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outlook

The media and food-risk perceptions

Science & Society series on Food and Science

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In 1996, at the height of the scandal about mad cow disease in the UK, a guest on Oprah Winfrey's talk show claimed that meat produced in the USA could cause bovine spongiform encephalopathy (BSE). "That just stopped me cold from eating another burger," Winfrey responded. Later, beef farmers from Texas sued Winfrey's show, claiming that it was partly responsible for the steep decline in beef prices in the USA during the following months, even though the country did not have a single case of BSE. This episode demonstrates not only the power of the media and its influence on the public, but also how easily the public is swayed, particularly by fear, even in the absence of information.

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Nevertheless, more information is not necessarily a panacea for disinformation. Households in developed countries have greater access to information than ever before—through television, newspapers, journals, radio and the internet—yet the public remains, ironically, poorly informed. This is most evident when consumption of a food dramatically declines after media reports about contamination or harm, or when European consumers vehemently oppose genetically modified food, despite accumulating scientific evidence that these products do not harm the environment and are safe for human consumption.

There are various understandable causes of public reactions to food scares or food-health stories in the media, but the media itself sets the stage for the public's response by choosing which information to present and, perhaps more importantly, how to present it. Extensive media coverage affects consumer perceptions of products and risks and, consequently, can influence demand for services and products.

The function of the media is not to foster the public good or to reassure the public that they are safe. Most television stations and newspapers are now privately owned—many of them by one of a few huge companies. The media therefore has its own financial and other interests, and needs to please both shareholders and audiences by providing the kind of information and analysis that mass audiences expect. Similarly, other sources of information—such as agriculture and biotechnology companies, universities and farmers—have equally powerful incentives that could bias the information they are willing to share and the conclusions they seek to draw. In the USA, news coverage has always been largely commercial in this way, whereas in Europe, private companies have only become the dominant source of information during the past two decades. Moreover, the structure of the media market itself has changed with the growth of 24-hour news and the internet—notably in terms of blogs, social media and the ability to distribute videos online.

One criticism that is often levelled at the media is that it sensationalizes news and is biased against positive news stories. Instead, the media seems to focus on negative news stories and shun careful and balanced analysis of an issue, favouring 'sound bites' and simplistic conclusions. Commercial news reporting tends to focus on events,

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such as a sudden food-safety problem or an organized event accompanying the launch of a new product or policy.

The overall concern is that the increasing commercialization of the media has led to a 'dumbing down' of the news; that is, lower-quality journalism and less coverage of complex issues, driven by competitive pressures that have forced media companies to cut back on reporting and editorial staff in areas that do not attract many readers or viewers (Alterman, 2008; Zaller, 1999). The emergence of the 24-hour news cycle might even have further weakened journalistic standards; modern news reports have been found to contain an increasing number of factual errors (Pew, 2004).

These concerns have caused many European governments to continue their subsidized public broadcasting, in order to maintain the overall quality and reliability of news and information. However, if subsidized public media cover the high-quality news market, it might further decrease the quality of coverage offered by commercial companies (Canoy & Nahuis, 2005). This

Science & Society Series on Food and Science

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argument is supported by studies of the US media market, which show that the regional expansion of so-called 'quality' newspapers such as *The New York Times* and *The Washington Post* has led to a reduction in the quality of local and regional newspapers (George & Waldfogel, 2006).

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All of this is particularly relevant in the context of food, as most consumers primarily receive information about food and biotechnology through the popular press and television (Hoban & Kendall, 1993; Marks *et al*, 2003). Extensive media coverage of an event can contribute to a heightened perception of risk and amplify its consequences. Food scares are prime examples of this effect: they are typically accompanied by a flood of media coverage and lead to a decline in demand for the product in question, often concomitant with a level of panic that scientists would argue is not appropriate, given the real risks.

