Changes to the amplification of risk information within the British press: 1985-2017

A Thesis

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By
Martin C. Rooke
BSc., Middlesex University, 2012
MSc., Middlesex University, 2014

Abstract

Research suggests that news reporting of health, science, and environmental hazards during the late 1990s / early 2000s became orientated around the disproportional amplification of risk information. From causal media observations, it has been speculated that the quality of British risk reporting has undergone significant improvements from the mid-2000s onward. This speculative assertion has remained largely under-researched by empirical inquiry. This thesis utilised quantitative and qualitative content analyses, alongside interviews with members of the press, to investigate if British risk reporting has become less amplified over the past thirty years. Both sets of content analyses were conducted on a corpus of British risk reporting (n=63,423) from across the full range of daily national newspapers. The qualitative content analysis investigated the changes to the volume of risk-based news publication, alongside the expression of sensationalist and politicising language. The qualitative content analysis utilised a rhetorical framing analysis to explore the changes to risk amplifying news frames across a sample of highly amplified news stories (n= 1490). The framing analysis sought to investigate the temporal changes to the expression of uncertainty, certainty, blame, trust, stigma and dread within risk reporting. Targeted interviews were conducted with twenty members of the British press who have reported on health, science, and environmental risks across their career. The interview schedule was designed to explore the changes to risk-based newswork across four distinct areas: (1) key historic news stories, (2) changing responsibilities and skills of newswork, (3) changes to the process of reporting risk information, (4) changing newsroom dynamics.

The data generated from these investigations provided evidence to suggest that amplified reporting of risk information is subject to the prevailing professional conventions embedded across four distinct periods of risk reporting. The first period of risk reporting extended from 1985-1994 can be described as a period of low-risk amplification. The first period of risk reporting is characterised by a relatively low volume of risk reporting and high expression of uncertainty frames. Evidence suggests that, during this first period, risk reporters faced systemic difficulties in accessing reliable and credible scientific news sources. Risk reporters would have to rely on journalistic instincts to process the array of information from conflicting news sources. The relative availability of "pressure group" campaigners made them ideal news sources for risk reporters during the first period, as their agenda driven framing of risk information contrasted well against Government framing of risk within official reports and safety assurances.

The second period of risk reporting extended from 1995-2004 can be described as an era of high-risk amplification. The second period of risk reporting was characterised by rapid proliferation of published risk reporting, and the disproportional expression of certainty frames within news. Across the second period, the volume of published risk reporting increased from 803 articles in 1995 to 2654 articles in 2004. In 2000, the published volume of risk reporting peaked at 3187 articles - and would remain uncontested as the year of most risk reporting until 2015 (3514 articles). The increased proliferation and peak volume of risk reporting lend evidence to suggest a major reorientation across British news organisation to focus on promoting risk reporting within their newspapers. During interviews, risk reporters established how the Government's admission of cross-species transmission of BSE/CJD in 1995 validated newspaper information campaigning efforts - which had maintained that cross special transmission was possible, despite Government assurances otherwise. What followed was a 'skeptical phase' of risk reporting, where government safety assurances were openly debated within ongoing newspaper campaigns against risky technologies. The observable increase in certainty frames during the second period were primarily due to the statements provided by contrasting news sources. While government safety assurances openly express a degree of confidence towards the known safety of technologies, statements from pressure group sources were equally confident in their expectation of hidden harms. Furthermore, pressure group sources drew upon historic social facts of risk to confidently suggest that vulnerable populations will be damaged should risky technologies be permitted by government.

The third period of risk reporting extends from 2005-2014 and can be described as an era of low-risk amplification. The third period is characterised by high volume of risk reporting, but a correspondingly low exhibition of certainty frames. While the volume of risk reporting published during the third period constitutes 45% of the entire sample, there is further evidence to suggest that risk became less amplified during this decade. Firstly, the proliferative publication of risk reporting underwent stagnation during the third period. Secondly, there were also notable lulls in reporting, where the volume of reporting declined sharply in the year(s) following a prominent risk event. It was further suggested by interviewees that risk reporting became a routine aspect of a newspaper's media offering and that focus of risk reporters pivoted away from exploring links between hidden hazards and institutional malfeasance. The evidence provided from the content analysis further supports this claim, as the proportional difference between uncertainty and certainty frames increased from 16.6% in the second period to 48.9% in the third period. The key reason for this change in the framing of risk information was that risk reporters began to prioritise statements from academic sources over pressure group sources. Interviewees suggested that prioritisation of scientific sources appears to demonstrate that they were attempting to

introduce "scientific balance" into their reporting. It was observed that the higher expression of uncertainty frames was generated from the generally tentative language used by scientific sources when discussing risk and their research. Furthermore, During the third period, risk reporters demonstrated a tendency to include several statements from different scientific sources as a counterbalance to the risk information provided within government reports.

The fourth period of risk reporting was observed between 2015-2017. However, given the previous trends, it is presumed by this thesis that the fourth period is still emerging. It is acknowledged that the observations made within the fourth period are somewhat speculative but may suggest the formation of novel conventions. The data obtained so far suggests that the emergent fourth era of risk reporting could be another era of high-risk amplification. So far, the proportional difference between uncertainty and certainty frames has decreased by 1.9% over three years. This small increase in certainty framing appears to correspond with a sudden increase in "opinion-based" content. The average number of opinion articles increased from 136 per year within the third period, to 246 per year within the emergent fourth period. During the content analysis, it was also observed that statements from scientific news sources appeared more inclined to politicise risk information by including prescriptive policy recommendations. Interviewees also suggested that the quality of risk reporting has also declined, as newsroom pressures promote the simple repackaging of academic press releases without critical inquiry.

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Chapter 1 - The Problem of Highly Amplified Risk Reporting Within the British Press

Introduction

Poor quality newspaper coverage of science, health, and environmental risks has been linked to the amplification of public perceptions of harm from being produced by novel applications of technology (see Bennett, et al 2010; Fischbacher-Smith et al, 2010, Frewer et al, 2010; and Veland and Aven, 2013). Research that explored the relationship between media amplification of risk and public risk perceptions has suggested that by exaggerating particularly fretful aspects of novel technologies, news organisations may inadvertently facilitate 'illogical' public responses such as protesting against safe technologies (I.e. Mobile phone masts) or needlessly avoiding applied technologies altogether (I.e. The MMR triple jab vaccination and GM food) (see Burgess, 2010; Owens, 2002; Burgess et al, 2006; Gaskell et al, 2004; and Finucane 2002). A consensus has emerged where amplified risk reporting undermines the perspective that news media should serve the function of aiding the public understanding of science, while also posting a threat to the evidence-based decision making within the contemporary policy making process around applied technologies (See Miller; 2001; Royal Society, 1985; House of Lords, 2000; Covello et al., 1986; Lofstedt, 2008; Veland and Aven, 2013).

By the late 1990s, amplified risk reporting on issues such as 'mad cow disease' and 'frankenfoods' was viewed to have become such a threat to British confidence in science that the House of Lords commissioned a report to address the issue. The House of Lords third report on Science and Technology (2000) contained several recommendations which appear to signify systemic reforms around risk reporting which aimed to improve the quality of science-based journalism. The House of Lords (2000) report identified a 'new mood for dialogue' whereby risk communication strategies by key stakeholders should shift away from the traditional 'deficit model' of risk reporting and begin to embrace the 'dialogic model' of communication (see Irwin *et al,* 2014; Miller *et al,* 2009; Trench, 2008). The purpose of such a change in communication strategy appears to be an attempt at addressing the core contention of the House of Lords report, namely that scientists and journalists did not share a common outlook on the purpose of risk reporting (see chapter 5 for further analysis). For the most part, scientists were reluctant to be included as news sources, leaving journalists to rely upon the most available sources (even if their

scientific credentials were somewhat dubious). While the House of Lords (2000) report has been praised for instigating systemic changes that improved the quality of British risk reporting [REF], there has yet to be a broad investigation that seeks to investigate how amplified risk reporting has changed over time. Within this thesis, a series of empirical investigations were conducted which sought to address two fundamental assumptions made of British risk reporting:

1) That risk reporting was particularly amplified between the mid-1990s until the early 2000s

2) From the mid-2000s onwards, the scientific quality of risk reporting substantially improved.

The remainder of this chapter will seek to establish the foundations which appear to inform the above assumptions. This will be conducted by cataloguing some of the key policy documents from government departments and other key stakeholders. Such documents are considered crucial for setting institutional agendas leading up to the House of Lords third report on Science and Technology, and provide a glimpse into the pertinent issues which have emerged since the turn of the century. Following this, attention will be paid towards providing a summary of the subsequent chapters within this thesis.

Risk information and the Public Communication of Science (1990-2000)

Within the preface to the Royal Society's (1985) report on The Public Understanding of Science, Professor D.C. Smith - then vice president - outlined the core rational for increasing the visibility of scientific information within the British press. Professor Smith suggests that the "need for an overall awareness of the nature of science" is especially pertinent as novel applied technologies had begun to "pervade modern life". It appears to be hoped that the report would "generate debate and discussions" within the public arena on the acceptance technology, while "achieving lasting improvements" on the public understanding of science. The report provides data which suggests around 66% of the general public may be interested in reading news stories on science, especially in the areas of "immediate human welfare", environmental pollution, food and medical issues (Royal Society 1985, pp 12-14). This argument presents the clear rational that increasing coverage of science within newspapers would, ultimately, be profitable for newspaper publishers. The report makes several recommendations for the press to improve the public understanding of science such as: incorporating 'scientific material' into general news reporting,

improving the contact between scientists and journalists, and to provide more physical space within newspapers for science-based reporting (Royal Society, 1985; pp 22-23). There was a further, perhaps idealistic, recommendation made within the report that newspapers should adopt a "much more positive attitude" towards science.

During the 1990s, while the British press appear to have increased their coverage of science, the core focus appears to have been on the role of government in permitting and managing risky technologies, rather than exploring the scientific effort behind technological developments (see Chapters four, five, and six). Media pressure upon the government during the BSE crisis appears to have sponsored several revisions to government policy on the communication of health risk information (Jensen, 2004). The importance of the BSE crisis cannot be understated, as it presents a prescient battle over the definition of a health risk between the British press and the government. Much of the news reporting on BSE maintained that the British government was actively suppressing and manipulating scientific evidence of a causal link between British Beef and the human variant of BSE (CJD) so as to claim that British beef was safe. It was reported that novel agricultural practices (such as feeding bone meal products to cattle) were to blame for the development of BSE in British cattle herds, and that consumption of BSE infected beef caused CJD - a claim that was rejected by the government (Delamothe, 1996).

In 1996, the press was rewarded for their steadfastness in claiming the risky status of British beef, when the government finally admitted that the link between British beef and CJD was real (Washer, 2006). Following the apparent press victory, systematic reviews of institutional data management and communication guidelines was conducted by government stakeholders, concluding that that the British government should transition towards a state of transparency and open dialogue to prevent the amplification of risk information (Wales *et al,* 2006). Following this, in 1997, the Governments Chief Scientific Advisor (CSA) published guidelines on the use of scientific advice and stressed the importance of explaining data to the public, rather than issuing safety of assertions (CSA, 2009). Furthermore, in 1998, the Royal Commission on Environmental Pollution (RECP) reported that government statements needed to articulate resonant social values when communicating risk information, alongside the importance of holding public consultations (RECP, 1998).

The suggestions to improve risk communication made within both the CSA and RECP reports have been suggested to attenuate public amplification of risk and stymie public outrage

(Sandman, 1987). The RECP report also incorporated findings from sociological studies on risk which highlight how low trust in public institutions and high levels of uncertainty around technology are contributory factors for the amplification of risk within public discourses (references within the report included: Renn, 1998; Jasanoff, 1991; Lash *et al,* 1996; Slovic, 1987 and Douglas and Wildavsky, 1982). Both the CSA and RECP reports provides evidence which suggests that, by the end of the 1990s, government ministers had become increasingly aware of the complex, psychosocial, dimensions of public risk perception, public responses to risk, and risk communication.

The House of Lords third report on Science and Technology (2000) seemingly codified the suggestions made in earlier parliamentary reports by outlining a new agenda for communicating risk information to the public. Within the introduction, the House of Lords report contended that "the future wealth and welfare of society" could be threatened if the "enthusiasm of young people to pursue scientific careers" is frustrated by media landscape which consistently amplifies the perception that novel scientific technology is risky, dangerous, and immoral (see chapter five). The House of Lords report used news reporting around Genetic Modification (GM) as a prevalent case study where public confidence in the assessed safety of science was "rocked" by unsubstantiated risks reported within news stories (see Augoustinos at al, 2010). The report made several recommendations for the press to improve the scientific quality of British risk reporting by minimising risk amplification and engendering public trust towards scientific institutions. One recommendation was that newspapers attempt tp distinguish between "proven" and "unproven" possibilities to avoid speculating upon uncertainty. While not explicitly stated, the distinction between proven and unproven possibilities appears to rely upon an established scientific consensus on specific risk issues. The report uses the example of the link between smoking and cancer as a pertinent case study where risk was substantiated by a robust collaboration of empirical evidence. Another recommendation made within the House of Lords report was that newspapers avoid "irresponsible" reporting, such as declaring scientific technologies as being "safe" or not. It was suggested that, rather than presenting a binary proposition of safe or risky, newspapers should actively attempt to inform public perceptions of safety by contrasting scientific information against the "subjective factors" regarding the social acceptability of specific risks. A final recommendation made by the House of Lords report was that newspapers embrace their responsibility towards fairness when dealing with scientists as news sources. This recommendation presumed that scientific news sources were generally unaware of standard journalistic conventions, resulting in statements that were made 'on the record' which were framed as supporting risk amplifying narratives.

Improving Risk Reporting (2000-2017)

The publication of the House of Lords report represents a critical step in addressing the "great challenge" of improving the state of risk reporting within British press. As a direct response to the House of Lords report, Baroness Susan Greenfield dedicated resources to establishing the Science Media Centre (SMC). The SMC is a non-governmental communications organisation with the stated agenda of being "unashamedly pro-science" in an attempt to "help renew public trust in science" (Kirby, 2011; Fox, 2012). One of the aims of the SMC is to improve communication between scientific sources of information and the British press. One improvement implemented by the SMC involved hosting press briefings at their London offices, where journalists are invited to ask a panel of experts pertinent questions during developing news cycles. Another improvement is the SMC's publication of press releases on emerging risk issues which contextualised scientific information, and provided a selection of statements, from a panel of expert voices (Fox, 2012).

The operations of the SMC provide some evidence to suggest that, by the mid-2000's, the British scientific communication apparatus had begun to reject the deficit model of risk communication and adopt the dialogic model, providing journalists with the opportunity to more easily access a consensus of credible scientific sources. The deficit-to-dialogue journey describes a change in momentum whereby the scientific establishment became less focused on expecting the public to view risk through a lens of potential harms against possible benefits, and increasingly focused on allowing scientific stakeholders the opportunity to forward their perspective on how technology can help address resonant sociopolitical concerns (Merkelsen, 2011). Furthermore, during the 2007 Sense About Science (SAS) annual lecture, Professor Raymond Tallis outlined how the dialogic model of communication could improve the public understanding of science. Professor Tallis suggests that by mitigating risk amplifying narratives within news reporting the press could be provided with the opportunity to forward scientific balance within their stories and explore the future social benefits of novel applied technologies (Tallis, 2007). Professor Tallis reinforced his argument by presenting data that which suggested that 85% of the public thought the benefits of science outweighed the risks, and that news audiences had become bored of reading amplified stories on 'junk science'.

There is evidence to suggest that the dialogic approach to risk communication had become increasingly incorporated into government risk communication strategies. For example, in 2010,

the Chief Scientific Advisor offered guidance that, by pre-emptively addressing pertinent sociopolitical issues, the government could effectively suppress the public amplification of risk (CSA, 2010). It was further suggested by the CSA that, in times of high public uncertainty, government advice should attempt to establish a scientific consensus from a broad range of expert sources such as British researchers, international organisations (I.e., The World Health Organisation), and industry spokespersons. Such an approach mirrors that of the SMC within their press releases and briefings. Another recommendation of the CSA was that government departments should seek to standardise scientific assessments of risk to avoid generating public uncertainty from apparent inconsistencies in data and information. However, despite the proposition that the dialogic model of risk communication would improve public trust in science, a recent House of Commons Science and Technology Committee (2017) report on Science Communication and Engagement presented evidence which suggested that:

"…while the public has developed a more positive attitude towards science over the past 30 years, most people still lack a personal connection or understanding of science. The Public Attitudes to Science survey, for example, found that 'people still do not know much about how scientists work', and that there was 'low trust in science journalism."

The above example may be read as an institutional criticism of the dialogic model, where attempts to improve the communication of science to the public has had little impact on public risk perceptions. The report suggests that, although news media has become far more positive in its coverage of science, there is substantial public distrust of the press when reporting on scientific issues in a fair and accurate manner (for a further exploration of how low trust aids amplified risk perceptions, see chapter two). Conclusion made within the Science and Communications (2017) report reiterated the key findings of the Communicating Climate Science report (2014), which claimed that issues such as false media balance and sensationalism are still far too prevalent within the British press coverage of risk-based stories. Furthermore, the Science and Communications report establishes that media outlets wilfully distort risks to satisfy their own agenda, and that journalists still lack the necessary skills to interpret the science they are reporting on. The critical nature of both the Science and Communications and Communicating Climate Science reports marked a significant change in tone from government regarding the self-regulatory ability of the press manage the quality of their risk reporting. The negative tone apparent within these two House of Commons reports presents a key question for this thesis - to what degree has the press' reporting on risk information changed over the past thirty years of news production?

