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Article Title; How message framing affects consumer attitudes in food crises.

Structured Abstract

Purpose; This study explores the relationship between consumer risk perceptions and behaviour when information about food risks is framed in a positive or negative way.

Design/methodology/approach; Using food consumption scenarios in an on-line experiment consumers perceived risk and risk tolerance is examined when messages are framed in three different news-type stories.

Findings; As anticipated, message framing emerged as a significant predictor of perceived risk and the higher an individual's self-reported tolerance of risk, the more risk they were willing to accept.

Research limitations/implications; The use of hypothetical scenarios and relatively small convenience sample size could be improved by further research.

Practical implications; Through simple adjustments to wording, food crises of confidence may be reduced and the implications for communication management strategies are discussed.

Originality/value; Originality stems from being one of the first papers to use Framing and Prospect Theory in a food crisis situation, in which both risk and framing are operationalised in different ways and the risk was not specified by the researcher. Also, unlike previous research identical numerical facts were framed in a positive, negative or neutral light by changing the wording.

Keywords: perceived risk, message framing, crisis management, scenarios, risk tolerance

Article Classification: Research Paper.

Introduction

From minor to major food issues, the erosion of trust in government, the food industry, and individual food providers to control risks has increased consumers' risk perceptions (Knox, 2000 Hatton, 2013). In many cases, any knowledge consumers have about the risk/trust trade-off, such as in the BSE or horsemeat crises (Charlebois and Elliott, 2009), is based almost entirely on media coverage (Eldridge, Kitzinger, Philo, Reilly, Macintyre, Miller, 1997). Media communications then, create a risk representation and in doing so can enhance, filter and reconfigure information (Breakwell 2000). In the selection and presentation of a story, journalists often employ certain strategies such as 'it could be YOU' approach, where the risk implications for the reader tend to assume greater importance and stimulate emotions such are fear (Kitzinger and Reilly, 1997). Indeed research has found that media stories tended to highlight the negative effects of food safety issues twice as often as the positive effects (Lichter and Amundson 1996). Such risk representation can be subject to further processes of refinement, reinterpretation and elaboration at both the individual and social levels in ways which intensify or attenuate risk perceptions and concerns and shape risk behaviour which is known as the Social Amplification of Risk Framework (SARF) (Kasperson, Renn and Slovic, 1988; Breakwell, 2000). This raises questions about whether risk behaviour, which is a function of the amount of risk a person perceives compared to the level of risk they feel is acceptable to continue with an action, can be influenced by the way in which information is presented.

Previous work in the area has looked at how consumers gather food risk information and relieve it (Yeung and Morris, 2001; van Dijk, Kleef, Owen, Frewer, 2012). There have also been several studies which have considered consumers' risk perception in specific foods such as minced beef (Mahon & Cowan, 2004) and fish (Pieniak, Verbeke, Scholderer, Brunsø & Olsen, 2008). While other work in the area results suggest that risk communication should be informed by knowledge of consumer risk

perceptions and information needs (Cope, Frewer, Houghton, Rowe, Fischer, & De Jonge, 2010). However none of this work has looked at how risk information is framed.

Prospect Theory provides some evidence to suggest that the way in which objectively equivalent information is presented can affect decision choices (Kahneman and Tversky, 1979; Tversky and Kahneman 1981), e.g., when numerical information is used to keep the information objectively equivalent (e.g., 25% fat versus 75% fat free). This raises the question of whether numerically *identical* information can produce different reactions when the verbal components of the expressions are changed so as to make the outcomes seem better or worse. Little is known about effects of positive/negative framing expressions on food behaviour as opposed to numerical probabilities commonly used by prior studies. This paper attempts to answer this question by providing a more sophisticated analysis of perceived risk and risk behaviour and assesses the role of risk tolerance in decision-making within a food crisis. Our objective is to identify and explore the boundary conditions of framing effects on food behaviour and we specifically address the research question, are consumers' perceptions and behaviours affected by the way in which information about these negative consequences is presented? Given media influence, an objective of the study was to investigate if simple modifications to the wording of information about risk changes perceptions of food risk and risk behaviour; and examine how this might change based on a person's risk tolerance. The conceptual framework draws on the concepts of crisis and perceived risk to develop a model of decision-making in a food crisis from which several hypotheses are generated.