Accordingly, social scientists and psychologists have conducted research into how information shapes and determines perceived risks of food. Generally, most consumers are "rationally ignorant" (McCluskey & Swinnen, 2004); they rationally choose not to fully inform themselves about an issue. In other words, although consumers have access to huge amounts of information, they choose to be less than fully informed. There are three explanations for this attitude. First, if it costs money to access the news and doing so only provides limited benefits, it is rational not to purchase the information. Second, although reducing the price of news will make information more accessible, acquiring and processing it takes time, energy and attention. Consequently, consumers reach a threshold at which the cost of processing the information is larger than the benefit. The third reason has to do with the information source: ideological bias or distrust of a news source might cause consumers not to inform themselves fully.

The decision about how much information is enough also depends on consumers' *ex ante* (previous) risk perceptions. In one of the first surveys of consumer perceptions of health risks in food, van Ravenswaay (1990) concluded that most consumers acknowledge the existence of risks, but perceive them to be small. Although the public adjust their risk perceptions in the light of new information, they are only willing to pay modest amounts for information that would reduce perceived food risks. One explanation is that the cost of risk avoidance is low because consumers can stop purchasing a specific food if they learn that it poses a higher risk than they thought.

In fact, *ex ante* beliefs tend to have a stronger influence on risk perceptions than news or other types of information. For example, many consumers think that organically produced products—which carry a higher risk of mycotoxins—are safer than more-intensively farmed crops, irrespective of information about management activities (Loureiro *et al*, 2001). Generally, consumers perceive natural risks as being easier to manage because they seem to be less threatening than technological risks.

In general, risk perception varies between consumers, owing to many factors. Gender and education are consistent demographic predictors of food-risk perceptions. Non-demographic predictors include the nature of the perceived threat, trust in regulatory authorities, the source of the information and the way in which it is distributed, and health and environmental concerns (Ellis & Tucker, 2009). For example, consumers of organic foods perceive greater risks from pesticide residues than other consumers.

Both social and individual factors can amplify or dampen perceptions of risk (Flynn *et al*, 1998; Koné & Mullet, 1994), and the media is an important mechanism in this process. Slovic (1987) suggests that risk perception is influenced by two factors: dread and unknown risks. Dreaded risks are those deemed to be uncontrollable, involuntary and affect many people with potentially catastrophic consequences. Unknown risks are new, uncertain and unobservable, or might have delayed effects. Food scares are often rated highly as dreaded risks, but because they are understood they receive lower ratings as unknown risks. By contrast, new food technologies, such as genetically modified foods, are rated highly as unknown risks. Thus, differences in consumer knowledge might influence risk perceptions; most scientists tend not to think that genetically modified foods are risky.

Previous beliefs also have an important role in the selection and processing of information provided by the media. Poortinga & Pidgeon (2004) studied the perception of genetically modified food in the UK and found a strong confirmatory bias—selecting information that agrees with your previous beliefs; those with positive or negative beliefs interpret the same events as being in line with their attitude. Frewer *et al* (1997) also found that the initial attitude to genetic engineering is the most important determinant of how people assess new information about it. These attitudes remain stable, even if persuasive arguments against them are provided. In fact, initial attitudes also affect perception of the quality of information; respondents with a negative view are likely to perceive positive information about the technology as less accurate and more biased than people with positive views.

The nature of the information also matters. In general, consumers give more weight to negative than positive information. This is ironic because one often-heard complaint about the media is that news coverage is too negative. This tendency is actually driven by demand (McCluskey & Swinnen, 2004), as the value of information is higher for consumers if it concerns an issue with a negative effect on welfare. The rationale is that consumers can use negative information to make decisions in order to avoid losses. As media companies care about profits, they will inevitably offer more negative stories.

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Siegrist & Cvetkovich (2001) conducted psychological experiments to assess this bias towards negative information in regard to health risks in food. They found that people place greater trust in results that indicate a health risk, and that confidence in the results increases with a higher indication of risk. The authors suggest three possible explanations: diagnosticity—negative information is more diagnostic than positive information, and might therefore be given greater weight; loss aversion—for most people it is important to avoid losses; and credibility—negative information might be more credible than positive information because positive information can be regarded as

self-serving, whereas negative information often seems to lack this quality. However, critics of these studies warn against confusing negativity bias and confirmatory bias in explaining how information shapes citizens' perceptions. Yet, after controlling for confirmatory bias, negativity bias still has a role: negative items have more impact than positive ones.

