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ABSTRACT This article analyses the discursive practices of scientists engaged in controversial science in their narrated accounts of encounters with activists. It explores what happens when scientific credibility and authority are challenged in a public debate on the benefits and risks of such science. The aim is to understand how scientists discursively negotiate and make sense of their encounters with activists, the range of subject positions they claim, and how power is implicated in identification with the public. The article shows how scientists counter emotional appeals, utilizing both scientific and public identities respectively to legitimate the epistemic and moral authority of science and to marginalize opposing activists. It is argued that a unitary view of scientific identity is inadequate. Rather, in times of public challenge and controversy, scientists may utilize a multiplicity of subject positions to achieve identification with public interests. The discursive construct, public interest, is interpreted as a contested discursive space and a discursive resource for influencing public opinion.

KEY WORDS: *activists, discourse, discursive practices, identity, narratives, positioning, public interest, public opinion, scientists*

Introduction

For the public, many aspects of science are becoming increasingly controversial as concern over the potential risks associated with scientific innovation extend into public domains (Beck, 1992). Prominent examples include public debates over the risks and benefits of nuclear energy, industrial hazards, medical research and genetic modification (Irwin and Wynne, 1996; Nerlich et al., 2004). Moirand (2003: 197) argues that the increased social awareness of risks has produced:

... a new discourse on science ... Rather than 'explaining science', this new type of discourse sets out to explain the social meaning of such events: hence the shifting of

the objects of discourse in the direction of newly emerging ideas and issues which are no longer merely scientific in nature.

For scientists working in these areas of controversial science, the public debate has challenged the legitimacy and credibility of scientific endeavour (Gieryn, 1999). Representations of science as a social good, conducted in the public interest to solve major medical and human welfare problems, are subject to intense scrutiny and questioning. The challenge frequently comes from social groups, variously labelled as interest groups, advocacy groups or activists, who seek to speak for the public on issues surrounding controversial science. The result has been the movement of some scientists out of the laboratory and into the public gaze, as they attempt to persuade or engage with various public groups about their work and its implications for society. Our aim in this article is to analyse how such engagement develops into a discursive struggle over the position and role of science in society, who speaks for the public, whose knowledge counts, who holds moral authority, and who exercises power in the debate (Foucault, 1978; van Dijk, 1993). We examine the discursive practices of scientists in their narrated accounts of encounters with activists protesting about the use of animals in biomedical research and the genetic modification (GM) of plants and animals.

In the next section of the article we locate our research within critical discourse theory and explore the implications for identity. We then discuss how our work builds on prior work that analyses scientists' discourse. In a subsequent section we outline our research method and discuss how scientists' narrated stories may be analysed using critical discourse analysis. The analysis that follows presents an examination of scientists' attempts to legitimate key aspects of biotechnology knowledge and its application, how power is exercised through the discursive construction and positioning of public identities, and the discursive contestation over the public interest.

Critical discourse theory

Within this article we draw from critical perspectives on discourse to analyse how scientists negotiate their engagement with society, and, in particular, activists. Discourse, for Foucault, may be understood as a set of statements, a signifying ensemble of practices that 'systematically form[s] the objects of which they speak' (Foucault, 1972: 49). In talking about discursive practices, Foucault was referring to the way discourses constitute how we come to think about things in a certain way and govern how we speak about things. A Foucauldian approach to discourse rejects traditional conceptualizations of power as hierarchical, adopting instead the understanding of power as residing in a network of relationships that depend upon the 'production, accumulation, circulating and functioning of a discourse' (Foucault, 1980: 93). In this way, discourse and power are conceptualized as mutually interdependent in that discourse produces the concepts, objects and subjects that shape power and power influences discourse production (Foucault, 1980; Hardy and Phillips, 2004).

Accordingly, the primary task of discourse analysis for Foucault is to focus on the formation and transformation of discourse or how ideas are 'put into discourse' (Foucault, 1978: 11). Discourse transformations occur within a set of historical conditions, form statements and concepts, and determine a complex group of power relations by 'separating out from among all the statements which are possible those that will be acceptable' (Foucault, 1980: 197). The discursive work of scientists, then, needs to be understood in terms of the socio-political context within which it is situated, the relations between science and other cultural authorities in society, and scientific judgments about which statements and discursive strands can influence debates on controversial science.

Critical discourse analysis, according to van Dijk (2001: 353) is a mode or perspective 'of theorizing, analysis and application' that regards discourses as 'socio-politically situated'. Such an analysis focuses on how discourses produce, maintain and transform dominant positions occupied by elites, institutions or groups (van Dijk, 1993) – for instance the hegemonic role played by science in western society. Thus, critical discourse analysis 'deal[s] with properties of relations between social groups' (van Dijk, 2003: 254). Institutions and individuals can utilize discourse as a resource in the attempt to change what is thinkable (van Dijk, 2001) – what van Dijk (1993: 280) refers to as the 'discursive management of the public mind.' However, the intended influence of a discourse is not guaranteed (van Dijk, 2001).

Legitimacy is a central concept for understanding how discourse participants attempt to guarantee the influence of a discourse. According to Habermas (1979), the legitimacy of competing claims is decided by a process of discursive justifications or justificatory argumentation. In order to gain legitimacy, discourse participants, ideally, engage in what Habermas (1973: 66) terms 'compromisibility of interests' to determine what is in the public interest. The process of attaining discursive legitimacy, from a more pragmatic perspective, is a power struggle to keep 'dominant meanings in place' (Hardy and Phillips, 2004: 307) through the adoption of a variety of authenticated positions.

Identity, too, is central to understanding the influence of discourse. Discourse users, such as scientists, engage in identity construction through discourse both as individuals and as members of multiple social groups, categories and communities (Ainsworth and Hardy, 2004; Fairclough and Wodak, 1997; van Dijk, 1997). From this perspective, rather than being unitary and given, identity involves the 'discursive production of a diversity of selves' (Davies and Harré, 1990: 47). That is, individual identity comprises multiple, shifting subject positions each situated in certain discourses. As Foucault (1991: 58) notes, 'Discourse is not a place into which the subjectivity irrupts; it is a space of differentiated subject-positions and subject-functions'.