Defining Risk Reporting

Within the governmental reports previously mentioned, there appears to be a degree of overlap between science journalism and risk reporting when communicating health risks within news stories. A distinction must be made between the two, so as to help demarcate the boundaries between media studies and social studies. Science journalism identified the endeavours of the press to report on stories arising from the world of science which are seen to be in the public interest (Dunwoody, 2014). Risk reporting is the manner in which empirical and experiential evidence of the apparent dangers posed by selected hazards is presented within news stories (Kitzinger & Reilly, 1997). Both science journalism and risk reporting operate synergistically to build a news story around health risks. However, interrogation of science journalism considers the modes of news production, which risk reporting considered how the framing of scientific controversies can influence public perceptions and behaviour (Hansen 2000, Flynn, Slovic, and Kunreuther 2001). Amplified risk reporting outlines a form of science journalism which capitalises upon escalating the danger posed by low-probability hazards (Kasperson, *et al,* 1988). Amplified risk reporting poses a unique challenge to decision making at the policy level, as risk amplifying news stories can encourage public calls for government to manage the apparently impending doom (see Renn *et al, 1992*; Kasperson *et al,* 2003; Yeo, 2014, Rothstein, 2003 and Wardman & Löfstedt, 2018). Amplified risk reporting may also serve the profit-seeking motive pf newspapers by allowing them to adopt campaign stances on health risks that sells newspapers through signifying solidarity with the concerns of their readers technology (Agha, 2003; Höijer *et al,* 2006; Burgess, 2010; Burgess, 2012). Risk-based campaigning draws upon several core elements to inspire protracted news cycles such as:

Associated risk - Statements which convey some probabilistic value of harm.

Blame and irresponsibility - The identification of critical failings from a key risk manager.

Projection of harm - Speculation on the future impacts if a risk is left unregulated.

The structure of news stories appears to aid the amplification of risk by seeking to provide balance between a collection of news sources that represent binary discursive positions within a controversy over applied technology. The concept of false balance describes a journalistic convention where credible scientific information on risk is juxtaposed against the unsubstantiated perspectives of non-institutional actors, which include the public, pressure group

sources, and maverick experts (Dixon & Clarke, 2013; Dearing; 2016; and Fahy, 2017). Dixon & Clarke (2013) suggest that false balance within news stories can facilitate risk amplification by spotlighting statements regarding applied technology that sensationalises and politicises risk information. One remedy for false balance is for journalists to employ scientific balance and writing news stories that centre around a constellation of scientific sources that outline the current discourses around risk management within an established scientific consensus (Clarke *et al,* 2015; van der Linden *et al,* 2015).

Thesis Structure

Despite the documented changes to institutional approaches towards risk communication (as outlined within this chapter), there has been limited research that analyses the changes in how the British press presents risk information within news stories. This gap in knowledge has informed three fundamental research questions that underpins this thesis. Firstly, are there observable changes in how risk information was reported by the British press over time? Secondly, have there been changes in how risk information was amplified by the British press? Thirdly, have there been changes in professional press conventions regarding risk-based newswork?

In addressing these three research questions, this thesis provides empirical evidence and theoretical considerations which contribute towards furthering the interdisciplinary understanding of the sociopolitical nature of risk amplification. This thesis is rooted within the sociological understanding of risk and branches out to provide fruitful insights for an array of cultural studies, media studies, and communications studies which congregate around issues of risk and science. Chapter two better outlines how some of the major approaches to risk research provided the theoretical grounding for thesis. Chapter two begins with Chauncy Starr's seminal observation of the seemingly "illogical" public perceptions of risk, before detailing how the sociological lenses of the psychometric paradigm, the governmentality perspective, the cultural theory approach and the risk society thesis facilitated the development of the primary conceptual tool used within this thesis - the Social Amplification of Risk Framework (SARF). Chapter two further demonstrates how SARF aided assessment of the interdisciplinary research questions posed within this chapter, especially in regards to how aspects of the *information mechanism* and the *response mechanism* operate as defined units of analysis to explore risk amplification within news texts. Finally, chapter two presents some curated literature on risk and mass media to

provide a more robust theoretical foundation which underpins newspapers as a social station of risk amplification.

Chapter three details the methodology of this thesis to analyse and explore the changes to news-based risk amplification over the past thirty years. Chapter three begins by situating the epistemological approach to this thesis within the emergent discipline of constructivist grounded theory (CGT). Chapter three outlines how CGT was useful in addressing key contentions that exist regarding the suitability of the more traditional beaches of grounded theory for producing valid empirical works. When detailing the methods used by this study, chapter three details how a mixed methods approach was crucial to investigate the complex phenomena of change to risk amplification within the British press over time. To facilitate such analysis, the theoretical considerations from Documentary Analysis (DA) research informed an audit trail method, which permitted the construction of a selective corpus of newspaper articles to track linguistic and narrative changes to risk amplification. Chapter three further details how computer aided linguistic methods enabled both quantitative and qualitative content analyses to be performed on a large corpus of news articles. The quantitative analysis performed within this thesis included volumetric counts of risk amplifying news stories, and word count analysis for risk amplifying determinants. The qualitative methods performed within this thesis included framing analyses and narrative analyses. Finally, chapter three outlines some of the methodological difficulties in conducting semi-structured interviews with professional risk reporters.

Chapter four presents the results of quantitative content analyses which map the longitudinal changes to *risk* amplification within the *information mechanism* of SARF - the volume of risk information, sensationalism, and politicisation. Chapter four highlights how the volume of risk information outlines several distinct periods of risk reporting, which may be reflective of conventional changes in how the press approached risk-based newswork. Such observations were reinforced by investigations into the expression of sensationalist and politicising language, which provide evidence of a differential expression of phrases across temporal periods. Overall, these studies present data which suggest that, while the volume of risk reporting increased over time, there was a periodisation effect in place where different moments exhibited defined characteristics of proliferative trajectory and linguistic change. Two key observations are that the 1995-2004 period appears to be a moment of unprecedented proliferation of risk reporting, while the 2005-2014 period was a moment de-amplified, science-based, reporting.

Chapter five presents the results of qualitative content analyses that investigate changes to risk amplification within the *response mechanism* of SARF - the framing of dread, trust, stigma, uncertainty, certainty, and blame within texts. The framing analysis compared how aspects of risk amplification were framed, within peak moments of risk reporting, between the different reporting periods. A narrative analysis was subsequently performed which investigated the changes to risky rhetoric over time. Risky rhetoric was identified as the presentation of *logos, ethos* and *pathos* relating to risk information and risk governance. Observations were supported by examples from the text and word count analyses to support claims of change over time. The data presented within Chapter five provides evidence to support claims made within this thesis that the different periods of risk reporting are reflective of different conventional approaches to risk-based newswork by risk reporters. Two key observations are that the 1995 to 2004 period appear to be a moment of intense press campaigning on risk issues that was predicated upon the framing of risk information by pressure group organisations, while the 2005 to 2014 period appears to be a moment which prioritised the tentative style of scientific communication and effectively de-amplified risk reporting by the British press.

Chapter six presents the results from interviews with British risk reporters and assists in contextualising some of the observations made within chapters four and five. The interviews provided evidence to suggest three distinct paradigms of risk reporting, which reflects some temporal overlap with the periods of risk reporting investigated in previous chapters. The paradigms of risk reporting were reported to have been influenced by several key factors such as technological changes which improved access to scientific sources of risk information, cultural pressure to improve the accuracy of risk reporting, and the economic pressure of newsroom cutbacks which have impacted the ability of the press to produce quality journalism. The results of this analysis lend further evidence to support the claims standard press conventions amplified risk during the 1995 - 2004 period and de-amplified risk during the 2005-2014 period. Furthermore, there were resonant concerns that the current state of the British press would sponsor a conventional approach to risk information that will produce a new era of risk amplification.

Chapter seven is the conclusory chapter of this thesis and provides a synthesis of evidence presented within this thesis and the limitations of the studies. Chapter seven revisits the aims of this thesis and considers how well the data produced by the mixed methods approach addresses the research questions. This chapter further outlines the contributions made by this thesis to the field of sociology, alongside the wider interdisciplinary umbrella of risk research. Finally,

chapter seven identifies some of the key limitations of this study and some methodological considerations that arose, before outlining a new horizon for media-based risk research.

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Chapter 2 - Reviewing the Literature on Risk, Amplification, and the News

Introduction

This chapter presents some of the relevant theoretical contributions from the field of risk research which has directly informed this thesis and outlines where this thesis makes an original contribution to the sociological and interdisciplinary literature on risk. The purpose of this chapter is to establish how the constellation of theory on risk was synthesised by this thesis, producing a solid foundation which supports risk amplification as a valuable sociological phenomenon. Or, rather, to outline the theoretical contributions which assist in liberating 'risk communication' from being rooted purely within the domain of science and technology studies and adopt a more interdisciplinary perspective that considers some of the wider sociocultural nuances of mediated risk information. This chapter is guided by the temporal development of risk theorisation, beginning with the foundational observations made by Chauncy Starr (1968). Following this, some contributions which distinguish the four theoretical branches of risk research will be explored: the *psychometric paradigm*, the *cultural theory* approach, the *governmentality* perspective, and the *risk society* thesis. The central theorisation around the *psychometric paradigm* is based upon the empirical work of the 'Oregon Group' of scholars and is primarily concerned with how the psychological development of public risk perceptions inform individual attitudes towards risk.

The *Cultural Theory* is based upon the works of Mary Douglas & Aaron Wildavsky and outlines how risk can be used by cultural groups within a struggle over regulatory systems. The *Governmentality* perspective is based upon the works of Michel Foucault to suggest how risk becomes instrumentalised by civil institutions and sponsors public coercion around levels of risk. The *Risk society* thesis is based on the works of Ulrich Beck & Anthony Giddens and suggests how society has become orientated around a reflexive modernity that questions the capability of institutions to organise capable responses to hazards. While each of these approaches provide valuable insights for risk research, they are often presented in conflict with one another for highlighting different aspects of risk as a sociopolitical construct. In an attempt to create an epistemological core to risk research, the *Social Amplification of Risk Framework* (SARF) was established which provides both theoretical and empirical insights into how the transmission of risk information by powerful social actors can produce wider social impacts. This chapter will further explore the general concept of SARF, paying particular attention to the role of newspapers as a social station of risk amplification. Finally, this chapter will address an article by

Vian Bakir (2010) that attempts to establish a more consolidated theory of mass media and risk. Bakir's work is given special commendation within this thesis for attempting to grapple with an aspect of risk that has been left under-theorised by some of the more canonical risk scholars.

Risk information and the 'Irrational' Public

Chauncey Starr's 1969 article, *Social Benefit Versus Technological Risk,* is often considered to be the origin point of socially orientated risk research (Burgess, 2017). While Starr's statistical computations are somewhat antiquated, it was his general observations on the nature of public risk perception which have directly informed the sociological development of risk research (Thompson, 1990). Starr (1969) concluded that the public generally exhibited an 'irrational' tendency to overestimate the dangers posed form low-probability risks derived from applied technology. Starr contended that the public generally viewed involuntary imposed risks as more dangerous than voluntarily accepted risks (Starr, 1969; Starr *et al,* 1976). Starr also suggested that the general public did not incorporate the 'benefit' of relatively sage technologies into their own risk assessments (Starr, 1969; Starr & Whipple, 1980). This prompted Starr to ask the question 'how safe is safe enough?' for applied technologies to be accepted by the public (Starr, 1969).

Starr's conclusions highlighted a key failing in the assumptions of institutional risk managers at the time, that the public *should* operate upon a model of rational self-interest (also referred to as the benefit-risk relationship) where the proposed benefits of applied technology (in terms of saving labour or increasing life expectancy) should be seen to outweigh the risk of potential harm for a small minority of people (Starr, 1969; Otway & Cohen, 1975). Instead, Starr's article demonstrates that the public hold their own social values to be self-evident, that it is the possibility for individuals to become one of the small minority who are negatively impacted by technology which informs risk perception and legitimises risk avoidant stances. Since Starr's article, the field of risk research has attempted to understand *what* these social values are, and *how* social values directly inform public risk perceptions. Each of the four foundational sub-fields of risk research have made significant contributions to substantiate Starr's initial claims. Each of these four foundational subfields - the *psychometric paradigm*, the *governmentality perspective*, the *cultural theory approach*, and the *risk society* thesis - will now be discussed in turn.

The Psychometric Paradigm

The *psychometric paradigm*, established by 'Oregon Group' of scholars, sought to evaluate how different cognitive models of probabilistic choice informed public perceptions on risk (Slovic, Kunreuther, & White, 1974). Concordantly, similar research was published on heuristics, biases and probabilistic thinking that offered an explanatory basis for how people responded to natural hazards (Tversky & Kahneman, 1974). The initial approach of the psychometric research aimed to establish the 'personality of hazards' which outlined how characterising risks as (in)voluntary, controllable, potentially catastrophic, or dreaded, influenced the acceptance of risk (Starr, 1969; Lowrance, 1976). The positivist epistemology of the *psychometric paradigm* maintained some of the fundamental assumptions forwarded by Starr, namely that there was some degree of disjuncture between the technical assessments which produced evidence that applied technologies were safe, and the public perceptions of risk which viewed applied technologies as dangerous. Early research within the psychometric paradigm demonstrated cross-cultural validity for the presumption that psychometric scaling metrics were appropriate tools to assess public risk perceptions. (see Slovic *et al* 1980; Teigen *et al,*1988; Bastide *et al;* 1989; and Goszczynska *et al* 1991). One key empirical method included magnitude estimation to assess risk perception derived from frequencies of fatal events (Stevens, 1958, Fischhoff et al., 1978; Lichtenstein et al., 1978). Later research supplemented this approach with more traditional survey-based designs.

The work of Lennart Sjöberg has provided some of the more robust criticisms of the psychometric paradigm. Sjöberg (1996; 2003) contends that methods which assess the heuristic processing of risk information do not fully account for the variance of risk perception between populations. Furthermore, Sjöberg (1996; 2000; Sjöberg *et al,* 2004) suggests that the *psychometric paradigm* presumes that risk information processing is a wholly cognitive endeavour, and disregards emotional influences on perception. To this point, Sjöberg makes a criticism which is most relevant to this thesis, in that the *psychometric paradigm* often tends to emphasise how dread and trust inform risk perceptions, without considering how the moral implications of hazards modulates the public acceptance of risk (Sjöberg and Winroth, 1986; Sjöberg and Torell, 1993; Sjöberg 2000). Despite the limitations, the psychometric paradigm generated a wealth of knowledge that allows for a series of generalisable conclusions to be drawn on the nature of risk and public perception (Slovic, 1992). One of the key conclusions is that risk is more akin to a social construct that allows humans to negotiate the uncertainties and dangers of life. Evidence for this claim was made apparent by demographic differences in risk perception between white, non-white, male, and female populations (Slovic *et al,* 1980; Fitchen *et al,* 1987 pp 43).

Risk perception, as a social construct, is a departure from the rational model of self-interest which suggests that risk is a calculable metric of benefit against harm (Starr 1969). The position that risk is a social construct undermines the conception that an 'objective' measure of risk is possible. When presented with ambiguous risk information, the lay public often rely upon their own set of intuitive heuristics when processing risk information (Han *et al,* 2006; Zhu *et al,* 2012). Research from behavioural economics suggests that there are two core heuristics which underpin public risk processing. First is the *affect heuristic* which centralises the emotional resonance of risk information in generating public risk perceptions (Slovic *et al,* 2007). Second is the *availability heuristic,* which suggests that risk perception is aided by what information individuals can recall from memory about risk (Tversky and Kahneman 1973). The coalescence of both heuristics can result in a representation bias, where the most readily recalled information is emotionally resonant reframing of risk information (Tversky and Kahneman 1973; Tversky and Kahneman 1974). As such, news reporting on risk information becomes a primary influence on public risk reception as news stories rarely present risk without associating it with powerful affective imagery, such as damaged children (Folkes, 1988).

Risk and Culture

Seemingly in opposition to the *psychometric paradigm's* positivist lens, the *cultural theory* approach adopts a constructivist epistemology and suggests that public risk perceptions are firmly rooted within wider frameworks of cultural biases (Douglas and Wildavsky, 1983; Wildavsky and Dake, 1990). The *cultural theory* approach was namely from Douglas's background as an anthropologist, and reflects her criticisms of technical and psychological approaches to understanding risk. Douglas's theorisation on risk aligns well with Swidler's (1986) toolkit model of culture which suggests that cultural knowledge provides a *repertoire* of semiotic codes. Repeated use of a select number of codes establishes an 'ecological space' to define the limits of danger and precaution (O'Riordan, 2013). The ecological boundaries of risk is demarcated by the cognitive limits of individuals and embedded within cultural subgroups (Tansey & O'Riordan, 1999). As such, what could be considered risky to one cultural subgroup (e.g., cosmopolitan office workers) can be radically different to another group (e.g., working class van drivers). Douglas (1999) suggests that risk is, therefore, a social battle of dominance between disparate social groups to define what is considered risky and the appropriate public responses to manage risk. Douglas (1990) further suggests that risk can be used as a forensic resource within sociology to explore the boundaries of definitional struggles by mapping the ever-shifting social attitudes towards risk. The forensic exploration of risk examines the sociolinguistic genealogy of 'risk' as a

phrase, and as a concept. It is contended that 'risk' was originally associated with marine insurance markets of in the 17th century (Covello and Mumpower, 1985). By the mid-20th century, 'risk' had become more commonly associated with jobs and finance, before shifting to centre mostly on health and environmental hazards by the end of the 20th century (Zinn, 2018; Zinn & McDonald, 2018). The changes in expressional forms suggests that 'risk' is subject to temporally bound linguistic redundancies, and has become incorporated into the language of populist struggles vying to utilise risk - as danger - to instrument social control (Lupton, 1993)

Douglas (2013) suggests that the roots of social control is located within the concepts of sin, taboo, and scapegoating (blame). Despite the Judaeo-Christian connotations of these phrases, Douglas suggests that the underlying concepts have cross cultural validity and exist independently of sociocultural and temporal contexts. Sin refers to a process of cultural homogenisation that stigmatises objects of risk as embodying future danger (Douglas, 2013; Lupton, 1993). Taboo details a cultural logic of 'cause-and-effect' and presupposes that transgressing established moral boundaries of acceptable (and therefore decidedly safe) behaviours, individuals invite future harms onto themselves and into their community (Douglas, 2002; Tansey, 2004). Finally, Scapegoating defines a process whereby blame is collectively allocated onto a socially targeted victim (Douglas, 2002). The allocation of blame is unwarranted, misinformed, or misdirected, and relies upon directed social cognition to justify the victimisation. One justification is that the proceeding punishment of the stigmatised is believed to absolve the community of Sin in an attempt to control the expected future harms (Dimitrova & Strömbäck, 2005; Cox & Wood, 2017). By collectively engaging in scapegoating, community members also experience the emotional rewards from having (indirectly) participated in the collective action of seeking shared justice (Taylor, 2006; Zak & Barraza, 2009). Douglas is not alone in attaching theorisation to superstitious symbology. Concepts such as 'phantom risk' and 'voodoo risk' identity risks which have been generated from cultural responses to a belief of danger (Park, 2002; Moore & Burgess, 2011). Often this is derived from court cases based upon dubious claims of harm, or reporting an adverse reaction to an inert stimuli (the 'Nocebo' effect) (Foster *et al,* 1999; Chapman et al, 2003; Colloca & Finniss, 2012). Voodoo risk extends the forensic resource of cultural theory to identify the mechanisms by which totemic behaviours in response to phantom risks become dispersed across culture through mediated information (Moore & Burgess, 2011).

