East Asian Science, Technology and Society: An International Journal (2010) 4:565–583
DOI 10.1007/s12280-010-9142-1

Many Minds, Common Sense and Genetically Modified Food: A Role for Q Methodology

Amanda Wolf

Received: 15 November 2009 / Accepted: 9 July 2010 / Published online: 29 July 2010

Abstract Over 15 years, genetically modified (GM) food has gradually reached around the globe. Yet, each new development occasions controversy, and hence, leads to interest in strategies to engage people in searching for durable public bargains. Even-handed treatment of diverse views is crucial to good engagement processes, as is the avoidance of processes that merely reinforce fixed views. Ideally, views develop as people engage with others' reasoning about the merits of different policy responses. Q methodology provides a useful strategy for eliciting views at the start of such engagement processes. It allows individuals to present their views as whole pictures, complete with inherent ambiguities and complexities. Embodied, holistic views stem from mutual understanding of everyday events shared among members of a society. Everyday understanding relies on common sense, a spontaneous application of a distinct form of intelligence to some practical matter. Q methodology can contribute to engaging the publics–science interface by showing how technologies, like GM food, intersect with people's lives and behaviours and by finding commonalities that may be masked in polarised debates.

Keywords Common sense · Genetic modification of food · Q methodology · Subjective views · Science and technology studies

1 Introduction

In 1994, Calgene, a California biotech firm, introduced its Flavr Savr tomato, which was the first genetically modified (GM) whole food product. Although the United States Food and Drug Administration ruled that the product required no special labelling, Calgene opted to provide point-of-purchase information to engage the consumer: the company *wanted* the consumer to know the product was bio-engineered

A. Wolf (✉)
School of Government, Victoria University of Wellington, Wellington, New Zealand
e-mail: amanda.wolf@vuw.ac.nz

and wanted consumers to attribute the tomato's superior flavour and long shelf-life to genetic modification (Martineau 2001). In retrospect, that decision appears both principled and responsible on the one hand, and commercially naïve on the other.

The Flavr Savr remained on the market only a short time (Martineau 2001). Yet its launch evidenced the challenges of regulating GM technology. By the end of the 1990s, GM crops and food products and processes ('GM food') had faced numerous hurdles and cleared few. 'Biotechnology overtook nuclear physics as the most controversial area of scientific endeavour' (Leitch 2008), a controversy played out in the market and policy spheres, even as scientific and technological investments continued. Many observers conclude that consumers' willingness to accept GM food was misjudged by its developers. Regulators' efforts to mediate their industry and consumer responsibilities initially failed to fathom the complex nature of the resistance. A value-charged debate emerged. GM food became a prime site for efforts to engage publics at the science–society interface.

Structured engagement processes involve parties from across the spectrum of interests—farmers, scientists, consumers, regulators, and so on—coming together to better understand their views and those of others and, where possible, to identify avenues for mutual gain. Yet, with issues like GM food, individuals may have mixed views on where they stand. They may offer qualified judgements about the good or bad features of a technology and different opinions depending on the specific process or product in question. Q methodology can be an effective means to capture and articulate individuals' underlying orientations toward GM food issues in the early stage of engagement processes. In brief, Q methodology provides both technique and philosophical principles for studying the inner field of a person's experiences—attitudes to self, beliefs and the like (Stephenson 1953) concerning virtually any topic, as 'measured' by a person rather than as observed or manipulated by a researcher. Well-designed Q-methodology studies enable the identification of common ground among apparently discrepant intrapersonal or interpersonal views and typically reveal that members of apparently homogeneous groups identify with different holistic value sets. There is some evidence that Q methodology can 'unlock' polarised conflicts (van Eeten 2001; Mattson et al. 2006).

2 GM Food in the East Asian Region

East Asian countries have experienced the global reach of GM food in a variety of ways. Faced with resistance to GM food development and field testing in the European Union, and lengthy regulatory compliance pathways in the United States of America, biotech firms have tried to collaborate with scientifically advanced countries elsewhere. BASF Plant Science, for instance, has partnered with China's National Institute of Biological Science to explore avenues for increasing yield in staple crops. Increased yield is important in China since rising standards of living lead to increased meat consumption and increased demand for animal feed. According to BASF, 'Asia is emerging as a key player in plant biotechnology both in research and cultivation and we are striving to intensify partnerships in this dynamic region. Europe, on the contrary, is losing its competitiveness due to slow and contradictory political decisions' (Crowley 2008a).

Crowley (2008a) reports that BASF also has cooperative agreements in South Korea focused on increased yield and stress tolerance in major crops. Such economic imperatives are mirrored in the very different domain of food trade and farmer livelihoods. Gruère et al. (2007) investigates whether the Philippines' agricultural exports would decline if GM production is allowed, since some markets (notably the European Union) resist GM food and many countries have strict labelling laws, which make technical compliance difficult. Worldwide food price increases, triggered by adverse weather events and competition from biofuel crops, are reported to be behind South Korea's decision to import GM starch and sugars for food manufacturing (Crowley 2008b).

Japan, as the world's largest importer of food, has yet to embrace GM food. According to Feffer (2004), Japanese consumer and environmental groups opposed to biotech foods take credit for Monsanto's decision not to release GM wheat on the global market and Japanese consumers have also persuaded their government to stop GM rice trials. Nevertheless, industry sources find that Japan is fast becoming an important importer of GM food (ISAAA 2009).

3 The Public Engagement Challenge

Science, technology and society (STS) studies focus, in part, on social processes of science production and the interface between scientific–technological change and social patterns of resistance, change or acceptance. STS includes studies of the beliefs of scientists and others, the values implied in those views and the potential for gradual transformations in different points of view (Hackett et al. 2007; Joerges and Nowotny 2003; Kleinman 2000).

While not everyone forms a strong view about GM food, strong views are polarised. For example, Eurobarometer evidence classifies respondents according to their perception of GM food: 25% 'optimistic', 58% 'pessimistic' and 17% 'undecided' (Montserrat Costa-Font et al. 2008). Yet, since everyone has a view about the sort of person they are and what matters most to them, and about food, nature and the role of government, GM issues can acquire nearly universal salience. Since the Flavr Savr's launch, we can trace a process of incremental change, with GM food sometimes accepted or tolerated and sometimes not (McHughen 2000; Evenson and Santaniello 2004). The trajectory is punctuated by some headline applications—'Golden Rice' most notably—and underpinned by the steady increase in the proportion of GM in staple crops grown in the major crop-exporting countries, led by the United States of America, Australia, Argentina and China (for example, USDA/ERS 2009).