The source of information is also important for shaping risk perception, as distrust of the institution providing the information increases the perception of risk (Renn, 2005). There is some debate about the importance of source credibility. Some studies find that source credibility has a key role in determining the impact of a message on public opinion, while others find that source credibility seems to have a limited effect and is less important than initial attitudes. Kumkale *et al* (2010) show in a meta-analysis that the credibility of the source matters mostly for attitude-formation conditions, whereas its impact in attitude-change conditions is lower. Conversely, recent studies show that internet users pay little or no attention to source credibility when they seek health information.

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Many people, in fact, anticipate that information from the media might be biased and take this into account when evaluating it. However, several behavioural studies conclude that even when viewers know that media sources are biased, they do not sufficiently discount the information to account for this bias. Exposure to media can thus systematically alter or reinforce beliefs and consumer behaviour. In conclusion, the impact of bias in media reporting on consumer attitudes is bidirectional and complex. Consumer bias in personal preferences and beliefs affect the media's reporting strategies to convince these consumers to buy their media products. Similar complex interactions occur between the media and politicians and between the media and business.

Although the media's effects on public perception are complex, their impact can be significant. Curtis *et al* (2008) argue that differences in the structure of the media

between countries might have important implications for food-risk perceptions. The negative attitude towards genetically modified foods that is typical of consumers in rich countries is in contrast to attitudes in poorer countries, where studies have found that consumer attitudes towards genetically modified foods are not as negative, and in many cases even positive. The authors claim that this might be partly explained by differences in the organization of the media. In poorer countries, information is more expensive and scarce and people often have less time to read and acquire information, which leads to an overall lower level of information. Moreover, government control of the media in poorer countries tends to be more extensive and might lead to more-positive coverage of biotechnology, if the government has a positive attitude.

An important issue is the dynamics of the media market—that is, not only whether, but when to publish news. The structure of the mass media encourages fast, concentrated coverage. As collecting information requires time, effort and other costs, publishing a story on the basis of incomplete information risks biasing reports, which might hurt the reputation of the media outlet, and thereby future profits. However, covering a story early on might yield market share and profits if an outlet can be the first to provide information on a new issue. Consumers also face a trade-off. They might be willing to take the risk of getting biased information, as long as they get whatever information is available. In other words, any news is better than no news.

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These issues are particularly important in food scares. A case in point is the 1989 Alar controversy in the USA. Alar was the trade name for daminozide, a plant growth-regulator used to stimulate the growth, appearance and ripening of fruits, primarily apples. In February 1989, the US news programme *60 Minutes* covered the Natural Resources Defence Council's report, which said that Alar poses a cancer risk to children. Most US media organizations followed suit. As a result, supermarkets took apples off their shelves and schools removed apples from their cafeterias. US apple growers lost millions of dollars in revenues and announced a voluntary ban on Alar, which became effective in the autumn of 1989. In hindsight, analysts argue that the media confused a long-term cumulative effect with an imminent danger, resulting in unnecessary panic and financial losses (Negin, 1996).

BSE, commonly known as mad cow disease, is another example. In March 1996, the UK government announced that mad cow disease was the likely cause of death for ten people. In April 1996, coverage of BSE on the Oprah Winfrey show in the USA was followed by a steep decline in beef prices in the following month, even though there were no BSE-infected cattle in the USA.

Tabloid newspapers and the popular press typically worry less about their reputation in terms of quality, and more about being the first to publish or broadcast a story. The elite press worries more about quality. However, there is an interesting dynamic component: once one media company reports a story—no matter how biased their coverage is—it can initiate a chain reaction. If the issue is important enough, competitive forces will cause elite press organizations to follow suit, even before they are able to verify the story. The first story becomes the basis of their reporting.

