The 10th Anniversary of the Chernobyl Accident: The impact of media reporting of risk on public risk perceptions in five European countries

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Report to the European Commission

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ABSTRACT

In this report, we integrate the results of the risk perception surveys and media analysis conducted as part of the RISKPERCOM project, in order to determine the extent to which the media influence public risk perceptions associated with a variety of potential hazards. In particular, the impact of reporting about Chernobyl, Eastern Nuclear Power and Nuclear Power (in general) were considered. Cross-cultural differences in media reporting of risk and public risk perceptions between the five countries involved were also considered. The social amplification of risk model was used as a framework for exploring the relationship between media and public risk perceptions.

It is concluded that:

- The social amplification of risk model is probably not amenable to the development of policy regarding effective risk communication (whether about radiation risks, or other types of risk).
- Even if amplification (increased risk perception) and attenuation (decreased risk perception) do occur via the conduit of the media, the 'saturation' levels of coverage that are likely to be needed to 'trigger' these effects arise under unusual circumstances. Amplification and attenuation are unlikely to be amenable to manipulation by risk communication specialists.
- Other factors beyond simple risk perceptions (such as social context and the value systems held by individuals) are important elements in developing effective risk communication.

Recommendations for future research are also made. In particular, risk management policy is likely to benefit through refined model development, the exploration of local information delivery systems in culturally salient contexts, and through developing methods to increase regulatory transparency through enhanced public participation in assigning risk mitigation priorities.

Aims of the current report

The current report aims to integrate the results of the risk perception surveys conducted as part of the RISKPERCOM project with the results of the media analysis conducted as part of the same project. Specifically, the aim is to determine the extent to which the media influence public risk perceptions associated with different types of potential hazards (in particular, public perceptions of risk associated with Chernobyl, Eastern Nuclear Power and Nuclear Power in general) and to identify any cross-cultural differences in either media reporting of risk or public risk perceptions between the different countries involved. Although the results are interpreted using the terminology and perspective of the social amplification of risk model, we recognise the limitations of this model for testing hypotheses, and discuss alternative interpretations of results. Finally, preliminary policy implications relevant to risk communication at national and international levels will be discussed.

Theoretical background

There are a number of hypotheses concerning how media exposure might influence public perceptions of risk. One of these proposes that it is the *availability* of risk information in the 'information environment' most frequently accessed by message receivers that is the most important factor in determining risk perception (Tversky and Kahneman, 1973). According to this hypothesis, events or issues which come easily to the mind of individuals, due, for example, to their frequent presentation in the media, are considered as more likely to occur.

An extension of the 'availability' explanation is the social amplification of risk model, which provides a more elaborate framework for explaining the potential impact of media reporting of risk on public risk perceptions. Although social amplification is no longer regarded as a theory *per se*, partly because it may be used to explain apparently contradictory findings and is thus difficult or impossible to falsify, it does provide a framework in which to examine media impact on risk perception. The focus of the current report is on the impact of media reporting of the Chernobyl and BSE hazards

on public risk perceptions, with the discussion being embedded within the social amplification of risk framework (discussed briefly in the next section).

The Social Amplification of Risk

Risk events (which may be actual or hypothesised accidents and incidents) will not have an extensive impact on public perceptions and behaviours unless information about the risk is communicated to somebody (Renn, 1991), or individuals have personal experience of the risk or its consequences. Renn has noted that, as a key part of the communication process, risk events and their characteristics become portrayed through various risk signals (images, signs and symbols). The 'social amplification of risk' metaphor implies that transformation of the 'risk signal' or risk information might occur with various consequences, such as the increase or decrease in the volume of information about an event, selection to heighten the salience of certain aspects of the message, or reinterpretation of the available symbols and images associated with the hazard by other recipients of these messages.

Some events may lead to the spread of 'ripples' of secondary consequences to initially unrelated hazards, which may include product avoidance, increased regulation, loss of credibility and trust in risk regulators, stigmatisation, and increased risk perceptions for hazards linked to the one that is the focus of the risk information. It is arguable that 'ripple' effects are at least as important as changes in risk perception in determining behavioural consequences of risk communication. In particular, trust and credibility of risk regulators is likely to be important, particularly for hazards over which people perceive that they have no personal control (Frewer *et al*, 1996).

