

**Trust, Affect and the Acceptability of GM Food: a Casual Analysis?**

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## Abstract

Although there is ample empirical evidence that trust in risk regulation is strongly related to the perception and acceptability of risk, it is less clear what the directions of these relationships are. This paper explores the role of trust in the context of genetically modified (GM) food in Britain, using three separate datasets on public perceptions of GM food. Firstly, this study compared two models of trust. More specifically, it was investigated whether trust is the cause (causal chain account) or the consequence (associationist view) of the acceptability GM food. The results were more supportive of the associationist view than of the causal chain account of trust. Secondly, this study examined whether the affect heuristic could be applied to a wider number of risk-relevant concepts than just perceived risk and benefits. In line with the associationist perspective, ‘affect’ accounted for a large portion of the variance between perceived risk, perceived benefit, trust in risk regulation, and acceptability. The implication of these results for risk communication and policy are discussed.

## Introduction

In the last decade trust has become one of the most intensively studied themes within risk research (e.g., Renn & Levine, 1991; Kasperson, Golding & Tuler, 1992; Freudenburg, 1993; Slovic, 1993; Earle & Cvetkovich, 1995; Frewer, Howard, Hedderley & Shepherd, 1996; Cvetkovich & Löfstedt, 1999; Greenberg & Williams, 1999; Johnson, 1999; Kasperson, Golding & Kasperson, 1999; Siegrist, Cvetkovich & Roth, 2000; Poortinga & Pidgeon, 2003a). Trust is generally considered important when tasks are too big or complex for individuals to manage themselves (Earle & Cvetkovich, 1995). Freudenburg (1993) uses Durkheim's work on the societal division of labour (1984, first published 1893) to stress the importance of trust in a complex modern society. With more differentiation and specialisation in society members become more dependent on each other. The division of labour comes with the expectation that the person who has a specific task or responsibility also will perform their duty in a way that others can count on. Although the division of labour has helped to substantially reduce various risks, Freudenburg (1993) argues that society has become more vulnerable in cases where duties are not properly being carried out. Trust is particularly important in the public sector, as these institutions often have the specific duty to protect the public from various risks. Trust in public institutions to effectively regulate or control (technological) risks is generally seen as an important factor in the acceptability of these risks.

## Trust: Cause or Consequence?

There is ample empirical evidence that trust in institutions is closely related to the perception and acceptability of various risks (see e.g., Pijawka & Mushkatel, 1991/1992; Bord & O'Connor, 1992; Flynn, Burns, Mertz & Slovic, 1992; Freudenburg, 1993;

Jungermann, Pfister & Fischer, 1996; Siegrist, 1999; Siegrist et al., 2000). The high correlates found in these studies show that trust is an important concept in the study of technological risk issues, and in particular ones that are surrounded by social controversy. It is often implicitly or explicitly assumed that trust is the determining factor in the perception and acceptability of risks. That is, the extent to which people trust risk management institutions determines the level of perceived risk, and, consequently, the acceptability of these activities or technologies. Eiser, Miles and Frewer (2002) call this the causal chain account of trust (see Figure 1). The causal model of trust is currently the most common interpretation of the generally strong relationships between trust, risk perception and acceptability. However, high correlates do not necessarily mean that the perceived risk and acceptability are caused by trust in risk regulation. Recently Eiser et al. (2002) came up with the alternative interpretation that, instead of a result, the acceptability of a risk is the determinant of trust. Both trust and risk perception can well be indicators or expressions of a more general attitude towards a certain activity or technology. This is what Eiser et al. (2002) call the associationist view of trust (cf. Eiser 1994; see Figure 1). Eiser et al. (2002) compared the two trust models through secondary analyses of three previous studies of public perceptions of various food technologies. Although they conclude that the findings broadly support the associationist view of trust, the results are somewhat mixed. Whereas in two studies more support was found for the associationist view, in one study the causal chain account of trust fitted the data best. An explanation for the mixed results might be that the studies were not directly designed to compare the two models of trust. Probably as a result, Eiser et al. (2002) used slightly different measures for trust, risk and acceptability in the three studies. Moreover, they

used measures of trust in information, while measures of trust in regulation would have been more appropriate.