There are two reasons for this dynamic. First, competition and consumer choice force the media to pay attention to an issue, otherwise consumers ask why their preferred media source is not covering the story and will go elsewhere. The second reason is that by commenting on a story that was launched by another media company, more-reputable media outlets are covered if things go wrong—that is, when the primary information turns out to be biased. They can hide behind the fact that they were not the first to cover it, and only reflected on a story launched by someone else. The first factor minimizes the immediate losses from waiting too long, and the second limits future negative effects on reputation. These dynamics are summarized by the following quote, "Even apparently responsible papers [...] contribute to building up [food] scares. When the scare has run its course, they will argue against it. But when the scare dynamic is up and running, [the quality press] will join with the throng and become more tabloid than the tabloids" (North, 2000).

Although competition for audiences leads to an intensification of media attention in the early reporting of a story, it also induces a rapid decline in attention afterwards. The popular press is often first to report on a crisis and more intense in its initial coverage, but quickly loses interest. Thus, competition in the commercial media intensifies the scale of the scare, as well as bringing it to a fast—and often premature—conclusion.

Even if the commercial media provide simple and clear messages, consumers might realize that reality is more complex

There is also evidence that early claims, even when they are false, are reported more extensively than later corrections. Swinnen *et al* (2005) examined the media response to two food-safety crises: the 1999 dioxin crisis, and the 2001 foot and mouth disease outbreak. Comparing tabloids and the elite press, they found that overall coverage was almost the same, but that tabloids initially responded more quickly and intensely and also lost interest more quickly. They also found that initial errors in the news were not properly corrected when new facts emerged and initial interest had waned.

The short-term impacts of food-safety information on consumer demand can be significant. One example is BSE, which had a negative effect on the consumer demand for beef, the severity of which was increased by the media. Verbeke & Ward (2001) found considerable misperception of the problem by consumers, a lack of knowledge about the relevant science and biased perception of the scientific criteria relevant to the safety of meat. Television coverage of meat safety had a negative effect on the demand for red meat after the BSE outbreak (Verbeke *et al*, 2000), and younger people were most susceptible to negative media coverage.

However, in the long run, consumption and sales typically recover if the problems are addressed (Henneberry *et al*, 1999; Piggott & Marsh, 2004), although the effects on policy can be lasting. In 1993, after an *Escherichia coli* outbreak at the Jack in the Box restaurant chain, 144 people were hospitalized and three died. The restaurant chain almost went out of business in the wake of the event, but after two years, sales had

recovered to pre-scare levels (Entine, 1999). By contrast, the legislative repercussions on burger restaurant chains have persisted.

The most-significant long-term effect of mass-media reporting is its impact on public policy. By invoking strong responses in their audiences through concentrated, emotionally charged coverage, media outlets put pressure on governments to react to situations, effectively setting the agenda on a certain issue; this is sometimes called the 'CNN factor' (Hawkins, 2002). Similarly, an absence of media coverage of even important events or problems lowers their priority in legislative agendas. Robinson (2001) suggests that the media has great power to lead policy-makers, especially when there is uncertainty or limited information. For example, in the wake of the media frenzy surrounding the Jack in the Box *E. coli* outbreak, US President Bill Clinton called congressional hearings about the safety of the food supply. The US Food and Drug Administration raised the recommended internal temperature of cooked burgers to 155 ° fahrenheit (68 °C). It is now almost impossible to order a burger cooked less than 'medium' in US restaurants.

Another interesting example is the use of the precautionary principle in regulation in the EU and the USA. The precautionary principle is now used as a major regulatory tool in food safety issues in the EU, in particular to regulate genetically modified foods. However, it was used more in the USA from the 1960s to the mid-1980s (Vogel, 2003). Several European food scares in the 1990s, heavily publicized in the mass media, changed this. It pushed politicians to introduce a series of new regulations and it caused consumers to be more concerned about food safety. Although *ex post* studies showed that several of these food-safety problems were exaggerated, the massive press coverage induced strong political reactions, leading to regulations and shifts in consumer preferences that are having long-lasting effects on perceptions of food risk and the regulation of the food system in Europe (Swinnen & Vandemoortele, 2010).