Conceptual Framework

Framing messages about food risk

A central tenet of Prospect Theory is that consumers favour risk aversion in choices involving sure gains and are risk seeking in choices involving sure losses (Kahneman

and Tversky, 1979). Gains and losses (of wealth or welfare) are evaluated with respect to a reference point which can be shifted by changing the labelling of outcomes (Li, 1998). This 'framing effect' results in consumer responses to objectively equivalent information being influenced by the semantic wording of options (prospects) (Tversky and Kahneman 1981). A meta-analysis of 230 effect sizes, involving almost 30,000 participants, concluded that, while the overall framing effect between conditions was of small to moderate size, and varied profoundly between research designs, framing is a reliable phenomenon (Kühberger, 1998). When outcomes are framed positively, in terms of lives saved, individuals prefer the less risky option over when outcomes were framed negatively, in terms of lives lost, where participants prefer the more risky option. While from another meta-analysis, gain-framed messages appear to be more effective than loss-framed messages in promoting illness prevention behaviors on the whole, and skin cancer prevention, smoking cessation, and physical activity behavior in particular (Gallagher, & Updegraff, 2012).

Importantly for media communications around food, framing effects are also relevant for situations described using verbal probabilities such as 'possible', 'doubtful', or 'likely', rather than numerical probabilities expressed, for example, as percentages (Teigen and Brun, 1999). Specifically, describing an outcome as having 'some possibility' of success led participants to make more positive recommendations than participants to whom an outcome was described as being 'quite uncertain' (Teigen and Brun, 1999). This is important because in food crisis situations, precise probabilities are often not known and/or are not preferred by journalist as the best way of communicating the relevant information. For example, using phrases such as '*as few as* 100 people have been affected' compared to '*as many as* 100 people have been affected'. Favourable or unfavourable wording can affect both 'overall risk' perceived within a certain context and the 'acceptable level' of risk at which a person feels comfortable in proceeding with the action. With a negatively framed condition, i.e.,

unfavourable wording of numerical information, consumers are likely to perceive greater overall risk and view the acceptable level of risk of consuming the food product higher than in if the wording is favourable. Thus we predict that;

H1; Message framing through favourable wording of numerical information reduces overall perceived risk (H1a) and acceptable risk level (H1b).

H2; Message framing through unfavourable wording of numerical information increases; overall perceived risk (H2a) and acceptable risk level (H2b).

Consumer Tolerance of food risk

Risk tolerance has been defined as the "tendency of a decision maker either to take or to avoid risks" and has been shown to have both situational and individual difference components (Sitkin and Pablo, 1992, p.12). A number of studies have found that risk behaviour can be ascribed in part at least to individual differences in risk tolerance. For example, evidence suggests the possibility of stable cross-situational risk preferences as a personality trait (Weber and Milliman, 1997) and that these dispositional measures explained at least some of the variance in individual choices between risky courses of action (Slattery and Ganster 2002). Specific risk tolerance is described as a dispositional tendency to take or avoid risks in a specific situation, which is different from general risk tolerance where people exhibit stable preferences over a variety of situations. In a consumer context, 'preference for risk' was significant in predicting choice under risk and early work on a portfolio of risk measures found some support for a concept of risk tolerance as an individual difference (Zickar and Highhouse, 1998), since differences among individuals were stronger than differences in the various measures for a single individual (MacCrimmon and Wehrung, 1985). In contrast, Pablo (1997) found that personality factors did not emerge as a significant determinant of an individual's willingness to take risks; and Schoemaker (1990) found low correlations within individuals across

decision domains. Thus, it is plausible for an individual to be generally risk averse, but happy to be risk taking for a specific event. Following this logic, we measure an individual's risk tolerance for a specific food product category, rather than their overall risk tolerance, since the arena of outcome has been shown to be an influencer of risky decision making (Fagley and Miller, 1997). We argue that an individual's risk tolerance for certain food product categories, with the risk of a specific adverse health effect, will be instrumental in determining the riskiness of the decision. More specifically, the higher a person's level of risk tolerance should be associated with a greater propensity to accept higher levels of risk and should decrease their perception of risk in that situation. Thus we predict that;

H3; situation-specific risk tolerance will: decrease overall risk perception (H 3a) and increase acceptable risk level (H 3b)

Method

Sample and procedure

Participants were contacted by email requesting that they take part in a study on perceived risk in the event of a food crisis. The first page of the site contained brief instructions about how to complete the questionnaire and emphasised the anonymity and confidentiality of any data submitted. From there, participants were randomly directed to one of three pages hosting the three different versions of the scenario/questionnaire. They were given a short limited time to complete the questionnaire to prevent them accessing other sources of information. The sample consisted of 152 respondents in total, and most were registered university students from a single university in the North of England. The sample breakdown showed respondents were aged between 18 and 31; and 45% were female. 74% were of British origin.