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Figure 1 about here

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Risk research provides some additional support for the associationist view, i.e., that specific judgements are driven by more general evaluative judgements. In particular, ‘affect’ is increasingly seen as an important part of the way in which lay perceptions of risk issues are constructed (Alhakami & Slovic, 1994; Finucane, Alhakami, Slovic & Johnson 2000; Loewenstein, Weber, Hsee & Welch, 2001; Langford, 2002; Rundmo, 2002; Slovic, Finucane, Peters & MacGregor, 2002; Slovic, in press). Although the measurement of affect is plagued by a number of conceptual and methodological problems (Crites, Fabrigar & Petty, 1994), affect could be conceptualised as a ‘fuzzy’ overall valenced (positive or negative) evaluation of a particular object. For example, Slovic et al. (2002) define affect as a specific quality of ‘goodness’ or ‘badness’ experienced as a feeling of state and demarcating a positive or negative quality of a stimulus (Slovic et al., 2002). Affect can be distinguished from more cognitive attitudes in the sense that they are more spontaneous and easier accessible. Moreover, because affective responses tend to be instantaneous, affect is seen to guide other judgements and influences subsequent information processing (Zajonc, 1980).

Alhakami & Slovic (1994) were among the first to explore in detail the generally robust inverse relationship between perceived risk and perceived benefit of various technologies. They demonstrated that the relationship between perceived risk and perceived benefit can largely be explained by a person’s overall evaluation of a hazard.

On the basis of this observation Finucane et al. (2000) proposed a model of affect coming prior to, and hence directing judgements of risks and benefits, which they labelled the affect heuristic. That is, people's general affective evaluation of an activity or technology operates as some kind of mental shortcut for more specific evaluations. Although the affect heuristic has mainly been used to explain the relationship between perceived risk and perceived benefit, it resonates well with the associationist view of risk perceptions and trust. Like the associationist view of trust, the affect heuristic reverses the widely held view that judgements being prior to preferences, and holds that in many cases preferences may well shape more specific beliefs. From this perspective the affect heuristic should not only be able to explain the relationship between perceived risk and benefits, but could also include other risk-relevant judgements, such as trust in risk regulation.

### Aims and Hypotheses

This paper explores the role of trust in the context of genetically modified (GM) food in Britain, using three separate datasets on public perceptions of GM food. GM food has become one of the most contentious risk cases in Britain in recent years (see e.g., Gaskell & Bauer, 2001). Having more clarity about the role of trust is of great importance to risk managers and policy makers working in the field of biotechnology. Different policy responses are likely to be dependent on whether trust is the cause or consequence of people's attitudes towards GM food. Whereas the most common interpretation is that the reluctance of the (British) public to embrace GM food is caused by their distrust of the government's ability to regulate GM food, it could well be that trust in government regulation is an expression of a more general (negative) attitude towards GM food. If the

latter is the case, efforts aimed solely at increasing trust could be unproductive, as they are based on incorrect assumptions about the roots of public opposition to GM food.

This study has two discrete but closely interrelated objectives. The first objective of this study is to empirically explore the nature of the relationships between trust, perceived risk, and acceptability. It is examined whether the relationship between trust and acceptability is mediated by perceived risk (i.e., the causal model of trust) or whether trust and perceived risk both are expressions of a general attitudinal orientation towards GM food (i.e., the associationist view of trust). This is effectively a replication of the study of Eiser et al. (2002) applied to the issue of GM food. The current series of studies are specifically designed to compare the two models of trust, and uses measures of ‘trust in risk regulation’ instead of measures of ‘trust in information’. It is expected that, in line with the findings of Eiser et al. (2002), more support will be found for the associationist view that both trust and perceived risk are reflections of a more general attitude towards GM food.