Whether the issue is GM field trials or maximum limits for GM contamination in 'GM-free' food, non-scientists' views are relevant to reaching durable collective agreements. Citizen consultation is widely expected in Western-tradition states (Hagendijk and Irwin 2006). Deliberative democratic practices are on the rise in East Asia (Leib and Baogang 2006) with attention to cultural differences (Min 2009). These practices and other engagement processes, influenced by a diverse spectrum of participatory theories, seek a balance among different views at a collective level, so that collectively desired activities can move ahead and risks can be controlled.

STS researchers and policy practitioners and advisors have developed numerous engagement strategies to elicit and understand divergent and convergent views and to facilitate constructive engagements among people with different initial views (Levidow 2007; O'Neill et al. 2008; Dryzek et al. 2006). However, engagement processes remain subject to a number of pitfalls and dilemmas (Hagendijk and Irwin 2006). One dilemma centres on the clarity of views and reasoning. Clear articulations help participants evaluate a range of views and perhaps reform their own. Yet, when issues are complex, clarity can be elusive and reasoning incomplete. Forcing clarity when none exists may polarise argumentation as well as disrespect valid, diverse views. Q methodology may be particularly well-suited to addressing this dilemma.

4 The Potential for Q Methodology in the Early Stages of Engagement

The process of science–society engagement often involves stages in which people come together, share and discuss views, learn and consider new views and finish with confirmed or new understandings of the matter at issue. Many of these processes centre on dialogue (see, for example, Chen and Deng 2007; Leitch 2008; Motion 2008). Q methodology has been used to study topics in food, science and environment (though its application is not limited to these areas). Many recent studies use Q methodology as a tool of discourse analysis (for example, Addams and Proops 2000; Hall 2008), thus aligning with dialogue strategies.

Based on a review of the theory and philosophy of Q methodology occasioned by the upsurge in discourse-analytic uses (Wolf 2009), two features of Q methodology recommend it for STS engagements. First, Q methodology finds clusters of people whose similar overall attitudes shed light on what goes with what (and what does not) and why. The emphasis on *people's underlying predispositions* that give rise to an issue position contrasts with a focus on *extant discourses* with which people may identify (Dryzek and Niemeyer 2008; Ockwell 2008). Looking first to people's underlying dispositions is useful when new issues emerge in manifestly value-complicated settings, where one may expect discourses to be in dynamic and emergent states.

Second, Q methodology is specifically suited to the everyday realm of *common sense*. Common sense, as used here, is the cognitively distinct judgemental faculty people use as they make their way through the ordinary activities of daily living (Lonergan 1957; Forguson 1989; Rescher 2005). The faculty arises from a person's beliefs, knowledge and experiences. Commonsense judgements are thus partly peculiar to an individual, and partly shared and emergent in the social fabric. They are uniquely valuable in everyday decision making and not reducible to pejorative senses of 'folk wisdom' or 'folk science'.

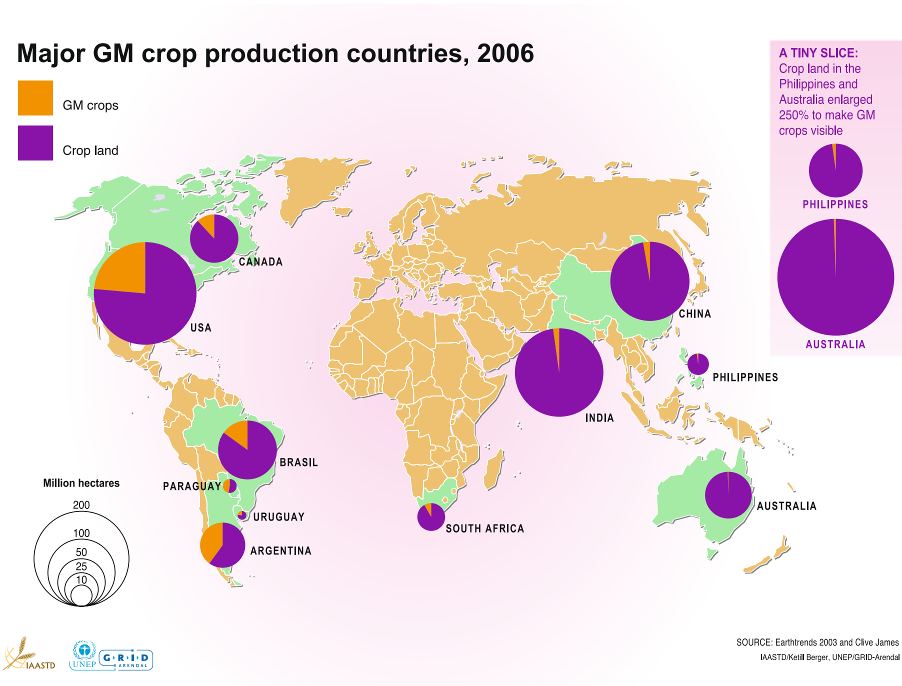
Q methodology approaches common sense with a theory of intersubjective communicability (Stephenson 1978a, b). With respect to any topic, such as GM food, a person's 'subjectivity' refers simply to the condition of viewing things from one's own standpoint. A subjective everyday experience (such as buying a GM tomato) is what a person says to him or herself or others at the time (Stephenson 1980), perhaps 'it's bigger than the ones last week'... 'it smells good'... 'I don't want my children exposed to this'. Such talk about a tomato emerges from a 'locally available ecology' of everything that *might be said* (Stephenson 1953: 221). Defined this way, *subjectivity* refers to the salient elements amongst the infinite possibilities for shared 'talk' among members of a society or culture (Wolf 2009). The possibilities are closely connected with the individual ('it smells good to *me*') and his or her experiences (it's bigger than the ones [*I saw*] last week'). Q methodology, as further explained below, finds patterns in this subjectivity.