The social amplification of risk model assumes that there are a variety of psychological mechanisms that are used by individuals in the formation of risk perceptions in response to incoming risk information. These include cognitive heuristics (such as the availability heuristic and preference for certainty), stigmatisation (concerning the negative imagery associated with a situation) and

interpretations of signal value (i.e. the informativeness) of an event. Social context effects - such as social identity of individuals - might also be important.

Heuristics

A number of inferential rules that people seem to use to help them deal with complex situations (by reducing difficult mental tasks to simpler ones) have been identified, and these are known as *heuristics*. Often, the cognitive application of a heuristic may be useful and lead to good judgement, but it may sometimes lead to systematic biases. The postulated existence of such heuristics and biases have been used to explain public responses to hazardous situations (Slovic, Fischhoff and Lichtenstein, 1980). For example, people tend to be inappropriately confident in judgements, and overconfidence can prevent an individual from realising how little they know about a hazard and how much additional information is needed about the various problems and risks associated with it (Frewer, Howard, Hedderley and Shepherd, in press).

The 'availability heuristic' is perhaps the most relevant heuristic when considering the potential impact of media reporting of risk. This predicts that a person will judge an event as likely or frequent if instances of it are easy to imagine or recall. Frequently occurring events are generally easier to imagine or recall than events that occur infrequently, and so the heuristic may lead to appropriate judgements. However, there are a number of other factors that are not related to the actual likelihood of an event, such as recency and emotional saliency (e.g. a recent disaster or a vivid film), which may also increase the 'availability' of instances that a person may recall, and hence distort risk judgements so that a hazard is perceived as more frequent than it really is. Thus, if an individual's experiences are biased, such that incoming information differentially emphasises one hazard over another, this is likely to influence hazard perception. The converse situation is where the lack of information about the hazard may result in reduced risk perceptions about the hazard. For a highly dreaded hazard, however, lack of information may have the opposite effect, as the public may perceive that information about the hazard is being hidden for some reason of vested interest.

Preference for certainty

Another heuristic that has been identified is people's desire for certainty. The risks and benefits associated with technologies may be traded off against each other in determining public acceptance of the technology (Alkhami and Slovic, 1994; Frewer, Howard and Shepherd, 1998). However, if there is perceived uncertainty associated with the risks and benefits of a particular potential hazard, people must make a cognitive 'gamble'. The attractiveness of the gamble depends on the probability and magnitude of possible gains and losses. People have difficulty thinking about and resolving the risk / benefit conflicts even in simple gambles. One way to reduce the anxiety generated by confronting uncertainty is to deny it, or to focus attitudes very quickly towards a new or emerging potential hazard. Once these attitudes have formed, it is likely that individuals will select information from the environment in line with these already held views, rather than attending to new information which may result in attitude change (Frewer *et al*, 1997 a).

Signal value or informativeness

The signal value or informativeness of a hazard event concerns the manner in which it affects the perception of new information about the likelihood of similar or more destructive events. An accident that takes many lives may produce relatively little social disturbance if it occurs as part of a familiar and well understood system, such as a train or aircraft accident. However, a small accident in an unfamiliar system (or one perceived as poorly understood) such as a nuclear reactor, may have immense social consequences if it perceived as a precursor to further, possibly catastrophic accidents (Slovic, 1987).

Stigmatisation

In recent years there have been a number of incidences of stigmatisation. For example, at the time of the Alar scare, not only were there huge losses in the US nation-wide apple market, but there was also a significant decrease in the Washington state cherry market, even though the only link to Alar application was geography (Sparks and

Shepherd, 1994). The BSE scare impacted upon confidence in British food exports outside of the UK (Braxton, Wunderer, Campion and Frewer, 1997).

Optimistic bias

One heuristic that has been the subject of much investigation is the optimistic bias, or unrealistic optimism. Optimistic bias can be defined as a tendency to claim that one is less at risk than comparable others (though it has also been found in positive situations, in that people regard themselves as more likely than others to experience financial success, career advancement and long life - e.g. Weinstein, 1989). Evidence suggests that this bias is robust and widespread: it appears with diverse hazards and samples, with different risk-rating question formats, and it does not appear to be limited to any particular age, sex, educational or occupational group. Indeed, the failure of risk communication efforts has been attributed to this effect. Pessimistic biases appear to reflect underlying psychological psychopathology.