By taking up positions in discourses, individuals construct identities reflexively, by locating themselves, or interactively, by locating others, through their discursive practices (Davies and Harré, 1990). Although positioning is not necessarily intentional, there remains the notional possibility that individuals may actively claim identities by taking up a particular position made available from

a range of discourses (Davies and Harré, 1990; Jorgenson, 2002). As well as a location within a discourse, a subject position offers an ideational, relational and identity conceptual repertoire (Fairclough, 1992). As a consequence:

Once having taken up a particular position as one's own, a person inevitably sees the world from the vantage point of that position and in terms of the . . . particular discursive practice in which they are positioned. (Davies and Harré, 1990: 46)

The notion of discursive positioning is useful for examining identity work in social encounters (Jorgenson, 2002). The multiple subject positions that individuals may hold can even be contradictory, as discourses may conflict or compete (Jorgenson, 2002; Moffitt, 1994). It is such contradictions in the discursive practices of scientists that we focus on in this article, including how, in their encounters with activists, scientists adopt certain positions over others and shift between those positions. Positions are relational (Jorgenson, 2002), in that individuals often position themselves in relation to constructed categories of the 'other':

Who one is is always an open question with a shifting answer depending on the positions made available within one's own and others' discursive practices and within those practices, the stories through which we make sense of our own and others' lives. (Davies and Harré, 1990: 46)

Davies and Harré (1990) suggest that stories are an important discursive practice through which position is established. These stories are narrated within a number of different discourses, constituting and reflecting the respective positions taken by an individual in response to social interaction within particular contexts.

For us, stories are a site for critical discourse analysis. Any instance of discourse functions ideationally in representing reality and interpersonally in con-structing social relations and identities (Fairclough, 1992; Fairclough and Wodak, 1997). In their stories, individuals delineate boundaries, narrate identities and relationships, and legitimate their actions. Through this discursive practice, stories contribute to the reproduction and maintenance of particular social structures and relations by their representation and positioning of objects and people (Fairclough and Wodak, 1997; Mumby, 1987):

Stories are narrative devices which do not exist independently of the ideological meaning formations and power relations within which they are structured. They are produced by and reproduce these relations, helping to position subjects within the historical and institutional context of the material conditions of existence. (Mumby, 1987: 125–6)

Underlying all this discursive work are relations of power which pervade social structures and are continually (re)produced through 'the most mundane social practices (such as telling a story)' (Mumby and Clair, 1997: 191).

Scientific discourse

Scientific discourses are meaning creation systems that emerge from the science domain to constitute concepts, objects, and subjects within a science frame or

mode of representing the world (Foucault, 1979; Maguire and Hardy, 2006). Scientific discourses do not, however, function in isolation, but, through a process known as interdiscursivity, draw upon, interrelate, compete and struggle with other discourses in order to both represent and also constitute science-oriented knowledge. Four significant constitutive discourses that influence scientific discourse, according to Maguire (2004), are marketing, technical, popular and policy discourses that deploy a complex network of artefact-making, fact-making, opinion-making and rule-making processes respectively. A key role of such constitutive discourses identified by Maguire is to maintain the place of technological or scientific artefacts in the economy by arguments. In the debate over GM, 'actors on both sides attempt to shape the GMO discourse and engage in discursive struggle in all four arenas, working especially hard to mold public opinion' (Maguire, 2004: 131).

Maguire and Hardy (2006) examined the discursive struggle to maintain the legitimated place of science and scientific discourse and the subordination of discourses of 'sound science' by a new environmental regulatory discourse of precaution. In order to open up or close down meaning, discursive resources and strategies were deployed to challenge, reconcile and invoke other texts and discourses.

In contrast, Cook et al. (2004) examined the discourse of UK scientists engaged in research on GM crops. They found that these scientists tended to operate within their own scientific discursive territory, framing GM issues in terms of empirical objectivity, and dismissing other non-scientific frames 'as irrelevant, or even dangerously anti-science' (Cook et al., 2004: 441). The GM scientists exhibited a siege mentality 'rather than seeing the presentation of other frames as an opportunity to engage in dialogue about wider issues' (p. 442). There was only vague recognition of ethical objections to GM and these were considered to be 'beyond the reach of reasoned argument' (p. 445).

The scientists in Cook et al.'s (2004) study tended to categorize the public as emotional rather than rational, and vulnerable to manipulation by groups such as NGOs, politicians and the media. As one of the interviewees put it, 'scientists think and the public feels' (Cook et al., 2004: 437). The scientists often emphasized public ignorance of GM science as the reason for their opposition to GM, envisaging its remedy through the one-way education of a passive public. Interestingly, the study found that the GM scientists they interviewed viewed themselves as distinct from 'the public', making no allowance for the possibility of their own dual membership of both groups.

Other analyses of scientists' discourse (e.g. Gilbert and Mulkay, 1984; Kerr et al., 1997; McCann-Mortimer et al., 2004), have emphasized that 'variability in accounting for various kinds of scientific activity is a pervasive and significant feature of scientists' discourse' (Potter and Mulkay, 1985: 265). In particular, scientists often use 'empiricist' and 'contingent' interpretative repertoires to move flexibly between the empirical world of scientific method and the contingent realm of society (Gilbert and Mulkay, 1984; Kerr et al., 1997). An empiricist repertoire emphasizes the objectivity of 'facts' derived through scientific method.

It legitimates scientific actions and beliefs on the basis that 'that is the way the world is' (Potter and Mulkay, 1985: 262). In contrast, a contingent repertoire acknowledges that the application of scientific methods or knowledge may be socially contingent. Scientists may use a contingent repertoire when interpreting occurrences that seem to contradict the supposedly orderly nature of the scientific world; for example, in explaining 'bad science' or the social influences shaping the funding and application of science. In their flexible use of these interpretative repertoires, scientists construct rhetorical boundaries that distance neutral, empirical scientific knowledge from the social contingencies that may shape or contaminate its use. In doing so, they maintain their professional autonomy and reinforce the epistemic authority of science while deflecting responsibility for the social and ethical consequences or implications of scientific developments onto society at large (Kerr et al., 1997, 1998).

