

# Restricted Voices in the New Zealand GM Debate: An Analysis of New Zealand Metropolitan Newspaper Coverage (1998 to February 2002)

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**Abstract** The discovery of genetically modified (GM) food in New Zealand in 1998 prompted a highly politicized debate about GM or biotechnology. In response, the government established a Royal Commission on Genetic Modification in May 2000. The Royal Commission and public opposition to GM, evident in large public protests, made the issue highly newsworthy. For many people the news media represent their main source of information on GM and the issues surrounding it. The news media are able to influence the public agenda by making some issues more salient in the minds of the public. Moreover, by highlighting certain attributes, the news media can suggest the most important aspects of these issues. Given the concern surrounding GM and its potential importance to the New Zealand economy, it is important to understand how the New Zealand press framed the GM debate. A content analysis of metropolitan newspaper reportage of the GM debate between 1998 and 2002 revealed that readers were offered a very narrow range of frames by which they could judge the issue and that some newspapers underrepresented some groups and their viewpoints. The results bring into question the ability of the press to act as a facilitator of public debate about GM and similar issues in the future.

**Keywords** News media · agenda setting · genetic modification

## 1 Introduction

Since the first successful recombinant DNA experiments in the early 1970s, biotechnology has been the subject of ongoing debate worldwide, with questions over the safety and morality of its use. These debates and the progress of biotechnology or genetic modification (GM) have been followed closely by the news media (Krimsky 1982; Nisbet and Lewenstein 2002; Pfund and Hofstadter 1981). In terms of scientific

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developments like biotechnology, the news media are an important source of information for most people after they leave the formal education system (Malone, Boyd, and Bero 2000; Nelkin 1995).

The theory of agenda setting argues that the media suggest to the public not only which issues are important to think about but also how to think about those issues (Coleman and McCombs 2007). The theory suggests that “the degree of emphasis placed on issues in the media influences the priority accorded these issues by the public” (McCombs and Ghanem 2001: 67). This influence occurs at two levels. At the first level, the news media’s emphasis on an issue can increase the salience of that issue in the minds of the public (Coleman and McCombs 2007). According to Renita Coleman and Maxwell McCombs, “Salience is the degree to which an issue is perceived as relatively important” (*ibid.*: 496). Therefore, the news media’s emphasis upon particular issues can influence public opinion by leading the public to perceive those issues as important to think about (*ibid.*). At the second level of agenda setting, the news media’s emphasis on particular attributes of the issues made salient can suggest to the public how one should think about those issues (Craft and Wanta 2004; Wanta and Ghanem 2007; Wanta, Golan, and Lee 2004). According to Maxwell McCombs and Salma Ghanem (2001), there are two main categories of attributes at the second level of agenda setting: cognitive attributes and affective attributes. Tamir Sheafer (2007: 23) notes that “cognitive attributes deal with the definition of issues (or objects in general) in the media, whereas affective attributes deal with the tone of media presentation, with *evaluation* of issues (i.e., positive, negative, or neutral)” (*italics in original*). The media may define the issue of GM in terms of scientific research, morality, or consumer choice (to name a few cognitive attributes) while the tone of the reportage could be for, against, or neutral toward GM (affective attributes). The ability of the media to set the agenda of public opinion on issues has been well researched, with a recent meta-analysis of agenda-setting studies finding significant media agenda-setting effects (Wanta and Ghanem 2007). According to Dietram Scheufele and Bruce Lewenstein (2005), the news media may be in a stronger position to set the agenda of public opinion when people have low levels of information or little personal experience of issues.

Therefore, for members of the public with low levels of information about GM, the news media’s emphasis on the issue could suggest that it is important for them to think about, while also suggesting what attributes of the issue are the most important to attend to. To understand how the New Zealand public may have come to understand biotechnology, it is important to research how the media portrayed the issue in terms of the emphasis it gave to the issue and its various attributes.

The news media are not only a source of information about important scientific and technological issues; they are also a “principal arena where policy-relevant issues come to the attention of decision-makers, interest groups and the public” (Nisbet and Lewenstein 2002: 360). In terms of GM, the news media not only influence the attention various groups give to the issue, but they “also powerfully shape how policy issues related to biotechnology are defined and symbolized” (*ibid.*: 360). This leads to the news media’s becoming a site of contest, as different interest groups or individuals attempt to influence how the news media shape and frame biotechnology as an issue in order to influence government policy. Dan Berkowitz (1992) argues that stakeholders who successfully influence news coverage can limit and even render invisible the

general arguments of opposition groups. This situation has the potential to restrict the scope of any debate because the public is only offered a limited number of viewpoints by which to judge and discuss the issue. Therefore, an analysis of news sources appearing in news stories is an essential part of understanding the role of the news media in the process of “social representation and power relationships in society” (Hansen et al. 1998: 108).

Previous international research into newspaper coverage of biotechnology in the United States, Europe, Australia, and New Zealand has shown that the reportage is dominated by news sources representing government-affiliated interests, including scientists (Hornig-Priest 2001; Kohring and Gorke 2000; Nisbet and Lewenstein 2002; Petersen 2001; Rupar 2007). These groups appear to exercise hegemonic control over the media reporting of biotechnology, as evidenced by the frequency in which these groups appear as news sources, the prominence of particular themes, and the consistent pro-biotechnology tone of the reportage (Nisbet and Lewenstein 2002). These types of news sources are part of the routine channel of information that journalists rely on because it readily fits with the demands and deadlines of their profession (*ibid.*). The heavy reliance on these source types has resulted in the exclusion of viewpoints from alternative sources, including environmentalists, religious leaders, and dissident scientists (Kohring and Gorke 2000; Nisbet, Brossard, and Kroepsch 2003; Nisbet and Lewenstein 2002; Pfund and Hofstadter 1981).

This domination of particular news sources appears to result in biotechnology reportage that is dominated or limited to particular themes, while others are consistently underrepresented. Studies in the United States and Europe have found that the scientific aspects of GM research, medicines, and human genetic inheritance and genetic testing were the main themes found in newspaper coverage of GM (Kohring and Gorke 2000; Nisbet and Lewenstein 2002). According to Matthew Nisbet and Bruce Lewenstein (2002: 385), the prominence of these themes comes at the expense of other themes dealing with “ethics, legal regulation, public opinion, and other competing interests, including environmentalists, religious groups, bio-ethicists, consumer groups and the public in general.” This situation has led to reportage that is predominantly positive toward biotechnology, including cloning and stem cell research (Durant, Bauer, and Gaskell 1998; Hyde 2006; Kitzinger and Williams 2005; Kohring and Gorke 2000; Nisbet and Lewenstein 2002).

This inequitable and limited coverage of biotechnology has been criticized by a number of researchers. These critiques are often predicated on the underlying assumption that the media should report a diversity of views and opinions when reporting issues. This assumption is based upon the normative theory of the role of the news media, requiring “high or professional standards of informativeness, truth, accuracy, objectivity and balance” (McQuail 1987: 118). Accordingly, the news media should be pluralist and reflect the diversity of viewpoints on different issues (*ibid.*). While the ability of the news media to uphold this ideal has been questioned (see Louw 2005; Nerone 1995; and Yin 2008), it still guides many Western media organizations, journalists, and journalism educators (Baran and Davis 2006). As already noted, the news media have the potential to facilitate public debate about the use and governance of biotechnology (Hindmarsh and Du Plessis 2008). Therefore, by adhering to the ideal of social responsibility and providing the public with diverse viewpoints, the news media have the potential to stimulate a multifaceted debate on biotechnology.

This essay reports a section of the results from a larger doctoral study that examined how the New Zealand press reported the GM debate in New Zealand from 1998 to 2002. The study was undertaken to examine how the press reported the relatively new and controversial science of GM, about which there appeared to be considerable public anxiety at the time (Weaver and Motion 2002). This was partially linked to the 1998 publication of Sue Kedgley's book *Eating Safely in a Toxic World* and the Green Party's election campaign on the issue. The book exposed the fact that GM food or food containing GM ingredients had been on New Zealand supermarket shelves since 1997 (Legat 1999), and this revelation "aroused considerable public outcry" (Weaver and Motion 2002: 331).