The media and social amplification of risk

Kasperson, Renn, Slovic, Brown, Emel, Goble, Kasperson and Ratick (1988) emphasize that, when people do not have direct personal experience of a hazard, they learn about risk from other people and the media (and, by implication, other information sources, such as environmental groups, consumer organisations, and the authorities). Transmitters are dominated by the media (McCallum, Hammond and Covello, 1991). The ‘social amplification of risk’ model was developed to explain the way in which cognitive information processing, institutional structures, social-group behaviour and group interactions, and individual responses to information, results in a ‘personalised’ social experience of risk, which results in associated perceptions and behaviours. Thus, information about a hazard interacts with psychological, social, institutional and cultural processes in ways that may amplify (increase) or attenuate (reduce) public perceptions of risk.

The model assumes that amplified risk perceptions lead to related and proportional behavioural responses (although there is at present little empirical support for such a

link), which in turn may lead to secondary impacts such as enduring mental perceptions (for example, the formation of anti-technology attitudes) or the avoidance of specific products perceived to be risky by consumers. It is assumed that risk perceptions drive value systems - which is again a supposition with little empirical support. A further part of the model addresses the issue of potential 'ripple' effects, whereby the risk amplification (or attenuation) spreads from individuals to companies, industry, and other technologies.

There have been some empirical tests of the social amplification model which suggest that at least some of the underlying causes and factors influencing social response can be explained within its framework (Freudenburg, 1992). If the model is to be useful in terms of policy formulation, however, it must have predictive power as well as explanatory capacity. In particular, the model does not allow prediction of the circumstances under which amplification and attenuation are likely to occur, or of whether such effects will be linked to other perceptual risk characteristics. A further problem is that the model may not hold in settings other than North America. For example, Pidgeon (1997) has noted that there is little evidence to support the idea that social amplification of risk is cross-culturally transferable. Kasperson and Kasperson (1996) have reported some anecdotal evidence of risk amplification in Brazil, and risk attenuation in Africa. Nonetheless, the cases reported reflect isolated risk events, and do not really represent predictive tests of the model. Against this, there is no evidence to suggest that the framework will not operationalise in settings other than the North American context.

It has been proposed that attenuation and amplification may or may not be desirable depending on the real status of the risk. For example, if a genuine risk was previously ignored by the public then amplification might be regarded as a positive effect as the public would then be responding to the hazard in line with expert risk priorities (Pidgeon, Henwood and Maguire, 1997). It has been proposed that, in terms of risk communication, risk amplification is likely to be increased for hazards that are associated with high threat values prior to amplification. In contrast, attenuation is more likely to be associated with hazards that have low potential threat value.

One consequence of the social amplification framework is the notion that behavioural responses to amplification and attenuation can, in turn, generate secondary socio-political or economic consequences that may seem out of proportion to the risks as assessed by formal risk analysis and experts. Despite this potential for disagreement, it is not generally regarded as appropriate to dismiss public perceptions and demands for risk mitigation as irrelevant and ill-informed. Rather, current models of risk management emphasise public involvement in risk decisions (Rowe and Frewer, 1998).

There are problems with using the model in terms of its potential for theoretical input. It has far too broad a remit to be empirically tested except in exceptionally well delineated circumstances. Questions arise as to what circumstances lead to amplification or attenuation, what are the characteristics of particular hazards which result in attenuation or amplification of risk perceptions, and what truly constitutes a ripple effect. It is also almost impossible to simulate empirical tests of the model (for example, through exposing individuals to simulated media hazard coverage). It is extremely unlikely that full media saturation of a risky event can be simulated within a laboratory setting as individuals typically get information from a variety of settings in their real lives. Any test of the model MUST reflect a real world risk event.

The current research aimed to test the model against such a real risk event - the predicted heightened media reporting surrounding the tenth anniversary of the Chernobyl accident in five different European countries. Survey data were collected before, during and after the 10^{th} anniversary media reporting (Sjoberg *et al*, 1998). Given the extremely hazardous nature of the original accident, it was predicted that media coverage of the anniversary would be high, particularly in Scandinavian countries, which were the worst effected by radiation fallout following the Chernobyl accident.