A person-centred Q-methodology study 'opens up' (Stirling 2008) new avenues for finding common ground among people who express different positions through its focus on common sense, self-referent talk and on the views-as-a-whole of individuals. Such views may be scientifically 'naïve', but equally they may be the endpoint of rational consideration of available scientific evidence. Q methodology's features may be especially valuable at the front end of a dialogue or other science–society engagement process—when views are first expressed. Dryzek and Niemeyer (2008) propose a 'chamber of discourses' as an advance in democratic representation, in which discursive representatives, selected perhaps with Q methodology, rather than representatives of people or groups, would debate challenging questions.

The main contours of the GM food debate are identified below. Then the concept of common sense is articulated as it applies to engaging the different views—the 'many minds'—in a society as a whole. This is followed by a succinct description of Q methodology that draws attention to the characteristics that recommend it in situations when many minds interact in the personal, everyday sense. Some general implications for engaging publics follow.

5 GM Food and the Contours of the Debate

Genetic modification of plants, animals or microbes changes the characteristics of the organism by changing its genetic make-up. Unlike changes introduced through cross-pollination or selective breeding, genetic modification changes the DNA of an organism at the level of a single gene, and may involve introducing genes from unrelated species for a specific purpose (WHO 2009). Significant portions of global production of maize, soya, cotton and canola are now genetically modified (Lawrence 2009; USDA/ERS 2009). A biotech-industry source estimates that China now has 3.7 million hectares planted in GM crops and claims that 2009 official approvals for biotech rice and maize 'are momentous and have enormous implications for biotech crop adoption not only for China and Asia but for the whole world' (ISAAA 2009). A wide range of biotech products are in some stage of development and commercialisation, including 'Golden Rice', a beta-carotene-fortified variety touted as a means to improve the nutrition of poor people whose rice diet lacks essential micronutrients (Dubock 2009). Country after country has confronted the host of issues first evident with the tomato: will a GM food product 'work' for manufacturer-growers, food processers and consumers, within the laws, regulations and underpinning principles of each country's food policies? Moreover, since food is the focus, the complexity is often expressed with reference to consumer-citizens' attitudes regarding the benefits and risks of GM food (Evenson and Santaniello 2004).



The benefits claimed for GM organisms destined for food, or food processing, include resistance to pests and diseases, higher yields, better processing and storage qualities and, as in the example of Golden Rice, better nutrition. Claimed environmental benefits include conservation of water, energy and soils associated with the fine-tuning of agricultural efficiency (Nelson 2001). However, critics counter that benefits accrue most to 'agribusiness' and least to poorer farmers and consumers (Kimbrell 2002). Concerns have been raised about food safety and potential environmental hazards. Noted risks include the transfer of insecticide properties to other plants, leading to reductions of beneficial insects, loss of genetic diversity, transfer of herbicide resistance to wild plants and collateral risks from the use of marker genes and methods of introducing modifications in the organism (McHughen 2000; WHO 2009). Ethical concerns focus on the industry's control of seeds and marketing practices (Weirich 2007).

GM foods are a subset of the larger 'biotechnology' domain. To illustrate the range, currency and complexity of these situations, Table 1 summarises headlines from the online edition of *New Scientist's* genetic modification page.

Table 1 Sample GM headlines

Headline	Teaser tagged to the article link
Genome smuggling is step towards synthetic life	Overcoming bacterial defences allows the genome of one bacteria to be transplanted into another species—creation of synthetic life possible 'in a month', claims genome pioneer
GM maize has built-in SOS chemical	A genetically modified maize plant is genetically engineered to produce a chemical rallying cry that summons help against a damaging pest
GM rice makes allergies easy to stomach	Rice that has been genetically modified to produce pollen proteins and then release them in the gut during digestion is ready for human trials, say its creators
Genetically modified crops get the Vatican's blessing	The pope's scientists endorse GM food as a solution to world hunger, but their conclusions prove controversial
GM monkey passes jellyfish gene to offspring	A genetically engineered monkey has for the first time passed an introduced gene to its offspring—the breakthrough could help advance studies of human disease, say researchers
Cow genome revealed—but how to milk it?	A Hereford cow named L1 Dominette has something that no other heifer in the world can claim: the sequence to her genome
Fluorescent puppy is world's first transgenic dog	A cloned beagle that glows could help researchers to model human disease, but the process could be too expensive to continue
'Alien' genes escape into wild corn	Genes from genetically modified crops have been found in wild Mexican maize—a finding which should end a long-running and bitter debate
Conventional crop breeding may be more harmful that GM	Should the regulations governing genetically modified crop strains be applied to other, more traditionally created, varieties too?
US prepares to block influx of GM food	The Department of Agriculture is urged to block some GM foods from entering the country, if they are deemed to threaten its agriculture, environment or citizens' health

Source: *New Scientist* online Available from: http://www.newscientist.com/topic/gm-food [accessed 29 August 2009]

6 Many Minds, Different Attitudes and Common Sense

Individuals may judge a given technology, such as GM food, all good or all bad. But usually, their views are more nuanced, particularly when considering the type of modification and purpose (McCluskey et al. 2006). For example, a person may like the consumer qualities of GM tomatoes, but worry about long-term effects from eating them. Such a person is 'is of two minds' while deciding whether to accept or reject the tomato. Two minds may resolve, however momentarily, in a settled choice. James (1892) distinguished 'transitive' and 'substantive' thoughts and likened their interplay to a bird's 'alternation of flights and perching'. Using survey data, Pope et al. (2004) found five distinct determinants of settled perches on GM food: danger, knowledge, labelling, trust in media and trust in food information sources.

Contentious GM food issues, such as setting minimum acceptable levels of GM contamination in a product labelled GM-free (EC 2009), pose a 'many minds' challenge. At a collective level many minds—like James' transitive thoughts (various streams of thought 'in flight')—are expected and accepted. Yet, a policy decision is equivalent to James' substantive thought. Policy makers need to understand what is at issue to steer a legitimate and acceptable course among the many minds. Table 1 can help to illustrate how Q methodology approaches 'many minds'.[1]

An everyday newsreader exposed to the headlines collated by *New Scientist* forms a holistic (subjective) picture based on his or her self-referential reactions to the items, and distinct from any (objective) evaluation of the science reported or implied in the headlines. In forming the picture, the reader situates the news items in the general 'space' of all such reactions, which Stephenson called a 'concourse'. Q methodology assumes that there are an infinite number of concourses (one each for every person, topic, time, etc.; Stephenson 1980; Wolf 2009). Each space is sharable, in the sense that people within a culture have shared access to potential picture elements (monkeys, maize, the Vatican), only a very few of which actually arise at any given occasion (such as buying a tomato), as well as some ideas about 'things to worry about'. While newsreaders typically do not pause to do so, any person can 'measure' his or her position using the device (called 'Q sorting') of arraying items along a scale according to some set condition. Q methodology exercises set out to capture complex pictures of 'minds' in a Q-sort 'perch'and to render them visible for further consideration by the Q sorter or others.