Douglas's second major contribution to the *cultural theory* of risk is the *Grid / Group* typology. Douglas's typology presents a polythetic scale which is occupied by at least four competing

cultural worldviews which reflect different preferences for risk management (Douglas, 1982, 2007). The x-axis of the polythetic scale represents *grid,* which reflects social preferences for rules and established regulation. Positionally across the *grid* axis is suggested to be determined by four underlying desires: insulation from risk, degree of social autonomy, control over uncertainty, and preference for competition (Douglas, 1978). Those who prefer low *grid* (*grid -1)* can be expected to orientate towards risk responses which rely upon the spontaneous application of an individual's skills, abilities, and resources (Altman & Baruch, 1998). Examples of preferred low *grid* responses to risk could include supporting volunteer rescue organisations (such as the Royal National Lifeboat Institution), spontaneous financial donations to charity appeals (such as Children in Need) or undertaking personal precautionary measures (such as doomsday prepping). Conversely, those who prefer high *grid* (*grid+1)* can be expected to orientate towards proscriptive risk responses from established, and trusted, sources (Altman & Baruch, 1998). Examples of preferred high *grid* responses to risk could be acting on institutional advice (such as advice from Public Health England), supporting organisations which campaign for policy change (such as Greenpeace), and relying upon tradition as a form of risk mitigation (such as organic farming methods). *Group,* the second variable within Douglas's typology, identifies the preference for risk management solutions which are orientated around group identity. *Group* preferences are suggested to be determined by four key social elements: frequency of social interactions, expected mutuality between groups, scope of group activity across society, and scope of definitional boundaries when managing risk (Altman & Baruch, 1998). Those with a preference for high *group (group +1)* risk orientate around collective risk management strategies such as established organisations (such as Weight Watchers), or bureaucratically enforced policy changes (such as the ban on public smoking). Conversely, individuals who express low *group* (*group -1*) are expected to prefer individualistic responses to risk management such as personal lifestyle choices, application of consumer technologies, and access to risk information.

From placement within the *grid/group* typology, four primary word views have been suggested (Douglas, 1982):

(1) Hierarchist *(Grid +1 / Group +1)*

(2) Fatalist *(Grid +1 / Group -1)*

(3) Enclavist *(Grid -1 / Group +1)*

(4) Individualist *(Grid -1 / Group -1)*

Adherents to the Heirarchist worldview appear less inclined to identify risks, but more likely to prefer bureaucratic risk management strategies which utilise credentialed experts to define risk and prescribe public responses (Xue *et al* 2014) . Heirarchists can be expected to prefer risk responses which preserve power within public institutions and the state apparatus and may not consider a hazard which draws attention to failing policies as a risk. Adherents to the Individualist worldview appear likely to identify risk, but only within the context that a hazard is seen to threaten their own preferred way of life (Wildavsky & Dake 1990; and Kahan *et al*, 2012). Individualists are generally in favour of deregulation and assume personal responsibility to manage risk exposure (Xue *et al* 2014). Adherents to the Egalitarian worldview are more inclined to recognise risks as inherent forms of social injustice (Wildavsky & Dake 1990). Egalitarians are generally in favour of participatory democracy which aims to curb the production of harms by industry (Kahan *et al*, 2012). Adherents to the Fatalist worldview are generally inclined to be indifferent towards risk. It is not that Fatalists are blind to perceiving risk, but rather they tend to be distrustful of institutional risk information and risk management efforts (Brenot *et al* 1998).

Risk and Governance

The *governmentality approach* to risk centralises the wider sociological concerns around power, fairness, and control, regarding the management of public behaviour around (and towards) suspected hazards (Powell and Steel, 2012). As such, the governmentally approach can be seen to be inherently structuralist and drew upon Michel Foucault's analysis of political power, to suggest that Governments (and other powerful institutions) deploy 'technologies of the self' to identify and control risky groups (Foucault, 1988). The application of 'technologies of the self' outlines the precautionary nature of political regimes, which endorses technologies that instrumentalises human resources to coerce public (through the threat of force) to achieve desired policy goals (Ewald, 1999; Dreyfus & Spinosa, 2003). As an abstract concept, risk can be considered a 'technology of the self' when institutions implement precautionary policies which attempt to manage the exposure of risky populations to the general public (Rose, 1993; O'Malley, 2008). The result is the personification of 'risk factors' which signifies specific social groups as a threat to the ongoing security of regulatory regimes (Castel *et al* 1991). For example, the association between homosexuality and HIV / AIDS during the 1980s/1990s saw the establishment of policies which banned homosexual men from donating blood in an effort to protect the 'safety' of the blood supply (Hurley, 2009). The HIV example demonstrate how 'objective' factors (I.e. Homosexuality) can be used to denote risk, and warrant institutional interventions to protect the general public from harm (Pratt, 1997). This raises substantive questions regarding the formulation of 'objectivity', which is often based on an aggregate of

expertise and evaluation (Castel *et al*, 1991). Expertise is used by regulatory regimes to illuminate what the hidden risk factors are, and prescribe preventative strategies (Rose, 1992). It is suggested that focus of preventative strategies has changed over time, from emphasising the role of institutional control towards internalised risk management. For instance the governance of pregnancy has moved from the institutional control of women's bodies - for the safety of both mother and baby - towards identifying the mother as wholly responsible for the health of her unborn child (Weir 1996; Ruhl 1999).

The media has been identified as a key resource which aids the self-governmentality of risk (Colombo, 2013; Castells *et al*, 2009). Columbo (2013, pp310) contends that the media reinforces the self-governmentality of risk by presenting hegemonic values of precaution as a form of social control. Risk-based news reporting is also used to define a framework of new objectivities on risk (in lieu of technical risk assessment) (Perreault 2005:198; Maclean, 2013). Often, this approach utilises social expertise to explore the interplay between risk and control, especially at the margins of society. Where examples of risk and control (or lack thereof) is made apparent, social actors are regularly observed utilising blame to redefine the boundaries of risk and coerce the political process (Hood, 2002). Given the focus on policy and control, the governmentality approach is often criticised as emphasising a top-down perspective rather than situating risk within wider cultural contexts (O'Malley *et al*. 1997; Frankel 1997; Novas and Rose 2000)

Risk and Society

The Risk Society thesis, based primarily on the work of Ulrich Beck and Anthony Giddens, contends that society has entered a new phase of modernity (dubbed *reflexive modernity)* where prevalent sociopolitical flux has resulted in a social order where populations frequently confront the lack of personal control over the risks produced by an increasingly globalised world (Beck, 1994; Hughes and Ferguson, 2000; Tomlinson, 1999; and Mythen, 2004). Mass media has been central to this process by framing discourses around risk as ubiquitous; contrasting public assumptions of safety and order, with novel information regarding danger and chaos (Adam and van Loon, 2000; Lupton, 1999; Lyng, 2008; Mythen, 2004). From the televised atrocities of the 9/11 terror attacks, to the ongoing social media debates around climate change, childhood vaccinations, and artificial intelligence, the fluidity of information has facilitated public discourse which presents challenges for the antiquated ability of state power to control mass perception (Mythen, 2004). Improved access to information has enabled the public to build social identities around lifestyles which aim to limit risk exposure (such as veganism or doomsday preppers)

(Beck-Gernsheim, 2000; Adam & van Loon, 2000). The rapid proliferation of fragmented social identities has also encouraged conflict across the social order over definitions of risk amongst competing groups (Beck, Giddens & Lash, 1994).

Individualisation has been identified as the process by which risk information is distributed across the risk society (Engel and Strasser, 1998; Goldblatt, 1995; Mol and Spaargaren, 1993). The distributional logic of *individualisation* outlines a set of organisational principles where ethical concerns, ideological connotations, and perceptions of institutional risk management shape the flow of risk information across the social strata (Beck, Lash & Wynne 1992; Mythen, 2004). In essence, the general public have become increasingly concerned with the social distribution of the 'bads' produced by global commerce, which are seen to outweigh the 'goods' produced by industrial output (Beck, 1992). Access to risk information that outlines the 'bads' of global commerce works to disembed individuals from traditional social relations and re-embeds them within an unsettling sociopolitical reality (Beck-Gernsheim, 2000; Lash, Urry & Urry, 1994; Giddens, 1994) The new, unsettling, sociopolitical reality of *reflexive modernisation* extends beyond traditional class-based struggles and allows the public to reflect on how their own personal biography has aided the development of predatory techno-capitalism (Beck-Gernsheim, 2000; Giddens 1991; Beck, 1995; Beck et aI., 1994).

The disembedding and re-embedding process of *individualisation* is theorised to be facilitated by *organised irresponsibility,* observable examples where powerful social actors contend that they are managing risk exposure, which their manifest behaviour seemingly permits the production of further risks (Beck, 1995). The lack of political will to ensure public safety is linked to the increasing technological dependency of contemporary politico-economic contexts (Krusell and Ríos-Rull, 2002; Lancia and Prarolo, 2012). As such, the Risk Society thesis is positioned within a realist - constructivist epistemology, which holds that levels of risk can be quantified, but that the use of such evidence is dependent upon socially constructed acceptance (Mythen, 2004). Risk can become detoxified by scientific authority, which relies upon repeated assertions that data provides reassuring evidence that control of risk is possible in the future (Adam and van Loon, 2000). Mythen, (2004) suggests that the symbolic detoxification of risk could be harmful to public health when: (1) at risk populations may falsely presume their own personal safety is assured. (2) potential crises could be exacerbated through institutional concealment of risk information. Beck (1992; 1995) contends that increased public awareness of symbolic detoxification will result in a crisis of confidence, causing a 'social explosion' of risk perception and leaving social institutions unable to control mass response to risks.

The Social Amplification of Risk Framework - an integrative approach to risk research

The Social Amplification of Risk Framework (SARF) is designed as a comprehensive mode of inquiry to explore the cascade of risk information across society. SARF synthesises key theoretical and empirical contributions from the psychometric paradigm, cultural theory, governmentality, and the risk society thesis, into a robust analytical tool which maps the process of how the information emerging from a single risk event can result in wider sociopolitical impacts (Kasperson *et al,* 1988; Renn, 1991; Kasperson *et al,* 2003; Breakwell, 2007). SARF adopts a realist-constructivist epistemology. It presumes that the technical assessment of risk works in tandem with the affective factors of risk to influence public perceptions of risk. Central to SARF is the metaphor of *risk amplification,* which conceptualises risk information as socially constructed signals (imagery, signs, and symbols). Risk signals are (re)produced by various social actors, who populate increasingly sophisticated social stations as risk information ascends through established social hierarchies (Frewer et al, 2003).

Under SARF, amplification stations are theorised as social institutions or public groupings which engage in the symbolising, processing and representing of risk information (Fellenor et al., 2020) News media occupy a position as an amplification station, alongside informal social networks, non-profit organisations, and government departments (to name a few examples). Conceptually, social stations amplify risk information by emitting risk signals that exaggerate the probability, or extent, of potential future harms from an identified hazard (Bakir, 2005). While social stations are able to bring risk issues to public awareness, there is often the tendency for social stations to oversimplify and misrepresent the risk information produced by technical assessments (Smith and McCloskey 1998). Amplified risk then adopts new meaning by different sections of the general public who interpret such signals through their own intuitive lens of psychosocial information processing (Kasperson *et al,* 2003). While SARF gives a conceptual overview of how social stations amplify risk, the differences in how risk becomes amplified by different social stations has yet to be fully explored (Pidgeon and Barnett 2013). Fellenor et al., (2020) suggests that specific amplification stations should be considered as a nexus for risk information that are composed of 'actual and virtual objects' which act upon risk information to produce the representational status of risk. While it was not the intent of this thesis to better establish how news media functions as an amplification station, the data provided by chapters five and six provide some evidence which outlines how journalistic conventions operate to help shape the risk signals that are introduced into the public discourse.

One of the core contentions of SARF is that the amplification of risk produces a set of anticipated social responses (Renn, 1991). The first anticipated response is that, as the volume of information available about a specific risk increases (due to a focus from technical assessment) it becomes likely for risk information to be incorporated into the apparatus of powerful social stations (Breakwell and Barnet, 2003). News media seemingly occupies an intermediary space as a social station of risk amplification, in that news organisation have the resources to access risk information produced by other powerful social stations (such as government or universities), while also being receptive to the concerns over risk from interpersonal information channels such as informal social networks. The second anticipated response occurs when newspapers decide to focus a substantial degree of resources to provide protracted coverage of a specific risk, rapidly proliferating the volume of risk information available within the public sphere by leveraging a range of news sources to maintain a news cycle (Kasperson *et al,* 1988; Kitzinger, 1999). As Bauer *et al* (2006) observed, protracted news cycles on risk exhibit a tendency to proliferate the volume of risk information until a peak reporting volume is achieved and, while interest in the risk becomes muted within newspapers, the story never fully disappears from the news agenda. The third anticipated response is that as news media popularise risk within their reporting, this will facilitate the production of more risk information from a constellation of sophisticated social organisations (Slovic, 1993). Such a positive feedback loop generates a substantial volume of information that knowledge of risk becomes salient within society, encouraging easy recollection of information by members of the public which is filtered through their personal values and media diet (Petts *et al,* 2000; Tulloch & Lupton, 2001). The fourth anticipated response is that, when amplified, risk information produces second order *ripple effects* and third order *impacts* upon various organisations across society. The *ripple effect* concept outlines a temporal process whereby the responses to amplified risk information begin to be observed within increasing auxiliary organisations (Kasperson *et al,* 2003).

Ripple effects draw upon the metaphor of a stone being thrown into a pond, where the largest ripples occur at the point of impact and dissipate outwards across the pond. At the point of impact, only a limited number of individuals and organisations can be expected to be impacted by a risk - the immediate victims and the organisations held directly responsible. As the ripples dissipate across the social landscape, more distal associations may also be impacted (by being brought into the public discourse or identifying the need for policy change) and alter their modes of operation accordingly. For example, during the BSE crisis beef farmers saw a decline in revenue as the general public avoided risky British beef. However, exotic meat farmers, and importers, observed a short-lived increase in orders as supermarkets began to stock novel beef substitutes for their customers (Adams & Revell, 1998). The third order *impacts* of risk

amplification have been established by SARF, and include factors such as changes to public behaviour, organisational restructuring, regulatory changes, and litigation, (Kasperson *et al,* 2003, Renn*,* 2011). Changes in consumer behaviour are often witnessed as abstaining from 'risky' purchases and choosing 'safer' (healthier) market alternatives instead (Horgen et al*,* 2002). Regulatory changes can be observed as an expedient way for government to garner favour with the electorate by being seen to protect the public from (potential) harm (Leiss 2003). Organisational restructuring occurs after a publicised risk event in an attempt to restore lost public confidence in a company, institution, or government (Beelitz & Merkl-Davis, 2012). Litigation is one way in which victims of risk can seek justice within a court of law (Pirk, 2002). Litigation describes a process whereby blame and compensation is ultimately established by the judicial system in situations where it is argued that damages were accrued from the inappropriate management of risk.

The role of news media is central to the social amplification of risk through the process of framing risk as a dangerous stimulus for a large proportion of the general public, which can trigger risk perception processing pathways (see Binder et al. 2014, Petts et al. 2001; Horlick-Jones, Sime and Pidgeon 2003; Häcker *et al,* 2014). The 'framing of risk as danger' is broad and context dependent (Henwood *et al,* 2008). In some cases, risk is framed as a danger of physical harm, or death, posed by a hazard or technology (e.g. radioactive emissions from nuclear power plants) (Fillmore & Atkins, 1992). In other cases, risk is framed as a moral hazard, where shifting policy outcomes could disadvantage vulnerable groups (e.g., victims of improper drug regulation being left without social support) (Baker, 1996). Chapter five further explores the multifaceted way that 'danger' is communicated by a newspaper to their readership.

Newspaper framing of 'risk as danger' serves as an example SARF's conceptualisation of risk information as signals. Risk signals are designed around communicative artefacts which suggest a possible future that anticipates harm, conflict, and struggle (Van de Brug *et al,* 2014). The amplification of risk signals relies upon the four key elements of the *sender-receiver* model: (1) the sender; (2) the message; (3) the communication channels; and (4) the receivers (Murdock *et al,* 2003). The signal *sender* is an actor that is embedded within a social station of risk amplification. The *sender* relies upon their credibility as an information source to communicate risk across interested parties (Jenkins-Smith and Silva, 1998*)* Credibility can be established through the presumptions of reliability, expertise, authenticity or authority of the *sender* (Richardson, 2003). Where credibility can not be established (or presumed), the *sender's* message may be rejected as

lies, fabrication, or 'tall tales' that omit the *sender* as an information source. The *message* is the specific packet of risk information issued by the *sender* (Lundgren and McMakin, 2018).