Tests were also made of specific features of the model. Potential ‘secondary effects’ (for example, increased negativity towards technology) were also assessed as part of the survey design, as well as potential ripple effects such as increased negativity

towards nuclear power, more positive attitudes towards alternative energy sources, and demands for mitigation of nuclear risks.

Despite the elegant design of the experiment, supervening events resulted in a rather different 'natural' experiment to that developed in the original project proposal. Alternative risk 'events' dominated the media, especially in the UK. There were clear cross-cultural differences in the extent to which these alternative events were predominant. Only some broad policy recommendations can therefore be extrapolated from the research, and it may be necessary to conduct further research to test findings of specific relevance to the radiation protection community.

Integrating the media data with the survey perception data

In integrating the results of the risk perception data with the media analysis, it is important to describe the wider context in which the information is embedded. The occurrence of the BSE crisis in March of 1996 could not have been predicted, and this tended to dominate newspaper reporting in some of the countries in which data were collected. Whilst it was possible to collect risk perception data regarding BSE in the second two waves of data collection, it was not possible to do so before the story broke. Nonetheless, it was possible to examine the effect of BSE reporting on subsequent risk perceptions in the different countries included in the research. It should also be noted that the high level of reporting of BSE may have reduced the impact of reporting about Chernobyl.

Potential impact of the media on public risk perceptions

Various hypotheses may be derived from the social amplification of risk framework, and these can be tested via the methodologies adopted in the current research. The effects of media reporting of risk (which are assessable using the survey methods described) might impact on risk perceptions in a number of ways:

- Increased media reporting of risks associated with the Chernobyl nuclear accident might increase perceptions of risk associated with Eastern nuclear power or nuclear power in general (amplification or establishment of an availability heuristic).
- Media reporting of risk might act to attenuate risk perceptions through providing reassuring information.
- Amplification effects might result in secondary effects (such as economic impacts or increases in anti-technology attitudes).
- Differential effects might be found in different countries linked to different public beliefs about risk mitigation priorities.

The importance of real world events

Real world events (i.e. the BSE 'food scare') overtook any possibility of straightforward evaluation of the effect of media reporting of the Chernobyl accident on public risk perceptions. The emphasis given to reporting of different hazards varied between the different countries assessed in the analysis (Frewer, Hunt, Braxton, Rowe and Miles, 1998): in Britain, the BSE crisis dominated the media at the expense of reporting about Chernobyl; in France, there was relatively more reporting about BSE than about Chernobyl; and in Sweden, Spain and Norway the relative level of reporting was very similar, with reporting about BSE at a similar level to that about Chernobyl.

The conclusions of the extensive cross-national report examining cross-cultural differences in media reporting of risk (Frewer *et al*, 1998) were as follows:

- The main differences in the media reports across the different countries concerned the *type* of hazard being reported as opposed to the actual *content* of the risk reports. That is, the content of reports appeared to be determined by (associated with) the specifics attributes of the hazard, and not the country in which the report was observed.

- In particular, the risks that were reported tended to reflect other contemporary events of national interest, particularly in countries where the BSE crisis had less impact (i.e. other than the UK).
- Newspapers appear to publish only a finite amount of information about risks, so that the occurrence of a 'crisis' tends to reduce the proportion of space dedicated to other risks.
- Media reporting about Chernobyl risks primarily indicated these to be problems for Eastern Europe, with blame and responsibility for the accident itself also being attributed to that region.
- Norwegian and Swedish reports were not differentiated from those in other countries, even though those nations were most directly affected by the accident when it originally occurred.
- Close association between Chernobyl and domestic nuclear power in terms of media reporting of risk was not observed.

Clearly, it is possible to criticise any attempt to extrapolate these findings to further discussion of the social amplification of risk framework as the media are not homogenous. More people read tabloids (or their local cultural equivalents) than quality newspapers. Indeed, there is evidence to suggest that newspapers which have a truly local circulation will tend to promote any issue which results in a local economic benefit over and above other risk issues, whereas the national press has much more of a national agenda-setting function debating, for example, regulatory issues (Frewer *et al*, 1997).