New Zealand's four largest metropolitan daily newspapers, the *Dominion*, the *New Zealand Herald*, the *Press*, and the *Otago Daily Times*, were chosen for analysis because they serve the four main population centers of Auckland, Wellington, Christchurch, and Dunedin, respectively. In addition, the *Dominion* and *New Zealand Herald* are also read widely outside of Auckland and Wellington. As of 30 September 2001, these newspapers had a combined circulation of just over four hundred thousand and represented a large proportion of newspapers read by the New Zealand public. These newspapers are therefore a major source of information for a large proportion of the New Zealand public about GM and the debate surrounding it. Furthermore, in the 1990s newspapers were regarded by New Zealanders as the most reliable source of information over television and radio (Roberts and Levine 1996).

The New Zealand press has also been found to be a primary source of science information for people (Billington and Bibby 1991). Furthermore, recent newspaper readership surveys suggest that newspapers are still a strong source of information for the New Zealand public. Despite the popularity of television and the growth of online media, a 2008 newspaper readership survey found that 1.6 million New Zealanders read a newspaper on a daily basis and that 80 percent of all homeowners read a newspaper each week (Newspaper Advertising Bureau 2008). Clearly, then, any study of agenda setting must consider the role of newspapers.

## 2 The New Zealand Biotechnology Debate

A number of writers have commented on the features of the GM debate. For example, Hugh Campbell (2000: 71) argued the debate about the use and governance of GM, especially in the area of food production, "is unlike that faced by any other country, with the possible exception of the United States, because of the New Zealand economy's heavy reliance on the export of primary products, especially agricultural products." The Association of Crown Research Institutes Inc. stated that "genetic technology [had] the potential to lift New Zealand's economic performance and quality of life in the 21st century" (2000: 5). This lift in economic performance would come in part through the use of GM, which would provide opportunities to New Zealand farmers to increase their agricultural outputs and export potential, while at the same time reducing their inputs. However, Campbell (2000) argued that the use of GM could threaten exports by damaging New Zealand's "clean, green image," which is seen by many as a major marketing advantage. It was also suggested that GM could transgress ethical boundaries or pose threats to human health and the environment.

According to James Watson (2000), debates about GM had to be allowed to continue and the concerns of the public answered. In his view scientists had a large part to play in answering these concerns. One commentator believed the GM issue was vitally important to New Zealand, arguing that the issue was the country's "nuclear-free issue of the 21st century" (Fitzsimons 2000). Whatever decision New Zealand made about the use and governance of GM, it clearly would have serious implications for the country's agricultural exports and overall economy.

Yet, in comparison to Europe, where concerns over GM food and crops had been debated in many countries since 1996 and more general concerns about biotechnology had been expressed since the mid-1980s (Campbell 2000; Durant, Bauer, and Gaskell 1998), New Zealand took up these issues quite late (Rogers-Hayden 2004). While a number of surveys prior to 1998 had shown concern among some New Zealanders with regard to biotechnology (see Richardson-Harman et al. 1998; Macer 1998; Macer et al. 1997), it appeared the announcement by Sue Kedgley in 1998 that foods containing GM ingredients were on supermarket shelves catalyzed for rising public concern about the issue. New Zealand's late entry into the debate also coincided with the country's second general election under the mixed member proportional system, in 1999. The election result saw a Labour-led coalition government that was supported on issues of supply and demand by the Greens. The Greens had made the issue of genetic modification part of their election campaign, calling for a government inquiry into the issue if they should be elected. The Greens' support for the Labour coalition saw the Royal Commission on Genetic Modification established in May 2000.

The Royal Commission was given the following warrant:

To receive representations upon, inquire into, investigate and report upon:

- (1) the strategic options available to New Zealand to address, now and in the future, genetic modification, genetically modified organisms and products; and
- (2) any changes considered desirable to the current legislative, regulatory policy, or institutional arrangements for addressing in New Zealand genetic modification, genetically modified organisms, and products. (Royal Commission on Genetic Modification 2001: 6)

The Royal Commission employed a number of initiatives to achieve this aim, including a public opinion survey, nationwide public meetings, consultation with Māori (the indigenous people of New Zealand), a youth forum, public submissions, and thirteen weeks of formal hearings (*ibid.*). The Royal Commission was a pivotal step for the establishment of public policy regarding the use of GM in New Zealand, offering an opportunity for the New Zealand public to become involved in the policy decision-making process.

During the time period examined, political involvement in the GM issue was strong (see Ashwell and Olsson 2004; Rogers-Hayden 2004; Rogers-Hayden and Hindmarsh 2002; Weaver and Motion 2002). There were also a number of protests against GM during the period examined, including the sabotage of GM experimental crops; public rallies and marches against GM, including one by Māori in October 2001 (Langdon 2001); and the establishment of a number of grassroots anti-GM groups. GM became a highly newsworthy issue, and the Royal Commission was a focal point for media coverage.

### 3 Method

The time span chosen for analysis, 1998 through February 2002, extends from the beginning of concern among the New Zealand public about GM to four months after the government announced its policy regarding GM use in New Zealand based upon the Royal Commission's findings released on 31 July 2001. The aim of the study was to examine New Zealand metropolitan press reportage of the GM debate. The research focused on which news source types and themes appeared most frequently in the reportage. The results indicate which news source types appeared most frequently in the New Zealand metropolitan press coverage of the GM debate and whether this adhered well to the norm of social responsibility. In addition, the thematic analysis illustrates which attributes of the debate were emphasized in the reportage.

Content analysis, or a systematic analysis of the manifest content of GM reportage in the *Dominion*, the *New Zealand Herald*, the *Press*, and the *Otago Daily Times* from January 1998 through February 2002 was conducted. A search of the Newztext database, an online "archive of the full text of many of New Zealand's key news and business publications" (Knowledge Basket 2011), was then conducted using the search terms *genetic engineering*, *GE*, *genetic modification*, *GM*, and *biotechnology*. These articles were then filtered to yield a sample of only news stories for analysis, because they are expected to adhere to the journalistic ideals of objectivity and balance. Editorials, columns, opinion pieces, and letters to the editor that forcefully present their viewpoints with little room for balance and objectivity (Kuypers 2002; Wahl-Jorgensen 2001) were not included in the final sample. Finally, while feature articles offered readers an in-depth examination of the issue, they were not included in the final sample, because only seven (0.9 percent), were found. It was decided that rather than including these articles, the research would concentrate on news stories, of which there were 638.

These 638 stories were first analyzed using a "visible source impact" approach (Berkowitz 1992). This approach uses content analysis to determine how frequently particular news sources appear in the text. This method gives a picture of the overall source influence on an issue, and as already noted, it aids in understanding the role of the media in social representations and power relationships in society (Hansen et al. 1998).

News source appearance was analyzed by measuring the volume (in square centimeters) of direct and indirect source citations and then calculating the percentage of each across the period examined. The classification of news source types was derived from previous research and through an analysis of a subset of fifty stories. The source categories are shown in Table 1.

A thematic analysis of source citations and nonattributed news content was also undertaken. By reading a subsample of fifty stories and using categories from previous research (see Durant, Bauer, and Gaskell 1998; Kohring and Gorke 2000; Nisbet and Lewenstein 2002), a set of mutually exclusive theme and subtheme categories were developed and tested to reflect the unique nature of the New Zealand data. These themes are shown in Table 2; they were also measured in terms of the volume given to each.

All source citations or quotes were coded by the primary theme of the citation. Where citations used or alluded to more than one theme, a more interpretive reading of

**Table 1** Source Categories

Source	Explanation of those included
Scientists	Individuals designated as scientists or scientific experts
Industry	Industrial and commercial enterprises and their employees. This group included people speaking on behalf of Crown Research Institutes.
Policy makers	Central and local body politicians, nonelected government officials. The latter groups included spokespersons for government ministers and/or government ministries.
Lobby groups	Sources attributed to or labeled as anti- or pro-GM groups and spokespersons for social issue groups, e.g., GE-Free New Zealand, Life Sciences Network, and the Society for the Protection of the Unborn Child
Religious spokespeople	Religious groups, spokespeople, and churches
Māori representatives (indigenous people of Aotearoa/New Zealand)	Māori spokespersons, iwi (tribe), and Māori authorities
Health/disease groups	Individuals suffering diseases and disease advocacy groups
Environmental/animal welfare groups	Greenpeace, Save Animals from Exploitation
Regulatory authorities	Government-appointed authorities, e.g., Environmental Risk Management Authority
Royal Commission	Commission members and appointed spokespersons
Other	Includes identified and unidentified sources without affiliation to any of the above

the citation would reveal that the intent of the source was to use one theme to argue for and support the primary theme being discussed. These supporting themes were often sandwiched between definitive statements concerning the primary theme being discussed. To treat these statements as separate themes would undermine the source's discursive intent; in these cases the source statement was coded under the primary theme in order to retain the intent of the speaker. For example, "Hilary Phillips, of Temple Sinai, said the observance of kashrut (laws relating to kosher food) 'determines the boundaries within which we regulate our lives.' Fundamental to that, she said, was the ability to separate certain mixes of food. 'The Jews are inveterate label readers'" (Samson 2001). A strict reading of this passage would code this citation under the economic subtheme of consumer choice, because it is speaking about the labeling of GM food. However, it is clear that the speaker is making an ethical or moral plea for the labeling of GM food, arguing for these foods to be labeled in order that people following the Jewish faith can avoid transgressing their kashrut laws. Therefore, this particular citation was coded under the ethical subtheme of transgression rather than that of consumer choice.