The *message* can be a specific statement form a single source or, as is the case in news stories, a coalition of statements from a variety of sources. The *message* is often composite of hard data, social facts, and narrative framing devices which outline the potential severity of risk, and the danger from (a lack of) regulation. *Communication channels* refers to the flow of information across communication stations (Griffin *et al*, 1998). *Communication channels* may be formal or informal, planned or ad hoc, and provide a site whereby the *message* can define risk and suggest methods of risk management (see Johnson and Covello 1987; Dake 1991; (Renn, 1991; Rayner 1992; Peters and Slovic, 1996; Marris, Langford, and O'Riordan 1998). *Communication channels* often work to shape the *message* of risk by applying their own worldview, institutionalised bias, and preferred ideologies to risk information.

The criteria for news selection demonstrates how news media, as a social station, has a clearly established bias towards some aspects of risk information as 'newsworthy' (I.e. novelty, sensation, relatable, risk affirming) (for a more substantial review on risk and news values, see Kitzinger, 1999). Finally, the *receivers* are the target audience of risk information (Bradbury, 1994). The *receiver* is presumed to decode the amplified risk message, resulting in the formulation of risk perceptions. *Receivers* do not passively internalise risk information, as it is filtered through an individual's decision-making heuristics. During decision making processes, the framing of risk information is contrasted against an individual's resonant cultural values before being accepted as 'probably true', or rejected as 'complete bullshit' (Pennycook *et al,* 2015). In order to aid the heuristic acceptance of risk information, *message senders* capitalise upon known narratives of trust, blame, stigma, and dread to tailor their products towards an established demographic of *receivers* (an audience) (Vaughan 1995; Palmer, 2003).

To date, there is limited research available which substantiates the theorised link between risk amplification and higher order impacts. However, this dearth of data is more a result of different research priorities than an inability to demonstrate a phenomenon. Over the past twenty years, the core focus of SARF-based research was to empirically validate the constituent factors of risk amplification (Kesperson, 2003). The factors of risk amplification have been clustered into two groups: the *information mechanism,* and the *response mechanism* (Adekola, 2020). Aspects of the *information mechanism* are primarily concerned with how the creative process of news media

facilitates the amplification of risk information through the overall volume of risk information, the dramatisation of risk information, and the degree of dispute over facts (Kasperson, et al 1988). Mazur, (1987; 1990) suggests that the media production of a volume of risk information amplifies risk through four distinct means.

Firstly, intense media coverage of a specific hazard raises the residual public concerns regarding risk. Secondly, the public demand for risk management is dependent upon the volume of media coverage on a specific hazard. Thirdly, powerful news organisations are privileged in their ability to shape the national conversation on risk issues through their coverage. Fourthly, event-orientated coverage speaks to broader issues of danger and control in the minds of the audience. Renn (1991) advices caution in emphasising the effect of volume as an amplification factor without taking into account how news organisations can modulate and frame risk information to satisfy their audiences (see also Wilkins and Patterson 1987; 1991; Freudenburg et al. 1996; Boholm 1998; Kitzinger, 1999).

The dramatisation of risk information has been linked to the disproportionate overstatement of risk within news reporting due to the sensationalisation and politicisation of information (Covello & Johnson, 1987; Wahlberg and Sjoberg, 2000). The dramatisation of risk result from the selective inflation of quantified levels of harm. This is usually achieved by selecting the upper boundaries of a technically assessed hazard (Combs and Slovic, 1979). Alternatively, the dramatisation of risk can be narratively driven within news articles which capitalise upon alarming language to generate intrigue in the story (Frewer *et al,* 1998*).* However, Freudenburg *et al* (1996: p. 38) provides evidence to suggests that news reporting is generally orientated around presenting a factual summary of events, statements, and information, rather than fabricating drama. More recently, Molek-Kozakowska (2013) suggests that sensationalist elements are be more common within the headlines of news stories, while the body of the story seeks to balance alarming and reassuring statements (Wahlberg & Sjoberg, 2000; Kitzinger, 1999).

The degree of dispute over facts outlines the popularisation of conflicting definitions over risk (Dunwoody, 2014). Within popular mediated disputes, 'facts' do not exclusively refer to objective measurements of risk, but rather the collation of evidence that supports (or rejects) a perception of reality (Mooney and Nisbet, 2005). Evidence, in this regard, can incorporate objective data alongside experiential observations, authoritative claims, and socially entrenched modes of thinking (e.g., 'common sense') (Whitmarsh, 2008; Brossard and Nisbet, 2007; Greenspan *et al,*

2001). By highlighting the conflicts between experts, politicians, and victims, news media manufactures public uncertainty over the over the legitimacy of facts, the credibility of expertise, and the intent of risk management policies (Mazur, 1987). Dispute between experts within the public arena often feature a dissenting expert opinion that challenges the 'scientific consensus' - data used to support risk governance (Drope & Chapman, 2001). Often, dissent is focused upon claims which challenge the impartiality of experts, suggesting that their research has been influenced by external pressures to produce a specific result (Munnichs, 2004). This brings into question the privileged position that experts hold within democratic societies, and the expected role of mediation between knowledge production and ethical application (Grundman, 2017). In other cases, dispute is generated between the public and scientific experts. These disputes often cast doubt on the legitimacy of the scientific method to accurately consider the social reality of risk or suggest that scientific experts are immorally detached from victims of technology (Shapin, 2009).

The remaining elements of risk amplification are grouped together under the *response mechanism.* These elements include the framing of trust, blame, stigma, and dread in relation to risk information (Kasperson *et al,* 2003; Breakwell, 2010; Flynn, 2003; Burgess, 2012). The *response mechanism* emphasis how narrative appeals to preconceived biases on sociopolitical issues can amplify risk correspondingly. The framing of trust aids risk amplification by expressing a degree of confidence in institutional actors to operate in a socially responsible manner (Lofstedt, 2005). Generally, high degrees of trust afforded towards civic institutions permits organisational agendas to be pursued without much scrutiny, scepticism, or resistance (Rykkja *et al,* 2011). However, as a social currency, the value of trust is in continual flux and must be constantly reinforced through trust-building actions. Trust can also be destroyed when the actions of civic institutions are framed as unfair, ineffective, and/or incompetent (Poortinga & Pidgeon, 2004). Negative framing of trust can amplify risk by suggesting that the evidence which assures safety was achieved by an information source with vested interests in the proposed technology (Frewer, 2003). Löfstedt (2005) suggests that Western nations currently operate as a 'post-trust society', where trust in civic institutions are so low that the public are more inclined to trust non-scientific sources provide honest information on risks.

Blame is the next element of amplification within the *response mechanism* (Susarla, 2003*).* Functionally, blame works to identify where institutional actors are seen to fail in their responsibility to protect the public from harm (Gephart, 1993). Within newspapers blame requires a centralising human actor, often within a position of power, in order for risks to be

amplified *(*Burgess, 2012; Frumkin, 2010). Failure to protect the public from harm can be framed as a problem with regulatory inaction, deliberate risk obfuscation, or immoral negligence of duty (Bickerstaff & Walker, 2002). It has been suggested that blame is embedded cultural practices that identify, and ostracise, those who introduce danger to the community (Douglas, 2002; Lash, 2000).

Hood (2002) makes a direct link between 'the blame game' and 'the risk game'. For Hood (2002), the 'game' is a process whereby exposure to blame must be managed to limit future institutional *impacts*. Blame management usually takes place as a precautionary measure through adherence to regulation, control over risk information, and positive public relation campaigns. However, in the aftermath of a risk event risk management becomes significantly more difficult, given the prevailing negativity bias carries by the press (Hood, 2010). Given that newspapers have positioned themselves as the public watchdog, especially when campaigning on risk issues, organisations would much prefer to not attract the attention of journalists during a time of crisis so as to avoid profit-threatening impacts (Burgess, 2012). It is suggested that the media's negativity bias further shapes public opinion by framing the statements and actions of institutional actors as socially irresponsible, while also omitting examples of good governance (Koren and Klein 1991; Kasperson 1992). It has been suggested that exposure to negative framing of events, and direct attribution of blame, can serve as a stimulus for collective action from an outraged public (Sandman, 1993)

Another element of amplification within the *response mechanism* is stigmatisation. The core concept of stigmatisation processes is that technologies, products, people, or locations become readily associated with abnormal hazards. (Goffman, 1963; Slovic et al, 1991; Gregory et al, 1995*).* Stigmatisation occurs when prejudiced imagery is utilised to normalise behaviour which rejects a marked target to control risk exposure (Satterfield 2001; Phelan *et al,* 2008). Stigmatisation processes exhibit a triangular relationship between *affective reactivity*, *cultural worldviews*, and *cognitive appraisal* to appraise hazards and influence risk perceptions (Peters *et al;* 2004). A*ffective Reactivity* outlines how individual's identity and respond to to dangerous or disgusting stimuli, to limit their exposure to risk (Haselton and Ketelaar, 2006). It is suggested that, after exposure to emotionally or physically unpleasant stimuli, people become sensitive to prejudging harm from similar hazards and overcompensate in their actions to avoid harm (Carver & White, 1994; Peters *et al*; 2004).

Exposure to unpleasant stimuli can be based on direct experience, or through mediated content which juxtaposes risky behaviour with negative experiences (e.g., Sex and HIV/STD scares) (Johnson, 2013). Next, *Cultural worldviews* outline how behavioural responses are mediated by both social relationships and generalised attitudes towards sociopolitical issues (Dake 1991). *Cultural worldviews* aid stigmatisation by pre-packaging the intolerance of perceived threats to cultural systems and legitimising disproportionate responses to cleanse society of an apparent danger (Oyserman & Swim, 2001). *Cultural worldviews* are instrumental in framing an individual's attitude towards risk by providing a lens to imputes significance and value to information (Jenkins-Smith, 1993).

Finally*, Cognitive appraisal* of risk incorporates a higher order processing of factors such as probabilities and coping-potential into decision making schemas (Smith and Ellsworth, 1985; Ellsworth & Scherer, 2003;). Cognitive appraisal does not assume that probabilistic information is derived from technical assessment, but from evolved intuition (Lieberman, 2000). Individuals are presumed to cognitively assess threats to their either their survival or social opportunities and respond to avoid extensive damage (Looney & Liang, 2003). The quality of responses resulting from *cognitive appraisal* of risk is susceptible to emotional flux (Frijda *et al,* 1989; Karasawa, 1995). Emotions such as fear, anger and happiness are assumed to exert direct and causal influence over cognitive appraisal. Research by Lerner and Keltner (2000; 2001) has demonstrated that anger exacerbates risk estimates and risk seeking behaviour, while fear acts as a suppressant. In situations which provoke outrage, this may suppress logical responses to stigmatised groups, and facilitate collective or individual actions to which seek to control the targets of stigmatisation to 'protect' society.

The final element of amplification within the *response mechanism* is *Dread.* As an affective component of risk, *dread factors* are constituent aspects of risk which heighten the expected likelihood of a catastrophe (Slovic and Weber, 2002). The mass communication of risk information can influence the perception that low-probability, high-impact risks (such as nuclear disaster) are, in-fact, imminent existential threats (Langford, 2002). The communication of *dread* frames risks as an existential threat to the survivability of social order (Abulof, 2009). It is suggested that dread-induced decision making is achieved by drawing conclusions from a dual system of *association-based* and *experientially based* information processing (Slovic & Weber, 2002; Weber, 2006. *Association-based* processing details a system where affective imagery and semantic codes construct a logic of symbolic interactions. Decision making under the logic of symbolic interactions is often rash and speculative, allowing individuals to create linkages from limited

evidence where an impending disaster is believed to be real. Alternatively, *experientially based* processing outlines a system of logical deduction based upon the known rules of reality. Perceptions of risk are generated from a rule of 'most likely to occur' developed from existing knowledge architectures. Such architectures include previously encountered technical information and historiographical experiences. Where mediated risk information provides the framing stimulus for *dread*-based decision making, individuals may actively try and control their presumed exposure to risk, even if the statistical assessment does not warrant policy intervention (Fetherstonhaugh et al, 1997).

Risk and News Media

News organisations have been elevated to prominence within risk research due to their intermediary role in disseminating risk information between public and institutional sources (Binder *et al,* 2014). Despite many of the canonical approaches to risk acknowledging the importance of news media to facilitate a mass understanding of risk, there is still a relative lack of theorisation which specifically focuses on risk and the media. Where work on risk and the media exists, it has not been collated under a unifying theoretical approach and is at risk of falling into esoteric irrelevance. Bakir (2010) attempted to address this issue by consolidated the loose strands of research on risk and news media to suggest four key theoretical perspectives: (1) News as an *informative medium*; (2) News and the *modulation of risk acceptance*; (3) News as *encouraging accountability;* (4) News as *providing an imaginative schema.* While Bakir's article only goes part-way in addressing the under theorisation of risk and the media, it still provides a worthy contribution to this theory.

As an *informative medium*, news media is presumed to assist in developing an informed public body by holding government, and institutions, to account for failing policies (Habermas, 1989, 1992; Curran *et al*, 2009). This process involves journalists seeking to report on the information that is obfuscated and less readily available for interrogation by the general public. It is also presumed that the relative power of mass media news organisations allows them to set the public agenda for discussion, especially where the government is seen to permit the introduction of risks into society (Frost *et al,* 1997). The ability for news organisations to set the public agenda is derived from the selective nature of reporting.

News reporting often ignores complex and long-term risks in favour of exploring a limited selection of issues resulting from a crisis event (Kitzinger et al. 2002; Kitzinger, 1999; Hansen

1991; Kitzinger and Reilly 1997). While the press maintain that they are dedicated to 'balance and truth', this is often shaped by the ideological orientation of news organisations (Carvalho and Burgess 2005; Smith 2005). News organisations adopt differential stances in framing risk by spotlighting some aspects of information while omitting other aspects (Kitzinger et al. 2002; Quigley 2005; Woods 2007). It has been suggested that the ideological drive of news organisations sees them framing the public perception of risk to exert pressure on institutional decision makers and exert control over the policy making process (Bakir 2005; Driedger 2008; Nisbet and Huge 2006; Quigley 2005; Schuck and de Vreese 2006). As such, the information provided to audiences is tailored to their interests, concerns, and cultural insecurities rather than providing a neutral and unbiased understanding of risk embedded within a wider sociopolitical context.

Ideally, to obtain a neutral understanding of risk information, the public are expected to purchase their news from multiple, conflicting, sources. However, this practice is far from the norm for media consumers, who seemingly prefer that their interests be catered to (Nadler, 2016). The consumer demand for specially tailored risk information has aided the contemporary development of news as an entertainment market, with many newspapers dabbling in 'infotainment' to attract new customers, despite constantly falling circulation figures (Sumner *et al,* 2014; Murdock, Petts, and Horlick-Jones et al 2003; Tanner, 2004; Hallin & Mancini, 2004).

'Infotainment' poses a novel challenge to the 'fair and unbiased' communication of risk information; in that it is the proactive adoption of politically partisan and hyper-sensationalist positions on issues by news organisations. Furthermore, risk as 'infotainment' places disproportionate value on the value of controversy, publicised failures of expert value systems, and public conflict between stakeholders (Taylor-Gooby and Zinn 2006, Bakir 2005; Peters 1995). News as 'infotainment' can further amplify risk by eroding public confidence in sound expert advice by being highly critical, and unnecessarily adversarial, towards public institutions as a capitalist venture (Bakir and Berlow 2007, Paek & Hove, 2017). Furthermore, news as 'infotainment' has the tendency to promote fringe actors whose radical policy recommendations for risk management are appealing platitudes that rely upon blaming the government for not having secured public safety in the first place (Wynne 1996; Critcher 2008).

The second branch of risk and media research focuses on the *modulation of risk acceptance* within the news. News modulation on risk acceptance occurs within the ongoing media

discourse regarding the contested nature of judgements, moral acceptability of risk, and the ethical arguments around governance (Taylor-Gooby and Zinn, 2006; Bakir, 2007; Critcher, 2007; Michelle, 2007). Ongoing media discourses on the acceptability of risk contribute to wider sociocultural narratives on power and control through varied media products, including newsprint, digital content, and documentary film (Elam, 2005; Allan, 2002; Gorke and Ruhrmann 2003; Haran et al. 2008; Hughes, Kitzinger, and Murdock, 2006; Kitzinger *et al*, 2002; Tulloch and Lupton 1997). Furthermore, narrative forms of news media are suggested to be an effective way for the public to engage with contemplation on the structural consequences of mismanaged risk (Gorke and Ruhrmann 2003; Kitzinger and Reilly 1997; Kitzinger *et al,* 2002). Media narratives on risk generally adopt a 'post-normal' approach to scientific communication, now that sacrifices factual accuracy, and conventional structures of scientific reports, to capitalise upon the 'tabloidisation' of urgency, uncertainty, and dispute (Funtowicz and Ravetz 1992; Ferreira 2006).

The post-normal approach to scientific communication is often more readily accessible to wider audiences, due to the informal structure and the tendency to wrestle with relatable moral questions regarding hazards, danger, and threats (Althaus, 2005; Bakir 2010). Recent studies suggests that news narratives on risk can undergo a process of 'storification', where the revelations and event bound within news coverage of a risk become ingrained in cultural memory (Sellnow *et al,* 2018*)* . These cultural narratives on risk serve as cautionary tales of risk governance through iterative retellings of the moral, ethical, or practical failings of government to manage risks for the public (Burgess, 2019; Mairal, 2011.)

The third branch of risk and the media investigates how the news *encourages accountability*. It is suggested that news media promotes accountability by encouraging individuals to adopt personal responsibility for their exposure to risk (Cottle 1998). Alezewski (2006) suggests that news organisations dedicate significant resources towards risk information campaigns in an attempt to 'positively' influence their readers' attitudes and behaviours when adopting personal responsibility. What constitutes as a 'positive' change is very much framed by the news organisation's selective framing of scientific evidence, expert advice, and moralistic arguments. While Bakir (2010) argues that there is limited theorisation on news-based risk information campaigns, Eide and Knight (1999) suggest that 'service journalism' promotes mass responses to adopting personal responsibility.