Message framing scenarios

Respondents read an extract of information describing a hypothetical event in which a food product, usually considered to be safe, was the subject of a food 'scare'. Corn cereals and potatoes were used for several reasons. 1. In order to make accurate risk assessments, subjects need to be very familiar with the object being assessed and cereals and potatoes are staple foods for the subjects. 2. It was important that the foods had not been subject to previous health scare to avoid any risk carryover effects from previous experience. 3. Corn cereals are cheap foods which can be thrown away and are substitutable which means that subjects risk assessments are not affected by their need to have these products. The scenarios described health effects that could result from the consumption of corn cereals and potatoes in extreme circumstances in order to retain some plausibility. The three scenarios reported the same number of people who were stated as having suffered adverse health effects as a result of eating either cereals or potatoes. In the *positive* framing condition, information minimised the health scare by using words 'only' or 'as few as' to describe the number of people affected. In the *negative* framing condition, information maximised the health scare by using the words 'already' or 'as many as'. These words were omitted in the *neutral* framing scenario. See Appendix A for sample scenarios.

In the scenarios, absolute numbers of people affected were used rather than percentages because percentages convey more information than absolute values. An intelligent participant could work out that if three per cent of consumers became ill then ninety seven per cent must be healthy. Absolute values were advantageous for two other reasons. Firstly, they more closely replicate a real crisis where the information communicated might be ambiguous, or the extent of damage is difficult to ascertain precisely. Secondly, this ambiguity leaves more scope for influencing participants' perceptions of risk.

Measures

In order to provide a benchmark of risk tolerance, *a situation-specific risk tolerance* was assessed by asking participants to report for each food product their willingness to take risks compared with their peers. Responses were recorded on a 5-point scale with response alternatives of: *much less willing* (1), *less willing* (2), *same* (3), *a little more willing* (4), *much more willing* (5).

The product-specific *perceived risk* associated with each product was assessed by asking participants to rate the likelihood of become ill following the consumption of that food. Responses were recorded on a five-point scale from '*not at all likely'* (1) to '*extremely likely'* (5). Responses were moderately positively skewed: for both corn and potatoes, 58% of respondents reported that they saw the risk of becoming ill as either '*not at all'* or '*only a little'* likely; while only a small proportion (14% for corn and 16% for potatoes) reported that they saw the risk as either very or extremely likely.

The measure of *acceptable risk* was based upon the choice dilemma response task used by Brown (1988). Participants were faced with a choice between a 'risky' and a 'safe' cereal or potato product, with the latter described as one and a half times the price and less tasty than the former. Respondents were asked to indicate, on a scale from zero to one hundred, the highest percentage risk of an adverse effect on health that they would accept in order to eat the 'risky' food rather than the 'safe' food. In general, respondents were unwilling to accept risk in consuming these products. A sizeable minority (23% for potatoes and 41% for corn) reported a zero acceptable risk; while the median level of acceptable risk in this sample was 5% for potatoes and 1% for corn. This is likely to be because these products are staple foods for this sample.

Analysis

The study hypotheses were tested using multiple regression analysis , performed

separately for the corn and potato products, taking message framing as a factor and risk tolerance as a covariate. The dependent variables were perceived risk and acceptable risk. Summary results are shown in Table 1 and detailed summary statistics for each scenario are shown in Table 2. The first column of Table 1 reports multiple regression tests of our variables, and columns 2 and 3 report the separate ANCOVA tests for each dependent variable namely overall perceived risk and acceptable risk. For both food products, covariate interactions for age, sex and nationality were also tested, but none was significant and they are left out of this table. Table 2 shows the mean scores for perceived risk and acceptable risk for each food product as a function of the valence of the message wording.