This 'boundary work' is consistent with Gieryn's (1999) discussion of the representation of scientific practice and knowledge. Scientific knowledge is powerful to the extent that it is able to represent the 'truth' about aspects of our reality. Through such power/knowledge relations, science occupies a hegemonic position as an 'epistemic authority' in western society. The term 'epistemic authority' refers to 'the legitimate power to define, describe, and explain bounded domains of reality' (Gieryn, 1999: 1). That position is not static, but is maintained through continuous boundary work, in which certain properties and qualities are attributed to scientists, scientific practices and scientific claims in order to establish the case for science over and against other, competing, cultural authorities. These strategic representations of science are discursively constructed, so that scientific practice and knowledge become 'wrapped up in layers of discursive interpretations . . . mediating representations of what science is or what scientists do' (Gieryn, 1999: x).

In another example of boundary work in scientists' discourse, Brown and Michael (2001) discuss how scientists defended their research on xenotransplantation by routinely switching between scientific and social discursive repertoires as they represented both expert identities in scientific discourse and public identities in social discourse. In a public debate over a controversial science, one might expect a scientist to take an expert subject position based on the epistemic authority of science in order to marginalize lay perspectives as non-scientific. However, Brown and Michael (2001) found that the scientists also adopted different, more public subject positions in social discourse, drawing on and rearticulating 'cultural commonplaces' so as to align themselves with a dominant public. In identifying with one version of the public they simultaneously excluded or marginalized other public groups, in this case animal advocates antagonistic to their research:

In the process of this discursive patterning, spokespersons define an 'other,' a set of subversive identities whose refusal of [xenotransplantation] marks them off from 'the public': '*We're the same, they're different*'. (Brown and Michael, 2001: 17, emphasis in original)

Analysing scientists' narratives

The fundamental question informing our research is 'What discursive practices do scientists utilize when scientific credibility and authority are challenged in a public debate on the benefits and risks of controversial science?' To address this question, we explore how individual scientists make sense of events that occur in their encounters with activists, focusing on how scientists author stories as a sense-making exercise that constructs meaning in their interactions and experiences with others (Currie and Brown, 2003; Patriotta, 2003). This leads to three specific research questions:

1. How do scientists who are working in a controversial science discursively position their work during their encounters with activists?
2. How and why, in narrating encounters with activists, do scientists claim and occupy particular subject positions over others?
3. How is power implicated in the construction of scientific and public identities and associated discursive concepts?

There is a considerable definitional debate over what constitutes a story, how it relates to narrative, which precedes the other, and to what extent plot, characters, and closure need to be fully elaborated (Boje, 2001; Boje et al., 2004; Gabriel, 2000). In this article we are interested in narration, in the sense that Fisher (1989: 55) defines it as (among other things):

individuated forms such as depiction, anecdote and characterization . . . [that] can be interpreted and assessed as modes of expressing good reasons, as rhetorical forms inducing conclusions about people, community, and the world.

In our study we looked for occasions when scientists constructed their experiences in narrative form. That is, they narrated personal accounts of particular events occurring over time that convey meaning and shed light on their actions, beliefs and values in their interpretation and construction of reality (Barry and Elmes, 1997; Bruner, 1991). Although many of these accounts could be more accurately described as story 'fragments' (Boje, 2001; Brown and Humphreys, 2003; Currie and Brown, 2003) we call them narratives in order to distinguish them from other discursive texts produced by our participants. We treat these narratives as indicative of not only their narrators' communicative efforts, but also the discourses they draw on and the positions they occupy within those discourses.

There are two important qualifications we need to make about these narratives. First, as Boje (1991) notes, the meaning of a narrative depends on its situated performance. Second, a narrator describes an event that took place in one context in order to make a point in the context shared by the narrator and his or her audience (O'Leary, 2003; Polanyi, 1981). While we acknowledge that interviews are situated narratives (Silverman, 2001), we assume that the interviewees' recourse to the narratives they told us essentially represented their sense-making processes and interpretative work about the issues discussed under more naturally-occurring circumstances (Potter and Mulkey, 1985).

The narratives we analysed were taken from a series of interviews conducted with 27 scientists performing biotechnology research and development in a range of New Zealand private and public sector institutions during 2004. These institutions included Crown Research Institutes, universities and biotechnology companies. Almost all the scientists we talked with were relatively senior in their institutions, were 'applied' in the sense that their work was intended to have commercial implications, and were 'public scientists' in that they engaged directly with society and its institutions (Gieryn, 1999; Kerr et al., 1997). The latter occurred through a range of mechanisms, including public speaking, regulatory hearings, media interviews and releases, and involvement in education or public policy.

The interviews took place just after the lifting of a government-imposed moratorium on applications for the release of genetically modified organisms (GMOs) in October 2003. The moratorium was a government response to the July 2001 report of a Royal Commission on Genetic Modification, which recommended a precautionary approach involving 'a strategy of preserving opportunities and proceeding selectively with appropriate care' (Royal Commission on Genetic Modification, 2001: 331). Between 2000, when the Commission was established, and 2003, when the moratorium was lifted, GM was the subject of intense public debate. A number of advocacy groups were active during this period, most in opposition to GM and the lifting of the moratorium (Henderson, 2005; Motion and Weaver, 2005a), but one, the Life Sciences Network, lobbying for the moratorium to be lifted (Motion and Weaver, 2005b). Although we interviewed scientists from across a wide range of biotechnologies, a number noted that the debate on GM and the actions of these advocacy groups had dominated public perceptions of biotechnology more generally.