**Table 2** Theme and Subtheme Categories

Science	The scientific issues surrounding GM
GM science	GM science and research issues
Containment	Risks associated with the limitations of GM containment
Rigor	Disputes over the scientific method used in GM research
Loss of scientists	Possible loss of scientists involved in GM experimentation
Science regulation	Possible impacts of regulation(s) on GM research/science
Politics	Political environment surrounding the GM issue
Political process	The political process in relation to GM, e.g., the passage of bills through parliament
Political division	Conflict between or within political parties regarding GM
Anti-GM activism	Anti-GM activism and protests occurring outside of Parliament
Balance	Issues of bias in Royal Commission proceedings
Political procedure	Processes and/or procedures of the Royal Commission and the Environmental Risk Management Authority
Political regulation	Control of GM within existing or proposed legislation
Report of the Royal Commission	The report of the Royal Commission
Economics	Economic issues surrounding GM
Consumer choice (economic)	Ability of consumers to choose whether or not they eat GM food, including issues of labeling and/or food traceability and the financial costs of these regimes
GM economics	Economic implications of GM
Organics	Economic possibilities of organic farming
GM/organics	Possible coexistence and/or the future collapse of the distinction between organic and GM food production
Economic regulation	Impact of GM regulation in relation to economics
Ethics	How GM may affect or conflict with spiritual, natural, ethical, and cultural values
Ethical consideration	Regard for ethical/moral values when making GM decisions
Ethical transgression	Possible transgression of ethical/moral values by GM use
Ethical regulation	The control of GM in relation to ethical/moral values
Environment	Environmental issues surrounding GM
Environmental effects	Possible effects of GM technology on the environment
Environmental regulation	Impact of GM regulation in relation to the environment
Health	GM and its possible impacts on human health
Health effects	Possible effects of GM on human health
Health regulation	Impact of GM regulation in relation to medicine



**Table 3** Distribution of Genetic Modification News Stories and Volume by Newspapers, January 1998 through February 2002

Newspaper	Number of stories	Percentage of total items	Volume (cm <sup>2</sup> )	Percentage of total volume
<i>Dominion</i>	216	33.9	30,707.82	38.4
<i>New Zealand Herald</i>	156	24.5	22,362.23	27.9
<i>Press</i>	111	17.3	11,582.73	14.5
<i>Otago Daily Times</i>	155	24.3	15,320.74	19.2
Totals	638	100.00	79,973.52	100.0

Source citations were also coded according to whether they were pro-GM, anti-GM, or neutral with regard to GM, measuring the tone or affective attributes of the GM reportage. Here are two examples:

Pro-GM: “A greater leadership role for governments in promoting biotechnology as a source of future prosperity.” (New Zealand Press Association 2000b)

Anti-GM: “Commercial cropping of genetically engineered canola in Otago-Southland will damage New Zealand’s image, Green Party co-leader Jeanette Fitzsimons warns.” (Gibb 1999)

Where a news source did not make a clear statement either supporting or opposing GM, the statement was recorded as neutral.<sup>1</sup>

As noted, the larger study also conducted semistructured interviews with science journalists involved in reporting the GM debate. While it is not the purpose of this essay to give an in-depth report of these interviews, insights from two of these journalists are used to lend support to the discussion of the content analysis findings. It is important to note that the *Dominion* journalist reported on the Royal Commission hearings daily.

The two journalists, working for the *Dominion* and the *New Zealand Herald*, had forty-six years of journalistic experience between them. In terms of science reporting, the *Dominion* journalist had been working in the area for ten years, and the *New Zealand Herald* journalist had been on the science/environment beat for three years. Both extensively reported on the GM debate during the period analyzed.

#### 4 Findings

As noted, 638 hard news stories from the four metropolitan dailies were analyzed. As shown in Table 3, the *Dominion* published the most stories during the period analyzed. This is probably due to the *Dominion* journalist’s reporting daily on the Royal Commission hearings.

<sup>1</sup> The operational definitions and coding protocols followed in this study are available from the author.

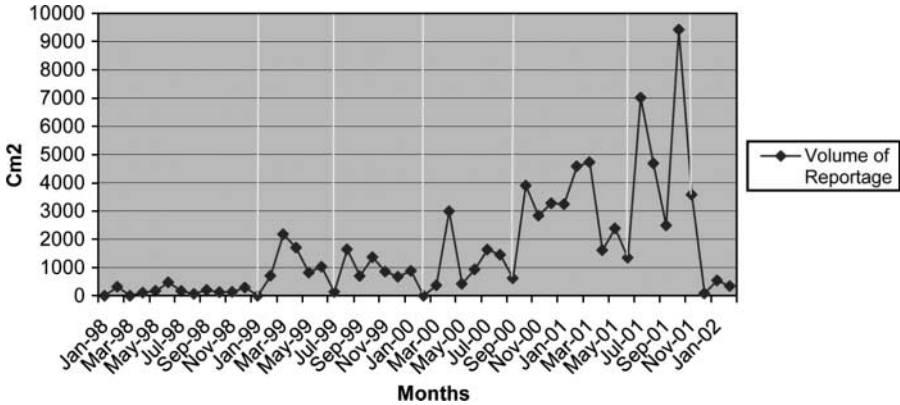


Fig. 1 New Zealand metropolitan newspaper reportage of the genetic modification debate from 1 January 1998 to 28 February 2002, by story volume (cm<sup>2</sup>)

The volume of coverage over the period analyzed is illustrated in Fig. 1. The reportage of the issue was minimal between January 1998 and January 1999 and then started to increase from February 1999. The volume of reportage fluctuated between February 1999 and October 2000, with peaks appearing in April and September 1999 and May 2000. The volume increased strongly from October 2000, reaching its peak in October 2001 at nearly nine times the volume recorded in February 1999. The volume of coverage then declined rapidly, reaching levels below those recorded in February 1999 by the end of February 2002.

As shown in Fig. 1, the volume distribution can be divided into seven stages reflecting the fluctuation in coverage across the period analyzed. The first stage appears between January 1998 and January 1999 and is represented by a nearly flat line, indicating that the GM debate was not considered very newsworthy at this time. This stage did mark the beginning of the regular inclusion of GM as an issue due to the discovery of GM food in New Zealand supermarkets in 1998 (Legat 1999). Stage 2, between February 1999 and July 1999, shows a peak in volume in March and April before declining again in July. The peaks were due to stories reporting concerns with GM food labeling and breaches in some GM field trials at that time (see, e.g., Samson 1999; New Zealand Press Association 1999). Stage 3 increased in volume in August 1999 before steadily declining to nearly nil in February 2000. The increase in volume in August 1999 was related to stories reporting the debate over proposed experiments to place human genes in cows to develop a possible cure for multiple sclerosis (see Milne 1999). In stage 4, peaks in April and July were again due to stories reporting concerns about possible containment breaches and further debate about cow experiments (see, e.g., New Zealand Press Association 2000a, 2000c). Stage 5 recorded the highest volume (October 2000) given to the issue to that date, before declining in April 2001, with the stage ending in June 2001 at a slightly higher level than that of September 2000. This period marked the beginning of the Royal Commission hearings held between October 2000 and March 2001, and a large number of stories reporting these hearings were published during this period. Stage 6 saw the volume rapidly increase in July 2001 and then again in October, when it reached the highest level of the period examined. The sharp rise in July was related to stories reporting the Royal