The examples considered above and the power of the media to influence an ignorant public—willfully or otherwise—have important implications for risk communication, education and management. First, because initial beliefs are important—affecting not only overall risk perceptions, but also the way in which consumers process new information—it is important to enhance consumer understanding of risk through education and by providing early information. This should create a realistic framework within which people can assess risks once an event occurs. Pre-emptive risk communication and the establishment of institutions that are responsive to problems can mitigate negative, long-term consequences on public policy or consumer preferences.

Scientists, businesses, interest groups and politicians can also influence public perception, in particular by using the internet to circumvent the mass media

Second, businesses, scientists and governments should be prepared to provide accurate, open and understandable information when crises occur. The media will report on the issues regardless and will draw on whichever 'expert' they can find if companies, scientists and governments are not ready to put events and facts into perspective.

Third, the growth of the internet as a source of information and a communication tool not only imposes challenges, but also provides important opportunities. It enables direct communication with the public to provide information without depending on the mass media as brokers. Hence, even if the media do not report—or do so with a lack of nuance—companies, scientists and governments can communicate correct and nuanced information through the internet.

Fourth, it is generally considered that successful risk management in regard to food safety critically depends on communication. Yet communication about food risk is difficult because the science is complex, uncertain and ambiguous. Even if the commercial media provide simple and clear messages, consumers might realize that reality is more complex. For example, Frewer *et al* (1997) have found that an admission of scientific uncertainty, which seems to reflect honesty, has a positive effect on the efficiency of communication. Risk communication should aim to enable citizens to make their own judgements, without trying to convince them that a certain risk is (in)tolerable. In order to be successful, communication should integrate documentation, information, dialogue and participation, and these four elements should be tailored towards meeting the three challenges of complexity, uncertainty and ambiguity (Renn, 2005).

Finally, there seem to be cultural variations in the impact of the media and risk-communication strategies and in how food risks are perceived. Van Dijk *et al* (2007) found variation in the impact of communication strategies, even among western European countries: the communication of uncertainty has a positive impact in Germany, whereas the same information has a negative impact in the UK and Norway. Hence, effective risk-communication strategies depend on the culture in which the scientist, company or government is operating.

Food scares are serious issues that have a significant impact in terms of consumer behaviour, economics and politics. Nevertheless, it would be wrong to blame the media for disproportionate public responses to such stories, although their influence is important and sometimes detrimental to public understanding. Scientists, businesses, interest groups and politicians can also influence public perception, in particular by using the internet to circumvent the mass media as the main source of information. As such, it is important for all parties to work together to become better at communicating with the public and providing education. In this way, the public should enjoy a heightened baseline of knowledge that will allow them to assess critically the sensationalist reports that appear in the media, and perhaps reduce the demand for such reporting in the first place.

ACKNOWLEDGEMENTS

We thank T. Vandemoortele and A. Guariso for their comments and research assistance.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

Alterman E (2008) Out of print: the death and life of the American newspaper. *The New Yorker*, pp 48–59, 31 Mar

Canoy M, Nahuis R (2005) *Public Service Broadcasting and the Quality of News on Commercial Channels Substitutes or Complements?* Utrecht, The Netherlands: CPB Netherlands Bureau for Economic Policy Analysis and Utrecht School of Economics

Curtis KR, McCluskey JJ, Swinnen J (2008) Differences in global risk perceptions of biotechnology and the political economy of the media. *Int J Global Environmental Issues* **8:** 77–89

Ellis JD, Tucker M (2009) Factors influencing consumer perception of food hazards. *CAB Rev: Persp Agr Vet Sci Nutr Nat Resour* **4:** 1–8

Entine J (1999) How 'Jack' turned crisis into opportunity. *Business Digest*. http://www.jonentine.com/ethical_corporation/jack_crisis.htm

Flynn J, Peters E, Mertz CK, Slovic P (1998) Risk media and stigma at rocky flats. *Risk Analysis* **18:** 715–727

Frewer L, Howard C, Shepherd R (1997) The influence of initial attitudes on responses to communication about genetic engineering in food production. *Agr Hum Values* **15:** 15–30

George L, Waldfogel J (2006) The New York Times and the market for local newspapers. *Am Econ Rev* **96:** 435–477