Service journalism is identified as a form of hybrid journalism where news stories are designed around expert publications that offer guidance and advice as a public service (Ferrucci, 2015). Service journalism is presumed to offer news audiences with the motivation to accept personal responsibility by suggesting technological, political, and behavioural strategies to manage risk exposure (Eide and Knight, 1999; McCurdy, 2011; Lester, and Hutchins, 2012). By providing news audiences with the motivation and strategies for change, individuals may alter their personal exposure to risk *en masse* by abstaining from unwise, risky, lifestyle choices and choosing safer alternatives. The media's individualised approach to *encouraging accountability* appears to be closely related to the *privatisation of risk* (Cottle, 1998; Castel *et al*, 1991; Althaus, 2005).

Conceptually, the *privatisation of risk* suggests a cognitive route whereby aggregate risk data for an entire population is internalised by the individual, who then personally accepts the responsibility to improve the metrics by contributing to perceived mass behavioural change (Castel, *et al,* 1991; Althaus 2005). One theory which aids the *privatisation of risk* is the *perceived similarity* of news organisations. This theory suggests that the public are more inclined to accept prescriptive behavioural changes that are published from media outlets which are believed to reflect their own personal characteristics, worldviews, and cultural values (Andsager *et al*, 2006; Austin & Meili, 1994). Research suggests that, where *perceived similarity* is high, audiences are more trusting of risk information and more inclined to follow prescriptive advice (Andsager *et al*, 2006; Aldoory & Van Dyke, 2006).

The final branch of risk and media research focuses on how news organisations *provide imaginative schemata* for individuals to process risk information. Generally, news organisations present risk as a threat to be avoided. However, in rare cases, informative media presents risk-seeking as aspirational, socially daring, and utilitarian. Bakir (2010) suggests that the theoretical development of news media *providing imaginative schemata* draws heavily from Lyng's (1990; 2004; 2005; 2008) work on *edgework,* and Lash's (2000) work in conceptualising *risk cultures*. The central thesis underpinning *edgework* is that informative media has increasingly framed elite-class risk seeking activities (I.e. skydiving, ultra-marathons, cycling, etc) as a positive emotional experience. which relies upon mastery and skill to avoid death while bordering on the 'edge' of catastrophe (Ferrell *et al,* 2001; Lyng, 2004). Conversely, mundane risk-seeking behaviour (e.g., excessive drinking, recreational drugs, unprotected sex, etc) is presented by news media as an indulgence of human nature which places the individual at unnecessary risk (Hickson, 2018). Lash's (2000) concept of *risk cultures* suggests that social groups exist across society that are

differentiated according to accepted realities on risk and harm. Lash (2000) suggests that 'sublime judgements' on risk inform a group's foundational understanding on risk. 'Sublime judgements' are achieved by applying a well-defined schema to acquired risk information, resulting in speculation on future harms. Lash (2000) suggests that 'sublime judgements' are derived from cognitive processing of risk information but from reflexive, reactive, and 'raw' emotion.

Generally, groups constructed around a specific judgement on risk are small and concerned with local risk management (e.g., electromagnetic radiation and the siting of mobile phone masts). These are usually defined by news media as pressure groups, special interest groups, or campaigning groups due to the highly specific focus and goals of the group. However, as Burgess (2003) demonstrates, news media can increase the public profile of pressure groups, seemingly legitimising their 'sublime judgement' on risk as a valid regulatory concern. Furthermore, by attributing statements to pressure group sources, news reporting enables geographically distal pressure groups to conglomerate under a specific definition of risk.

The conglomeration of pressure groups may not result in the creation of a formal organisation, but conglomeration enables subscribers to a 'sublime judgment' to share resources, information, and strategies between one another (Diani and Donati, 1999). Through news coverage and group conglomeration, 'sublime judgements' move from the fringes of society and into the popular mainstream media narratives. Once embedded within popular media narratives, the national discussion (or Overton window) shifts towards debating the staged reality of 'sublime judgements' for personal entertainment (Kilborn, 2003). It can be argued that public's desire to engage in debate on the staged reality of 'sublime judgements' serves to counter more grounded discourses on risk management (Stranger, 1999).

Potential Utility of Theoretical Perspectives

While each of the different theoretical perspectives of risk research explored within this chapter contribute towards addressing the research questions of this thesis, some are considerably more valuable than others. Starr's foundational insights are crucial for this thesis by moving the analytical lens away from assessing the scientific accuracy of risk reporting towards considering the narrative framing of risk information and the more performative elements of news reporting on risk communication. Research findings from the Psychometric Paradigm also provided a strong, empirical, foundation for this thesis by illustrating how 'public risk perception' is not a hegemonic phenomenon. Psychometric studies have consistently demonstrated that, when 'the

public' is disaggregated along spatial/temporal/demographic lines, definitions of risk (and how risky an object seems) can vary greatly. For this thesis, findings from the Psychometric Paradigm assisted in conceptualising news audiences as stratified social demographics. For example, it was not presumed that readers of The Sun were the same readers of The Guardian. This informed considerations of how newspapers may frame risk information to not only appeal to different cultural values but may also rely upon exploiting cultural values around risk to help grow their audience base.

Perspectives from Cultural Theory provided a key insight for this thesis by suggesting that risk is a contest for dominance over definition between ideologically aligned groupings. This insight brought into stark contrast the relationship between journalists, their information sources, and the temporal modes of newswork. While it was presumed that such relationships are somewhat fluid, such fluidity may be temporally fixed and illustrate changes in how risk is communicated within newspapers. As such, through assessing the narrative framing of risk information, these relationships may become apparent and further outline the needs of key sociopolitical actors across the timeline of risk reporting. The Risk Society thesis better solidifies the fluidity of relationships by forwardly asserting that the late 1990s/early 2000s was the period emergence/dominance of the Cosmopolitan worldview (and definitions) of risk. Rather than assuming that all risk reporters became aligned with Cosmopolitan definitions of risk, this thesis considered how aspects of news production were brought into line with neoliberal modes of work through technological advances and economic pressure. To this point, the Governmentality perspective contributed some limited insights. The crux of the argument underpinning the Governmentality perspective is that the application of technologies used to define and communicate risk are, themselves, in danger of being coerced by powerful social institutions to suit institutional goals. Technologies that are used to communicate risk instrumentalises the person to (re)produce definitions of risk which endorses (or apologises for) the control of public bodies. For this thesis, the relationship between technological advancements in communications technology and changes in newswork is unavoidable. However, presuming that advances in technologies of newswork is distilled from dominant power structures risks removing journalistic agency. Furthermore it seemingly presupposes that observable changes in risk reporting are insignificant, as communicating risk inevitably reinforces social control.

SARF was the theoretical perspective which contributed the most to this thesis. SARF provided this thesis with a well-established framework for risk communication which centralises newspapers as an intermediary social station which mediates discourses over risk between the

general public and institutional actors. Furthermore, SARF places a specific focus on the value of risk communication in informing and justifying public responses to amplified risk information. SARF also contends that the impacts from responses to amplified risk information are multidirectional, suggesting an ongoing cycle of action and reaction across social and policy domains. This presupposes that the modes of newswork are in flux, the imperfect result of an iterative process where agents across the social strata reflect (and improve) upon their practice of attracting media attention to their framing of risk information. As such, SARF grants leniency for this thesis to explore the temporal contexts around more dominant approaches to risk reporting. Beyond this, research under SARF has produced a body of work which has defined the characteristics of risk reporting and assists the analysis of news texts (see chapter three).

Finally, Bakir's insights regarding risk and the media fill a substantial gap in the literature. Despite other approaches acknowledging the importance of news media in communicating risk broadly across society, there appears to be a general lack media theory incorporated into other theoretical perspectives. Bakir's insights more directly grounds risk reporting within the wider framework of news production, outlining how the pressures and limitations of journalism can have a substantial influence over the narrative framing of risk. This perspective highlights considerations over source acquisition, turnover time, and the entertainment value of risk reporting which provides journalists with greater agency in shaping their stories compared to other theoretical approaches. This perspective shifts the ontological focus of risk reporting away from considering it as a vehicle to improve the public understanding of risk, towards risk reporting as a product of hyperreality. As such, the value of risk information becomes relative to shifting journalistic needs across temporal contexts. Above all else, the approach presumes that conventional approaches to risk reporting within temporal contexts is framed by (what is considered to be) best practices at the time to ensure continued employment and a positive career trajectory.

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Chapter 3 - Methods to Researching Changes in Risk Amplification within Newspapers

Introduction

This chapter outlines how the mixed methodological approach of this thesis aided the analysis into the changes in amplified health risk reporting across the past thirty years of British news production. This chapter will begin by outlining how the epistemological considerations of Constructivist Grounded Theory (CGT) provided a useful epistemological approach to analysing health risk amplification within news texts. Next, this chapter will detail Document Analysis (DA) provided useful methodological considerations that aided the data gathering methods of this thesis and helped to build a specialised and robust corpus of health risk-based newspaper documents. Finally, this chapter will detail how the theoretical considerations of the Social Amplification of Risk Framework (SARF) provided a practical scaffold for identifying, measuring, and analysing the amplification of health risks within news texts.

There were several studies conducted across this thesis which involved quantitative content analysis, qualitative content analysis, and interviews with professional journalists. Quantitative content analysis included counts of published news articles and word count analysis of news texts. These were used primarily to analyse the changes to amplified news production within the Information Mechanism of SARF. Qualitative content analysis included framing and narrative analysis to investigate the changes to risk amplification within the Response Mechanism of SARF. The semi-structured interviews were conducted with health risk reporters to explore how risk-based newswork has changed since the 1980s. This chapter concludes by outlining the procedures and ethical considerations of interviewing members of the British press.

Aim and Research Questions

The overall aim of this thesis was to investigate the observable changes to amplified risk reporting within British national daily newspapers between 1985-2017. Several research questions were designed to achieve this aim:

1) What has been the observable changes in published news volume and risk amplifying language?

2) What has been the observable changes in the framing of risk information within news stories over time?

3) What have been some of the changes to risk reporting as a form of newswork?

Constructivist Grounded Theory as a Theoretical Approach to Research

Constructivist Grounded Theory (CGT) offers one of the most comprehensive epistemological approaches to investigating risk as a sociological phenomenon. CGT aids this thesis by advocating for a constellation of mutually reinforcing research methods to interrogate a series of chronologically ordered texts (Charmez, 2016,). The use of CGT, as the epistemological approach for this thesis, allowed for analytical units of research to emerge from existing empirical data (the information and response mechanisms of SARF), rather than being arbitrarily defined by the researcher. CGT emerged from the work of Kathy Charmaz and made significant headway in repairing the methodological divisions between more traditional branches of Grounded Theory. Chamaz (2016, p127) considers CGT to be appropriate for research projects which satisfy two key criteria:

1) Where the field of study demands diverse and substantive inquiry

2) Where the research project necessitates a novel approach to conceptualising data.

The research conducted within this thesis satisfies both of those criteria. Firstly, the field of risk research is founded upon an interdisciplinary approach to investigating risk as a social phenomenon. The central concept of risk amplification relies upon the relationship between institutional agendas, public perception, and news production to embed risk information within standardised forms of communication (i.e., News articles) (Kasperson et al. 2003). Research under SARF has sought to generate substantive evidence which validates sociological theorisation on risk (see Chapter 2). Secondly, the premise of this thesis - the longitudinal investigation of news-bound amplification of risk information - is relatively novel within the field of risk research. Most SARF based research contends with a limited number of newspapers and are restricted to analysing a single moment of risk amplification (i.e., MMR, BSE, Chernobyl, etc). The investigations within this thesis seek to explore a diverse range of temporal, textual, and institutional contexts to analyse the changes to the formulation of newspaper-amplified risk

information. Limiting the methodological scope of this study would limit the ability for this research to explore the broad contexts of amplified risk reporting.

CGT is well suited as the epistemological approach of this thesis by presuming a relativist position, where knowledge (of risk) is both socially constructed and managed through the social interactions of conflicting standpoints (Charmaz, 2016). CGT permits research that acknowledges that the formulation of public risk perceptions is constructivist in nature and mediated by the modulation of information across social stations (Jasanoff, 1998; Weber and Morris, 2010). This is not to deny the value of empirically assessed risk information within the wider sociopolitical realm, but rather this approach acknowledges that such empirical evidence holds little value within mediated communication which seeks to depict the sociocultural struggles over conflicting risk definitions.

CGT is prevented from collapsing into absolute relativism by acknowledging a realist-constructivist ontology. Charmaz (2014) acknowledges the existential reality of a stable natural world, and that social understanding of the natural world is constructed through perspective, observations, and attempts at measurement. Charmaz's considerations is similar to Beck, who considered himself "both a realist and a constructivist" and that a pragmatic differentiation between the two positions grants empirical research the ability to reveal the "contradictions" in the social governance of risk (Beck, 2006; pp62). For Chamaz (2006, p130), CGT permits researchers to investigate how meaning is constructed during times of tumultuous uncertainty, and how the value of definitions changes over time. This is achieved as CGT views social conditions as being simultaneously hierarchical and comparative between social stations (Charmaz, 1990). SARF also views social conditions in a similar manner, as risk amplification underpins institutional policy directions and describes different meanings across social groups (Finucane *et al*, 2000; Joffe, 2003). CGT allows researchers to enter differentiated empirical realities by allowing generalisable themes to emerge from data by comparing the diversity of perceptions, while remaining isolated within their contextual boundaries (Charmaz 2016, p139-140).

Document Analysis as a Data Gathering Methodology

One of CGT's core contributions to this thesis is the idea that the data collection methods should flow from the research questions (Charmaz, 2006). This introduces methodological eclecticism to the thesis, prompting a stratified approach to investigating risk. Stratification, in

this regard, encourages multi-layered approaches to research which support and validate one another (Charmaz, 2014). Document Analysis (DA) is a methodological approach to research design which presumes that data collection protocols directly influence the proceeding analytical process (Altheide *et al,* 2008). In many ways DA could be considered to be an applied version of CGT, in that it acknowledges the realist-constructivist nature of organisational knowledge production and the ways in which published documents reframe reality in accordance with policy, ideology, or agenda goals (Atkinson and Coffey, 2004; Bowen, 2009). Newspaper articles serve as exemplary documents for sociolinguistic analysis of news stories by rendering public uncertainties, stakeholder conflicts, and organisational agendas visible to researchers as a struggle over sociocultural issues (Granero-Molina et al., 2009). DA also permits comparative document analysis between distinct temporal contexts to investigate how linguistic signifiers have changed over time (Shaw *et al,* 2004).

The principal issue for DA research is ensuring that the corpus of documents is robust enough to yield valid empirical evidence on sociolinguistic changes (Bowen, 2009). DA advocates for a systematic approach to data gathering and analysis in order to assure the reliability, generalisability, and of research observations (Bowen, 2009). DA acknowledges the limited representativeness of individual documents to reflect wider societal changes and encourages triangulation methods to compensate for this deficit (Altheide, 2000; Bowen, 2000; Crombag et al., 2014.) To inspire trust in the data collection protocols DA recommends an audit trail methodology, where the chronological order of documents are considered alongside factors such as *authenticity*, *credibility*, *representativeness* and *meaning* (Bowen, 2009; Brown *et al*, 2002; Scott, 1990. p19-35).

Authenticity refers to concerns about how genuine a document is, and the authority of the document source. *Authenticity* is assured in this thesis as newspapers corporate adherence to British Press Standards, which outline how factors of newsworthiness, accuracy and balance inform 'quality' press reporting (Editor's Codebook, 2019; Frost, 2004). *Credibility* encourages researchers to consider how typical a document is within its literary genre. *Credibility* is achieved in this thesis as news stories organise factual events chronologically. By utilising information from credible sources, news stories achieve a level of institutional access which is unavailable to the general public (Lashmar, 2013, Lewis *et al,* 2008). *Representativeness* addresses questions as to whether the sample of documents can be generalisable to the wider literary form. In regards to this thesis, the question of *representativeness* is addressed as news reporting has previously been used to serve as a site of social documentary which outlines temporally defined intersections

between the public lives of individuals, the managerial power applied technologies, and natural hazards as external threats (see Boon et al, 2009; Teräväinen et al, 2011; and Himmelsbach et al, 2015;). *Meaning* refers to the legibility and comprehensibility of documents to convey concepts to an intended audience. Newspaper articles satisfy all four criteria and are well suited for use within DA research. Within this thesis, *Meaning* is presumed to be verified through professional standards, as news stories are published by profit-seeking entities which trade on the production of written texts as an informative medium (Trussler and Soroka, 2014). While clarity and coherence of communication can be presumed it is also acknowledged that style and form of language varies between British newspapers to appeal to different audiences. Within news articles, meaning is conveyed through literal and interpretive meaning (Lester, 1980). The literal meaning of information within news articles coalesces around the presentation of data, statistics and the ordering of facts that underpin a story. The interpretive meaning of information reflects the framing, rhetorical, and sophistic devices expressed within the news stories.

Document Data Collection Methods

The data collection method for this thesis involved building a large corpus of health risk-based newspaper articles from a newspaper archive. The decision to prioritise health risk reporting over other forms of risk (such as crime, economics, or terrorism) was made primarily due to the focus on misreporting around health risks embedded within the House of Lords (2000) report on science and technology (See chapter 1) and the suggestion that arises from sociological risk research (see chapter 2) which suggests that amplified reporting on health risks can encourage negative public responses towards novel applied technologies (such as choosing to avoid childhood vaccinations or conducting criminal activity to destroy field trials). As such, health risk reporting is defined within this thesis as news stories which prioritise the probability (risk) that a novel applied technology (hazard) poses some kind of threat to physical health.