Beyond this, it is also important to note that more people tend to watch television news reports than read newspapers (particularly quality newspapers). Analysis of television news reporting was conducted in the UK, Norway and Sweden (no such data were collected from France or Spain). It is of interest that, whilst there were no differences between the different hazards in the two media formats in terms of the relative proportion of reporting associated with them, the extent to which qualitative and quantitative reporting of risk information occurred was reduced in television news programs. That is, in all three countries, the majority of television reports served to draw the attention of the general public to a risk, rather than give detailed information

about the hazard, with most of the reports being shorter than four minutes in duration. As such, it seems likely that any impact on risk perceptions due to this media is more likely to be attributable to the development of an availability heuristic, rather than to the content (informativeness) of risk information. Thus, any discussion of the effects of media reporting of risk might more appropriately focus on potential amplification effects resulting from exposure, as compared to content of the risk reports themselves, as this is the only part of the media which is likely to have a generalisable effect.

Summary of cross-cultural differences in risk perceptions (and other related attitudes)

The following findings are summarised from the report comparing cross cultural perceptions of risk (Sjoberg *et al*, 1998):

- Taking an average across all five countries, Eastern European Nuclear Power Plants were considered as the highest personal risk. However, ratings of personal risk associated with nuclear power plants were greater in Sweden, Norway and France relative to Spain and the UK. This might reflect the extent to which the different countries were affected by the original accident in 1986, although this interpretation does not explain the higher ratings in France.

- In terms of ratings of general risks across countries, cigarette smoking came out as the highest general risk. This was mostly due to the higher perceived level of risk associated with this hazard in the UK, and may reflect the fact that many of the respondents were likely to be non-smokers. Some of the nuclear hazards were rated as the highest risks - specifically, nuclear arms, nuclear waste, and domestic nuclear power plants. Norwegians expressed some confidence in the handling of domestic nuclear power in Norway, probably reflecting the fact that it does not have a large-scale domestic nuclear program, as have the other four countries. Thus the issue is not seen as a public priority for risk mitigation in Norway.

- A finding common to all countries was that female respondents rated the need for mitigation of all risks as higher than did men.

- Optimistic bias was compared between countries for different hazards and for different genders. Female respondents in all countries exhibited greater optimistic bias than did men. This was particularly true for Norwegian and Swedish women. Although high optimistic bias levels were not associated with having children, the result was interpreted as reflecting a general and non-selfish concern about others. In general, optimistic bias effects were smaller for nuclear risks compared to non-nuclear risks.

- Lowest trust in the authorities was observed in the UK. Intermediate trust was observed in France and Spain. Greatest trust was observed in Sweden and Norway.

- For nuclear issues, respondents in Sweden and Norway expressed a higher confidence in the abilities of the authorities to protect the public than did the respondents in the other three countries. This effect was not observed for non-nuclear issues.

- Respondents recalled learning about the Chernobyl accident primarily through the media. Some respondents stated that they learned about the accident through friends and family. Cross-cultural differentiation was not significant.

- French respondents judged the health consequences of the Chernobyl accident as more serious than did others, but even so, the accident was not considered a serious threat to health. This might be related to French respondents expressing greater concern about health in general.

Hearing about the accident in 1996 via the media

- The majority of respondents (60% across all countries) claimed that they had not seen stories about Chernobyl in the media. Deconstructing this aggregated figure across waves indicated that more people reported hearing about the Chernobyl accident during the second wave. Even so, about a fifth of the population in each

country did not report that they had observed increased media attention associated with the accident even during the second wave of data collection.

- In all countries, women rated the perceived effects of the media reports to be greater than men - that is, they found the reports more alarming and less reassuring, and suggested that nuclear power was more dangerous than did male respondents. This could imply that women were selectively recalling information from the media which agreed with their already held views regarding the risks from Chernobyl.

- Overall, only 10% of respondents rated the media as the most trustworthy source (from self-report data). Sources which competed in terms of being named as trusted sources included the following: instructions in an emergency broadcast (rated as most trusted by 15% of respondents); information from the nearest hospital (12%); information from the family doctor (11%); information from the media (10%); and information from the national authorities (9%).

- Overall, trust in the authorities to provide information was greater following the10th anniversary (i.e. in the second and third waves), perhaps indicating that risk attenuation might have occurred.

- Within the context of radiation risks, there were virtually no effects due to wave. In the UK, there was an increase in perception of both personal and general risks associated with the hazard BSE, from waves 2 to 3. As no data for BSE had been collected at wave 1, it is difficult to determine whether perceptions at wave 3 declined to the same levels as at wave 1. However, it is possible that this reflects short term amplification of perceived risks of BSE.