Hawkins V (2002) The other side of the CNN factor: the media and conflict. *Journalism Stud* **3:** 225–240

Henneberry SR, Piewthongngam K, Qiang H (1999) Consumer food safety concerns and fresh produce consumption. *J Agr Resour Econ* **24:** 98–113

Hoban TJ, Kendall PA (1993) *Consumer Attitudes about Food Biotechnology*. Raleigh, NC, USA: North Carolina Cooperative Extension Service

Koné D, Mullet E (1994) Societal risk perception and media coverage. *Risk Analysis* **14:** 21–24

Kumkale GT, Albarracín D, Seignourel P (2010) The effects of source credibility in the presence or absence of prior attitudes: implications for the design of persuasive communication campaigns. *J Appl Soc Psychol* **40:** 1325–1356

Loureiro M, McCluskey J, Mittelhammer R (2001) Assessing consumer preferences for organic, eco-labeled, and regular apples. *J Agr Resour Econ* **26:** 404–416

Marks L, Kalaitzandonakes N, Zakharova L (2003) Media coverage of agrobiotechnology: did the butterfly have an effect? *J Agribusiness* **21:** 1–20

McCluskey JJ, Swinnen JFM (2004) Political economy of the media and consumer perceptions of biotechnology. *Am J Agr Econ* **86:** 1230–1237

Negin E (1996) The Alar 'scare' was for real. *Columbia Journalism Rev* **35:** 13–15

North R (2000) *Scared to death. The anatomy of the food scare phenomenon*. Presented at the symposium 'Gezond Voedsel: Genese en Dynamiek van een crisis', Katholieke Universiteit Leuven, Belgium, 31 Mar

Pew (2004) *How Journalists See Journalists*. Washington, DC, USA: Pew Research Center for the People and the Press. http://people-press.org/reports/pdf/214.pdf

Piggott NE, Marsh TL (2004) Does food safety information impact US meat demand? *Am J Agr Econ* **86:** 154–174

Poortinga W, Pidgeon NF (2004) Trust, the asymmetry principle, and the role of prior beliefs. *Risk Analysis* **24:** 1475–1486

Renn O (2005) Risk perception and communication: lessons for the food and food packaging Industry. *Food Addit Contam* **22:** 1061–1071

Robinson P (2001) Theorizing the influence of media on world politics. *Eur J Commun* **16:** 523–544

Siegrist M, Cvetkovich G (2001) Better negative than positive? Evidence of a bias for negative information about possible health dangers. *Risk Analysis* **21:** 199–206

Slovic P (1987) Perception of risk. *Science* **236:** 280–285

Swinnen JFM, McCluskey JJ, Francken N (2005) Food s afety, the media, and the information market. *Agr Econ* **32:** 175–188

Swinnen JFM, Vandemoortele T (2010) Policy gridlock or future change? The political economy dynamics of EU biotechnology regulation. *AgBioForum* **13:** 291–296

van Dijk H, Houghton J, van Kleef E, van der Lans I, Rowe G, Frewer L (2007) Consumer responses to communication about food risk management. *Appetite* **50:** 340–352

van Ravenswaay E (1990) *Consumer Perception of Health Risks In Food*. Oak Brook, IL, USA: Farm Foundation

Verbeke W, Ward R (2001) A fresh meat almost ideal demand system incorporating negative TV press and advertising impact. *Agr Econ* **25:** 359–374

Verbeke W, Ward RW, Viaene J (2000) Probit analysis of fresh meat consumption in Belgium: exploring BSE and television communication impact. *Agribusiness* **16:** 215–234

Vogel D (2003) The hare and the tortoise revisited: the new politics of consumer and environmental regulation in Europe. *Br J Pol Sci* **33:** 557–580

Zaller J (1999) *Market competition and news quality*. Presented at the 1999 Annual Meeting of the American Political Science Association. http://www.sscnet.ucla.edu/polisci/faculty/zaller/News%20quality%20paper.PDF

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Received and accepted 26 May 2011; published online 24 June 2011

EMBO *reports* (2011) **12,** 624–629.
doi:10.1038/embor.2011.118