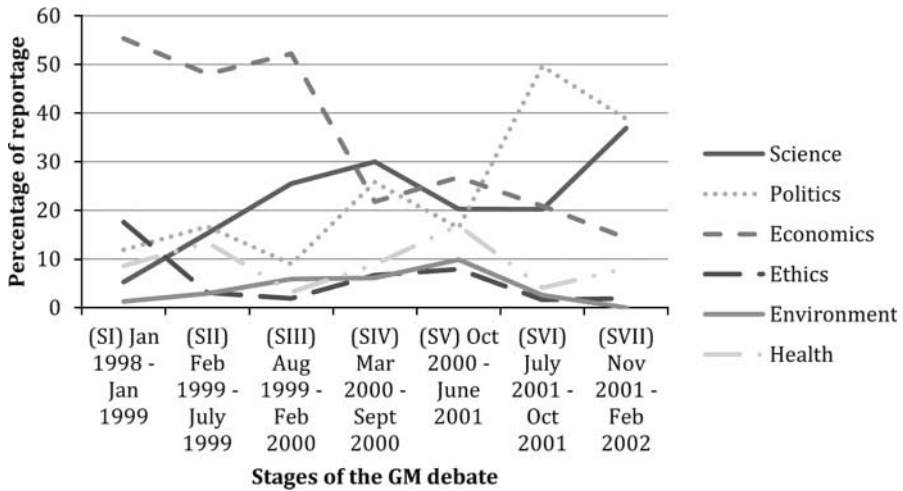


Fig. 2 Major themes of the New Zealand genetic modification debate as a percentage of the total volume of reportage (cm<sup>2</sup>) across the stages of the GM debate

Commission’s delivering its findings to the government, and the large rise in October correlated to stories reporting the government’s announcement of its policy on GM based on those findings. The announcement was followed by a rapid decline in volume in the seventh and final stage, with reportage starting to show a flat line from December 2001 to the end of February 2002. However, the volume was still slightly higher than that recorded in stage 1 between January 1998 and January 1999. While a large number of events related to GM occurred during the period analyzed (see McGuinness, White, and Versteeg 2008), the events outlined above were the most frequently reported by the newspapers analyzed and therefore gave rise to the peaks in volume reported.

Only 3 percent (19) of the 638 stories appeared on front pages during the period analyzed. The largest number of these stories (seven) were published in October 2001, the month the government announced its policy decisions on GM based on the Royal Commission’s findings. The suggestion that the New Zealand metropolitan newspapers did not regard GM as a high-profile issue is also supported by the fact that only the *Dominion* reported on the Royal Commission hearings daily. In a research interview, the *Dominion* journalist said they had struggled to convince their editor that the GM issue was important enough, in terms of its long-term impact on New Zealand, to report the hearings in this manner.

### 5 Themes and Subthemes

As illustrated in Fig. 2, in all stages the themes of economics, politics, and science dominated the reportage. Except for science in stage 1, each of these themes comprised more than 10 percent of the reportage in any one stage. The ethics theme rose above 10 percent of all reportage only in stage 1, and the health theme comprised more than 10 percent of all reportage only in stages 2 and 5. However, the environment theme never rose above 10 percent in any stage, reaching its highest percentage (9.9 percent) of all

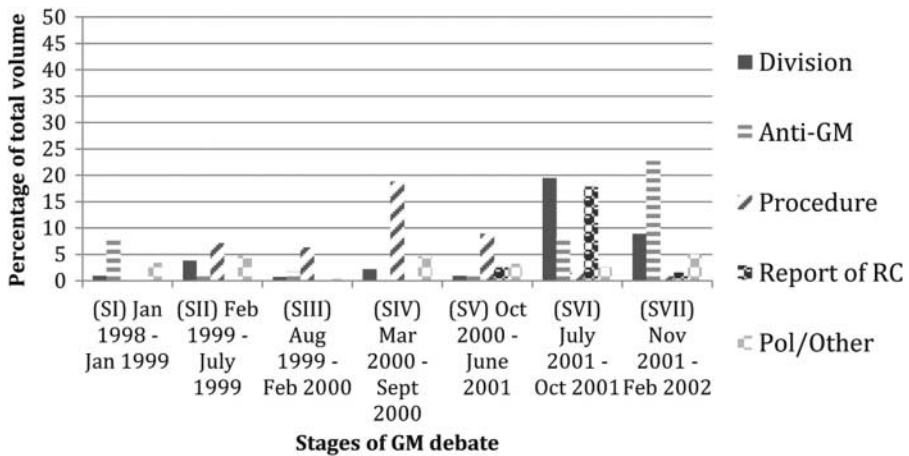


Fig. 3 Political subthemes as a percentage of all themes

reportage in stage 5. These results suggest that the New Zealand press primarily reported the GM debate in terms of the technology's scientific, economic, and political implications. The ethical implications and GM's possible effects on human health and the environment received less coverage. Previous research of press coverage of GM in the United States and Europe also found the reportage dominated by themes emphasizing the scientific and economic implications of GM (Kohring and Gorke 2000; Nisbet and Lewenstein 2002). The New Zealand reportage differs from that analyzed in these earlier studies, with the dominance of political themes reflecting the highly politicized nature of the GM debate in this country.

As shown in Table 4, each of these major themes comprised a number of mutually exclusive subthemes. How the reportage was distributed among three of these subthemes is illustrated in Figs. 3, 4, and 5. The politics theme had the largest percentage of volume overall (Fig. 3). The largest political subtheme in any stage was anti-GM activism at 22.9 percent in stage 7. Next was the political division subtheme in stage 6, at 20.0 percent, and the report of the Royal Commission followed this at 18.3 percent in stage 6. Finally, the political procedure subtheme reached its highest level in stage 4. The other political subthemes of political regulation and balance, shown in Table 2, did not exceed 5 percent of all themes individually in any stage and so in Fig. 3 are combined under the label "Pol/Other."

After politics, science was the next largest overall theme. Unlike our results for New Zealand, most international studies have found this to be the major theme of biotechnology reportage, with GM research in general being the most common subtheme (Nisbet and Lewenstein 2002). As Fig. 4 and Table 4 illustrate, GM science was the largest science subtheme in any stage, at 26.3 percent of reportage in stage 7. This was followed closely by science regulation at 25 percent in stage 4. The only other science subtheme to exceed 5 percent of reportage was containment, at 7.8 percent in stage 3. The remaining science subthemes shown in Table 2, rigor and loss of scientists, did not exceed 5 percent of reportage individually in any stage and were therefore combined under the label "Science Other."

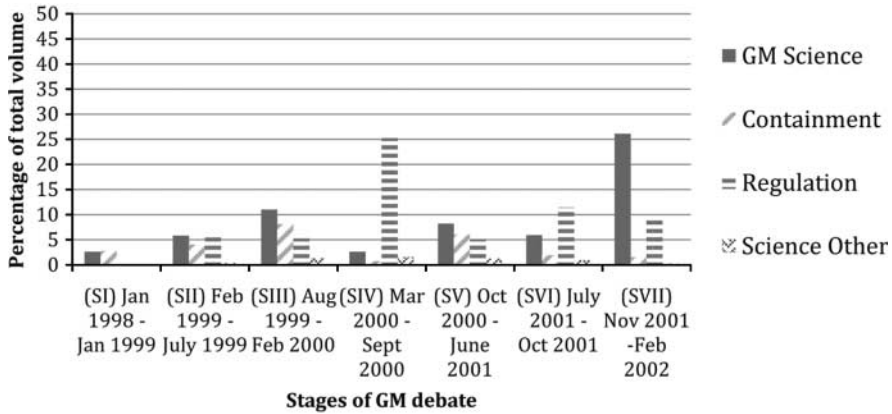


Fig. 4 Science subthemes as a percentage of all themes

The distribution of economic subthemes is illustrated in Fig. 5. The largest economic subtheme in any one stage was consumer choice, reaching its highest level in stage 1 at 47 percent of the reportage. This coincided with the announcement that foods containing GM ingredients had been on supermarket shelves in 1998 (Legat 1999). The only other economic subtheme to exceed 5 percent of reportage in any stage was GM/economics, at its highest level in stage 2 at 29.2 percent. The other economic subthemes of GM/organics, organics, and economic regulation were combined and recorded under “Econ Other” because none exceeded 5 percent of all themes individually.