The second objective of this study is to examine whether the affect heuristic can be applied to multiple risk-relevant concepts. As argued, the affect heuristic is closely related to the associationist view of trust. Both models hold that specific risk judgements are driven by more general evaluative judgements. Although the affect heuristic has mainly been used to explain the relationship between perceived risks and perceived benefits, this study investigates whether it can be applied to a wider set of important risk judgements (i.e., perceived risk, perceived benefit, trust in risk regulation, and acceptability). It is expected that people’s general affective evaluation of GM food will account for most of the shared variance between the different risk judgements, among

which trust in risk regulation. This would also be in line with the associationist view of trust.

### Analyses

Although it is difficult to assess the direction of correlational relationships with standard statistical techniques, there are some ways to get an indication of the causality of such a relationship. De Vaus (2002) describes how to ascertain the nature of the relationship between variables by identifying a third variable that might account for (part of) the relationship between two variables. De Vaus (2002) describes three typical relationships between three variables. The first is a direct causal relationship, in which two variables are directly related without being mediated by a third variable. Second, an indirect causal relationship exists when the relationship between two variables is mediated by a third variable. The third model is one of a spurious relationship. In this case the relationship between two variables is an erroneous one, because it is caused by a third variable. [INSERT FOOTNOTE 1] The latter two models are most important here as they represent the causal account and the associationist view of trust respectively (see Figure 1). The causal model of trust can be described as an indirect causal relationship, as the causal link between trust and acceptability is mediated by risk perception. The associationist view represents a spurious relationship between trust and risk perception, i.e., the two are correlated because both are affected by the variable acceptability – representing a more general attitude towards genetically modified food.

As Eiser et al. (2002) suggest, the nature of the relationships between perceived risk, trust in risk regulation and risk acceptability can be explored by comparing the zero-order relationships (i.e., the original bivariate correlations) and the correlations after

controlling for the third variable (i.e., the first-order partial correlations). If the associationist approach is correct, controlling for acceptability should substantially decrease the relationship between trust and perceived risk, whilst the relationship between perceived risk and acceptability should remain high after controlling for trust as should the relationship between trust and acceptability after controlling for perceived risk. The causal chain view is supported if the initial relationship between trust and acceptability substantially decreases when controlling for perceived risk (see also Baron & Kenny 1986; Eiser *et al.*, 2002). At the same time the partial correlation between acceptance and perceived risk (controlling for trust) and the partial correlation between trust and perceived risk (controlling for acceptability) should remain significant. We compare the two competing trust models in all three studies.

Zero-order and partial correlations are also used to investigate whether ‘affect’ can explain the relationships between various risk-relevant variables (i.e., perceived risk, perceived benefit, trust, and acceptability). If the relationships between the different variables are due to differences in people’s general affective evaluation of GM food, controlling for affect should substantially decrease the correlations between these variables (analogous to the associationist model of trust). We investigate this hypothesis in study 2 and study 3.

## Study 1

### Method

Data for this first study comes from a large-scale British survey. A national quota sample of 1,547 respondents aged 15 years and older were interviewed face-to-face in people their own homes between 6 July and 31 July 2002 by the market research

company MORI. The total sample comprised of five separate quota samples of about 300 respondents, each covering one of five core risk cases, i.e., Climate Change, Radiation from Mobile Phones, Radioactive Waste, GM food and Genetic Testing (see Poortinga & Pidgeon, 2003b). The demographic profile of the overall sample as well as the five sub-samples reflected that of the British population. This paper only uses the sub-sample of 296 respondents that were interviewed about GM food.