In the everyday domain, the *analytic* aspects of compromise and consensus do not apply. For most daily decisions, a person moves through transitive flight with occasional perches, without high reliance on rational reasoning. In the case of ten headlines, over 3.6 million (10! or '10 factorial') possible combinations are available, but not fully rationally compared to reach the 'perch' recorded in the Q-sort array. The relevant faculty in the case of daily decisions is *common sense* because it can act on the immediate context on the basis of holistic, complex pictures. In the everyday world, GM information, news stories, regulations on labelling and so on, interact with people's daily conversations in ordinary situations and their behaviours through a common-sense-making process. Put differently, information relevant to a GM food issue interacts with and influences common sense when it becomes part of the 'locally available ecology'. The headlines read today become part of the available ecology for tomorrow's decision whether to buy a GM tomato.

Common sense has been widely debated in the Western tradition (Forguson 1989; Rescher 2005). It was defined above as the faculty people use as they make their way through the ordinary activities of daily living. Common sense is a spontaneous, fleeting application of intelligence in the face of an immediate practical demand (Lonergan 1957). In this sense, common sense differs from scientific knowing and learning, in which an inquirer accumulates and develops knowledge through systematic and analytic revision and rejection through purposive efforts to find answers to some question. It bears emphasising that common sense is not an indication of a lack or failure of other cognitive reasoning abilities.

Common sense is also conceived as a sort of *reservoir* which has built up from individuals' experiences, and which can be drawn upon as needed. It resembles practical wisdom and includes what everyone 'learns at a mother's knee' (Rescher 2005). But the reservoir does not contain the exact situation and experience at hand; the individual has to complete the response by supplying what is relevant in that situation. The result is a commonsense 'insight' (Lonergan 1957). Following Lonergan (1957),

[1] Readers are invited to look again at the 10 headlines, and to array them on a scale from 'does not worry me at all' to 'worries me a great deal' placing items, if possible, at five or six points along the full scale.

the response to a critic's rejection of conventional wisdom, folk science and the rest (for example, what good is some faculty if it comes up with such 'blatant falsehoods' as 'the sun rises in the east'?), is to decouple the scientific sphere from the everyday (in which the sun, quite evidently and often quite beautifully, does 'rise'). Since they are fleeting, commonsense judgements are hard to measure, but Q methodology meets the measurement challenge. It has been demonstrated as an effective way to learn about engagement at the interface of science and society, particularly with environmental conflict (Focht and Lawler 2000; Steelman and Maguire 2000; Mattson et al. 2006).

7 Q Methodology

The theory of Q methodology assumes that everyday knowledge and experience can be a source of insights about the most complex issues. A key to learning about the interface of science, technology and society is to start where people are, in everyday pervasive communicability (Stephenson 1980) with each other and their own transitive thoughts. So what does Q methodology offer and how does it work?

Q methodology helps find salience patterns among 'many minds'. Considering again the headlines example, we can imagine them as one editor's 'random dip' into a strongly 'flowing river' of GM stories: a different editor, trolling a different segment of 'the river', might pull up items that combine to provide a very different picture of the relative mix of topics and values associated with GM food and biotechnology more broadly. There are potentially a very large number of headline samples, each of which might be interpreted differently by different people. One can imagine a variety of dimensions along which sets of headlines might be arrayed. Instead of the 'worries me' dimension, one could ask a person to sort the headlines on a 'good science' dimension: he or she might cluster 'miracles of science' stories at one end, and stories of GM experiments badly conducted at the other end. In between, a sorter might place stories in which the 'science' elements were less salient. Trade stories, for example, might be placed in the middle. Q methodology, therefore, can be used to find common patterns among diverse people responding to a representative sample of statements or to find common features in a single person's responses to a range of linked Q-sorting exercises (Wolf 2006).

Q methodology typically involves a number of steps (Brown 1980; McKeown and Thomas 1988; Kim 2008 [in Korean]; Webler et al. 2009). Once an 'event' of interest is identified (for example, farmers' attitudes toward GM crops: see Hall 2008), a representative sample of 30–50 statements is selected, each expressing a self-referent position that a person will be able to engage with to some degree, such as 'I would choose to grow GM crops because technology should be embraced' and 'I might be encouraged to grow GM crops if there was demand from consumers' (Hall 2008: 208–209).

As stated, such statements are not provable or disprovable—they are everyday utterances of opinions and reactions. Typically 20–40 research participants (15 in Hall 2008) array these items into a +4 to –4 (or similar scale) Q sort according to some instruction (such as 'most/least like my farmer standpoint'). Post-sort interviews are often conducted, to gain amplification of the participant's views, especially of high- or low-ranked items. Interviews may (but often do not) ask participants to provide connections between their immediate views and their experiences. The Q sorts are correlated and factor analysed. In essence, each factor presents an overall Q sort, with statements allocated weighted-average scores based on the individual rankings of the people whose sorts 'define' the particular factor. Calculations of 'factor arrays' may be done with *PQMethod* software (Schmolck 2002), which also provides diagnostic information to assist researchers' interpretations.

Recall that 'subjectivity' in Q methodology is defined as self-referent talk. Thus, a Q sort is a record of a person's engagement with the social 'talk' on a topic. The engagement is enabled by the researcher's careful selection of a representative sample (the 'Q sample') of statements, ideally elicited from the participants themselves, and thus captured in their natural language. Hall (2008) collected over 700 statements from a postal survey of farmers and retained 48 for Q sorting. In Q sorting, a person 'measures' what is on his or her mind as stimulated by the statements, and crystallises meanings when the statements are placed on a scale (Wolf 2009). The interpretation of factors relies on the researcher's ability to make sense of the factor patterns, with reference to the statements that comprise them and aided by statistical information and interview data.