## 6 News Sources

As noted earlier, the dominance of particular news sources in U.S. coverage of biotechnology appears to allow these groups to exercise hegemonic control over the

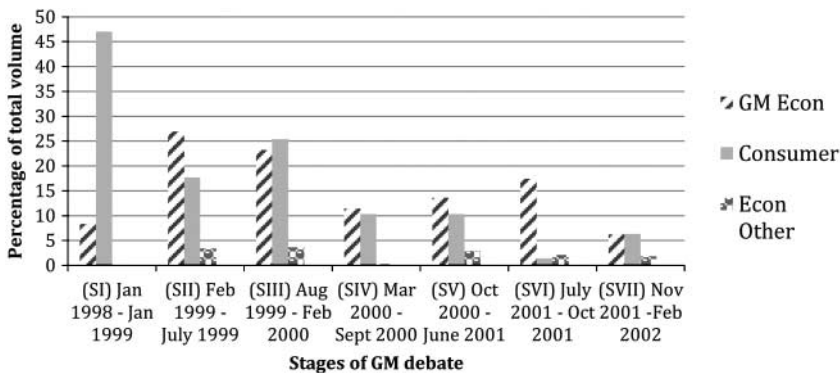


Fig. 5 Economic subthemes as a percentage of all themes

reporting of GM (Nisbet and Lewenstein 2002). As Fig. 6 illustrates, the three most frequently cited types of news sources in the New Zealand coverage were policy makers, scientists, and industry spokespersons. On average, these three groups were 74.11 percent of all source citations across the seven stages, with the highest average occurring in stage 2, at 89.3 percent, and the lowest average in stage 1, at 65.4 percent. Of these three groups, only scientists, in stage 1 (5.3 percent), were ever below 10 percent of all source citations. The only other news source types to exceed 10 percent of all source citations in any given stage were regulatory authorities in Stages 1 and 4 and lobby groups in Stage 7. However, over the seven stages of the debate, regulatory authorities only comprised 6.36 percent of all source citations and lobby groups 6.16 percent of all citations. Overall, these figures clearly show the dominance of policy makers, scientists, and industry spokespersons as news sources throughout the reporting of the GM debate.

A cross-tabulation of the data also shows which news source types were most likely to speak about which themes or subthemes. When combined, policy makers, scientists, and industry spokespersons had the largest percentage of source citations on all subthemes except one: transgression (see Table 4). Sources recorded as “other” made up 57.1 percent ( $n = 24$ ) of all source citations for the transgression subtheme, compared with the combined percentage of citations from policy makers, scientists, and industry spokespersons at 35.7 percent ( $n = 15$ ). This was the only subtheme where citations from sources representing the interests of religious, Māori, health, and environmental groups appeared to dominate. However, as a subtheme it comprised only 2.1 percent of all source citations.

## 7 Tone of Reportage

Finally, an analysis of the tone or affective attributes of source citations toward GM found that 30.8 percent of all source citations favored GM, 18.4 percent opposed GM,

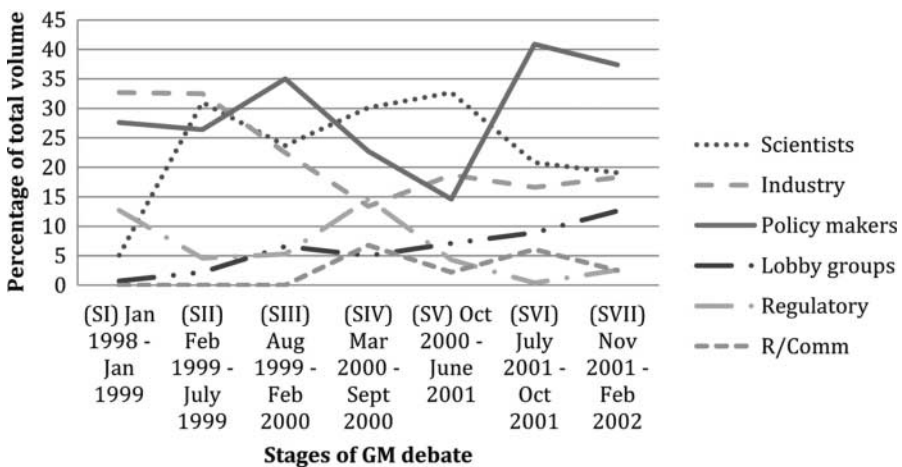


Fig. 6 News sources as a percentage of the total volume of all source citations across the stages of the GM debate

**Table 4** Cross-tabulation of news source type by subthemes [percent (n)]

Theme/subtheme	News source type							Total
	Scientist	Policy maker	Industry	Lobby groups	Regulatory authorities	Royal Commission members	Other	
<i>Science</i>								
GM science	53.6 (n = 59)	18.2 (n = 20)	10.9 (n = 12)	10.0 (n = 11)	0.9 (n = 1)	0	6.4 (n = 7)	n = 110
Containment	31.8 (n = 26)	20.7 (n = 17)	26.8 (n = 22)	2.4 (n = 2)	11.0 (n = 9)	2.4 (n = 2)	4.9 (n = 4)	n = 82
Science regulation	38.9 (n = 86)	32.1 (n = 71)	8.1 (n = 18)	7.7 (n = 17)	7.7 (n = 17)	1.0 (n = 2)	4.5 (n = 10)	n = 221
Science other	51.7 (n = 15)	13.7 (n = 4)	0	27.6 (n = 8)	0	0	7.0 (n = 2)	n = 29
<i>Politics</i>								
Division	0.7 (n = 1)	93.4 (n = 128)	0.7 (n = 1)	0.7 (n = 1)	0	0	4.5 (n = 6)	n = 137
Anti-GM activism	17.9 (n = 21)	35.0 (n = 41)	5.1 (n = 6)	27.4 (n = 32)	1.7 (n = 2)	0	12.9 (n = 15)	n = 117
Procedure	7.5 (n = 8)	29.0 (n = 31)	0	5.6 (n = 6)	15.0 (n = 16)	24.3 (n = 26)	18.6 (n = 20)	n = 107
Report of Royal Commission	19.3 (n = 12)	45.2 (n = 28)	8.1 (n = 5)	4.8 (n = 3)	0	12.9 (n = 8)	9.7 (n = 6)	n = 62
Politics other	0	54.6 (n = 65)	6.7 (n = 8)	17.7 (n = 21)	1.7 (n = 2)	6.7 (n = 8)	12.6 (n = 15)	n = 119
<i>Economics</i>								
GM economics	23.3 (n = 60)	21.3 (n = 55)	41.0 (n = 106)	6.2 (n = 16)	0	1.2 (n = 3)	7.0 (n = 18)	n = 258
Consumer choice (economic)	9.1 (n = 21)	31.3 (n = 72)	40.4 (n = 93)	5.7 (n = 13)	6.1 (n = 14)	0.5 (n = 1)	6.9 (n = 16)	n = 230
Economics other	8.7 (n = 4)	21.7 (n = 10)	50.0 (n = 23)	6.5 (n = 3)	0	2.2 (n = 1)	10.9 (n = 5)	n = 46
<i>Ethics</i>								
Consideration	28.8 (n = 19)	19.7 (n = 13)	0	1.5 (n = 1)	9.1 (n = 6)	1.5 (n = 1)	39.4 (n = 26)	n = 66
Transgression	11.9 (n = 5)	16.7 (n = 7)	7.1 (n = 3)	4.8 (n = 2)	2.4 (n = 1)	0	57.1 (n = 24)	n = 42

Table 4 – continued

Theme/subtheme	News source type							Total
	Scientist	Policy maker	Industry	Lobby groups	Regulatory authorities	Royal Commission members	Other	
Regulation	33.3 (n = 5)	33.3 (n = 5)	0	0	0	0	33.3 (n = 5)	n = 15
Environment								
Effects	33.7 (n = 39)	17.3 (n = 17)	17.3 (n = 17)	9.2 (n = 9)	0	1.0 (n = 1)	21.5 (n = 15)	n = 98
Regulation	28.6 (n = 2)	14.3 (n = 1)	14.3 (n = 1)	0	0	0	43.0 (n = 3)	n = 7
Health								
Effects	42.7 (n = 83)	13.9 (n = 27)	8.7 (n = 17)	4.6 (n = 9)	0.5 (n = 1)	1.0 (n = 2)	28.6 (n = 55)	n = 194
Regulation	6.2 (n = 1)	43.8 (n = 7)	18.7 (n = 3)	0	12.5 (n = 2)	0	18.8 (n = 3)	n = 16
<b>Total</b>	<b>n = 467</b>	<b>n = 619</b>	<b>n = 335</b>	<b>n = 154</b>	<b>n = 71</b>	<b>n = 55</b>	<b>n = 255</b>	<b>n = 1956</b>



and 50.76 percent of citations had a neutral or undisclosed stance toward GM. This result is at odds with previous international research that has found GM reportage to have a pro-biotechnology bias of 46 to 80 percent (see [Kohring and Gorke 2000](#); [Nisbet and Lewenstein 2002](#)). The reason for the large percentage of source citations having a neutral or undisclosed stance is unclear, although a small proportion (7.6 percent) may be explained because unelected government officials and those speaking for regulatory authorities made them. People in such positions are not expected to take a stance on issues; but they simply make statements concerning policies or regulations. However, these statements are a very small proportion of the citations and do not explain the large percentage of neutral or undisclosed source citations. This is an area for further investigation.