The questionnaire contained a wide range of items on the issue of GM food. Trust in Risk Regulation was measured with two items. People were asked whether they agreed with the statements “I feel that current rules and regulations are sufficient to control GM food” and “I feel confident that the British government adequately regulates GM food”. People could answer on a scale ranging from 1: “totally disagree” to 5: “totally agree”. The two items were used to construct a reliable trust measure (Cronbach’s  $\alpha=0.81$ ). Perceived Risk of GM food was measured by asking people to assess the risks of GM food to themselves, to the environment, and to British society as a whole. The scores of all items could vary from 1: “no risks” to 7: “very high risks”, with 4: “some” in the middle. The internal consistency of the three risk items was high (Cronbach’s  $\alpha=0.88$ ). Acceptability of GM food was measured with two items. First, respondents were asked to indicate the extent to which they thought that GM food is acceptable on a scale ranging from 1: “very unacceptable”, to 5: “very acceptable”. Second, they were asked to weigh the risks and benefits of GM food on a scale with the following response options: 1: “the risks far outweigh the benefits”, 2: “the risks slightly outweigh the benefits”, 3: “the risks and the benefits are about the same”, 4: “the benefits slightly outweigh the risks”, 5: “the benefits far outweigh the risks”. As the reliability was again high (Cronbach’s  $\alpha=0.85$ ), an acceptability scale was constructed combining these two items.

## Results

The zero-order and the partial correlations between trust, perceived risk and acceptability of GM food are presented in Table 1. Consistent with the associationist view, controlling for acceptability substantially reduced the negative correlation between perceived risk and trust. At the same time the positive correlation between trust and acceptability was reduced after controlling for perceived risk, this latter effect being somewhat smaller than the former one. The negative correlation between perceived risk and acceptability only slightly diminished after controlling for trust.

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Table 1 about here

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## Study 2

### Method

Data for the second study were collected between 31 April and 13 May 2003. During this period 600 questionnaires were distributed to households in Norwich, the county town of Norfolk (United Kingdom). In order to ensure a wide range of people with different backgrounds, the survey was conducted in three parts of Norwich with different socio-economic profiles. In these three areas people of every third house was asked to participate in a study on GM food. The questionnaires were left for self-completion and collected by the researchers on a subsequent day. Where a respondent was not at home at the time of collection a freepost envelope was left so that the questionnaire could be returned. In total, 396 respondents completed and returned the questionnaire, representing a response rate of 66 percent.

The questionnaire contained items on trust, perception of risks and benefits, acceptability and affect. Trust in Risk Regulation was measured using three items. People were asked whether they agreed with the statement “I feel confident that the government adequately regulates GM food”, “The regulation of GM food is in safe hands with the government”, and “I feel that the current rules and regulation are sufficient to control GM food”. Respondents answered on a scale ranging from 1: “totally disagree” to 5: “totally agree”. The reliability of the three items was sufficient (Cronbach’s  $\alpha=0.71$ ). Perceived Risk of GM food was measured by asking people to indicate the risks to themselves, to the environment, and to society as a whole on a 5-point scale, ranging from 1: “very low” to 5: “very high”. The three perceived risk items were combined into one perceived risk measure with a high internal consistency (Cronbach’s  $\alpha=0.90$ ). Perceived Benefit of GM food was measured by asking people to assess the personal and environmental benefits of GM food, as well as the benefits for society as a whole, with scores varying from 1: “very low” to 5: “very high”, with 3: “moderate” as the scale midpoint. The reliability of the three benefit items was again high (Cronbach’s  $\alpha=0.89$ ). Acceptability of GM food was measured with the same two items used in study 1. An internally consistent acceptability scale was constructed using the average response to the two items (Cronbach’s  $\alpha=0.84$ ). People’s General Affective Evaluation of GM food was measured by asking people “how do you feel about GM food” on a scale from 1: “very negatively”, to 5 “very positively”, with 3: “neither positively nor negatively” as the midpoint value. People were also asked “to what extent do you think GM food is a good or a bad thing” on a 5-point scale, ranging from 1: “very bad thing”, to 5 “very good thing”, with 3: “neither good nor bad thing” as the midpoint value”. The internal consistency was again sufficiently high to create one general affective evaluation scale (Cronbach  $\alpha=0.82$ ).

## Results

Table 2 shows the zero-order and partial correlation between trust, perceived risk and the acceptability of GM food. The results of the second study clearly support the associationist view of trust. The relationship between perceived risk and trust was considerably lower after controlling for acceptability. In contrast, the correlations between perceived risk and acceptability, and between trust in risk regulation and acceptability remained high after controlling for trust and perceived risk, respectively.