Interviews were organized around a number of topics that allowed participants to talk freely and at length and created a context within the interview to constructively explore their variable interpretative practices (Potter and Mulkay, 1985). Scientists discussed their institution's involvement in biotechnology, how their science was performed, the nature of their relationships and communication with others, issues involved in biotechnology R&D and commercialization, the role of science in society, how they dealt with the scientific, commercial and social issues they encountered in their work, the nature of risk and the regulatory environment for biotechnology, and the implications of the GM debate for their work. The interviews were audiotaped and transcribed, and lasted for an average of around 90 minutes.

Instances when scientists narrated encounters and interactions with others in the public were identified. The most common interactions narrated involved scientists' public encounters with activists. These narratives form the object of our analysis in this article, because they represent instances of discursive struggle in the debate over the role and practices of a relatively new and controversial science.

In the following three sections we present the analysis of six narratives. In five of these narratives, scientists relate their public encounters with activist groups opposing scientific research on GM or animals and their reactions to them. The sixth narrative is that of a scientist who spoke out against the justification

for particular GM research, and arguably was positioned by the establishment as an activist himself. At a more general level, the narratives are representative of themes that recur throughout the interviews we conducted.

Public encounters

The 'general public' forms a key interest group for scientists because as citizens they may legitimate or de-legitimate policy and funding directions, and more generally, influence the position of science in society. Discussion of the difficulty of managing public perceptions and expectations led two scientists to narrate a story about their relationship with the public. One of the scientists explained that science reporting can mislead the public and raise false hope, particularly in the case of cancer research, which they highlighted as a particularly emotive topic. After an announcement of a medical breakthrough in cancer treatment on a prime time current affairs television show in New Zealand, the scientists (A and B) experienced both appreciation and repudiation for their work.

Narrative 1

- 1 A: There were good and bad sequelae [chuckle from B] of that
 2 particular appearance [on TV]. B and I got sent a pair of knitted woolly
 3 hats by a delightful lady . . .
 4 B: Yes, that's right, and I got a bomb threat at midnight as well, didn't
 5 I? . . . I rang the Police at midnight and they came because [the caller]
 6 said it was outside the Cancer Society. So I told them and the Police
 7 sort of nosed around there.
 8 A: And they went and had a look.
 9 B: But they didn't find this one.
 10 A: And I came into work on the Saturday morning and found a fake
 11 bomb outside the front door
 12 *Interviewer: But why . . . ?*
 13 B: Because we announced, I think we probably mentioned the word
 14 mice somewhere . . . It was the animal activists that did it.
 15 A: The Police were commendably nonchalant about it. I phoned the
 16 Police, they turned up, looked at it, and it was a box with wires going in
 17 and out, and one of them said, 'Oh, this is a fake,' he said, and pulled
 18 all the wires out [laughter] . . . He did say, 'You go over there, but it's a
 19 fake and I'm going to pull the wires out.' And so I went over there, and
 20 he did.
 21 *Interviewer: So what were the woolly hats for?*
 22 B: Something to protect us from the bomb! [laughter].
 23 A: Just a gesture from somebody. My wife still wears it.

In this narrative, the two scientists co-construct an account and make sense of their encounters with two extremes of public reaction to their research, in which they are positioned variously as working for and against the public interest. The primary discursive practice that the scientists deploy in their narrative to construct the public response to science work as contradictory (Hatch, 1997) is

humour. The use of the word 'sequelae' (l. 1) represents a medical joke. Sequelae is a medical term for morbid conditions or symptoms following a disease. Its use as a joke between the two scientists equates working with the public with working with cancer.

Irony is also present in the narrated account through the juxtaposition of the ordinariness of woolly hats (l. 2–3) with the rather more extreme bomb threat (l. 4–11). These two objects are intensely symbolic. The former invokes images of supporting frontline troops with hand-knitted hats from home, the latter a direct threat of violence to the scientists. A possible interpretation that can be drawn is that the scientists, due to the nature of their research, position themselves on the 'frontline' of biomedical research. Overall, the use of humour in the story may be interpreted variously as a sang-froid response to danger and fear, a way of dealing with extreme public emotion, or a means of mitigating threats.

A scientist conducting GM research recalled his encounter with a group of people from Greenpeace in which he too was subjected to the threat of violence.

Narrative 2

- 1 I chose to go and talk to a Greenpeace stall in Wellington who were
 2 handing out leaflets that were based on outdated arguments, the
 3 tryptophan story and all the Monarch butterfly and all the stuff that has
 4 since been discredited or not attributed to the GM aspect of the
 5 concern. And . . . I was having a very nice conversation with the woman
 6 at the desk, and then some guy came out from the side and decided he
 7 wanted to smack me. He didn't, but I mean it really sort of like, I mean
 8 it was quite fortunate because I was quite considerably larger than him.
 9 And I just turned round and said, 'Well, if that's the level of your
 10 conversation and your argument, there's no point in carrying on is
 11 there?'
- 12 *Interviewer: A lot of the advocacy groups have been called activists*
 13 *because they seem quite entrenched in their views.*
 14 But then we both are . . . we do genetic modification because we
 15 believe in it and they oppose it because they believe to oppose it. I
 16 believe in it because of its value and its scientific grounding but it's still,
 17 at the end of the day, it's still a belief, you know. You know, I tend not
 18 to focus on the facts so much [with members of the public], you know
 19 the specific scientific issues, but more on the actual belief of the
 20 system. Because emotion is the first thing that people consider when
 21 they're looking at it. They don't like the facts, and points of science are
 22 not what get people going. It's emotion.

In this account, the scientist describes how he sought to correct misinformation based on 'bad science' (Kerr et al., 1997). The scientist is discursively positioned as safeguarding the public interest by providing accurate, factual information on GM. By being labelling as 'outdated' (l. 2) or 'discredited' (l. 4), the evidence presented by Greenpeace is dismissed as socially contingent or contaminated (Gilbert and Mulkay, 1984; Kerr et al., 1997). In effect, the scientist locates himself within scientific discourse and excludes and de-legitimizes Greenpeace as a source of epistemic authority on GM.