Newspapers were chosen as the primary data source for this thesis as news articles function, primarily, as a document of record for public discourse. Newspapers exist as tangible artefacts which have subsequently been digitised for online archival. All of the currently circulating British daily newspapers were included for analysis within this thesis (Table 1). The News of the World was not included in the corpus, as archived documents were removed from archival services since the newspaper folded. National newspapers were chosen as the primary data source for several reasons. Firstly, there is a parity in scale of circulation across a national geography and they have the ability to escalate local issues onto the national stage (Burgess, 2010). It can be

The Guardian / The Observer
The Daily Mail / Mail on Sunday
The Times / Sunday Times
The Independent
The i
The Financial Times
The Mirror
The Daily Express / Sunday Express
The Sun / Sun on Sunday
The Daily Telegraph / Sunday Telegraph
The Daily Star

Table 1. List of daily national newspapers included in this study

presumed that the financial considerations and workload pressures are similar across the national daily newspapers and are more intense than their local counterparts (Deuze and Marjoribanks, 2009). The second reason why newspapers were chosen as the primary source of data is that all national daily newspapers have agreed to self-regulation through the Independent Press Complaints Organisation (IPCO). Press guidelines are outlined within the Editors Codebook (2019) and detail good practice around issues of accuracy, fairness, and privacy. Regional and online news platforms were omitted from this analysis as there is no guarantee that they subscribe to British press standards. Another issue regarding online news platforms is that it raises questions as to what "type" of news organisation can be included within the corpus. It would be arbitrary to discount specialist news platforms (I.e. PinkNews.co.uk) as 'illegitimate' news sources as it could be argued that they adhere to traditional journalistic principles within newswork, but have a refined focus which serve a culturally identarian audience. International news platform (such as HindustanTimes.org) are also readily accessible by British news readers, and it would be arbitrary to discount them for not being "British" enough. This thesis is not well equipped to distinguish what constitutes as British risk reporting within an online media landscape. As such, this thesis chose to discount all web-based news articles from analysis, including the online counterparts to physical newspapers.

LexisNexis was selected as the primary platform to access and download digitised newspaper articles for several reasons. Firstly, LexisNexis provides a pre-established library of daily British newspapers which standardised the search procedure and reduced the possibility of selection errors during the corpus building process. Furthermore, LexisNexis is the only online news archive which provides access to a broad selection of British news sources. Secondly, LexisNexus permits news articles to be downloaded common file formats which enabled content analysis within Nvivo12. Thirdly, LexisNexis provides the ability to refine searches by date. For this thesis, a timeframe between 1985-2017 was decided upon. The starting year of 1985 was selected as this coincided with the Royal Society's report on the Public Understanding of Science (1985). The terminal year of 2017 was selected as this was the last completed year prior to data collection. Next, LexisNexis provides keyword search functions, which can be augmented by Boolean logic (Altheide and Schneider, 1996. pp94; Diesner *et al*, 2016; and Xie, 2009).

LexisNexis provides a string of up to four different key words to be used to return results, further refined by date ranges. From a scoping exercise, it was discovered that using "Health AND Risk" (the capitalisation denotes a Boolean operator) as suffixal terms returned results which were specific to health, science, and environmental risk reporting. Similarly, using popular fields of science as prefixal search terms allowed for further refinement of the corpus. From the scoping exercise, five distinct search strings were designed for data collection within this thesis (Table 2). Finally, LexisNexis provided search tools that further refined the searches. One tool ensured that news articles were returned where "Health AND Risk" constituted 'major mentions' within the news article. This tool was useful to remove articles where the reporting of risk was auxiliary to the story - such as within coverage of political party manifestos.

Story Type	Term 1	Boolean	Term 2	Boolean	Term 3	Boolean	Term 4
Health Risks	Health	AND	Risk				
Food Alerts	Food	OR	Diet	AND	Health	AND	Risk
Radiation Risks	Radiation	OR	Nuclear	AND	Health	AND	Risk
Disease Stories	Disease	OR	Vaccine	AND	Health	AND	Risk
Environmental Pollution	Environment	OR	Pollution	AND	Health	AND	Risk

Table 2. String of search terms and Boolean operators used within this study

The 'remove duplicates' tool also allowed for the removal of articles which shared "high similarity" with one another. From scoping exercises, it was understood that the 'remove duplicates' tool encouraged the search algorithms to not return articles which presented minimal variation between news texts. Such a tool was useful for minimising the duplication of news stories between different editions of the same newspaper (such as the morning and evening editions, or the Scottish or English editions). From the scoping exercise, it was observed that such duplications essentially published the same text of a news article or included minor additions which did not substantively alter the overall meaning of the story. Scoping exercises also illustrated that this tool had zero impact on the reporting between different newspapers, even if target news stories utilised the same information sources. This was because the remainder of the text within the story was substantially different enough to not be considered a duplication by the algorithm.

The last useful tool was the "exclusion of web-based news". This tool was useful to ensure that returned news articles had been published within newspapers, maintaining data consistency across the entire thirty-year period. The decision to omit the web-based counterparts of the daily British newspapers identified in table was also made to avoid the issue of duplication, as a scoping exercise demonstrated that some stories tended to be published online first, before being reformatted for physical publication the following day. As there was little in the way of online news prior to the mid-2000s, this would have caused an overinflation of news stories within the final decade of analysis. This would have exaggerated all quantitative assessments throughout this study and raised concerns over accuracy. As such, this thesis only includes and considers news stories printed within newspapers.

Also presented within Table 2 is a list of search terms with reflect four popular fields of health risk reporting and included: Food Alerts, Disease Stories, Radiation Risks, and Environmental Pollution. These four fields of popular health risk reporting were built around broad categorisation of themes present with both the extant literature and risk reporting (see Singer and Endry (1993), Lupton, 1999; pp14). Food Alerts identifies news reporting on emergent risks from farming technologies, genetically engineered crops, and modern food consumption (see McCluskey and Swinnen, 2011; Lofstedt, 2006; and Cope et al, 2010). Disease Stories identifies news reporting on novel threats from pathogens, pharmaceutical side effects (including vaccinations), and neurological disorders (see Young et al, 2008; Tchuenche et al, 2012; and Leask, 2002). Radiation Risks identifies news reporting on the dangers of nuclear technologies, radioactive material, and electromagnetic emissions (see Burgess, 2010; Covello, 2011; Perko, 2014; and Gamson and Modigliani, 1989). Environmental Pollution identifies news reporting on the perils posed by chemical pollutants, anthropogenic climate change, and industrial emissions (see Wilson, 2000; Weingart *et al.*, 2000; and Horlick-Jones *et al,* 2003).

Using SARF to Inform Content Analysis

This thesis utilised both quantitative and qualitative content analysis methods to investigate the changes to amplified risk reporting within British newspapers. Mixed content analysis methods were selected for the capacity to analyse the sociolinguistic structures of risk-based news reporting and framing of amplified media messages. Both sets on content analysis were designed around the theoretical contributions of SARF to define analytical units. Quantitative content analysis sought to analyse changes to risk amplification under the information mechanism of SARF, such as the *volume of information, sensationalism of risk information,* and *politicisation of risk*

information. Conversely, qualitative content analysis sought to analyse changes to risk amplification under the response mechanism of SARF, such as the framing of Uncertainty, Certainty, Blame, Trust, Dread, and Stigma (See chapter 2 for a more comprehensive discussion of the information and response mechanisms of SARF).

Nvivo12 was selected to facilitate the content analysis as the software boasts a range of tools to conduct qualitative and quantitative content analysis. NVivo's 'word count' function provides the ability to quantify the expression of phrases across a corpus (Leech and Onwuegbuzie, 2011). The tolerance of NVivo's word count analysis can also be set to include pluralisation (e.g., "Risks") and stemmed words (e.g., "Risky"). The ability to include plural and stemmed words improves the validity of the analysis by better reflecting the general use of language by risk reporters and quoted news sources. NVivo also assists qualitative analysis through enabling the coding of digital documents, organising codes as 'nodes'. The hierarchical architecture of nodes aids the comparative analysis of risk amplifying frames by providing ease of access to coded sections of texts, while also providing a count of recorded instances.

Quantitative Content Analysis

The quantitative content analysis conducted within this thesis was concerned with investigating the differential expression of risk amplification factors, as outlined by the information mechanism of SARF (see chapter 2). The quantitative content analysis involves two principal aspects: (1) Volumetric counts of risk reporting to investigate the changing *volume* of risk information published by British news organisations. (2) Word count analysis across published risk reporting to investigate the changing *sensationalisation* and *politicisation* of risk information. By conducting both a volumetric count of published news, and a word count analysis of amplifying language, it was possible to map the longitudinal trends in reporting and identify distinct periods of risk reporting (see chapter 4).

The analysis of published news volume was based upon the perspective that high volumes of risk reporting reflects a high transmission of risk information to the general public (Renn, 1992). Therefore, observably high volumes of published risk reporting can suggest the potential for risk amplification. However, any observations made from this analysis must be contextualised against other sociolinguistic factors of amplification (Kesperson *et al,* 2003). Assessing high volumes of reporting is somewhat contentious if left poorly defined. Given that this study is investigating the longitudinal changes to amplified risk reporting, there is a need to set the

definition of high-volume for the different temporal contexts under investigation. When taking a broad, multi-decade, view of risk reporting, high-volume can be observed as long-term changes in the proliferative trajectory of yearly news publication. On a more refined scale of less than a decade, high-volume risk reporting can be observed as notable peaks in reporting volume. Notable peaks in reporting describe a rapidly proliferative state of news publication over a short-term period (usually one to two years). A peak in risk reporting is further defined by the way in which the volume of published news returns to rates that are comparable to the pre-peak trajectory.

Mapping the trends in published risk reporting was achieved by performing a yearly count of news articles returned through the keyword searches on LexisNexis. The count of news articles was presented as an artefact on the documents downloaded from LexisNexis. The count of news articles presented by LexisNexis ensured accuracy by reducing the opportunity for errors during data entry. The count of news articles was translated from the downloaded documents of yearly risk reporting (I.e. 1985, 1986, 1987, etc). The yearly timeframe was set to capture risk reporting from the 1st of January to the 31st of December for each year between 1985-2017. The count of published risk reporting was conducted across the five distinct searches outlined in table 2.

The data for each of these searches was input into both excel and SPSS for further analysis. One analysis involved graphically visualising the trajectory of reporting. From these graphs, notable trajectory shifts, and moments of peak reporting could be observed. Next, a liner regression analysis was conducted to ascertain the overall trend in yearly reporting volume over time. Finally, the data wan interrogated upon the count of published health risk reporting to ascertain if the temporal differences between the volume and proliferation of news articles generated evidence which assisted in establishing the existence of specific periods of risk reporting. A supplemental analysis of news volume was conducted which assessed the median change in the word count of published risk reporting. The median word count was calculated by translating the number of words per article within each of the yearly documents downloaded from LexisNexis. Accuracy for this word count was ensured by LexisNexis, who include the word length for each news article as an artefact within the downloaded Word document.

The next stage of quantitative content analysis involved word counts of *sensationalising* and *politicising* language across the corpus of risk reporting. Word count analysis are well suited to identifying patterns in linguistic expression, especially when applied to exploring a psychosocial

phenomenon - such as risk amplification (Pennebaker et al., 2007). Word count analysis presumes that words form the fundamental expression of meaning within a published text (Groom and Pennebaker (2002). Categorial linguistic hierarchies are formed when a constellation of words with similar meaning are used concordantly to denote a specific phenomenon. Word count methods have been readily utilised to analyse news-bound changes to risk reporting, and on writings of emotion and control (Pennebacker et al, 2001). The use of word count methods to analyse *sensationalism and politicisation* resulted in a count of instances of target phrases per year, rather than a count of news articles which featured the target phrases. This provides more detailed rich data for analysis by allowing linguistic tendencies to become realised, rather than omitting repeated expression of target phrases. This permits a comparative analysis between the use of *alarming* and *reassuring* phrases, rather than simply capturing the number of articles in which *alarming* or *reassuring* phrases occur. As a theory of media effects, SARF suggests that news-based risk amplification is achieved through the disproportionate expression of certain categorical linguistic hierarchies of risk communication (such as sensationalism and politicisation) (Duckett and Busby, 2013).

There is some debate as to whether risk reporters tend to sensationalise or attenuate risk information. Kitzinger (1999) highlights some of the conflicting evidence which has emerged from risk research. However, it should be noted that many of these early studies were based upon case studies and limited sample sets - issues that this study aims to address. With the disputes in mind in mind, the question is not "to what degree does *sensationalism* and *politicisation* take place, it is more a question as to whether changes in the expression of *sensationalism* and *politicisation* suggest wider sociocultural reorientations around reporting risk. There are significant methodological issues around defining *sensationalism* and *politicisation* within risk reporting, in that they are somewhat nebulous terms. For this thesis, several steps of verification and validation were performed within the word count methods when analysing the *sensationalism* and *politicisation* of risk. The verification and validation of *sensationalism* adopted a top-down approach, while a bottom-up approach was adopted to analyse *politicisation*.

The top-down approach of analysing *sensationalism* was developed from the work of Frewer et al (1998), who demonstrated that *alarming* phrases fit within the linguistic hierarchy of *sensationalism*. For Frewer et al (1998), *alarming* phrases within texts disproportionately exaggerated the dangers of a hazard. Frewer et al (1998) also noted that *reassuring* phrases operated to attenuate risk amplification by offering audiences safety and security when confronted with a hazard. The antonymic difference between *alarming* and *reassuring* phrases

presents comparable variables to measure the proportional expression of *sensationalism* against a linguistic determinant of risk attenuation (see chapter 4). The degree of *sensationalisation* was investigated by analysing the proportional difference in expression between *alarming* and *reassuring* phrases. It was presumed that, given the reputation of the British press to sensationalise news stories, that there would be a tendency for *alarming* phrases to be more readily expressed than *reassuring* phrases within news texts. The purpose of this analysis was to identify the moments where *either alarming* or *reassuring* phrases were disproportionally expressed within news texts. Where disproportionate expression of *alarming* or *reassuring* language can be identified over a prolonged period, this provided partial evidence to suggest the emergence of novel conventions towards health risk reporting by the British press.

Alarming Synonyms	*Reassuring* Synonyms
Alarm	Reassure
Scare	Secure
Danger	Safe

Table 3. List of popular synonyms of *alarming* and *reassuring* phrases acquired from powerthesaurus.org

The analysis was conducted by first identifying *alarming* and *reassuring* phrases. A scoping exercise demonstrated that 'alarm' and 'reassure' were not particularly common within risk reporting, as such there was a need to broaden the target phrases. To compensate for this, a series of synonyms were used as target variables within a word count analysis. A list of suitable synonyms (table 3) was built using powerthesaurus.org. Unlike other online dictionary platforms, powerthesaurus.org lists synonyms based upon user generated rankings. Initially, the top ten synonyms for 'alarm' and 'reassure' were selected for analysis. However, a scoping exercise demonstrated that only the top three phrases returned any notable results.

Website	Avg. user time	Alexa Ranking
Powerthesaurus.org	5:32	#3,635
Thesaurus.com	3:14	#327
Merriam-webster.com	2:57	#608
Macmillandictionary.com	2:43	#3,296
Wordhippo.com	2:36	#2,858
Collinsdictionary.com	2:29	#1902
Synonym.com	1:53	#10,951
Synonyms.com	1:39	#17,716

Table 4. User metrics for popular dictionary / thesaurus websites provided by Alexa.com. Items are listed according to average time users spend on the site.

The user generated raking system of powerthesaurus.org better reflects common language, making it a viable tool to reflect the audience-centric language of popular daily newspapers. To further strengthen the validity of Powerthesaurus.org, Amazon's Alexa rankings reveal metrics that the website is a reasonably popular online linguistic resource (table 4). The disproportionately high user visit time suggests that users are highly engaged

with the website, spending time ranking synonyms and becoming involved with the online community. Having selected the phrases of alarm and reassurance, a word count analysis was performed within NVivo which targeted these terms. Tolerances were set to include 'stemmed words' so as to better capture a fuller range of linguistic contexts (i.e., 'Alarm', 'Alarmed', Alarming, etc). The word count analysis provided a count of expression for *alarming* or *reassuring* phrases across all news articles per year. The data was recorded into Excel and SPSS for further analysis, which included mapping the proportional difference between *alarming* and *reassuring* phrases and the proliferation of *sensationalist* phrases over time. Both analyses presented evidence to further reinforce the establishment of specific eras of risk reporting.

The bottom-up approach to analysing *politicising* language involved a series of exploratory protocols to identify common relationships between the politically connotative language and risk information. This approach involved building a categorical linguistic hierarchy for *politicisation* based upon a series of word count analysis. *Politicisation,* in the context of this study, is defined as phrases used within risk reporting which specifically denote social actors which some degree of political currency to define health risks within public discourse. From an initial word count which returned the 50 most common words, per year, common *politicising* phrases were observed (Table 5). The word count was conducted using NVivo's 'stemmed words' function to pool all the different linguistic contexts as grouped counts (i.e., Government, Governments, Governmental would all count towards the results for a single phrase). These phrases were grouped into three categories to facilitate a comparative analysis between different political news sources: (1) *Institutional Source,* (2) *Institutional actor,* (3) *Institutional Publication.*

Phrase	Linguistic category
Government	Institutional Source
Scientist	
Minister	Institutional Actor
Expert	
Chief	
Report	Institutional Publication
Parents	Unassigned

Table 5. List of common political phrases generated by word count analysis of the Health Risk corpus. Unassigned items were due to the inability to differentiate phrase from common linguistic use.

The *Institutional Source* category was constructed around roles of science or government to operate as an arbiter of health risk information within the public sphere. Whilst science or government are abstract systems of governance, they are seemingly personified as social actors within news reporting. Both government and science hold some claim in their ability to render risk information as a tangible reality of future harms, which is further used to legitimise coercive statements that are designed to alter public behaviour (either through policy change or changes to personal behaviour around

risk). The key distinction between the two information sources is that 'government', is presumed to readily manipulate risk information to suit stated policy goals, where as 'science' is presumed to have a more benevolent influence over risk - producing information that is both independent of government aims, and in the pursuit of a public good. To this point, the 'public' were similarly identified as a potential social actor that could have been included within this category. However, the term 'public' had also been used by the government apparatus with the establishment of Public Health England, which demonstrated to be difficult to separate with word count analyses.

