific epistemic discourses. However, communicating across discourses is more likely to be effective when there is an in-depth understanding of the boundaries and differences that impact on such efforts. Contested controversial scientific innovations require sensitive communication to cut across all of the discourse boundaries identified in the research project. Science-society engagement needs to address the discourses of concern, scepticism and distrust that the public have towards science in order to generate value and rebuild public trust. Ontological values and emotions rather than knowledge function as the guiding principles for societal decisions about scientific developments. Public value for science can only be generated once there is an understanding of what the public value. However, that has been challenging for scientists because it is difficult to know which discourses, values and emotions to connect with and consider. A key contribution of this analysis is the identification of the discourses of altruism, empathy and compassion as the significant determining values that underpin public opinions about genetic science. A shift in media communication is required that emphasizes the ontological implications of scientific advances for society, rather than the current focus on trying to help the public understand scientific processes.

Democratization of science-society engagement may assist in generating public value and avoid public controversy if the sound science discourse is reframed to create a discursive space for the public. It is difficult for the public to participate in scientific discourses and decision making because there is no established role for the public in the sound science discourse. For some, the public's lack of information restricted

perceptions about the potential contribution that the public could make. An understanding that the public work at an ontological level rather than an epistemic level, using their values and emotions to make decisions about the role of science in society, rather than scientific knowledge and understanding, could transform how the public role in science is valued. In order to identify prevailing public values, meanings and concerns rigorous social science research and a democratized space for public engagement is necessary.

Acknowledgements

The authors gratefully acknowledge the Foundation for Research, Science and Technology New Zealand for funding the Socially and Culturally Sustainable Biotechnology project (UoWXO227) and their support of our work. They also thank all members of the project (James Barker, Karen Cronin, Sally Davenport, Bill Doolin, Jo Gamble, Jarrod Haar, Alison Henderson, Michael Shyue Wai Lee, Kevin Pryor, Fiona Te Momo, Richard Varey and C. Kay Weaver). The support of the Royal Society, and in particular, the president, Neville Jordan is deeply appreciated. Thank you to the New Zealand scientists, journalists and members of the focus group studies who participated in the project.

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