The attempt to provide a scientific perspective on the Greenpeace leaflets exposes this scientist to a threat of physical violence. From 'a very nice conversation' (l. 5), the scene shifts to an emotional and potentially violent confrontation (ll. 6–7), connoting the ambivalent relationship of science with different members of the public, in this instance activists. In telling the story, the scientist contrasts his reasoned argument with the emotive and unreasonable position adopted by this particular activist. The scientist emphasizes that he could have reciprocated with violence, but made an active choice to disengage (l. 8). By presenting himself as the active participant, with an ability to withdraw rather than engage in an emotional confrontation, he exercises power and control in his relations with the activists. His statement, 'Well, if that's the level of your conversation and your argument, there's no point in carrying on is there?' (ll. 9–11), suggests that his disengagement was not based on intimidation, but on rational behaviour. This portrays and reinforces scientific identity as rational and controlled and implicitly positions the scientist as adopting a moral position.

In the second part of the narrative, the scientist explains that both his and the activists' positions in relation to GM are based on beliefs (ll. 14–15). This acknowledgement is a significant shift in scientific discourse, as the idea that science is a belief system is not widely promulgated by scientists. However, this scientist qualifies his comment by distinguishing the basis for his belief in science, rational empiricism (l. 16), from the emotional basis of the activists' beliefs (ll. 20–22). The characterization of the public as emotional is consistent with the findings of Cook et al. (2004). This latter part of the narrative reflects a perception that in engaging with public over controversial science, a 'focus on the facts' (l. 18) or 'points of science' (l. 21) may be less than effective.

Marginalizing the 'Other'

As part of a discursive struggle, individuals attempt to reflexively construct and occupy various subject positions within contested discourses, which in turn then form part of the identities that individuals develop or accrue. Not only do individuals attempt to position themselves, but they may also attempt to position both supporters and opponents in order to erect or dismantle discursive boundaries. Typically, scientists have adopted a position as scientific expert that provides epistemic authority (Gieryn, 1999). However, within the following narrative account, which a scientist uses to position science work as in the public interest and illustrate a section of the public's ignorance of the consequences of cancer, we can see an example of scientists switching between expert and public identities (Brown and Michael, 2001).

Narrative 3

- 1 There is another aspect of this animal activist area . . . and that's that
- 2 cancer research has done nothing for cancer patients and that modern
- 3 drugs are making patients worse rather than better. And, you know,
- 4 that the whole thing is a sham and that people in charge of research
- 5 institutes are shareholders of companies and make money out of

6 cancer. That whole thing, you know, that trials have been faked and so
 7 on, is basically done out of ignorance because I think they should see
 8 some cancer patients and realize the reality of cancer and the
 9 problems of treating people. But I mean that is propagated, and
 10 believed by those people, that in fact the cancer on animals, the cancer
 11 research on animals is actually leading to drugs which are bad for
 12 humans. So they think that they're justified in opposing animal research
 13 because they think it's actually bad for humans. And they may in fact
 14 feel very deeply about people and disease but they feel very strongly
 15 that this is not doing something. So in a way you have to make people
 16 realize that, with what it is actually doing, you know, we have
 17 progressed in treating cancer research and people are actually doing
 18 better and feeling better with the current treatments. . . .
 19 I had a bunch of people come to my house once to protest about
 20 animal research and I said to them, I mean, they were practically all
 21 quite young, um, probably all younger than eighteen . . . And I said,
 22 you know, 'What would you do if your best friend had cancer?' And
 23 they said, 'Oh, we'll, send him to a clinic in Mexico', which I thought
 24 was interesting, firstly, that they . . . had enough money to think about,
 25 you know, that they thought sending someone to Mexico, you know,
 26 as, should be, anybody should be able to do it, kind of thing. And I
 27 think, you know, they just weren't old enough to have experienced their
 28 friends dying of cancer. I am sure as that happens they tend to fade
 29 away from that movement – because you suddenly realize the other
 30 aspect. So, I think a lot of it is probably sustained by people who really
 31 haven't had much experience with cancer.

In this narrative, the scientist effectively deconstructs the justificatory discourse deployed by animal activists and asserts the public good role of science. He represents animal activists as genuine in their beliefs about animal research (ll. 9–15), but nonetheless ignorant in that their beliefs are based on erroneous knowledge about the conduct of cancer research (ll. 4–6), and the efficacy of cancer treatments (ll. 2–3). The scientist comments on the need to promote the empirical benefits of cancer research and treatment to the public. He defends the contribution that cancer research makes to society, repositioning science in the public interest and thereby reclaims the high moral ground for science and scientists. This, in turn, re-legitimizes science as an epistemic authority and establishes a position for science as a moral authority.

The scientist then narrates an encounter with some young animal activists protesting outside his house. Instead of debating the legitimacy for cancer research on empirical scientific grounds, the medical researcher, possibly in an attempt to communicate in a social discourse understandable to the protestors, asks them what they would do if their best friend had cancer (ll. 21–2). Instead of relying on his scientific expertise, the scientist is identifying himself with the larger and older section of the public who have experienced the suffering associated with cancer (ll. 27–31). In doing so, he effectively marginalizes the younger protestors as a specific group of the public whose refusal to accept animal testing in cancer research distinguishes them from the greater public

(Brown and Michael, 2001). Identification is thus a key discursive practice used to articulate scientific and public interests.

The young protesters are further marginalized in the way that the medical researcher highlights their naivety in assuming that everyone has the financial resources to use overseas alternative medicine clinics (ll. 23–6). Again, rather than use scientific empiricism to argue against alternative medicine, he discursively foregrounds a larger section of the public who lack the socioeconomic privileges that these young protestors presumably enjoy. In this way, science is positioned as contributing to the betterment of society whereas the protestors are effectively positioned and marginalized as a group markedly different from the general public.

Activists, in particular, were a significant representation of public opinion and sentiment for many of the scientists we talked with. As these scientists recounted stories about interactions with activists a level of cynicism emerged and activists were discursively positioned as ‘other’. Consider the following narrative told to us by a scientist when discussing how anti-GM groups had affected his work.