Of interest is not simply the patterning of views on the topic, but the embodied, underlying dispositions of likes and dislikes that predispose a person's engagement with the stimuli presented by the Q sample. Thus, understanding requires finding what Stephenson (1986: 47) called a 'vector' of a person's lived experience. Stephenson notes that 'past experiences, beliefs, and the like' are 'active systems which determine what the individual will perceive or react to...' (p. 53). Most contemporary Q methodology studies concentrate on describing factor patterns as 'discourses'. Rarely do they seek to understand those patterns according to what is revealed about subjectivity. This would require researchers to check whether their interpretations fit with Q sorters' predispositions based on lived experiences or to compare the patterns with theories about the way experiences affect beliefs.

Understanding how people are attached to their views can be deployed to resolve conflict. Mattson et al. (2006) sought common ground regarding large carnivore conservation in the North American West during a 2-day Q-methodology workshop, with one day devoted to problem clarification and 1 day to solution searching. As is common in Q-methodology studies, participants were drawn from different 'sides' of an issue. Because both common ground and differences 'emerge' and are not preconditioned by the researcher, ways to bridge apparent polarities can be discovered and researchers' interpretations of the measurements and their meanings can inform policy participants and policy choices (see also van Eeten 2001).

8 Q Methodology and STS Topics

Q methodology has been used to look at a wide range of STS topics, seeking the views of ordinary people with respect to advances in science and technology. Examples include a study on nutrition-oriented agriculture projects in the global south (Levin et al. 2003), siting waste facilities (Wolsink 2004) and wind-farm development (Ellis et al. 2007).

Hall (2008: 205) used Q-methodology techniques to 'investigate the attitudes and opinions that comprise the whole social discourse' on farmers' attitudes to GM food. Hall found three factors from the Q-sort data provided by 15 farmers. Profiles for factors labelled 'benefit believers', 'risk perceivers' and 'fatalists' are given (Hall 2008: 208–210). Hall also found a 'pragmatic farmer viewpoint' shared among the participants, and stemming from their common practical farming experience: 'They all operate in the same 'real-world'' (p. 210). Against this common ground, Hall is able to see the factors as 'differentiated by the degree of caution and concern about potential risks and the expectation of potential benefits' (p. 210). Hall's report does not take Stephenson's recommended second step: that of understanding factors according to the farmers' lived experience. Nevertheless, Hall ventures a view that factor-three (fatalist) farmers 'appear to hold a cynical view of the world... [believing] what will be will be' (p. 210). It was not Hall's intention to offer explanations, but such a speculation indicates the potential of going the next step.

Source: http://www.commongroundfarm.org; used with permission

Published Q-methodology studies that go deeply into lived experience are those that study such experience as the focal topic, rather than 'attitudes' for example. Regrettably, there have been no such studies in the GM food area. Many lived-experience studies occur in the health fields and look at the experience of living with a disease (for example, Baker 2006) or making end-of-life decisions (for example, Wong et al. 2004). Venables et al. (2009) looks at living with nuclear power in a local community that hosts a nuclear power station. The authors emphasise the importance of local geographical and social context in the formation of views. For example, the study shows that trust is a deeply socially embedded concept, not simply a matter of one-to-other relationships. The authors note when comparing two groups, one of which characterises nuclear power as 'beneficial and safe' and the other as threatening: 'Trust (in Factor 1) was associated with the perceived familiarity, reliability, and competence of the local power station staff, while distrust (in Factor 2) was associated with the openness, honesty, and integrity of the nuclear industry' (Venables et al. 2009: 1100). The authors go on to explain this asymmetry (trust is not the reverse of distrust) as a consequence of the respondents' experiences and prior beliefs. This interdependence shows that elements of the 'lived experience' are neither 'out there' forming and shaping individual attitudes and behaviour nor entirely 'constructed': instead, there is a life-course interaction that forms (and re-forms) attitudes. A person has a predisposition, or an attitude, in the now old-fashioned sense of posture or orientation.

Venables et al. (2009) show, as is frequently the case with Q-methodology studies, that clusters of views correlate only moderately or weakly with pre-conceived social groups (such as those economically dependent on the nuclear station). As Leitch (2008) notes, often the first step in a consultation exercise is to 'construct groups' (p. 15), thereby creating boundaries within which one will search for common ground. Venables et al. (2009) show that perspectives can be shared, to varying degrees, across social networks. Moreover, these authors claim that perspectives are not 'fixed', but are responsive to new 'discourse' (on climate change, for instance) emerging into the space of the 'old' discourse of nuclear power.

In a study on consumers' responses to information about food, Eden et al. (2008) note that information provided to assure consumers (whether at point-of-purchase or indirectly by 'independent' sources, industry, NGOs or government) depends on consumers' '*giving* [the message and the messenger] meaning and trust' (p. 625, emphasis added). This usage implicitly acknowledges the subjectivity involved in Q methodology—a person 'gives' the message meaning—even when the explicit focus is on messages that *have* meaning.

9 Engaging Publics with Q Methodology

There are many techniques that can be used to engage scientists and non-scientists with each other (Rowe and Frewer 2000). Many are premised on a group-specific conception of 'expertise', in which scientists have expert knowledge of the 'facts' of the technology, safety assessments and the probabilities of hazards, and non-scientists have expert knowledge of their own beliefs about the ethics of technologies, their mistrust of the motives of large technology businesses, their rights to choose and so on (Cook et al. 2004; Leitch 2008; Motion 2008). New work seeks to overcome the expert/lay split (for example, Cronin and Jackson 2004; Cronin 2007) and to ensure a broader consideration generally of 'expertise' such as ethical expertise (Reber 2010). Moreover, there is a range of work that looks critically at participatory processes in order to recommend improvements (for example, Hindmarsh and Du Plessis 2008; also Dryzek and Niemeyer 2008; Cuppen et al. 2010, which note roles for Q methodology).

This large body of work responds to the central challenge of designing participatory processes that are responsive and representative of the diversity of interests and that also contribute to ‘better’ collective decisions and outcomes. Q methodology’s particular contribution (in addition to its value as a tool of discourse analysis) stems from its ability to ‘reveal’ individuals’ holistic views about a topic—complete with their ambiguities. Moreover, these views, according to Q-methodology theory, capture a person’s perception of the implicit, complex wholeness of some everyday phenomenon as a common sense, personal judgement. A person brings prior experience and knowledge to bear on the matter. Q methodology thus does not distinguish groups of people on the basis of their role in some topic situation or conflict. Instead, it finds the different (but often partly overlapping) ways in which people see a situation from their own perspectives.