The *Institutional actor* category was constructed around phrases which denoted a class of social actors who provided statements to the press within ongoing discourse around risk information. Government 'Ministers', Scientific 'Experts' and Industry 'Chiefs' were clearly defined as general characters within news narratives who represented the different aspects of an institutionalised class of actors. Government Ministers were usually identified as individuals who were responsible for the operation of government ministries/departments which were perceived to have some influence over health risk policies. Such ministers often included those within the realms of agriculture, food, public health, energy, and the environment. While it would have been reasonable to map the references to specific ministries, such as the Ministry of Agriculture, Fisheries and Food (MAFF), issues arose when government restructuring resulted in the construction of new departments with altered names and a different remit of responsibility (Such an example as when MAFF and the Department of the Environment (DoE) was abolished around the turn of the century in favour of the Department for Environment, Food and Rural Affairs (DEFRA). However, while specific government ministries / departments were liable to altered nomenclature, the press were observed to maintain a convention whereby members of parliament who offered public statements on health risk issues were referred to as ministers. Similarly, those who purported to hold some degree of scientific credibility to offer public statements on health risks were generally characterised as scientific 'experts' by the press.

While the credentials of purported 'expert' news sources within news reporting certainly warrants further examination, this thesis is more concerned with how the press use the represent the character of the scientific 'expert' within news narratives. Given the cultural value of established scientific principles (especially political independence) the relationship between expertise and government power may hold some value in the amplification of risk information within newspapers. Being able to map the references to Scientific Experts within health risk reporting may provide evidence to suggest the changing value of 'experts' within the British press

to offer an authoritative claim or refutation regarding health risk information. The term, Industry 'Chief' was generally used to spotlight the statements provided to the press by a corporate executive that has, for whatever reason, been brought into the public discourse over health risk issues. The role of corporate voices within amplified risk has, so far, been under explored by the wider field of risk researchers. It appears that the phrase "Chief" is used by risk reporters as a narrative shorthand to signify the authority of corporate actors to have some legitimate interest in the wider public debate on health risk issues. Furthermore, the decision to include statements from Industry Chiefs may be an attempt by risk reporters to identify individuals for be held responsible for risk issues, or as an attempt at PR-spin by corporate entities to mitigate blame. Either way, the identification of 'Industry Chiefs' introduces another news source for analysis which may provide evidence to highlight the shifting power of *institutional sources* to define risk within the public debate and further prescribe the desirable sociopolitical response to manage risk.

The *Institutional Publication* category seemingly highlights the value of official documents in transmitting risk information between institutional sources and the press. A scoping exercise identified that "report" was commonly used to denote documents issued by government departments, while "research" was commonly used to denote the scientific papers produced by scientific research. Such a differentiation in documentary sources by the press may again carry different connotations regarding the methods used by institutional sources to measure and define health risks. "Government Reports" carry inherent questions over the biases inherent to the methods by which risk information is collected and manipulated to suit institutional agendas. Conversely, "Scientific Research" may be presumed to be politically independent and risk assessments could be presumed to be approached in good faith attempts to better improve public health. By measuring the expression of these two terms over time, this thesis is better able to investigate the value of specific *institutional publications* to the British press. Where "Government Reports" is prioritised within reporting, it may be presumed that risk information could be viewed as a coercive tool of government that aims to influence the behaviour of the British public. Where "Scientific Research" is prioritised *within* reporting, it may be presumed that risk information could be viewed as arising from a neutral source that is encouraging the British public to make more informed (and therefore better) decisions to manage their own exposure to health risks.

Having established the *politicising phrases* to be used within analysis, the context by which the phrases were used was varied identifying two hundred random instances where each phrase was

used within news texts. Using Nvivo, the instances where *politicising* phrases were identified were allocated a number, and a random number generator was employed to identify the two hundred instances for each phrase. Using Nvivo's "broad context" function, the wider context for each of the two hundred instances were returned by the software, which provided several lines of text both in front and behind the text. From this contextual analysis, it was confirmed that the phrases of *politicisation* reflected the categorical functions determined by this thesis. The context analysis also further confirmed that the term "public" was too broad to denote any specific aspect of politicisation, being used simultaneously within the corpus to identify the general public and specific government departments (such as Public Health England). As such, the phrase "public" was discounted from the overall analysis. "Parents" was another phrase that was discounted from the analysis. While "Parents" was sometimes used to denote a specific victim class - those whose children had been harmed or were threatened by health risks - there were far too many idiosyncrasies between newspapers and/or temporal moments for this phrase to be properly assessed. For example, in many cases newspapers would choose to use "child" to connote parental status. In other cases, were a parent had become a key pressure group spokesperson, newspapers would simply refer to them by name and omit their parental status (such as Jackie Fletcher within the MMR reporting). With the phrases of *politicisation* fully identified, a targeted word count analysis were performed across each year of the chronology. Analysis was conducted using the "stemmed word" function within NVivo. Word count data was input into Excel for further analysis. Within Excel, data was visualised as general trends across the chronology of risk reporting and proportional differences between phrases within different categories of politicisation were also explored.

Qualitative Content Analysis

The qualitative content analysis conducted within this thesis was concerned with investigating the framing of risk amplification factors, as outlined by the response mechanism of SARF (see chapter 2). Framing analysis provides an analytical lens to analyse how perspectives on sociopolitical issues can be informed by communication between social actors (Scheufele, 1999; and D'Angelo, 2002). Newspapers present a site of social conflict where framing of events (and risk information) are openly contested for public consumption (Coleman, 1995; Berkowitz and Beach, 1993). News framing is contested by actors from across the social strata who position themselves as stakeholders within an ongoing sociopolitical debate (Hänggli and Kriesi, 2010). Actors usually emerge from organisations such as government officials, academic experts, industry leaders, and spokespersons from interest groups (see Schnell, 2001; Brewer and Sigelman, 2002; and Pride, 1995). While public stakeholders seek to forward their own agenda-

driven framing of events, it is ultimately the decision of journalists, editors, and news managers to set the framing of information within their news products (Gamson and Modigliani, 1989). Frame setting within newspapers is usually conducted by journalists as a normative convention of newswork, rather than with the intent to influence public opinion (Brüggemann, 2014). While unintended, the rhetorical function of framing information cannot be ignored. The framing of risk information is rhetorical in nature, as it is a persuasive use of language with the intent to achieve a specific goal (Bazerman 1988). The profit seeking motive of newspapers is linked to the selective framing of information to generate stories that audiences are interested in reading - even if the amplification of risk is a consequence (Olive and Delshad, 2017). It has been demonstrated that several key archetypes exist in the rhetorical framing of risk information (Gamson and Modigliani 1989; Nisbet, 2009). However, it is not presumed that newspapers adopt a rigid stance on framing risk. One principal aspect of this study was to investigate how the rhetorical framing of risk information was modulated between different temporal contexts. The framing analysis was conducted by using Nvivo12 to code for risk amplifying frames across moments of peak reporting volume.

The codes used within the framing analysis were adapted from Gamson and Modigliani's (1989) codebook to better reflect the factors of risk amplification under the response mechanism of SARF. The six factors of risk amplification include Uncertainty, Certainty, Blame, Trust, Stigma, and Vulnerability. The rhetorical framing of Uncertainty outlines the contention between the limits of public knowledge regarding hazards and the institutional knowledge of danger posed by hazards (Lewis and Tyshenko, 2009; and Spiegelhalter et al., 2011). The Uncertainty frame was developed from the "Scientific /Technical Uncertainty" frame within this original codebook. The "Scientific /Technical Uncertainty" details Uncertainty as a question of "what is known versus unknown", where expert consensus or scientific authority is undermined by news sources. Uncertainty has been linked to risk amplification through bringing into contrast the institutional ambiguities in identifying and managing risks (Breakwell, 2000; Breakwell and Barnett, 2003, and Beck, 2009). Expression of Uncertainty within news reporting often relies upon sources who question the proposed scale of a hypothesised threat, the adequacy of resources to respond to a crisis, and the fair distribution of benefits / harms (Adams, 1998; Fowler et al., 2007; Krishnan and Bhattacharya, 2002). Newspaper-based information campaigns have been suggested to capitalise upon Uncertainty by seeking answers to prevailing institutional ambiguities (Burgess, 2006; Djerf-Pierre, 2007). This involves a "balancing" of conflicting statements, from a range of institutional and non-instutional sources, to provide news audiences with an array of "facts" for them to reach their own decision on preferred risk management strategies (Jensen, 2008).

Proportional differences in frame expression were produced from a count of instances where specific frames identified within news texts. Nvivo 12 provides function whereby instances of coded text for each document are stored as a node. A node architecture was established where a specific node was used to store the coded section of text for a specific frame. News stories from each of the sixteen different moments of peak amplification which was analysed by this study were re-imported to Nvivo 12 as individual files, allowing the program to independently count the number of identified frames across each of the sixteen moments of peak amplification. By aggregating the count of frames across the four periods of risk reporting allows the proportional expression of single frames to become apparent. It was found that aggregating the count of frames across the four periods of risk reporting produced a more robust means of tracking the expression of frames over time by producing a more generalisable data set which was not unduly influenced by one dominant news cycle.

Robustness of the framing analysis was assessed using a supplementary exercise where participants were invited to code a selection of news articles and attempt to replicate results. Ten participants were selected through snowball sampling and invited to conduct a framing analysis on five news texts. Two participants were place into a control group. All participants were provided with five news texts, which had been previously identified as reflecting a broad range of frames. The sample was selected so as to represent a similar proportion of frame distribution as the data set used within this chapter. The control group were provided with five news texts which were previously identified as being absent of frames. Participants were not made aware of what had previously been coded. All participants were provided with a copy of the codebook used by this study. The results typically ranged from -3.38% to +4.30% of conning instances compared with researcher framing of the same texts. Stigma appeared to be an outlier, which was coded at +12.6% by participants. However, this result may have been an artefact of sample text selection and participant demographics. Several news texts related to coverage of MMR and BSE, while participant demographics tended to skew towards those between the age of 55-70. It may be that some of these participants held residual feelings towards MMR and BSE as events (or media coverage of those events) and were particularly sensitive towards the Stigma frame. Within the control group, two instances of Certainty and one instance of Uncertainty were coded. Due to the overall lack of other coded frames these instances may be due to observer bias, with participants feeling pressured to record some observations rather than recording nothing.

The rhetorical framing of Certainty has received little attention from risk researchers. However, recent research on "anti-vaccination truthers" has demonstrated how entrenched beliefs on risk management can inform the perception of danger from suspected hazards (Capurro *et al,* 2018). The Certainty frame was inverted from the "Scientific / Technical Uncertainty" frame, and identifies Certainty as a matter of social fact, which calls on experiential knowledge and socially constructed truths. Van Zoonen (2012) describes Certainty as a cultural practice where 'truth' is an expression of "individual experiences and opinions" as fact. Furthermore, socially constructed facts about risk hold some inferential value to social groups by guiding speculation upon how vulnerable demographic groups will become victimised by risk management policies (Kasperson *et al,* 1988). The 'truth' which underpins the social facts of Certainty draws from a salient distrust of institutional knowledge by non-government actors (Sunstein and Vermeule, 2009). Highly sceptical, non-governmental, actors provide value to newspapers as information sources who challenge the ethics, completeness, or accuracy of institutional knowledge (Low and Morrison, 1984). Institutional knowledge refers to the constellation of credible data, evidence, and opinions which are (presumed) to have been incorporated into public policy decision making (Olausson, 2009). Institutional knowledge is also a form of rhetorical Certainty expressed within newspapers. Journalists often cite institutional sources who make appeals appeal to scientific evidence, accepted theory, and scientific authority, to offer safety assurances and justify policy decisions (Peters, 1995).

Within rhetorical framing of Blame, news sources seek to establish how institutional risk managers have failed in their social responsibility to protect the public from harm (Susarla, 2003. pp185-185). The Blame frame was adapted from the "Public Accountability / Governance" frame within the original codebook. The "Public Accountability / Governance" frame is concerned the identifying relationship between public policy making and the ownership, control, and abuses of technology (Kitzinger, 1999). Blame amplifies risk by providing the ongoing news story with a villain, someone whose actions and suspected motives can be expounded upon and linked to policy failures (Freudenburg, 1993; Burgess, 2012). Blame can also be attributed by cited social experts who accuse policymakers of violating a social contract by foisting unwanted, unknown, or unnatural risks onto the public (Wolff, 2006). As a principle of journalistic balance, newspapers may publish statements from the targets of Blame. Often, such statements attempt to limit liability and attempt to negotiate with aggrieved stakeholders (Hood, 2002). However, attempts at mitigating Blame can initiate further news cycles by providing fuel to renew public accusations of recreancy and wrongful behaviour (Freudenburg, 1993).

The Trust frame was developed from the "Conflict/Strategy" frame within the original codebook. The "Conflict/Strategy" frame is concerned with how the management of risk is presented as a competition, or game, between elite actors. The rhetorical framing of Trust features two principal components: trust building frames and trust destroying frames (Slovic, 1993). However, given the asymmetric nature of trust, Trust destroying frames are more apparent within risk reporting (Poortinga and Pidgeon, 2004; Cvetkovich *et al*, 2002; and Kasperson *et al*, 2003. pp32). Trust frames revolve around outwardly accepting or rejecting the legitimacy of risk managers to offer assurances and safety advice (Hughes *et al*, 2006. Pp253-255). Within risk reporting, news sources from across the social strata provide statements which either support or doubt the efficacy of government to faithfully protect the public from harm (Covello and Sandman, 2001). In response, government sources may 'spin' their message in an attempt to use available risk information to validate contentious policy decisions (Anderson et al., 2005. pp191-195.). Trust has been conceptualised as a form of social currency, which is spent by civil institutions to facilitate the implementation of new policies (Ter Huurne and Gutteling, 2009). As a rhetorical strategy, Trust destroying frames offers the public a rationale to start doubting institutional assurances and seek alternative possibilities for risk management (Garzio, 2018).

The rhetorical framing of Stigmatisation, associates emotional, symbolic, or metaphysical conditions of an object with prima face evidence of catastrophic, and avoidable, future harms (Kurzban and Leary, 2001; Kasperson *et al*, 2013). The Stigma frame was developed from the "Morality / Ethics" frame in the original codebook. The "Morality / Ethics" frame encompasses discussions of hazards and risk management in terms of respecting or transgressing sociocultural boundaries. Stigmatisation has been linked to the amplification of ripple effects by incorporating distal social groups, geographical locations, and technologies into wider narratives of danger and control (Kasperson *et al.*, 2003; Ichinosawa, 2006). Within risk reporting, Stigmatisation functions to demarcate, and appeal to, the normative values of a newspaper's presumed readership (Malterud and Ulriksen, 2010). Stigmatisation offers a locus for contested discourses over the identification, definition, and control of unknown hazards.

The final rhetorical framing device is Dread. Framing Dread is a key factor in risk amplification as it highlights personal vulnerability to harm and inability to control danger (Slovic et al., 2005; Satterfield, *et al* 2009). The Dread frame was developed from the from the

"Pandora's Box" frame in the original codebook. The "Pandora's Box" frame outlines calls for the precautionary management of hazards or else face a 'slippery-slope' into catastrophe. The rhetorical framing of Dread draws upon affective cognition whereby risk information is presented as a indeterminate threat towards progeny, social security, or cultural identity (Kesebir, 2011, Loewenstein, Weber, et al., 2001; Slovic and Peters, 2006). Risk information becomes Dreaded when disproportionate public attention is focused upon the catastrophic potential, uncontrollability, and inequitable distribution of a hazard (Slovic *et al,* 1980; Slovic, 1987). News reporting utilises Dread by narratively associating objectionable technologies with potentially chaotic futures, where contemporary comforts have been replaced with an ongoing and irreversible state of strife (Nisbet and Mooney, 2007).

The framing analysis was conducted across sixteen moments of peak risk reporting. The moments of peak risk reporting were identified during the qualitative analysis and evenly distributed across the identified reporting periods and fields of popular science. The sample period was refined to a six-week news cycle around the month of most voluminous risk reporting. A six-week news cycle was decided upon as it extended beyond the expected timeframe for media saturation of news items (Rowe *et al,* 2000). All news articles within each of the six-week news cycles were read and coded within Nvivo. Coded sections of news articles were saved as nodes within Nvivo, which provided a count of frames and allowed easy comparison of frames across the sample documents. Once the news articles were performed, two different analysis were performed. Firstly, the proportional changes in frame expression were analysed using the comparative count of frames across the sample documents. Secondly, the changes in rhetorical expression of frames were analysed using the classical considerations of rhetoric (logos, ethos, and pathos) to guide observations (Higgins and Walker, 2012).

Interviews with Risk Reporters - Changes to Professional Newswork

The final element of this research's mixed methods approach was conducting a series of interviews with professional risk reporters. The interviews were designed to contextualise the changes observed during the content analysis phase of this study, through the experiential lenses of professional news reporters. The term "risk reporters" is used throughout this thesis to denote members of the press that regularly report on health, science, and environmental risks. While "risk reporter" is not a professional job title, the term is functional in that it navigates around contentions regarding work identities and addresses ethical concerns regarding the anonymity of participants. This study managed to secure twenty interviews with risk reporters whose

General period of professional activity	No. of participants
Pre1980s – 2000s	3
1980s -2000s	9
1990s 2010s	5
2000-2010s	3

Table 6. Distribution of interview participants by period of professional experience in reporting risk for national daily newspapers

experience ranges across the thirty-year sample period (Table 6). Securing twenty interviews with reflects a 40% buffer on the suggested number of interviews required to achieve thematic saturation when interviewing professional participants (Baker *et al,* 2012). The large buffer was necessary to compensate for the range of professional experience reflected by the sample of participants.

Participants were secured using targeted sampling methods. Targeted sampling identifies individuals within a specific field, who are then screened for suitability and approached to participate in interviews (Peterson et al, 2008). Targeted sampling methods have been well utilised for identifying research participants from hard-to-reach populations (Shaghaghi *et al,* 2011). Although members of the professional press operate as pseudo-public figures, as a demographic they exhibit several characteristics which makes them "hard to reach" for academic research (Faugier and Sargeant, 1997). The first criteria for a hard-to-reach population is their active engagement with a sensitive phenomenon. News-based risk amplification is a sensitive phenomenon within professional circles as the act of risk reporting encompasses a prevailing scepticism towards government policy, academic research, and proposed benefits of applied sciences.