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Table 2 about here

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Study 2 was also designed to explicitly test whether the correlations between various risk-relevant variables could be explained by people's general affective evaluation of GM food. Table 3 shows the zero-order correlations between perceived risk, perceived benefit, trust in risk regulation and acceptability of GM food, as well as the partial correlations between these variable after controlling for respondents' general affective evaluation of GM food. All correlations were clearly reduced after taking into account differences in people's general affective evaluation of GM food. Especially the correlations between perceived risk, perceived benefit and trust in risk regulation were reduced when controlling for people's general affective evaluation of GM food. Also the relationships between acceptability and the other variables decreased after controlling for affect, albeit to a lesser extent. While the partial correlations remained significant, the size of the relationships (percentage of overlapping variance) was generally small.

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Table 3 about here

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### Study 3

#### Method

Data for the third study were collected between 19 July and 12 September 2003 (see Poortinga & Pidgeon, 2004). This was a large-scale British survey designed to measure attitudes to GM food in general as well as to evaluate a national public debate on the commercialisation of agricultural biotechnology occurring during the summer of 2003. A nationally representative quota sample of 1,363 respondents aged 15 years and older was interviewed face-to-face in their own homes by the market research company MORI.

Trust in Risk Regulation was measured with the items “I feel confident that the British government adequately regulates GM food” and “I am confident that the development of GM Crops is being carefully regulated”. Both statements were answered on a 5-point scale from 1: “totally disagree” to 5: “totally agree”. The internal consistency of the two items was moderate, but high enough to construct a common scale (Cronbach’s  $\alpha=0.69$ ). Perceived Risk of GM food was measured with three items. People were asked to assess the risks of GM food for themselves, the environment, and British society as a whole. The scale ranged from 1: “no risks” to 7: “very high risks”, with 4: “some” in the middle. The reliability of these three risk items was high (Cronbach’s  $\alpha=0.91$ ), and could therefore be combined into one variable. To measure the Perceived Benefit of GM food, respondents were asked to assess the benefits of GM food for themselves, the environment, and for British society as a whole. The scores of all items could vary from 1: “no benefits” to 7: “very high benefits”, with 4: “some” in the middle.

An reliable benefit variable was constructed using these three items (Cronbach's  $\alpha=0.88$ ). Acceptability of GM food was measured with the same two items used in study 1 and study 2. The internal consistency of the two items was sufficiently high to create a acceptability scale (Cronbach  $\alpha=0.84$ ). Finally, people's General Affective Evaluation of GM food was measured with measured using the same items as in study 2. A reliability analysis showed that one scale could be constructed from the two items (Cronbach's  $\alpha=0.75$ ).

### Results

Also the third study found more support for the associationist view than for the causal chain account of trust (see Table 4). Controlling for acceptability clearly reduced the correlation between perceived risk and trust. In contrast, the relationship between perceived risk and acceptability decreased marginally after controlling for trust. Likewise, controlling for perceived risk only slightly decreased the correlation between trust and acceptability.

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Table 4 about here

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The results presented in Table 5 confirm the results of study 2 that people's general affective evaluation of GM food accounts for a large proportion of the shared variance between the different risk-relevant variables. As would be predicted by the affect heuristic, the correlations between perceived risk, perceived benefit, trust in risk regulation and acceptability decreased after controlling for people's general affective evaluation of GM food. Especially the correlations between perceived risk, perceived

benefit and trust in risk regulation were substantially reduced after controlling for people's general affective evaluation of GM food, even rendering the relationship between perceived risk and perceived benefit non-significant. The relationships with acceptability were reduced to a lesser extent.

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Table 5 about here

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### Discussion

This paper explored the role of trust in the context of GM food in Britain. By comparing the zero-order and partial correlations between perceived risk, trust in risk regulation and the acceptability GM food we have been able to examine whether trust in the government's ability to regulate GM food is likely to be the cause (causal chain account) or the consequence (associationist view) of the acceptability GM food. The results presented in this study are generally more supportive of the associationist view than of the causal chain account of trust. The results from three separate studies of public attitudes to GM food demonstrated that controlling for acceptability reduced the correlations between perceived risk and trust in risk regulation to very low levels. Conversely, controlling for perceived risk only somewhat diminished the relationship between trust in risk regulation and acceptability. Also controlling for trust only slightly reduced the correlation between perceived risk and acceptability. Although these results more closely support the associationist view of trust, the causal chain account of trust cannot be completely ruled out because the relationship between trust and risk perception remained significant in all three studies when variation in acceptability was partialled out.