- The 10th anniversary of Chernobyl did impact upon the respondents' ratings of media reporting of Chernobyl. However, there was virtually no effect on risk perceptions associated either with Chernobyl specifically or radiation risk in general. There is virtually no evidence that social amplification of risk occurs following increased media reporting, nor that an increased availability of risk

information had an effect on risk perception. This is true of both text and keynote effects such as photographs and headlines.

Discussion

Consideration of those hazards which scored highest in terms of risk ratings, and those hazards which dominated the media, indicates no clear association between media reporting and risk perceptions, except, perhaps, in the case of BSE in the UK where saturation coverage of the risk has occurred. In Sweden, for example, those hazards which are frequently described in the media, such as BSE, traffic accidents, air pollution, alcohol consumption, chemical waste, the Chernobyl accident, domestic and East European nuclear power and nuclear power plants, and nuclear waste, were also hazards associated with the high end of scale ratings for the risk variables. A similar, although not identical, pattern is found in the other European countries. This could indicate that the media is setting the agenda for public discussion about risk, in that risk perceptions are high for those issues which appear frequently in the media. It is, however, equally possible that hazards appearing in the media are simply reflecting those issues which are important to the public - that is, the media is reflecting the public debate about risk itself (i.e. it is not possible to distinguish cause and effect from these data).

Of greater value in determining the extent to which the media is shaping risk perceptions is when a change in risk reporting results in a change in risk perceptions - that is, when risk amplification or attenuation may be said to occur.

In the event, there was virtually no evidence to support the social amplification of risk theory was operationalising within the context of the Chernobyl reporting. This may be, in part, due to the fact that the reporting was associated with the 10th anniversary of the accident (presumably a real accident would have more contemporary impact) and that the reporting centred on the Eastern European location of the accident, which reduced its impact on risk perceptions of individuals living in Western Europe. Such reporting might have been predicted to result in risk attenuation, but the risk perception data indicated that such an effect did not occur. Nor were there secondary

effects (increased anti-technology attitudes, for example, which might result from increased reporting about both Chernobyl and BSE), or ripple effects (increased risk perceptions associated with nuclear power in general). Given that media discussion of domestic Western nuclear power tended to be dissociated from reporting about Chernobyl, it is unlikely that the predicted secondary ripple effects would occur.

There is no support for the amplification of risk perceptions associated with nuclear power, either that originating in Eastern Europe or Nuclear Power in general, despite the fact that media coverage was perceived as alarming, and that the increase in reporting was observed by about 80% of respondents overall. The somewhat limited evidence for social amplification of risk was associated only with BSE in the UK, and this was by no means conclusive. In the UK, BSE dominated the media reporting of risks at the expense of all other coverage. One interpretation is that amplification occurs ONLY under conditions of 'saturated' media coverage. The results indicate that, even under such saturated conditions, amplification is likely to be somewhat short lived in duration. This type of media saturation situation is extremely rare, and is unlikely to be exploitable by professional risk managers, communicators or policy formulators. It is likely to be extremely difficult to create a saturation situation of this type.

Despite the lack of evidence for the social amplification of risk framework, the media is the most important source of risk information for most members of the public. It is therefore extremely important that risk managers learn to communicate effectively with the media. It must also be remembered that it is not the job of the media to DO risk communication - rather, risk communicators must learn to effectively communicate with media representatives.

Although the media is probably the most useful conduit for risk communication messages (potentially), public risk communication needs are different for different types of media. For example, local media tend to focus on mobilising information and issues of local economic importance. The national and international media focus on culpability and blame at the level of risk regulation and mitigation. It is probably important to ensure that mobilising information appears in the local press, as this is

where people expect to find information pertinent to local issues. Paying for advertisements might be necessary if risk information is to be delivered efficiently to target groups. Other local media sources, such as radio or television, should be also used to maximise risk communication effectiveness. It is important to use multiple information delivery channels to ensure that risk information reaches target audiences. It is also important that the media and journalists are part of the risk communication team in order that risk communications are in an appropriate form for transmission within the media. In cases where resources are limited, it is important to target at risk populations, and for risk managers to develop effective interfaces with maximally used risk information sources. This might involve understanding how to convey risk information in terms of 'soundbites' and exploiting imagery which is of direct utility in the context of the media.