Narrative 4

1 For me it's almost just a philosophical thing, you know. I believe that
 2 science and technology has given society the huge advantages that
 3 many of us in the Western civilisations, you know, have. And, the day
 4 that that's compromised because of, um, you know, just beliefs in other
 5 systems without hard evidence, is a very sad day.
 6 I guess for my part it's that a lot of these subscribers to the NGOs and
 7 things tend to be well off, middle class . . . And they complain and say
 8 these things because they have the luxury of being able to do it. They
 9 have afternoon coffee, afternoons in Ponsonby or whatever, and they
 10 have someone coming in who has got their Zen together and sort of
 11 tells them all these things and then they go off converted. Whereas
 12 people like us who are working five days a week . . . helping with the
 13 community swimming pool, the soccer team and the board of trustees,
 14 don't actually get the opportunity to do that. And we have to go and
 15 shop at Pak 'n Save on the basis of price and things like that. And I
 16 think that they've lost touch with reality. They take for granted all the
 17 things that science and technology have given them and then they turn
 18 round and use it against the very people that have given them all that
 19 science and all that luxury.

In this scientist's story we can see a similar discursive effect to that in the previous narrative, in which scientists discursively identify themselves with the general public, thus positioning themselves as working in the public interest and marginalizing the opponents to their work. In this account, the scientist draws on and locates himself in both scientific and socio-economic discourses, promoting science, a system based on ‘hard evidence’ (l. 5), as a public good. The scientist constructs activism as a luxury, something that only the rich have time to indulge, rather than a publicly motivated activity. Opponents to GM are described as ‘subscribers to NGOs’ (l. 6); ‘well-off, middle class’ (l. 7) people who have little to

do and, therefore, presumably engage in activism to fill the void. This discursive definition is contrasted to the social identity adopted by the scientist, who aligns himself with the general public – ‘people like us’ (l. 12) – who do not live in trendy and expensive suburbs (l. 9), who shop at budget supermarkets (l. 15), are leading busy and ordinary working, family and community lives (ll. 12–13), and generally do not have the ‘luxury’ (l. 8) of taking science ‘for granted’ (ll. 16–17).

The subject position as a member of the community has a legitimating effect; like activists, the scientist may also claim to speak on behalf of the community – in fact, a wider public. We interpret this as a discursive struggle to establish who has the legitimate right to speak for the public, and define and determine what is in the public interest. In essence, both activists and scientists are competing for the same discursive space, attempting to identify with the general public and legitimate their work by claiming the public interest. In this discursive work, the scientist effectively positions science as originating from a public interest perspective, thus constructing science as for the people, of the people, and not able to be legitimately challenged by a well-off minority of the public.

Public interest or commercial interests?

A number of the scientists we talked to were involved in various ways with the development of transgenic cattle by a New Zealand government-owned Crown Research Institute (CRI). The cows were genetically modified to express particular proteins in their milk, some to improve the production of dairy products and some as a ‘biopharming’ process for the production of a therapeutic protein promoted as a potential treatment for multiple sclerosis. As might be expected, such an application of GM science produced very different reactions in a range of social groups interested in the experiment. One anti-GM group, MAdGE (‘Mothers Against Genetic Engineering’), was concerned about the introduction of GM food and legally challenged the institution’s right to conduct the research. A scientist told us the following story in which he describes his reaction to a visit from members of MAdGE after they were invited to view the site where the research project was being conducted. In many ways, the visit could be interpreted as an exercise in public relations, in which the CRI, if not actually educating its opponents, was certainly promoting its research and demonstrating its transparency to a wider audience.

Narrative 5

- 1 They [MAdGE] had been also visiting here and I think it was a week
- 2 later they used the information they got here or what they had seen to
- 3 start a big campaign and lie. Which seemed strange, and ah, really it
- 4 looked like to me they are really making up things, what they
- 5 apparently have seen, which is really not true. It was disappointing. I
- 6 mean, it was okay, and they come and they are not prepared to change
- 7 their views on that. I can accept that, but, yeah, it was a bit
- 8 disappointing that we’re spending this time talking to people with other
- 9 views, and they are just using us. It doesn’t have the dialogue. . . .

10 I wouldn't say that they didn't understand. It seemed that, that for
 11 example, um, if I'm, I'm not sure if I'm correct but this is how I
 12 remember it, that they made some comments that there were blood
 13 stains somewhere and stuff like that, which they blew up, which I don't
 14 think that's true. Certainly they came, the point of view was that unless
 15 we can prove without any doubt that there's no risk then we shouldn't
 16 do it. And, of course, such a position you can never fulfil. Our world is
 17 based on change and we don't have any control over the changes that
 18 happen, just because it's a dynamic system. We can't put everything to
 19 a stop and just keep the status quo, it's not possible, so that's always
 20 an element of risk. But their point of view is, is the absolute certainty
 21 that there's no risk, which I think nobody can give them. Even, and their
 22 focus is certainly on food products, but even on normal food products
 23 there's always an element of risk. Of course a lot of people are dying of
 24 food poisoning, just conventional food. So then, if you buy normal food
 25 there is a component of risk. Nobody can guarantee that there will
 26 never be any problem with the food.

In this account, the scientist describes his disappointment that the visiting anti-GM group do not seem willing to engage in 'dialogue' (ll. 7–9). He positions himself and his scientific colleagues as actively engaging with others, and appears willing to accept that other people may have different personal views or beliefs on the use of GM (ll. 5–7). However, for this scientist, the activists' subsequent actions in deliberately misrepresenting the scientific practice that they observed (ll. 2–5) are not a case of public ignorance of science or a misunderstanding (l. 10). Rather, he positions the activists as 'liars' (l. 3), 'making up things' (l. 4) to use against the scientists. The effect is to dismantle the activists' arguments as untruthful; an anti-thesis to scientific truth. Foucault (1988: 107) suggested that 'truth is no doubt a form of power'. For scientists a key discursive practice is to position science as the truth and thus maintain its position and status. Discourse contestations are, in effect, power struggles. Struggles over truth, in this instance, serve to reinforce the epistemic and moral authority of science in the discursive 'credibility contest' (Gieryn, 1999) occurring in New Zealand over who represents the legitimate reality of GM.