Engaging publics at the science–society interface can benefit from Q methodology’s ‘pictures’ of the momentarily captured many minds evoked by an everyday situation. These pictures are composites of people’s stances in a situation, in which their positions, and the justifications for them, are infused with their own feelings. In this conception, people’s access to a commonsense reservoir allows them to measure and give meaning to their responses to the situation in the form of commonsense insights. It must be acknowledged that different philosophical beliefs about the nature of reality and knowledge may lead some to reject the claim that embodied commonsense insights exist or can be known.[2] Nevertheless, if one accepts that Q methodology is able to capture and picture everyday fleeting feelings and meanings, then the distinct cognitive content of common sense can be shown.

In a typical policy setting, policy designers require a sophisticated understanding of the communicative milieu of the people they hope to reach if their interventions are to be effective. They need a solid understanding of the choices that need to change, that is, of what those choices involve now, in the absence of the intervention in question, and a clear understanding of how such choices can be changed. ‘Choice’ in this context refers to both consumer and citizen choices.

Participants’ own ‘talk’ that bears on a topic provides an excellent entrée into debates. A person’s stance or identity reveals dimensions of an issue that may otherwise stay hidden. While many GM food matters are not talked about in everyday conversations, people can engage with related or proxy ‘talk’ in a manner that reveals their inclinations or stance. Researchers do not need to assume participants’ familiarity with a GM food application to embark on a constructive exercise to inform subsequent discussions. For example, Wolf (2006) showed that pre-adolescent girls did not talk about a healthy-eating campaign running in their city, but they did talk about how they ‘consume’ both advertising and food and make connections between the two. Underlying dispositions showed the girls’ shifting from parental influence to independence was much more salient than views about social-marketing efforts.

[2] A special issue of *Operant Subjectivity: The International Journal of Q Methodology* (vol. 32, 2009), explores some of the philosophical questions in depth.

Groups within a given culture or society may privilege attitudes and values that traverse the terms of the scientific or technological debate, but are not expressed in terms of those debates. For example, in a social marketing study, salient topics include ‘knowing one’s food—what’s in it and where it’s come from’ (Wolf 2006). ‘Knowing one’s food’ is an example of a theme that connects intimately with a participant’s experience and not only with ‘science’. These themes, if identified, may create new common ground (since, for example, some manufacturers also want consumers to know their food) from which to consider how people explain their positions. As many dispute resolution experts realise, shifting the terms of discussion often leads to improvements and breakthroughs in communication and consensus (Zartman 2008). Q-methodology studies bear this out (van Eeten 2001; Rutherford et al. 2009).

10 Conclusions

The contours of the GM debate and the needs of policy making provide the setting for a ‘second look’ at Q methodology’s untapped potential for public engagement. The technology—a genetic modification somewhere in the production chain—provides the occasion for a range of positions to be claimed when subsequent policy directions, such as whether or not to label GM food, are debated. While it is not expected that democratic deliberation or political processes generally will converge on a universally acceptable policy, it is asserted that initial clarification of holistic value positions (that is, positions that touch on aesthetic, economic, ethical, political and scientific values) respects the diversity and richness of the lives and experiences that contribute to those value positions. This inherent-value argument, based on respect for persons, is not subject to empirical verification. The instrumental assertion—that a deliberation process may be helped if Q methodology is used to elicit holistic, person-connected views early on—could be further explored empirically.

At the core of science, technology and society interfaces are phenomena enabled or conditioned by science and technology (and recursively through individual and social responses) that have ambiguous implications for individuals and collectivities and hence some perceived need for a public collective response. The phenomena—however simply stated or however simple the technology involved—unfold in complex ramifications in society. Usually, there are significant matters of uncertainty and risk, which complicate decision-making environments that are already thick with conflict between normative principles. STS studies may enter the fray in order to understand better the beliefs and behaviours at these interfaces and, often, to know better how to influence behaviours. The potential of Q methodology is its capacity to discover a person’s connection to commonsense judgements at a science–society interface.

GM food debates continue to flare-up, often in a specific context—such as the discovery of GM maize in a shipment marked as GM-free. This everyday immediacy, coupled with ordinary people’s ready knowledge and experience of the core issues, suggests that efforts to engage scientists and others at the interface should explicitly draw upon holistic everyday pictures that reveal common sense in play. Q methodology suits such efforts.

Q methodology offers two methodological contributions to STS studies. First, Q methodology can be particularly useful in the first stage of engagement processes, when the range of views—however mixed and muddled they may be—need to be open to view but not prematurely fixed.

The second methodological contribution is to elucidate one aspect of why Q methodology 'works'. This aspect hinges on Q methodology's engagement with the common sense of people who have views about some technology like GM food. Common sense is the link between the technology and the person who holds a view about it. Q methodology allows people's own connections between themselves and the focal technology to be brought to mind and then captured for a researcher's subsequent analysis. These connections, the underlying 'vectors' of a person's lived experience, are deep causal mechanisms that contribute to day-to-day opinions and behaviours. With Q methodology of growing interest in several East Asian countries (notably South Korea, Taiwan and Japan), there is scope to use it to explore the common sense underpinnings in an Eastern philosophical tradition.

In sum, Q methodology may support and augment other inquiry and participatory processes. It measures the common sense pulse people experience everyday and allows everyday meanings to crystallise, even when issues are complex and value-charged. We may be able to understand the behaviours of people in reaction to some scientific or technological phenomenon better when we can see it as they do. Understanding, in this sense, is the first stage of publics–science engagement, not its endpoint.

References

Addams, H., & Proops, J. (Eds.). (2000). *Social discourse and environmental policy*. Cheltenham: Edward Elgar.

Baker, R. (2006). Economic rationality and health and lifestyle choices for people with diabetes. *Social Science & Medicine, 63*(9), 2341–2353.

Brown, S. (1980). *Political subjectivity*. New Haven, CT: Yale University Press.

Chen, D.-S., & Deng, C.-Y. (2007). Interaction between citizens and experts in public deliberation: A case study of consensus conferences in Taiwan. *East Asian Science, Technology and Society: An International Journal, 1*(1), 77–97.