## 8 Discussion

These results show that the newspapers analyzed reported the GM debate in a limited manner. The issue was low on the press agenda, with only 3 percent of stories ever reaching the front pages, and the reportage was dominated by a limited number of themes and news source types.

When examined in terms of the news sources cited, three source types dominated the GM reportage, policy makers, scientists, and industry spokespeople (see [Fig. 6](#)), making up 74.11 percent of all source citations across the period analyzed. Only two other source types, lobby groups and regulatory authorities, gained more than 5 percent of all source citations during the period analyzed. This result is consistent with previous international research that found these three groups dominate the reporting of biotechnology in both Europe and the United States ([Hyde 2006](#); [Kohring and Gorke 2000](#); [Nisbet, Brossard, and Kroepsch 2003](#); [Nisbet and Lewenstein 2002](#); [Pfund and Hofstadter 1981](#)).

The most cited of these groups, policy makers, are consistently identified as major news sources used by journalists. These sources are built into the routines of journalists because they are easily accessed and are perceived as credible ([Davis 2000](#); [Gans 1979](#); [Miller and Riechert 2000](#)). In the GM debate, policy makers were involved in many of the key decisions concerning the labeling of GM food, the setting up of the Royal Commission, and the organization of the moratorium on GM field trials, and they were the final arbiters of the policy decision based on the Royal Commission's findings. In addition, Green members of Parliament spearheaded the opposition to GM. Therefore, policy makers were logical news sources for journalists reporting on the debate.

Scientists were the second largest news source type cited in the reportage. The possible reasons for the reliance on scientists as sources include that "science is seen as an avenue of access to assured findings, and scientists—in the dissemination of these findings—as the initial sources" ([Dornan 1990](#): 51). Furthermore, the complexity of GM means that journalists without an adequate scientific background will have to rely on scientists as sources ([Hornig-Priest 2001](#)).

The third most frequent type of news source cited was industry spokespeople. Previous studies have often found industry spokespeople being cited discussing new GM developments and/or the economic prospects of GM ([Krimsky 1982](#); [Nisbet](#)

and Lewenstein 2002; Pfund and Hofstadter 1981). This was also the case in the New Zealand reportage, with the industry spokespersons often being cited discussing the local economic prospects for GM, which was recorded under the economic subtheme of GM economics (see Table 4).

The dominance of these three source types meant little space was given to citations from other source types. As Fig. 6 shows, only two other source types, regulatory authorities and lobby groups, exceeded 10 percent of all source citations. Announcements from regulatory authorities are frequently reported by the news media, so their slightly stronger representation is perhaps not surprising. The lobby group category represented both pro- and anti-GM groups. This source type gained more than 10 percent of all source citations only in stage 7 (see Fig. 6). This coverage resulted from the actions of anti-GM groups sabotaging experimental GM crops at Lincoln University in January 2002 (Beston 2002). Both anti- and pro-GM lobby groups were heavily cited in stories reporting this incident. Other groups representing Māori, health, environment, and religious viewpoints collectively gained only 5.63 percent of all source citations.

It can be argued that this lack of coverage of the viewpoints of these groups is simply a true reflection of the groups' actual involvement in the debate. However, a number of factors restricted the possibility of these groups' receiving more coverage. First, policy makers, industry spokespeople, and scientists are favored, routine channels of information for journalists (Brown et al. 1987; Davis 2000). Journalists also perceive these routine sources to be reliable, trustworthy, authoritative, and articulate (Brown et al. 1987). Reliance on these routine news sources by New Zealand journalists has possibly increased as a result of increased concentration of news media ownership, accompanied by a decline in newsroom resources (Hollings et al. 2007; Rosenberg 2008).

In contrast, protest groups, in this case anti-GM groups, are often seen as unreliable and untrustworthy and therefore are often underreported because of "the media's implicit presumption that their positions are (almost by definition) beyond the pale of rational thought" (Hornig-Priest 2001: 3). Such groups can also appear to threaten the status quo or that which is considered sensible and are therefore not likely to be represented out of concern for offending the wider audience (Louw 2005).

In interviews with the two journalists representing the *Dominion* and *New Zealand Herald*, it was clear that they did not hold protest groups in high esteem as reliable news sources. Both of the journalists remarked that their papers did not report on many of the protest actions of anti-GM groups. The *New Zealand Herald* journalist said they had been criticized by anti-GM groups as being pro-GM because of the very limited space given to anti-GM groups and their views by the newspaper. The *Dominion* journalist said: "Our newspaper made a conscious decision to generally not show pictures of protests. As a paper we decided the only way to cover this whole GM issue was to stick as closely as possible to the commission hearings, and we ignored 90 percent of all lobbying that went around it" (personal communication, 17 October 2002). While the *Dominion* journalist was speaking about both anti- and pro-GM lobbying, the decision to report the GM debate in terms of the Royal Commission, while ignoring lobbying, may have more adversely affected anti-GM groups and the message they wanted to portray, because many did not gain access to the Royal Commission. In contrast, the largest pro-GM lobby group, the Life Sciences Network,

did gain access to the Royal Commission, so their views had more opportunity to be reported.

The deliberate choice to exclude coverage of the protests of lobby groups may have eliminated any chance some groups had to receive media coverage, because for some groups protest is the only option they have to gain media attention (McCombs and Shaw 1977). Furthermore, the exclusion of these groups and their actions also brings into question whether the metropolitan press did adhere to the ideal of social responsibility. While choosing to use the Royal Commission hearings appeared to offer newspapers the most balanced way to report the GM debate, ironically, it had the effect of further limiting the representation of some groups and their viewpoints. The reasons for this situation are discussed below.

According to Brian Wynne (1982), royal commissions have become a formal setting for conflict over matters of public policy, and the Royal Commission on Genetic Modification was no exception. The commission gave space to interested parties representing a wide range of groups interested in the possible effects of GM on the environment, animal welfare, and human health, as well as those who wished to question how GM techniques might affect the religious and moral beliefs held by Māori and religious groups. However, volunteer organizations such as environmental or religious organizations were somewhat disadvantaged in gaining interested party (IP) status because the Royal Commission's "restrictive timelines presumed hierarchical organizational structures, limiting member consultation time and creating additional obstacles to participation for groups relying mainly on volunteers and small budgets" (Rogers-Hayden 2004: 219). Corrina Tucker (2003) noted that only one advertisement, taken out in twenty-two daily newspapers on 29 July 2000, was ever published notifying interested groups to register their interest in becoming IPs, making it difficult for voluntary organizations to prepare their submissions. Some groups that were refused IP status criticized this lack of advertising and also the difficulty of gaining further information or clarification about the process of applying for IP status (*ibid.*). Tucker's (2003) analysis of groups gaining IP status found that 59 percent were in favor of GM, in contrast to 30 percent that were opposed to GM. Further analysis revealed that of those groups that were refused IP status, 12.4 percent were in favor of GM, while 63.4 percent opposed GM.

Furthermore, Tee Rogers-Hayden (2004: 219) argues that the Royal Commission privileged "rational scientific administrative discourse," resulting in "interest groups separated from publics presumably separating 'facts' from opinions." Timothy Doyle and Doug McEachern (2008: 257) also argue that "there is a certain kind of authority that attaches itself to the 'independent,' 'public' or 'expert' inquiry; this gives recommendations some standing that may sanction developments under conditions that would make continued opposition seem at best unreasonable and churlish." Arguments based on environmental, spiritual, or health perspectives are not seen as equal to ones based on scientific knowledge, to the point that "discourses that are not science based are deemed 'private' concerns" (Rogers-Hayden and Campbell 2003: 524). As a result, these arguments are often dismissed as emotional or antitechnology and not taken seriously. Therefore, the decision by newspapers to cover the GM debate predominantly in terms of the Royal Commission appears to have reduced the ability of groups representing spiritual, health, and environmental concerns to have these issues reported.