In the second part of the narrative, the scientist counters the discursive argument on the risk of GM used by many anti-GM groups, that under the 'precautionary principle' (Ahteensuu, 2004), safety must be proven. In contrast, the scientific perspective on risk is that a certain level of risk is acceptable and in fact unavoidable. In his account, the scientist emphasizes the anti-GM group's apparently naïve demand for assurances of 'zero risk' (Cook et al., 2004) (ll. 14–16, 20–1). Risk is an area in which many non-scientist groups do look to the epistemic authority of science to provide an objective evaluation for decision-making. Ironically, of course, the empirical facticity of science is unable to guarantee the absence of risk. The scientist falls back on a contingent explanation linking the dynamic nature of the world (l. 18) with the inevitability of scientific progress and the risks associated with it. Such progress is implicitly in the public interest.

The perceived inability of non-scientific members of the public to understand the scientific impossibility of 'zero risk' was a theme that a number of the scientists we talked to emphasized. However, Cook et al. (2004) warn against the notion that the public lack an understanding of risk. They argue that, in fact, most people are well aware that nothing is risk free and live their lives in light of this knowledge. Perhaps acknowledging this, the scientist in the narrative above uses a commonplace example of food poisoning to illustrate the nature of risk (ll. 23–4). The discursive effect of positioning the risk of food poisoning in conventional food alongside the potential risk of GM food is that GM is rendered more mundane and familiar, and hence, more 'palatable' to the public (ll. 22–6).

It is important to note that these particular transgenic research experiments were publicly criticized by other scientists. In the following narrative, a scientist questions the claims made about the public benefit of the experiments. In contrast with the previous narrative, in which a scientist accuses anti-GM activists of being untruthful, here it is the CRI that is positioned as untruthful in its scientific claims.

Narrative 6

- 1 We did publish, I guess, the first work on that in New Zealand some
 2 years ago from our genetically engineered mouse, the first animal work
 3 . . . Until [the CRI] and I saw differently.
 4 *Interviewer: What was that about?*
 5 Well, I mean, I'm basically a scientist and not only a 'bullshit, let's
 6 pretend we've got the science' person. CRIs, particularly [this CRI],
 7 tend to be very much, 'Well, let's just assume we've got the science.
 8 Let's go and use it.' But hey, hold it. No, but hold it, um, where's your,
 9 where's actually your position, um, in the science. So those things
 10 cause a lot of problems. Yeah, so we've done some work with animals,
 11 animal models, on that kind of thing, . . .
 12 I mean personally I don't think there's, with animals I don't see any
 13 hazards as long as people are not completely silly. I'd be the first to
 14 say, 'Hey, stop doing it until you get the public onside with you,' and I
 15 think that's the problem they got into again. I mean, I got involved in
 16 this controversy over making a cow that produced a protein called
 17 myelin, a basic protein that supposedly could help multiple sclerosis
 18 patients. Well, [the CRI] had absolutely no basis, scientifically or
 19 medically, for making that claim. They go ahead for other reasons and
 20 make this animal and then they get all upset when people say, 'Hey,
 21 um, that animal, what's it actually going to do?' So you've got these
 22 issues that evolve, the public's perception and their understanding.
 23 *Interviewer: So what were they doing?*
 24 Oh, they needed an animal that looked as if it had a medical
 25 application. So they looked for it. . . . Politically they needed something
 26 that looked medical because people would accept that wouldn't they?
 27 But they had no fundamental science underlying that. And those kinds
 28 of things I think are the, well, they were driven into that because they
 29 realized unless they had that, they wouldn't get through the system. So
 I think the big threat, or the big problem, is really scientists a long way

30 removed from the public. So anything you do scientifically you're going
 31 to get people worrying.

This scientist expresses his concerns with the political justification and public relations for the GM science performed by the CRI in this particular case. In doing so, he criticizes the unsubstantiated political promotion of this GM research as public interest science. The initial part of his narrative establishes his credibility to speak on GM (ll. 1–2). He then discursively distinguishes two types of science. He positions himself as doing ‘real’ science, as opposed to ‘bullshit’ science, in which exaggerated claims are used to promote controversial research motivated by corporate and commercial interests (ll. 5–9). The scientist implies that political expediency, in order to gain public and regulatory acceptance, lies behind the claim that the GM research would provide a treatment for multiple sclerosis (ll. 15–20, 24–8). This scientist, who could be considered as an ‘activist’ by the CRI, positions himself as a ‘truth teller’, an advocate for the accurate representation of sound science and its claims. By providing public information and acting as an independent critic, the scientist adopts a moral position and works in the public interest.

Public interest is again a contested discursive concept indicative of the dialectical power relations within science. In this instance, public interest was deployed by the CRI as a discursive resource to further corporate interests. However, it was also a discursive practice whereby the scientist highlighted the misrepresentation of the science as public interest when it is actually for corporate commercial interests. This dialectic between promotional discourse practices and conventional empirical information practices serves to redefine and problematize the concept of public interest.

For this scientist, public trust in the integrity of sound science (Maguire and Hardy, 2006) was at stake. The scientist’s narrative provides a possible explanation for public activism against GM research, postulating that the problem the CRI faced with public acceptance of its GM research is based in its lack of understanding of the public’s perception of GM. In effect, the scientist is referring to the existence of a ‘legitimacy gap’ (Heath, 2000) between the CRI’s actions and the expectation of the public.