Cook, G., Pieri, E., & Robbins, P. (2004). 'The scientists think and the public feels': Expert perceptions of the discourse of GM food. *Discourse and Society, 15*(4), 433–449.

Cronin, K. (2007). *Risk communication and dialogue: A critical exploration of communication practices in the management of technological risk*. PhD dissertation, Victoria University of Wellington.

Cronin, K., & Jackson, L. (2004). *Hands across the water: Developing dialogue between stakeholders in the New Zealand biotechnology debate*. Wellington: Report to the Ministry of Research Science and Technology.

Crowley, L. (2008a). BASF expands GM activities in competitive Asia-Pacific. Montpellier, France: Decision News Media. Available from: http://www.foodnavigator.com/Financial-Industry/BASF-expands-GM-activities-in-competitive-Asia-Pacific [accessed 29 August 2009].

Crowley, L. (2008b). Korea looks to GM to answer price hikes. Montpelier, France: Decision News Media. Available from: http://www.foodnavigator-usa.com/Financial-Industry/Korea-looks-to-GM-to-answer-price-hikes [accessed 29 August 2009].

Cuppen, E., Breukersb, S., Hisschemöllera, M., & Bergsmaa, E. (2010). Q methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands. *Ecological Economics, 69*(3), 579–591.

Dryzek, J., & Niemeyer, S. (2008). Discursive representation. *American Political Science Review, 102*(4), 481–493.

Dryzek, J., Goodin, R., Tucker, A., Reber, B. (2006). *Promethean elites encounter precautionary publics: The case of GM foods*. Available from: http://deliberativedemocracy.anu.edu.au/documents/Dryzeketal2006.pdf [accessed 20 October 2009].

Dubock, A. (2009). Crop conundrum. *Nutrition Review, 67*(1), 17–20.

Eden, S., Bear, C., & Walker, G. (2008). The sceptical consumer? Exploring views about food assurance. *Food Policy, 33*, 624–630.

Ellis, G., Barry, J., & Robinson, C. (2007). Many ways to say 'no'—different ways to say 'yes': Applying Q-methodology to understand public acceptance of wind farm proposals. *Journal of Planning and Environmental Management, 50*(4), 517–551.

European Commission (EC). (2009). *Coexistence of genetically modified crops with conventional and organic agriculture*. Available from: http://ec.europa.eu/agriculture/coexistence/index_en.htm#com153 [accessed 20 October 2009].

Evenson, R., & Santaniello, V. (Eds.). (2004). *Consumer acceptance of genetically modified foods*. Cambridge, MA: CABI Publishing.

Feffer, J. (2004). Asia holds the key to the future of GM food. *Global Policy Forum*, available from: http://www.globalpolicy.org/component/content/article/220/47320.html [accessed 29 August 2009].

Focht, W., & Lawler, J. (2000). Using Q methodology to facilitate policy dialogue. In H. Addams & J. Proops (Eds.), *Social discourse and environmental policy* (pp. 100–122). Cheltenham, UK: Edward Elgar.

Forguson, L. (1989). *Common sense*. London: Routledge.

Gruère, G., Bouët, A., Mevel, S. (2007). Genetically modified food and international trade: The case of India, Bangladesh, Indonesia and the Philippines. IFPRI Discussion Paper 00740, Washington, DC: International Food Policy Research Institute. Available from: http://www.ifpri.org/pubs/dp/ifpridp00740.asp [accessed 26 August 2009].

Hackett, E. J., Amsterdamska, O., Lynch, M., & Wajcman, J. (Eds.). (2007). *The handbook of science and technology studies*. Cambridge, MA: MIT Press.

Hagendijk, R., & Irwin, A. (2006). Public deliberation and governance: Engaging with science and technology in contemporary Europe. *Minerva, 44*(2), 167–184.

Hall, C. (2008). Identifying farmer attitudes towards genetically modified (GM) corps in Scotland: Are they pro- or anti-GM? *Geoforum, 39*, 204–212.

Hindmarsh, R., & Du Plessis, R. (2008). GMO regulation and civic participation at the 'edge of the world': The case of Australia and New Zealand. *New Genetics and Society, 27*, 180–199.

International Service of the Acquisition of Agri-Biotech Applications (ISAAA). 2009. *Global status of commercialized biotech/GM crops: 2009.* Brief 41-2009. http://www.isaaa.org/resources/publications/briefs/41/executivesummary/default.asp [Accessed 1 June 2010].

James, W. (1892). *Psychology.* Cleveland & New York: World.

Joerges, B., & Nowotny, H. (Eds.). (2003). *Social studies of science and technology: Looking back, ahead*. Dordrecht: Springer.

Kim, H. (2008). *Q methodology: Philosophy, theories, analysis & practice*. Seoul: Communications Books (in Korean).

Kimbrell, A. (Ed.). (2002). *The fatal harvest reader.* Sausalito CA: Foundation for Deep Ecology and Island Press.

Kleinman, D. L. (Ed.). (2000). *Science, technology, and democracy.* Albany, NY: SUNY Press.

Lawrence, F. (2009). It is too late to shut the door on GM foods. *The Guardian online*. Available from: http://www.guardian.co.uk/environment/2009/oct/16/too-late-to-stop-gm [accessed 22 October 2009].

Leib, E., & Baogang, H. (Eds.). (2006). *The search for deliberative democracy in China*. New York: Palgrave Macmillan.

Leitch, S. (2008). Engaging across boundaries: Consultation, collaboration and resistance. In S. Davenport, J., Motion, S. Leitch, (Eds.), *Working across boundaries: Science industry in society*, pp. 13–19. Report of a Royal Society of NZ Symposium, Wellington: Sustainable Biotechnology Project.

Levidow, L. (2007). European public participation as risk governance: Enhancing democratic accountability for agribiotech policy? *East Asian Science, Technology and Society, 1*, 19–51.

Levin, C., Long, J., Simler, K., & Johnson-Welch, C. (2003). *Cultivating nutrition: A survey of viewpoints on integrating agriculture and nutrition. Food Consumption and Nutrition Division Discussion Paper No 154*. Washington, DC: International Good Policy Research Institute.

Lonergan, B. (1957). *Insight: A study of human understanding*. San Francisco: Harper & Row.

Martineau, B. (2001). *First fruit: The creation of the Flavr Savr tomato and the birth of biotech foods*. New York: McGraw-Hill.