The thematic analysis reinforces the dominance of certain news source types in the reportage. The analysis illustrates that the reportage was dominated by the three major themes, politics, science, and economics, while themes concerned with health, environment, and ethics were far less represented (Fig. 2). As Table 4 illustrates, even in an examination of which sources were most likely to be cited on a theme, policy makers, scientists, and industrial spokespersons were the most likely groups to be cited on all subthemes except one, transgression. However, as noted earlier, this subtheme comprised only 2.1 percent of all themes in the reportage.

Furthermore, the analysis of subthemes in Figs 4, 5, and 6 illustrates that the attributes of the GM debate that were emphasized in the reportage were political division, political procedure, GM science, science regulation, consumer choice, and GM economics (Table 2). The concept of second-level agenda setting suggests that the reading public may have been encouraged to regard the most important aspects of the GM debate in terms of the political division it caused between political parties, procedures to be used at the Royal Commission, the importance of GM science and how it was to be regulated, debate about the cost and viability of labeling GM food, and the importance of adoption for the New Zealand economy. This is a limited view of the wider issues that surround the science of GM.

Whether this limited range of themes in the reportage is the result of the heavy reliance of journalists on institutional sources, while choosing to ignore other sources and themes, or whether it is due to the decision to report the issue in terms of the Royal Commission hearings, the content analysis is unable to answer. However, the results do illustrate that the public was only offered a limited number of attributes or themes by which it could judge the GM debate.

## 9 Conclusions

While content analysis can be used to unobtrusively observe the final product of the agenda-setting and framing processes, from which some valid and reliable interpretations can be made, it does little to explain the agenda-setting process itself (Nisbet and Lewenstein 2002). This study used additional information gained from interviews with journalists working for two of the newspapers analyzed to further explain some of the findings. This is an area for future research.

The results of this study clearly show that metropolitan newspapers relied heavily on institutional news sources—policy makers, scientists, and industry spokespeople—in their reporting of the GM debate. The patterns in the news coverage indicate the news media fell short of normative ideals of social responsibility, particularly in the consistent underreporting of noninstitutional lobby groups. When combined with their decision to report the GM debate in terms of the Royal Commission hearings, the resultant reportage strongly emphasized themes reflecting the political, scientific, and economic implications GM held for New Zealand.

The results also suggest that these editorial decisions may have allowed institutional news sources to exercise hegemonic influence, resulting in the GM debate's being reported in a manner favoring their own interests, while making alternative frameworks and issues less visible (Berkowitz 1992; Nisbet and Lewenstein 2002). The limited nature of reportage given to groups with concerns about the ethical,

environmental, and health aspects of GM seems to support this. Therefore, it appears that the newspapers analyzed did not facilitate an inclusive public debate and that many other important issues related to GM received little or no coverage (e.g., see Ho 2004; Hutchings 2004). This situation appears to leave the public with limited information about GM and also could alienate groups with concerns about the ethical, environmental, and health aspects of GM from science, the policy-making process, and the media (Wynne 2001). Whether this has occurred is an area for future research. It is suggested that such research could usefully investigate how less represented groups perceive their interactions with the news media. While the press is only one channel through which the public gains science information, these results do raise concerns about the ability of the press to inform the public about scientific developments and facilitate public debate.

Finally, while these events occurred a decade ago, the study still has relevance today. Given that the news media still play a strong role in influencing public perceptions and policy debates about scientific developments (Caufield, Bubela, and Murdoch 2007), the GM debate provided an opportunity to analyze how the news media structured this type of debate. As a result, this analysis may give some insight into how current debates surrounding climate change, biotechnology, and nanotechnology are reported and structured.

## References

- Ashwell, Douglas, and Su Olsson (2004). Political party issue or party credibility contest? An analysis of rhetoric in the debate on genetic modification, leading up to the 2002 general election in New Zealand. *Communication Journal of New Zealand* 4: 45–63.
- Association of Crown Research Institutes Inc. (2000). *The place of genetic technology in New Zealand*. Wellington: Association of Crown Research Institutes Inc.
- Baran, Stanley J., and Dennis K. Davis (2006). *Mass communication theory: Foundations, ferment, and future*. 4th ed. Boston: Wadsworth.
- Berkowitz, Dan (1992). Who sets the media agenda? The ability of policymakers to determine news decisions. In *Public opinion, the press, and public policy*, edited by J. David Kenamer, 81–102. Westport, CT: Praeger.
- Beston, A. (2002). Anti-GM sabotage destroys potatoes. *New Zealand Herald*, 11 January.
- Billington, Gregory, and Barbara C. Bibby (1991). *Survey of attitudes to, and understanding of, science and technology in New Zealand*. Wellington: Ministry of Research, Science and Technology.
- Brown, Jane D., Carl R. Bybee, Stanley T. Wearden, and Dulcie M. Straughan (1987). Invisible power: Newspaper news and sources and the limits of diversity. *Journalism Quarterly* 64: 45–54.
- Campbell, Hugh (2000). The future of New Zealand's food exports. In *Designer genes: The New Zealand guide to the issues, facts, and theories about genetic engineering*, edited by Prebble Ray, 71–84. Wellington: Dark Horse.
- Caufield, Timothy, Tania Bubela, and C. J. Murdoch (2007). Myriad and the mass media: The covering of a gene patent controversy. *Genetics in Medicine* 9 (12): 850–55.
- Coleman, Renita, and Maxwell McCombs (2007). The young and agenda-less? Exploring age-related differences in agenda setting on the youngest generation, baby boomers, and the civic generation. *Journalism and Mass Communication Quarterly* 84 (3): 495–508.
- Craft, Stephanie, and Wayne Wanta (2004). U.S. public concerns in the aftermath of 9-11: A test of second level agenda setting. *International Journal of Public Opinion* 16 (4): 457–63.
- Davis, Aaron (2000). Public relations, news production, and changing patterns of source access in the British national media. *Media, Culture, and Society* 22 (1): 39–59.
- Dornan, Christopher (1990). Some problems in conceptualizing the issue of “science and the media.” *Critical Studies in Mass Communication* 7 (1): 48–71.
- Doyle, Timothy, and Doug McEachern (2008). *Environment and politics*. 3rd ed. London: Routledge.