Discussion

During a societal controversy, science work moves beyond the laboratory to a socio-political task of legitimating scientific discourse, positioning identities, and sustaining identification with public interests. During our analysis of the interviews with biotechnology scientists, we noted that many of the scientists shifted into a story mode when they began telling us about their encounters with activists. In the encounters described in the above narratives, the scientist narrators attempt to make sense of events in which their scientific position and knowledge are actively challenged by an activist section of the public. We were interested in the discursive practices that come into play when scientists are publicly challenged during a controversy of this nature. In the analysis, the dominant discursive

practices identified were the legitimation of science as an epistemic and moral authority; positioning of science, self and other; and identification with public interests. Attempts to position science and the self are accompanied by attempts to destabilize the position of activists, de-legitimize their epistemic and moral authority and therefore reclaim the public interest.

The scientists represented their encounters as being unproductive or in some cases confrontational. A common theme running through the narratives is that of 'threat'. This operates at a number of levels, including threats to the scientist's person, to the validity of the science, and to their identity as scientists. In their narratives, the scientists respond to these threats using a range of discursive practices. For example, irony and humour are used in a number of the narratives to neutralize threat and extreme emotion in the scientists' encounters with activists. It is also used to reconcile the apparent contradiction in the divergent responses of different members of the public – some in support, others in opposition – to scientists and their work.

In many of the scientists' stories, they act discursively to legitimate and protect the integrity (and status) of science as an epistemic authority working in the public interest through their provision of empirical facts and the 'truth' about GM. They often use a contingent repertoire to separate 'real' GM science from the facts and evidence presented by their opponents. In doing so they exercise a form of social control, maintaining the autonomy of scientific knowledge (Gieryn, 1999). Encounters between the scientists and activists signify a contest over who represents the public interest, and who speaks for the public on GM and related issues. In the narratives we see the scientists countering the activist advocacy with advocacy of their own. They reiterate their belief in science as a system grounded in empirical knowledge about the world. While they may acknowledge that others have different belief systems, nevertheless only science is an appropriate belief system for evaluating the risks and benefits of GM.

As Davies and Harré (1990) have noted, stories are an important discursive practice through which position is established. In the narrated accounts, the scientists often utilize a subject position as scientific expert. Such a position is consistent with their identity as 'scientist' and enables them to access a repertoire of discursive resources which privilege scientific knowledge and a scientific world view. These resources are used to undermine and discredit the activists' arguments and behaviour, positioning the activists as unscientific and emotional and therefore not working in the public interest. Scientists position themselves as 'truth tellers'; the publicly motivated advocates for the legitimacy of scientific knowledge as the basis for decision-making in society.

However, GM and research on animals are emotive aspects of science's relationship with society for many people. When science cannot provide certainty on controversial issues like these, the social meaning of events becomes important (Moirand, 2003). In the narratives we analysed, the scientists sometimes also moved outside the scientific domain and claimed other subject positions located in social discourses. Jorgenson (2002: 359) examined 'how, in certain situated encounters, participants choose to take up some positions over others'. In this

analysis we are interested in when and why scientists claim non-scientific subject positions.

In our interpretation of the narratives, the scientists take up social subject positions when scientific discourse is apparently unable to counter emotional appeals or ambiguity in the application of science (for example, risk in GM food). They draw on and locate themselves in social discourses positioning themselves as members of the public, whether as threatened citizens, older people with 'lived experience', or community members and working parents. The discursive positioning of scientists as members of the public functions to reassure the public and remind them that scientists, as part of society, work in the public interest. This may also serve an important identity function for the scientists, who genuinely believe in the public benefits of their work. It represents a multifaceted identity for scientists, the 'multiplicities of "self"' referred to by Davies and Harré (1990: 47). This is in contrast with the monolithic scientific identity found by Cook et al. (2004: 436), in which scientists 'made no allowance . . . for their own dual existence as both scientists and members of the public'. A second discursive effect arising from the adoption of a public subject position in the scientists' narratives is the positioning of activists as the 'other'. The scientists were able to align themselves with a broader public and its interests and thereby marginalize their opponents as a subversive minority (Brown and Michael, 2001).

By claiming a subject position as scientific expert, scientists are able to utilize an extensive discursive repertoire that attempts to legitimate the knowledge and authority of science to judge or sanction what are acceptable statements for constituting the 'truth' about GM. The flexible switching to more public subject positions marginalizes opposing activist groups and establishes scientists' legitimacy as spokespersons for the public on matters like GM and representatives for the public interest.

Conclusion

This study highlights the importance of a discursive, complex, multi-faceted view of scientific identity. Scientific identity work, particularly in the context of a controversial science, is interpreted as a process of claiming, drawing upon or shifting between multiple scientific and social subject positions to position scientists as publicly motivated and working in the public interest. Traditional notions of a unitary scientific identity are therefore incompatible with a discourse perspective of identity which analyses the multiple subject positioning practices that comprise identity.

Scientists may be understood to literally and figuratively move out of the laboratory to protect the discourse of sound science. The power struggle between scientists and activists is a contest between an ensemble of beliefs and interests. Scientists recognize that science is a belief system but use scientific approaches to critique opponents' belief systems, thus expanding the discourse of sound science to include new discursive possibilities, but at the same time, amplifying contradictions and ambiguities within science discourses. The biggest challenge

for scientists working within a science discourse is how to counter the emotional discourse practices of activists. This study identified that scientists discursively shift the focus from emotion to morality to ensure that the integrity of the cultural boundary of science as a moral authority is maintained and, thus, de-legitimate emotional responses.


This brings us to a consideration of the discursive construct, public interest. Essentially, both scientists and activists are seeking to occupy a discursive space in which their actions and discourse are perceived as moral and legitimate, and in which they are positioned as the appropriate representatives of and spokespersons for the public and its interests. Power is exercised in the discursive contest of these specific scientific and public identities by claiming to represent the truth and attempting to ensure identification with the broader public. Public interest may therefore be understood as a justificatory discursive concept that functions as both a discursive space to be competed for and a discursive resource for influencing public opinion. Thus, the highly contested nature of scientific discourses and the centrality of knowledge, power, and truth in social controversies were accentuated through the discursive struggle to be positioned as the legitimate representatives of the public interest.

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