Accordingly, the current findings suggest that this relationship can best be characterised as a partly spurious one (De Vaus, 2002). This means that, even if both trust and perceived risk are largely expressions of a more general attitude towards GM food, there is still a direct, if small, relationship between trust and perceived risk.

This paper also examined whether the affect heuristic could be applied to a wider set of risk-relevant concepts than just perceived risk and benefits, again by comparing the zero-order with the partial correlations after controlling for people's general affective evaluation of GM food. As expected, and in line with the associationist perspective, people's general affective evaluation of GM food accounted for a large portion of the variance between perceived risk, perceived benefit, trust in risk regulation and acceptability. In particular the associations between the former three were substantially reduced after controlling for people's general affective evaluation of GM food. In the third study controlling for affect even rendered the relationship between perceived risk and perceived benefit of GM food non-significant. These findings clearly demonstrate that the affect heuristic can be broadened to other risk-relevant concepts such as trust in risk regulation and acceptability. This also strengthens the idea of the associationist view that a number of concepts used in risk research seem to be expressions of a more general attitude towards the risk issue at hand. Then again, the partial correlations also reveal that perceived risk, perceived benefit and trust in risk regulation each have a modest but significant independent contribution to the explanation of the acceptability of GM food. In other words, while most of the overlapping variance can be attributed to differences in general affective evaluation of GM food, a part of the variation in acceptability can indeed be explained by individual differences in perceived risk, perceived benefit and trust in risk regulation.

It is important to consider that when comparing different theoretical models it is necessary that the measures of the various model constructs are valid and reliable. Especially the measurement of 'affect' seems to be critical, as this construct is surrounded by a number of conceptual and methodological problems (see e.g., Crites et al., 1994; Peters, Slovic & Flynn, under review). Although a criticism of this study could be that some of the scales consist of only two items and that they therefore may not have measured the different concepts accurately, all scales were internally consistent. Moreover, the results were repeated in three separate studies with relatively large sample sizes. The findings clearly indicate that, using two different measures (i.e., 'acceptability' and 'affect'), someone's overall evaluation of GM food may serve as a powerful 'anchor' for other risk judgements. An additional positive feature of the current series of studies is that they investigated beliefs about risk and trust in samples of the general population.

A more political argument can also be advanced here, which is by no means in conflict with the affect heuristic or the associationist view of trust. The issue of GM food was a particularly visible, controversial, and to some extent polarised case in Britain during the time that all of the surveys were conducted (see e.g., Poortinga & Pidgeon, 2004). Over twenty-five years ago Molotch and Lester (1975) noted that "one dimension of power can be construed as the ability to have one's account become the perceived reality of others". Accordingly, Horlick-Jones, Sime and Pidgeon (2003) point out that where risk issues are hotly contested considerable care has to be exercised over the interpretation of perceptions data. In short, one should be aware of the 'politics of accounts'. The mere filling out of a questionnaire, or attendance at a focus group, can in itself represent a political or symbolic act for some respondents. In a polarised situation many people have (by definition) already taken a particular stance that may drive their