Examining the level of risk reporting following the Chernobyl accident in 1986, and BSE in 1996, it is clear that most of the reports appear within the first 10 days of the story breaking. After this time, the news level of coverage tended to drop to a far lower, but constant, level (Braxton *et al*, 1997). It is likely that after this initial period an information heuristic has been set up in terms of public perception. (This is different from an availability heuristic. An information heuristic refers to the situation where an attitudinal system is established by an individual and retrieved upon presentation of a retrieval cue.) Once such a heuristic is established, it is unlikely that new risk information about a particular hazard will be incorporated into the mental picture that people hold about the risk. Risk communicators must act swiftly to ensure that the information is transmitted in the first ten days of the risk story breaking in the media. Further research needs to be conducted in order to understand how people incorporate new risk information into an already established belief system about a particular hazard.

It is also important to remember that television is likely to be more important than newspapers as a conduit for risk information. This is because television news reaches a larger section of the population and permits less 'selective processing' as individuals do not choose which stories to read as on a printed page, but are rather exposed to a continuous stream of chronologically sequential reports containing less information.

Thus, TV news reporting draws attention to the fact that a hazard exists, but does little to provide additional risk information. Again, mobilising information might best be delivered to 'at-risk' groups by local media delivery systems, although alternative systems might be investigated at a local level as they are likely to be subject to cross-cultural variations.

Media reporting of risk is also inextricably entwined with other social context issues, such as trust in risk regulators, the differential accruement of risk and benefit associated with a particular hazard, and issues of blame and culpability. Risk communicators must be aware of this when developing an interface with the media, and perhaps focus some of their communications (such as that contained in press releases) on these issues which are salient and likely to be of interest to the media.

Future Research Needs

It is unlikely that the social amplification of risk model can be used in the development of policy regarding effective risk communication. Even if amplification and attenuation do occur via the conduit of the media, the 'saturation' levels of coverage that are likely to be needed to 'trigger' these effects arise under unusual circumstances, and are unlikely to be amenable to manipulation by risk communication specialists. It is important, therefore, to develop, examine and empirically test alternative risk communication models.

One issue that has been identified by the RISKPERCOM project is that the form media itself differs between countries. Local and tabloid newspapers are of a more 'extreme' form in the UK compared to the other countries, and have clearly delineated reporting agendas, whereby local papers focus on local economic agendas, but the tabloids have a completely contrasting agenda. In contrast, Spanish newspapers tend to focus on in-depth national reporting about fewer hazards. Whilst these agendas might not be culturally determined, they are likely to be culturally specific. It would be useful to perform research to examine the effectiveness of culturally specific media delivery systems upon public risk perceptions. It is important to distinguish between risk communication in the context of emergencies (of greatest interest to those

concerned with emergency preparedness) and more general risk-benefit communication about nuclear technology, as there may be differences in individual responses according to the different information delivery systems employed.

In the next five to ten years, it is envisaged that particular research projects may emerge which develop novel theoretical approaches (combining qualitative methodologies and predictive modelling techniques such as structural equation modelling) to understand public values and belief systems associated with radiation risks. This may include assessment of public beliefs regarding appropriate regulatory application of the precautionary principal.

Indeed, it may also be fruitful to direct future research towards the development of new theories of risk perception and communication, which may or may not generalise beyond the area of radiation protection. Research outputs would be best directed towards the development of recommendations regarding both formulation and implementation of policy regarding radiation risk communication and radiation risk management practice. As is now generally recognised for technological potential hazards, the issue of benefit communication might also be usefully addressed within this context. Other value systems and beliefs held by the public about technologies MUST form the third element in the research, as must public priorities for risk mitigation decisions.

Effective risk communication is also, in part, determined by public trust in the regulatory system, and this is likely to be increased through developing methods relating to increased transparency in risk management processes, and increased public involvement in risk management decisions. Developing methods for increasing public participation in risk management strategies and prioritisation of risk management decisions is a key element in promoting increased transparency in the regulatory framework. Research will include the development of methodological advances in assessment of the success or failure public participation interventions, and address both the needs of the public and the sponsor (Rowe and Frewer, 1998).

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