Results

(insert Tables 1 & 2 about here)

Message framing

The first set of hypotheses concerned the effect of message framing on overall perceived risk (hypotheses 1a and 2a) and acceptable risk (hypotheses 2a and 2b). The multivariate test was highly significant for both food products (for corn products, $F = 15.28$, $df = 4, 294$, $p < .01$; and for potatoes, $F = 11.15$, $df = 4, 294$, $p < .01$). For overall perceived risk (the second column of Table 1), the results show a highly significant message framing effect for both food products (for corn products, $F = 33.38$, $df = 2, 148$, $p < .01$; for potatoes, $F = 23.53$, $df = 2, 148$, $p < .01$). Table 2 shows that, as expected, positively worded messages led to lower *overall perceived risk* compared to neutral messages for both food products; while the opposite was the case for negatively worded messages. Examination of mean differences (relative to the neutral messages) shows a stronger impact on perceived risk for the negative messages, but the difference is relatively small (for corn products, the mean differences are -0.52 and 0.91 for positively and negatively worded messages respectively; for potatoes, the

mean differences are -0.51 and 0.75 for positively and negatively worded messages respectively).

When the frequency distributions are examined, however, a rather different picture emerges. For example, for corn cereals, only 2% of respondents reported that the risk of illness was *likely*, or *very likely*, for the positively worded message, compared with 6% for the neutral message and 32% for the negatively worded message. For potatoes, the results were similar: 6% of respondents reported that the risk of illness was *likely* or *very likely* for the positively worded message, compared with 8% for the neutral message and 32% for the negatively worded message. The effect of the positive or negative wording was therefore to shift the group mean in the expected direction relative to the neutral message condition. Overall, then, the findings show strong support for hypothesis 1: the way in which messages are framed in news-type stories does immediately influence perceptions of risk.

For *acceptable risk*, the third column of Table 1 shows that the main effect for message framing was not significant for either food product (for corn products, $F = 1.10$, $df = 2, 148$, $p = ns$; for potatoes, $F = 1.12$, $df = 2, 148$, $p = ns$). Examination of the means in Table 2 shows that findings for the *acceptable risk* variable were similar to those for overall perceived risk, though group differences are much smaller. Although not significant, respondents were prepared to accept higher levels of risk in the positively worded message group, compared to those in the negatively worded message group. Therefore, hypotheses 1b and 2b are rejected.

Risk tolerance

The third hypothesis concerned the effect of situation-specific risk tolerance on overall perceived risk (hypothesis 3a) and acceptable risk (hypothesis 3b). The multivariate test results for risk tolerance as a covariate shows strongly significant effects for both food products (for corn cereals, $F = 12.24$, $df = 2, 147$, $p < .01$; for potatoes, $F = 12.15$,

df = 2, 147, $p < .01$).

The univariate tests for *perceived risk* in column 2 of Table 1 show significant main effects for both food products (for corn cereals, $F = 7.75$, df = 1, 148, $p < .01$; for potatoes, $F = 4.43$, df = 1, 148, $p < .05$). A more detailed inspection shows that those who described themselves as more risk tolerant than their peers reported a lower perception of the health risk associated with the product described in the message. This confirms hypothesis 3a. Findings in column 3 for *acceptable risk* show a similar result, with significant effects for both food products (for corn cereals, $F = 18.15$, df = 1, 148, $p < .01$; for potatoes, $F = 22.47$, df = 1, 148, $p < .01$). Those who described themselves as more risk tolerant than their peers reported a higher willingness to accept risk in both food products. This confirms hypothesis 3b.

Discussion

Our findings allow us to discuss several important issues. Firstly, the present research extends Tversky and Kahneman's (1981) original theory to other situations, namely a food crisis, in which both risk and framing are operationalised in different ways. For example, the focus was on the adoption or otherwise of one course of action, specifically, the choice between purchasing a 'risky' food product or not purchasing the product. Typically, studies of the framing effect have focused on a choice between two distinct options, associated with specified probabilities, and presented as gains or losses information. Also, the risk was not specified by the researcher, instead participants rated the highest degree of risk they deemed acceptable to make the purchase. In addition, rather than framing as gains or losses (hence using different numerical expressions), identical numerical facts were framed in a positive, negative or neutral light by changing the wording of the hypothetical newspaper extracts.