further responses to that particular issue. Accordingly, it could well be possible that people use their risk, benefit and trust judgements in a rhetorical way in order to support their own (political) standpoint. For example, an opponent is unlikely to say that GM food is safe, has major benefits, or that GM food can be properly regulated. This would not only lead to an internal ‘attitudinal conflict’ (cf., Festinger, 1957), but it is also not strategically to support views or to trust regulation in ways that that contradict your own position on GM food. Likewise, it would be unwise for supporters to undermine their own position by questioning the safety or regulation of GM food. It is important to recognise here that that people’s expressed judgements still reflect their opinion on the particular issue. However, viewing people as political actors provides a plausible additional explanation for the findings of the current studies, alongside some pointers for further research. For example, if this interpretation is correct then for polarised issues the influence of overall affect judgements on various risk-relevant concepts should remain relatively stable across different situations, as they are expressions of underlying and strongly held beliefs about the particular issue. Equally, a legitimate empirical question arises over the generalisability of the current findings to other less contested risk issues and social contexts. In particular, would the influence of affect and associational judgements be so marked with more mundane (e.g., automobiles) or less well-known risk issues (such as nano-technology)? Clearly there is further productive research to be done here.

The findings of this study may also hold important implications for risk communication and policy. Although for many the ‘reclamation of trust’ has become an explicit objective, this study suggests that risk communication efforts that are aimed at directly increasing trust may not be universally effective in solving risk controversies (cf.

Fischhoff, 1995). These policies could well be counterproductive where they are based on the incorrect assumption that trust can be simply manipulated in order to increase the acceptance of a controversial technology. As the results suggest, where trust in regulation is strongly dependent on someone's general attitude, it is more likely that trust will be increased only through understanding and addressing the underlying concerns about that particular issue. This would support the view that two-way risk communication holds advantages over conventional one-way provision of information. On the issue of trust and risk communication Bier (2001) argues that, especially in a situation of distrust, one must begin with listening to the concerns of the public before giving them new information. Trying to increase trust by simply providing information may well be interpreted as not taking concerns seriously, and is more likely to destroy than to create trust.

Although this study shows that trust in regulation is largely an expression of a more general attitude, it does not mean that specific events have no impact on perceived risk, trust, or acceptability. As demonstrated earlier, perceived risk and trust in risk regulation still have a moderate but significant contribution to the explanation of acceptability. In addition, Kasperson, Golding and Kasperson (1999) showed that trust in institutions is quite sensitive to specific events. An interesting direction for future research would be to examine how the impacts of events interact with people's (prior) attitudes. There is ample evidence that suggests that people select and interpret social information in order to support their existing worldviews (see e.g., Sherif & Hovland, 1961; Lord, Ross & Lepper, 1979; Eiser, Spears & Webley, 1989; Plous, 1991; Koehler, 1993; Frewer, Howard & Shepherd, 1998; White, Pahl, Buehner & Haye, 2003). In the 1960s it was demonstrated that people interpret new information by taking their own attitudinal position as a frame of reference (Sherif & Hovland, 1961). In the context of

the controversial issue of capital punishment, Lord, Ross and Lepper (1979) found that people considered evidence that supported their own views as more trustworthy than evidence that was at variance. Likewise, Plous (1991) found that people with differing attitudes draw different conclusions from non-catastrophic industrial breakdowns. That is, supporters of a technology interpret near misses as evidence that safeguards had worked, whereas the same events negatively influenced opponent's trust in safeguards to prevent future accidents. In a study about communicating possible benefits of GM food to the general public, Frewer et al. (1998) found that trust in information sources as well as the evaluation and the impact of persuasive information are dependent on people their initial attitudes. Recently, White et al. (2003) found that prior attitudes significantly moderated the effect of valence on trust. More specifically, whereas participants with a positive attitude generally had greater confidence in positive messages than in negative messages, the reverse pattern was found for participants with less favourable attitudes. More research is needed in order to get a better understanding of the logic and dynamics of trust, especially in relation to complex technological risk cases such as GM food. The underlying issue of whether trust is stable (e.g., Earle & Cvetkovich, 1995) or volatile (e.g., Slovic, 1993) has yet to be resolved. The results of the present study that trust is largely an expression of a more general attitude suggest a considerable degree of stability. Differences in the interpretation of evidence and the onus of proof in interaction with the networks of cognitive and affective associations people hold regarding risk issues could explain the relative stability or otherwise of trust and attitudes towards various risk issues.