- Durant, John, Martin W. Bauer, and George Gaskell, eds. (1998). *Biotechnology in the public sphere: European sourcebook*. London: Science Museum.
- Fitzsimons, J. (2000). The nuclear-free issue of the twenty-first century. In *Designer genes: The New Zealand guide to the issues, facts, and theories about genetic engineering*, edited by Ray Prebble, 187–96. Wellington: Dark Horse.
- Gans, Herbert J. (1979). *Deciding what's news: A study of CBS Evening News, NBC Nightly News, Newsweek, and Time*. New York: Pantheon.
- Gibb, J. (1999). Modified canola threat to NZ image. *Otago Daily Times*, 14 April.
- Hansen, Anders, Simon Cottle, Ralph Negrine, and Chris Newbold (1998). *Mass communication research methods*. New York: New York University Press.
- Hindmarsh, Richard, and Rosemary Du Plessis (2008). The new civic geography of life sciences governance: Transitions and trajectories in Australia and New Zealand. *New Genetics and Society* 27 (3): 175–80.
- Ho, Mae-Wan (2004). Foreword: Science, ethics, and nature. In *Recoding nature: Critical perspectives on genetic engineering*, edited by Richard Hindmarsh and Geoffrey Lawrence, 15–20. Sydney: University of New South Wales Press.
- Hollings, James, Geoff Lealand, Alan Samson, and Elspeth Tilley (2007). The big NZ journalism survey: Underpaid, under-trained, under-resourced, unsure about the future—but still realistic. *Pacific Journalism Review* 13 (2): 175–97.
- Hornig-Priest, Susanna (2001). *Grain of truth: The media, the public, and biotechnology*. Lanham, MD: Rowman and Littlefield.
- Hutchings, Jessica (2004). Tradition and test tubes: Maori and GM. In *Recoding nature: Critical perspectives on genetic engineering*, edited by Richard Hindmarsh and Geoffrey Lawrence, 179–91. Sydney: University of New South Wales Press.
- Hyde, John (2006). News coverage of genetic cloning: When science journalism becomes future oriented speculation. *Journal of Communication Inquiry* 30 (3): 229–50.
- Kedgley, Sue (1998). *Eating safely in a toxic world*. Auckland: Penguin (NZ).
- Kitzinger, Jenny, and Clare Williams (2005). Forecasting science futures: Legitimising hope and calming fears in the embryo stem cell debate. *Social Science and Medicine* 61 (3): 731–40.
- Knowledge Basket (2011). All about Newtext. (<http://www.knowledge-basket.co.nz/newztext/welcome.html>, accessed on 24 July 2011)
- Kohring, Matthias, and Alexander Gorke (2000). Genetic engineering in the international media: Analysis of opinion-leading magazines. *New Genetics and Society* 19 (3): 345–63.
- Krimsky, Sheldon (1982). *Genetic alchemy: The social history of the recombinant DNA controversy*. Cambridge, MA: MIT Press.
- Kuypers, Jim A. (2002). *Press bias and politics: How the media frame controversial issues*. Westport, CT: Praeger.
- Langdon, C. (2001). Marchers promote anti-GM message. *Dominion*, 1 November.
- Legat, N. (1999). GM food: Should we worry? *North and South*, August, 39–50.
- Louw, P. Eric (2005). *The media and political process*. London: Sage.
- Macer, Darryl (1998). *Public perceptions of biotechnology in New Zealand and the international community: Eurobarometer 46.1*. Christchurch: Eubios Ethics Institute.
- Macer, Darryl, Howard Bezar, Nicola Harman, Hiroshi Kamada, and Nobuko Y. Macer (1997). Attitudes to biotechnology in Japan and New Zealand in 1997, with international comparisons. *Eubios Journal of Asian and International Bioethics* 7: 137–51.
- Malone, Ruth E., Elizabeth Boyd, and Lisa A. Bero (2000). Science in the news: Journalists' constructions of passive smoking as a social problem. *Social Studies of Science* 30 (5): 713–35.
- McCombs, Maxwell E., and Salma I. Ghanem (2001). The convergence of agenda setting and framing. In *Framing public life: Perspectives on media and our understanding of the social world*, edited by Stephen D. Reese, Oscar H. Gandy, and August E. Grant, 67–82. Mahwah, NJ: Erlbaum.
- McCombs, Maxwell E., and Donald L. Shaw (1977). Agenda-setting and the political process. In *The emergence of American political issues: The agenda-setting function of the press*, edited by Donald L. Shaw and Maxwell E. McCombs, 149–56. St. Paul, MN: West.
- McGuinness, Wendy, Miriam White, and Steph Versteeg (2008). The history of genetic modification in New Zealand. ([http://www.sustainablefuture.info/Site/Publications/Project\\_Reports.aspx](http://www.sustainablefuture.info/Site/Publications/Project_Reports.aspx), accessed on 29 July 2011)
- McQuail, Denis (1987). *Mass communication theory: An introduction*. London: Sage.

- Miller, M. Mark, and Bonnie P. Riechert (2000). Interest groups strategies and journalistic norms: News media framing of environmental issues. In *Environmental risks and the media*, edited by Stuart Allan, Barbara Adam, and Cynthia Carter, 45–54. London: Routledge.
- Milne, J. (1999). Push for human genes in cows. *Dominion*, 25 August.
- Nelkin, Dorothy (1995). *Selling science: How the press covers science and technology*. Revised ed. New York: Freeman.
- John C. Nerone, ed. (1995). *Last rights: Revisiting four theories of the press*. Urbana: University of Illinois Press.
- New Zealand Press Association (1999). National MPs block Bunkle gene-food bill. *Dominion*, 17 March.
- New Zealand Press Association (2000a). Gene experiment tipped to go ahead. *Dominion*, 22 July.
- New Zealand Press Association (2000b). Scientists warn on gene bans. *Dominion*, 25 October.
- New Zealand Press Association (2000c). University gene work shut down. *Dominion*, 13 April.
- Newspaper Advertising Bureau (2008). 2008 Newspaper readership survey and circulation results [electronic version], 1. (<http://www.infonews.co.nz/news.cfm?l=1andt=138andid=33510>, accessed on 7 July 2010).
- Nisbet, Matthew C., Dominique Brossard, and Adrienne Kroepsch (2003). Framing science: The stem cell controversy in an age of press/politics. *Press/Politics* 8 (2): 36–70.
- Nisbet, Matthew C., and Bruce V. Lewenstein (2002). Biotechnology and the American media: The policy process and the elite press, 1970 to 1999. *Science Communication* 23 (4): 359–91.
- Petersen, Alan (2001). Biofantasies: Genetics and medicine in the print news media. *Social Science and Medicine* 52 (1): 1255–68.
- Pfund, Nancy, and Laura Hofstadter (1981). Biomedical innovation and the press. *Journal of Communication* 31 (2): 138–54.
- Richardson-Harman, Nicola, Tracey Phelps, Pauline Mooney, and Rod Ball (1998). Consumer perceptions of fruit production technologies. *New Zealand Journal of Crop and Horticultural Science* 26 (3): 181–92.
- Roberts, Nigel S., and Stephen Levine (1996). Bias and reliability: Political perceptions of the New Zealand media. In *Dangerous democracy: New media politics in New Zealand*, edited by Judy McGregor, 197–209. Palmerston North: Dunmore.
- Rogers-Hayden, Tee (2004). Commissioning genetic modification: The marginalisation of dissent in the Royal Commission on Genetic Modification. Ph.D. diss., University of Waikato, Hamilton, New Zealand.
- Rogers-Hayden, Tee, and John R. Campbell (2003). Re-negotiating science in environmentalists' submissions to New Zealand's Royal Commission on Genetic Modification. *Environmental Values* 12 (4): 515–34.
- Rogers-Hayden, Tee, and Richard Hindmarsh (2002). Modernity contextualises New Zealand's Royal Commission on Genetic Modification: A discourse analysis. *Journal of New Zealand Studies* 1 (1): 41–62.
- Rosenberg, Bill (2008). *News media ownership in New Zealand*. Christchurch: Campaign against Foreign Control of Aotearoa.
- Royal Commission on Genetic Modification (2001). *The report of the Royal Commission on Genetic Modification*. Wellington: Printlink.
- Rupar, Verica (2007). Investigating the journalistic field: The influence of objectivity as a journalistic norm on the public debate on genetic engineering in New Zealand. Ph.D. diss., Waikato University, Hamilton.
- Samson, A. (1999). Call to halt tests after possible trial crop "escape." *Dominion*, 12 April.
- Samson, A. (2001). Case for food labelling argued. *Dominion*, 22 February.
- Scheufele, Dietram A., and Bruce V. Lewenstein (2005). The public and nanotechnology: How citizens make sense of emerging technologies. *Journal of Nanoparticle Research* 7: 659–67.
- Sheafer, Tamir (2007). How to evaluate it: The role of story-evaluative tone in agenda setting and priming. *Journal of Communication* 57: 21–39.
- Tucker, Corrina A. (2003). *Contaminated democracy: A discourse analysis of the submissions to the Royal Commission on Genetic Modification*. Master's thesis, Massey University, Palmerston North.
- Wahl-Jorgensen, Karin (2001). Letters to the editor as a forum for public deliberation: Modes of publicity and democratic debate. *Critical Studies in Media Communication* 18 (3): 303–20.
- Wanta, Wayne, and Salma Ghanem (2007). Effects of agenda setting. In *Mass media effects research: Advances through meta-analysis*, edited by Raymond W. Priess, Barbara M. Gayle, Nancy Burrell, Mike Allen, and Jennings Bryant, 37–52. Mahwah, NJ: Erlbaum.

- Wanta, Wayne, Guy Golan, and Cheolhan Lee (2004). Agenda setting and international news: Media influence on public perceptions of foreign nations. *Journalism and Mass Communication Quarterly* 81 (2): 364–77.
- Watson, James D. (2000). The debate on genetic engineering. In *Designer genes: The New Zealand guide to the issues, facts, and theories about genetic engineering*, edited by Ray Prebble, 187–96. Wellington: Dark Horse.
- Weaver, C. Kay, and Judy Motion (2002). Sabotage and subterfuge: Public relations, democracy, and genetic engineering in New Zealand. *Media, Culture, and Society* 24 (3): 325–43.
- Wynne, Brian (1982). *Rationality and ritual: The Windscale Inquiry and nuclear decisions in Britain*. Bucks: British Society for the History of Science.
- Wynne, Brian (2001). Creating public alienation: Expert cultures of risk and ethics on GMOs. *Science as Culture* 10 (4): 445–81.
- Yin, Jiafei (2008). Beyond the four theories of the press: A new model for the Asian and world press. *Journalism Communication Monographs* 10 (1): 5–62.