Secondly, the results support hypothesis 1a and 2a which posited that perceived risk would be highest when figures are negatively framed, followed by the control and then positively framed. Despite all participants receiving identical numerical information, the differences in perceived risk were likely to be brought about by the ambiguity of the hypothetical newspaper extract. Although consumers use information as a risk-reducing strategy (Mitchell and McGoldrick, 1996, Mitchell, 1998), simply stating an estimation of how many people have been affected does not convey enough information for individuals to make an informed judgement. This is often the case in crisis situations, when precise information is lacking. The results suggest that in such ambiguous circumstances, people look for additional information to guide their evaluations. In this case, the additional information that was available was the journalist's portrayal of how positive or negative the figure was that described the number of people affected which then goes on to be reinterpreted by the individual (Breakwell, 2000). It is worth noting that the social processes that also refine the risk representation were not relevant in the present circumstances, since participants did not confer with others when making their judgements about risk.

Thirdly, as expected, participants' risk acceptance ratings were shown to be a function of their reported specific risk propensities for both scenarios, suggesting that those who believe themselves to be more willing to take risks than their peers did accept more risk in their purchases. Significant results were also obtained for the effect of situation-specific risk tolerance on overall perceived risk. This suggests that consumers' specific willingness to take risks affects the way in which they interpret risky situations, such that those with higher specific risk propensities perceive less risk to be associated with the products in question. This might be due to some learning effect and Sitkin and Weingart's (1995) model of the determinants of risky decision-making behaviour depicts outcome history as a determinant of risk tolerance. Hence, it might be the case that when individuals take a risk which yields a positive outcome,

not only are they more likely to take risks in future (Sitkin and Pablo, 1992; Sitkin and Weingart, 1995), but also the experience may change a reference point regarding how risky a situation is perceived to be. Thus, individuals learn to decrease his or her subjective perceptions of risk and apply this modified strategy to future events and purchases.

Finally, the framing effect did not have a bearing on participants' willingness to purchase an alternative product which was more expensive, but risk free. These results would suggest that negative messages about a product do not necessarily deter the purchase of the product category in general; rather they simply deter the purchase of a particular product if it is perceived to be associated with the risk.

Implications

How consumers handle risk information and how their perceptions can be altered has implications for food manufacturers, retailers and food agencies. One issue is that companies often focus on the technical aspects and ignore issues of public perception that causes the crises (Augustine, 1995). In fact, three-quarters of all crises resulted from inappropriate action or inaction by top management (Wooten and James Institute of Crisis Management, 2008) who often discount the fact that it is this subjective impression, rather than the objectivity of risk that motivates behaviour (Coppola 2005). The results suggest risk perceptions of products which are subject to a food crisis can be influenced by the way in which information is worded as well as by consumers' willingness to take risks.

Secondly, since crises feed on a lack of information (Parsons, 1996), one of the most important aspects of food crisis management is communication. The present findings

suggest that media communications can serve to increase subjective risk evaluations, which in turn might affect purchasing behaviour. In addition, it is speculated that the ambiguity and uncertainty that characterise a crisis situation would magnify this effect. Thus, companies needs to present facts about a crisis in a favourable light in order to decrease these risk evaluations and increase participants' willingness to accept risk in their purchases.

Finally, the results support the suggestion that the effectiveness of a message is not only a function of message content, but also the characteristics of the audience (Breakwell, 2000). Food companies and food agencies should understand that there are stable, individual differences among consumers which might mean that the effectiveness of a communication strategy differs from person to person. That is, consumers with low risk tolerance are likely to be affected more by a food crisis than those with high risk tolerance, such that under no circumstances would they consider the purchase of a product for which the risks were high. This means that the effectiveness of a communication strategy might change from person to person and introduces the possibility that segmentation practices may be useful in crisis management. Some acknowledgement of this may be appropriate in order to target more efficiently the consumers that are most likely to respond favourably to the food crisis management plan; thus minimising the wastage of valuable marketing resources.