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### Footnotes

[1] A nice illustration is the fictional observation of a positive correlation between the number of firemen used to fight a fire and the damage caused by that fire. Someone could draw the conclusion that the deployment of more firemen leads to more damage. However, it is more likely that the relationship is caused by a third variable, e.g., the size of the fire. In other words, the size of a fire generally leads to the deployment of more firemen as well as to more damage. If the relationship between number of firemen and damage is indeed caused by the size of the fire, then this relationship should decrease when controlling for the ‘confounding’ influence of fire size.

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(a) The causal model of trust



(b) The associationist model of trust

Figure 1. Two models of trust

Table 1. Zero-order and partial correlation between trust, perceived risk and acceptability of GM food (study 1).

<i>Relationship</i>	<i>Zero-order</i>		<i>Controlling for:</i>	<i>Partial</i>	
	<i>correlation</i>	<i>n</i>		<i>correlation</i>	<i>n</i>
Trust × Risk	-0.54**	193	Acceptability	-0.25**	196
Risk × Acceptability	-0.68**	216	Trust	-0.53**	196
Trust × Acceptability	0.56**	221	Risk	0.32**	192

Note: \*  $p < .01$ ; \*\*  $p < .001$

Table 2. Zero-order and partial correlations between trust, perceived risk and acceptability of GM food (study 2).

<i>Relationship</i>	<i>Zero-order</i>		<i>Controlling for:</i>	<i>Partial</i>	
	<i>correlation</i>	<i>n</i>		<i>correlation</i>	<i>n</i>
Trust × Risk	-0.57**	296	Acceptability	-0.21**	291
Risk × Acceptability	-0.68**	298	Trust	-0.47**	291
Trust × Acceptability	0.62**	375	Risk	0.50**	291

Note: \*  $p < .01$ ; \*\*  $p < .001$

Table 3. Zero-order and partial correlations controlling for general affective evaluation (study 2).

<i>Zero-order r</i>	<i>Perceived risk</i>	<i>Perceived benefit</i>	<i>Trust in risk regulation</i>	<i>Acceptability</i>
<i>Partial r</i>				
Perceived risk		-0.58** (287)	-0.57** (296)	-0.68** (298)
Perceived benefit	-0.12+ (274)		0.60** (304)	0.81** (304)
Trust in risk regulation	-0.21** (274)	0.17* (274)		0.62** (375)
Acceptability	-0.24** (274)	0.42** (274)	0.26** (274)	

Note: Zero-order correlations are presented above the table diagonal and the partial correlations controlling for general affect are presented below the table diagonal; Sample sizes are given in brackets; +  $p < .05$ ; \*  $p < .01$ ; \*\*  $p < .001$

Table 4. Zero-order and partial correlations between trust, perceived risk and acceptability of GM food (study 3).

<i>Relationship</i>	<i>Zero-order</i>		<i>Controlling for:</i>	<i>Partial</i>	
	<i>correlation</i>	<i>n</i>		<i>correlation</i>	<i>n</i>
Trust × Risk	-0.47**	1033	Acceptability	-0.18**	951
Risk × Acceptability	-0.64**	1006	Trust	-0.50**	951
Trust × Acceptability	0.58**	1071	Risk	0.42**	951

Note: \*  $p < .01$ ; \*\*  $p < .001$

Table 5. Zero-order and partial correlations controlling for general affective evaluation (study 3).

<i>Zero-order r</i>	<i>Perceived risk</i>	<i>Perceived benefit</i>	<i>Trust in risk regulation</i>	<i>Acceptability</i>
<i>Partial r</i>				
Perceived risk		-0.35** (973)	-0.47** (1033)	-0.64** (1006)
Perceived benefit	0.00 (n.s.) (854)		0.48** (993)	0.67** (964)
Trust in risk regulation	-0.23** (854)	0.15** (854)		0.58** (1071)
Acceptability	-0.36** (854)	0.32** (854)	0.28** (854)	

Note: Zero-order correlations are presented above the table diagonal and the partial correlations controlling for general affect are presented below the table diagonal; Sample sizes are given in brackets; n.s = non-significant; \*  $p < .01$ ; \*\*  $p < .001$