Mattson, D., Byrd, K., Rutherford, M., Brown, S., & Clark, T. (2006). Finding common ground in large carnivore conservation: Mapping contending perspectives. *Environmental Science & Policy, 9*, 392–405.
McCluskey, J., Grimsrud, K., & Wahl, T. (2006). Comparison of consumer responses to genetically modified foods in Asia, North America, and Europe. In R. Just, J. Alston, & D. Zilberman (Eds.), *Regulating agricultural biotechnology: Economics and policy* (pp. 227–240). New York: Springer.
McHughen, A. (2000). *Pandora's picnic basket: The potential and hazards of genetically modified foods*. Oxford: Oxford University Press.
McKeown, B., & Thomas, D. (1988). *Q methodology*. Newbury Park: Sage.
Min, S. J. (2009). *Deliberation, East meets West: Exploring the cultural dimensions of citizen deliberation*. PhD dissertation, Ohio State University.
Montserrat Costa-Font, M., Gil, J., & Traill, W. (2008). Consumer acceptance, valuation of and attitudes toward genetically modified food: Review and implications for food policy. *Food Policy, 33*(2), 99–111.
Motion, J. (2008). Communicating across science/society boundaries: Ideas, values and bodies of knowledge. In S. Davenport, J. Motion, S. Leitch, (Eds.), *Working across boundaries: Science industry in society*, pp. 8–12. Report of a Royal Society of NZ Symposium. Wellington: Sustainable Biotechnology Project.
Nelson, G. (2001). *Genetically modified organisms in agriculture: Economics and politics*. New York: Academic.
Ockwell, D. (2008). 'Opening up' policy to reflexive appraisal: A role for Q methodology?: A case study of fire management in Cape York, Australia. *Policy Sciences, 41*, 263–292.
O'Neill, J., Carter, C., Ekeli, K., & Kenyon, W. (2008). *Representing diversity in participatory approaches. PATH Policy Brief 1*. Aberdeen, UK: Macaulay Institute.
Pope, N., Voges, K., Brown, M., Forrest, E. (2004) Consumer attitudes towards genetically modified foods: Development of a multidimensional scale. Wellington, New Zealand: Australian and New Zealand Marketing Academy Conference. Available from: http://smib.vuw.ac.nz:8081/WWW/ANZMAC2004/CDsite/papers/Pope1.PDF [accessed 20 October 2009].
Reber, B. (2010). *La démocratie génétiquement modifiée. Sociologies éthiques de l'évaluation des technologies controversies*. Quebec: Presses Universitaires de Laval.
Rescher, N. (2005). *Common-sense: A new look at an old philosophical tradition*. Milwaukee: Marquette University Press.
Rowe, G., & Frewer, L. (2000). Public participation methods: A framework for evaluation. *Science, Technology, and Human Values, 25*, 3–29.
Rutherford, M. B., Gibeau, M. L., Clark, S. G., & Chamberlain, E. C. (2009). Interdisciplinary problem solving workshops for grizzly bear conservation in Banff National Park, Canada. *Policy Sciences, 42*, 163–187.
Schmolck, P. (2002). PQMethod 2.11. Available from: http://www.rz.unibw-muenchen.de/~p41bsmk/qmethod [accessed 20 October 2009].
Steelman, T., & Maguire, L. (2000). Understanding participant perspectives: Q methodology in national forest management. *Journal of Policy Analysis and Management, 18*, 361–388.
Stephenson, W. (1953). *The study of behavior: Q-technique and its methodology*. Chicago: University of Chicago Press.
Stephenson, W. (1978a). Concourse theory of communication. *Communication, 3*, 21–40.
Stephenson, W. (1978b). The shame of science. *Ethics in Science & Medicine, 5*, 25–38.
Stephenson, W. (1980). Consciring: A general theory for subjective communicability. In D. Nimmo (Ed.), *Communication yearbook, 4/7–36*. New Brunswick: Transaction.
Stephenson, W. (1986). Protoconcursus: The concourse theory of communication, parts 1 and 2. *Operant Subjectivity, 9*, 37–58–73–96.
Stirling, A. (2008). 'Opening up' and 'closing down': Power, participation, and pluralism in the social appraisal of technology. *Science, Technology & Human Values, 33*, 262–294.
United States Department of Agriculture, Economic Research Service (USDA/ERS). (2009). *Adoption of genetically engineered crops in the US*. Available from: http://www.ers.usda.gov/data/biotechcrops [accessed 20 October 2009].
van Eeten, M. (2001). Recasting intractable policy issues: The wider implications of the Netherlands civil aviation controversy. *Journal of Policy Analysis and Management, 20*, 391–414.
Venables, D., Pidgeon, N., Simmons, P., Henwood, K., & Parkhill, K. (2009). Living with nuclear risk: A Q-method study. *Risk Analysis, 29*(8), 1089–1104.

Webler, T., Danielson, S., Tuler, S. (2009). Using Q method to reveal social perspectives in environmental research. Greenfield MA: Social and Environmental Research Institute. Available from: www.serius.org/pubs/Qprimer.pdf [accessed 18 September 2009].

Weirich, P. (Ed.). (2007). *Labeling genetically modified food: The philosophical and legal debate*. Oxford: Oxford University Press.

Wolf, A. (2006). *Operant subjectivity and persuasion in public policies. Paper presented at the 22nd Annual Conference of the International Society for the Scientific Study of Subjectivity*. Norway: Tronheim.

Wolf, A. (2009). Subjectivity, the researcher and the researched. *Operant Subjectivity: The International Journal of Q Methodology, 32*, 6–28.

Wolsink, M. (2004). Policy beliefs in spatial decisions: contrasting core beliefs concerning space-making for waste infrastructure. *Urban Studies, 41*, 2669–2690.

Wong, W., Eiser, A., Mrtek, R., & Heckerling, P. (2004). By-person factor analysis in clinical ethical decision making: Q methodology in end-of-life care decisions. *The American Journal of Bioethics, 4*, W8–W22.

World Health Organization (WHO). (2009). 20 questions on genetically modified (GM) foods. Available from: http://www.who.int/foodsafety/publications/biotech/20questions/en/index.html [accessed 20 October 2009].

Zartman, I. (2008). *Negotiation and conflict management: Essays on theory and practice*. Oxon, England: Routledge.