Conclusions, Limitations and Future Research

The results suggest that message framing can have important implications for food crisis communication strategies. As risk behaviour is a function of the amount of perceived risk which can be influenced by the way in which information is presented, firms should present the facts in a favourable light to minimise perceived risk. Theoretically, the results lend support to previous studies which report evidence for an

effect of message framing and risk tolerance on subjective evaluations of risk and willingness to take a risky course of action.

However, the study has several limitations including the use of hypothetical scenarios which rely on two assumptions namely, that people know how they would behave in actual situations of choice, and that participants have no special reason to disguise their true preferences (Kahneman and Tversky, 1979). Also, since the news extracts used in the study were not given in a media format or within a product choice context, they are unlikely to produce responses that perfectly mimic the emotions experienced in a true crisis situation, responses to hypothetical scenarios do not fully capture the true feelings and behaviour which would be experienced should a real crisis have occurred, but are likely to be the 'best case' scenario. Although the present study attempted to improve on methods employed by many researchers investigating risky behaviour by using a rating scale rather than a dichotomous choice between certain or risky options, the risk tolerance measure employed was a one-dimensional measure of self-reported willingness to take risks. A more complex and objective assessment of participants' willingness to take risks (e.g., the risk subscale of the Jackson Personality Inventory used by Tabak and Barr (1999) may have produced more insightful results. Finally, although care was taken to control statistically for variables such as age, sex and nationality, the controllability of the situation, credibility of the source, and outcome utility, the study did not address all possible variables that might contribute to the determination of perceived risk and risky behaviour, e.g., innovation adoption and self-efficacy (Tabak and Barr, 1999). In particular, the use of a homogeneous sample of most university students from a single North England university who usually having a high level of risk tolerance level will have affected the results to some degree and the small sample size limits the generalizability of the findings.

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Appendix A: Examples of scenarios used in the study

Confidence Retained in cereal industry: only 121 cases of cancer in UK linked to contaminated corn

When corn, wheat and peanuts are improperly sorted, it allows a certain fungus to grow. This fungus gives rise to the growth of a substance called aflotoxin, which is carcinogenic (a cancer-causing agent). Cancer is a condition in which cells grow and spread unrestrained in the body, creating a growing mass of tissue called a tumour.

Fears over potato safety unfounded: as few as 656 have suffered toxic poisoning in the UK

Potatoes usually contain low levels of natural toxicants called glycoalkaloids but higher levels can be found in green parts of potatoes, sprouted potatoes, and potatoes stored in light. Glycoalkaloid poisoning causes diarrhoea and vomiting and in severe cases can disrupt cell membranes which may result in abdominal pain and bleeding. The illness usually lasts 4 to 7 days and most people recover without treatment. UK supermarkets have accidently sold potatoes with high levels of toxic

glycoalkaloids but these are linked to as few as 656 cases of toxic poisoning in the UK

Table 1. *Results of multiple regression analysis and ANCOVA for each food product between framing conditions.*

	Multiple regression		ANCOVA tests			
	Test		Perceived risk		Acceptable risk	
	F	df	F	df	F	df
Corn						
Message framing	15.28 **	4, 294	33.38 **	2, 148	1.10 ns	2, 148
Risk tolerance	12.24 **	2, 147	7.75 **	1, 148	18.15 **	1, 148
Potatoes						
Message framing	11.15 **	4, 294	23.53 **	2, 148	1.02 ns	2, 148
Risk tolerance	12.15 **	2, 147	4.33 *	1, 148	22.47 **	1, 148

$p < .05$; ** $p < .01$

Table 2. *Summary scores on dependent variables for each food product, according to message framing condition (standard deviations shown in parentheses)*

	Message framing condition		
	Positive (n = 49)	Neutral (n = 49)	Negative (n = 54)
Corn Cereals			
Perceived risk	1.67	2.18	3.09
	(0.75)	(0.90)	(0.81)
Percent reporting risk as likely or very likely	2%	6%	32%
Acceptable risk	8.98	6.92	4.06
	(14.94)	(9.82)	(7.86)
Percent reporting acceptable risk > 5%	33%	33%	18%
Potatoes			
Perceived risk	1.76	2.27	3.02
	(0.90)	(1.05)	(0.86)
Percent reporting risk as likely or very likely	6%	8%	32%
Acceptable risk	15.31	12.45	10.50
	(19.59)	(14.61)	(12.24)
Percent reporting acceptable risk > 5%	51%	47%	44%