Risk reporters, as a professional identity, may feel marginalised as the very nature of their work could provoke legal action from organisations and individuals who feel aggrieved by negative coverage (Goldacre, 2010). Freelance risk reporters are particularly vulnerable to "lawfare" - vexatious legal claims of liable, slander, and invasions of privacy which are implemented to deter the press from covering a particular issue or on a specific entity (Goldstein and Meyer, 2008). Next, individuals within hard-to-reach populations may expect prejudice and discrimination. Due to the nature of their work, risk reporters may feel marginalised by other elite professional identities. The press has regularly been investigated by academics and blamed for exposing the public to poor quality science within misinformed news stories (Kininmonth, *et al;* 2017). As members of the British press, risk reporters must also reconcile the fact that they work in a generally distrusted profession and face public criticisms of being deceitful and manipulative (IPSOS, 2019). Risk reporters may internalise the resonant institutional and public distrust targeted at the press and be less inclined to trust academic research to approach their concerns in good faith.

Another issue is that hidden populations face complex insecurities. The ongoing decline of newspaper circulations, and difficulties of generating revenue online, has placed many risk reporters in precarious employment situations - especially within the oversaturated field of health, science, and environmental reporting (Levi and Nielsen, 2010). Freelance journalists may face further uncertainties from irregular work and not knowing how their professional profile may impact future job opportunities. As such, risk reporters may be particularly reticent to engage with news-focused academic research in fear that assurances of anonymity will not be upheld, and their statements will be read by newspaper editors and senior management. Finally, the limited population of hard-to-reach demographics are incompatible with random sampling methods (Marshall, 1996). Despite the size of news organisations, and the public visibility of press members, there are only a handful of correspondents who work on health, science, and environment news desks at any one time. There is also the career trajectory of risk reporters to consider, with members of the press retiring and moving onto other career opportunities outside of news publishing. The factors described above validate targeted sampling as a viable method to recruit participants for this study.

Participant recruitment was conducted in two phases. The first phase utilised the Science Media Centre (SMC) to mediate contact with receptive risk reporters and invite them for an interview. Through the SMC's resources, four interviews were secured. It was hoped that, through these interviews, respondent driven sampling could be conducted. However, risk reporters were apprehensive to suggest other potential participants without first learning who else had been contacted. As this would have violated ethical guidelines, an alternative method to participant recruitment was considered. The second phase of participant recruitment was conducted using the public list of risk reporters made available by Association of British Science Writers (ABSW). The ABSW list provided publicly available contact details for risk reporters with varying degrees of experience. Fifty potential participants were randomly selected and screened for suitability. The screening process involved using professional social media platforms to gauge the credentials of potential participants. From the screening process, thirty-two potential participants were identified as having the suitable experience of working as risk reporters within the British national daily newspapers over the target timeframe. Of these thirty-two potential participants, sixteen interviews were secured. The interviews were conducted across a three-month period, taking place either in-person or via telephone / Skype. All interviews were recorded and transcribed using Google's voice-to-text software. The interviews were designed to be semi-structured in nature. However, the practicalities of exploring the past thirty years of risk

reporting dictated that issues were often discussed out of order. It was found that a more open style of interview was well suited to prompting further questions which explored the salient changes to risk reporting, while also navigating around the pervasive animosity towards academia from participants. The interview schedule was designed around four spheres of inquiry.

The first sphere of inquiry involved questions which encouraged participants to reflect on key examples of poor risk reporting. The key examples of risk reporting were not prescribed to participants but were drawn from their own experiences and observations. Questions from the first sphere were designed to establish a general consensus on what constitutes as "poor risk reporting" looks like from the perspective of media professionals. By linking several temporally isolated examples of poor risk reporting, participants provided the opportunity to prompt for further details on change. The second sphere of inquiry explored the changing role of risk reporters/reporting over time. Questions from the second sphere encouraged participants to reflect on the changing responsibilities of their work, and the skills necessary to pursue a career in risk reporting. This line of questioning prompted participants to reflect on the impact that improved training and education of risk reporters has had on the media landscape. The third sphere of inquiry explored the changing processes of reporting risk information. Questions from the third sphere invited participants to reflect on how the relationships between risk reporters, news sources, newspapers, and the public have been shaped by wider sociocultural changes.

These questions prompted participants to outline how the flow of information from news sources into newspapers has been modulated by different temporal contexts. The final sphere of inquiry explored how changing newsroom dynamics has generally impacted risk reporting over time. Questions from the fourth sphere invited participants to draw upon their own experiences to highlight how the pressures of newswork shape the final form of risk reporting. These questions prompted participants to suggest how shifting newsroom dynamics, such as funding and staffing, can influence the overall quality of British risk reporting. Once the interviews were completed and transcribed, they were imported into Nvivo12 for analysis. The interview transcripts were anonymised using the Greek alphabet as an identifier. Interview analysis involved a thematic comparison across the twenty transcripts. The analysis sought to identify the general themes which emerged within each of the spheres of investigation. Themes were identified using ad-hoc codes (stored as nodes within Nvivo). Analysis was conducted within each sphere of investigation until a saturation point was reached and no new themes emerged.

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Chapter 4 - Changes to the Character of Risk Reporting

Introduction

This chapter explores the data generated from the quantitative content analysis performed across the corpus of British risk reporting. The quantitative content analysis sought to map and investigate longitudinal changes to the amplification of risk information. The analysis was guided by the *information mechanism* of SARF, which highlights the *volume of information,* the *sensationalisation* of risk, and the *politicisation* of risk as markers of risk amplification within news media (Adekola, 2020). This chapter begins by demonstrating how temporal differences in *the volume of risk information* published by the British press, outlines four distinct periods of risk reporting since the mid-1980s. Changes to *volume of risk information* were mapped through observable changes in the proliferative trajectory of published news articles regarding health, science, and environmental risk issues. The periodisation of risk reporting was confirmed through statistical analysis of news volume over time. This chapter will then explore how the expression of *sensationalist* and *politicising* language changes across the distinct periods of risk reporting. Changes in *sensationalist* language was assessed as the relative difference in expression between *alarming* and *reassuring* phrases, quantified through word count analysis within the corpus. Changes in *politicising* language was assessed as the longitudinal change in expression of phrases across the corpus that juxtapose risk information and institutional systems of risk management.

Establishing the Periods of Risk Reporting Within British Newspapers

So far, this thesis has presumed that health risks are of particular significance to the British press, however the value of health risk reporting within newspapers has not yet been fully investigated. Health risk reporting is considered to be a subgenre of the wider news genre of Health reporting. As such, the value of health risk reporting may be ascertained by first identifying the proportion of British news dedicated to health reporting, and then further comparing the proportion of health risk reporting against the proportion of risk reporting within other news genres. The decision to focus on mapping the number of health risk news articles (as a defined news genre) rather than mapping the instances where health risks were mentioned across all forms of reporting was based upon a consideration where a genre of health risk-

reporting would better reflect the quantity of health risk information (facts, data, and potentials) that audiences may have been exposed to.

This investigation began by using a series of key word searches within LexisNexis to provide a count of news stories across six key news genres: Sport, Entertainment, Health, Crime, Economic, and Lifestyle. The parameters of the key word searches were set to include the full range of British daily newspapers and date ranges outlined in chapter two. The six news genres were built around an intuitive understanding of news products and sought to capture distinct aspects of British news reporting. As such, potential news genres such as 'politics' or 'government' were omitted, as robustness testing demonstrated that such phrases appeared consistently within other news genres. In total, 3,464,807 news stories were returned by LexisNexis. Analysis of the data demonstrated that Health news (n=485,948) constituted 14% of the sample and was notably lower than other news genres. For instance, Sport news (n=937,411) constituted 27.1% of the sample, Economic news (n=776,704) constituted 22.4% of the sample, and Crime news (n=741,123) constituted 21.4% of the sample. However, a trend can be observed where there is generally more news published across all news genres over time.

When viewed as defined temporal periods, certain characteristics of British news reporting become apparent (fig 1). When viewed at ten-year intervals general trends are observed, which were not apparent at lesser timescales. Between 1985-1994, there appears to be a low level of news reporting which focused upon a limited number of news genres. Between 1995-2004, there appears to be a general proliferation of all news genres. Between 2005-2015, there appears to be a stratification of news genres. By convention, an incomplete period appears to emerge from 2015 onwards where the volume of printed news appears to decline. While analysis of the data at fifteen-year timescale is possible, this broad overview would have permitted fewer periods for comparative analysis.

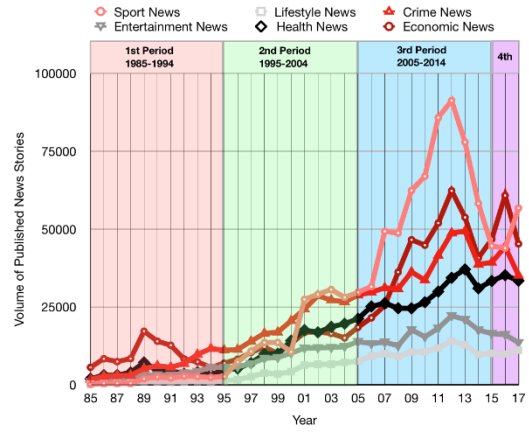

Fig 1. Volume of news reporting across six popular news genres within the British press.

While the overall volume of reporting increased for each news genre, there does not appear to be much variance in the proportional difference between news genres when ranked by volume.

For instance, in the 1985-1994 period, the three most common news genres were Economic news (39%), Crime news (22.9%) and Health news (16.4%). In the 1995-2004 period, the three most common news genres were Crime news (26.1%), Sport news (23.5%), and Economic news (17.1%). In the 2005-2014 period, the three most common news genres were Sport news (31.8%), Economic reporting (26.1%), and Crime news (20.3%). While the profile of news published by the British press seemingly shifts periodically, it is worth noting that the proportion of health news ranged between 16.4% to 13.2% of news stories. The not insignificant media profile of Health reporting is further reinforced by evidence that the average volume of health stories increased from 11 per day to 69 per day between the 1985-1994 and 2005-2014 periods. This data suggests that, overtime, the public's exposure to health-related news increased, even though the proportion of health stories remained largely consistent.

It was acknowledged that not all stories published within a specific news genre were inherently orientated around risk. As such, to investigate how the volume of risk reporting changed over time another investigation a count of news stories was conducted, within each news genre, for stories which contained stemmed phrases of "Risk". To improve the clarity of data, Lifestyle news and Entertainment news were omitted from the analysis. As fig 2 illustrates, the volume of risk-based news reporting generally increased across the reporting periods. Between 1985-1994 and 1995-2004 periods the volume of risk reporting increased by 204%, from 18,695 to 56,785 news stories. As it pertains to this thesis, overall, the volume of Health risk reporting represented 22% of all risk reporting. While it was noted that, in 1999 and 2000, Health risk reporting was the more dominant form of risk reporting within the sample, there appears to be an intense media focus on Economic risk from 2007 onwards, which seemingly corresponds to the Global Financial Crisis. To compensate for this, the proportion of risk reporting within news genres was assessed (fig 3) to provide a more reliable overview of changes to risk reporting over time.

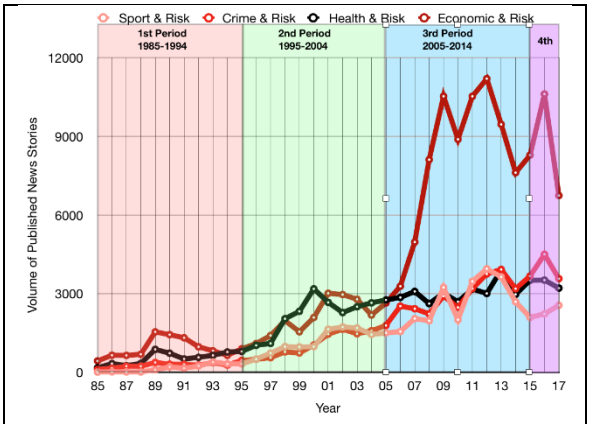

Fig 2. Volume of news reporting across four key news genres within the British press.

As fig 3 illustrates, the proportion of risk reporting appears to be somewhat independent of increases to the volume of news for each news genre.

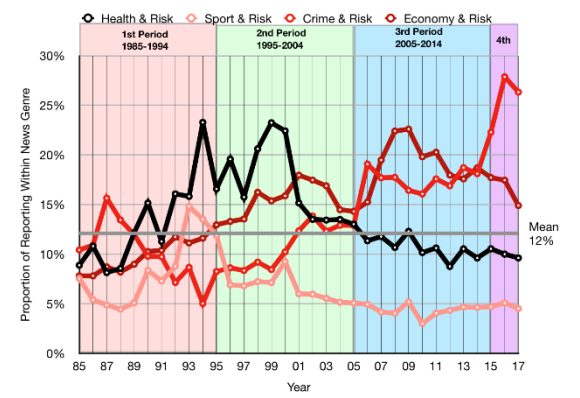

Fig 3. Risk reporting as a proportion of published stories across news genres

While the volume of Health and Health Risk reporting generally increased over time, there appears to be sustained over-representation of risk from 1993 to 2000, followed by a sustained decline in representation between 2001-2017. While the proportion of risk reporting within Economic news continuously increased across the reporting periods, the peak proportion of Economic risk reporting was comparable to the peak proportion of Health risk reporting (23%). The proportion of Sport risk reporting was largely underrepresented over time. The period between 1994-1997 where Sport risk reporting appeared above the mean seemingly correlates with the initial years of the English Premier League and may be related to coverage of Manchester United's quest to win (and subsequently defend) the cup.

The proportional profile of Crime risk exhibits temporal changes which seemingly mirror those of Health risk reporting. The proportion of Crime risk appears largely under-represented within Crime news between 1990 to 2000, before becoming increasingly overrepresented from 2001 onwards. While this late stage shift towards overrepresentation appears to correspond with the 9/11 and 7/7 terror attacks (and subsequent 'war on terror'), this does not explain the 2016 peak in proportional risk reporting (28%). While the proportional changes in Crime risk reporting certainly warrants scholarly attention, the emergence of the late-stage peak in 2015 suggests that journalists may have been undergoing some reorientation around risk at the time that data was collected for this thesis. As such, it would have been premature to conduct analysis of change before they had time to be resolved.

Data provided from the analysis so far provides both a general overview of the changes to British risk reporting and strong evidence to substantiate the focus of this thesis. Although the volume of Health news and Health risk reporting did not dominate the British press landscape, they both form a substantial part of the British news diet. Furthermore, while the volume of published news and risk reporting increased across news genres, Health risk reporting exhibits a unique profile of early-stage over-representation of risk reporting, followed by a consistent period of under-representation. Given that this shift in trajectory appears to hinge around the year 2000, this warrants further investigation into the Health Risk which compares the temporal profiles of

risk reporting to provide more refined explanations of changes. Finally, there is a wealth of data which suggests that using ten-year time periods works well to capture distinct temporal contexts more holistically for more robust comparative analysis across this chapter.

Comparing the Periods of Health Risk-Reporting Within British Newspapers

Using the ten-year timeframe to guide the analysis of changes in the volume of risk reporting appeared to demonstrate distinct periods of Health risk reporting (fig 4). Whilst this periodisation is coarse, the data does suggest shifting trends in the proliferation of Health risk-reporting which describes stratified levels of health risk information being made available to audiences. The first period seemingly extends from 1985 to 1994; it is characterised by a steady proliferation of around 54 additional articles yearly and a comparatively low volume of overall risk reporting (5246 articles). The second period seemingly extends from 1995 to 2004; it is characterised by a rapid proliferation of around 200 additional articles yearly and a notable increase in the volume of risk reporting (20,624 articles). The third period seemingly extends from 2005 to 2014; it is characterised by a decline in proliferation of around 35 additional articles and a further increase in the volume of risk reporting (30,141 articles). From this established convention, a contemporary fourth period of risk reporting emerges from 2015 to 2017. Whilst this period is expected to extend

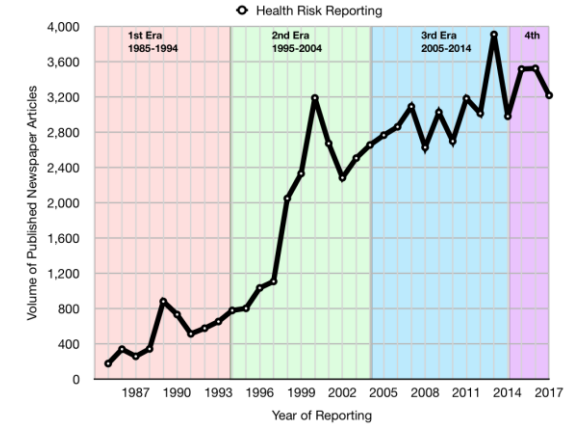

Fig 4. Periods of risk reporting outlined by proliferative changes in news volume from a more refined corpus of Health risk reporting.

until 2024, it was not possible to capture any data from 2018 onwards. There is currently not enough data to suggest any changes in the proliferation of risk reporting, However, within the three years made available for analysis, there already exists a higher volume of risk reporting (10,253 articles) compared to the first period. As such, this emergent fourth period was not omitted from analysis, as comparative qualitative analysis may yield notable insights (see chapter five).

When comparing the reporting trends across the reporting periods, evidence emerges which reinforces the claim that the second period (1995-2004) was a moment of particularly high risk amplification. It appears that a moment of intense proliferation of Health risk-reporting extends between 1996 to 2000, which corresponds with a period between the apparent press victory over BSE in 1996 and the publication of the House of Lords report on Science and Technology in 2000. The rapid proliferation of risk reporting between 1996 and 2000 and suggests a reorientation of the press around Health risk-based news reporting. Such a reorientation suggests that the value of Health risk-reporting to newspapers had increased, and that journalists were actively seeking to embed the language of risk within health reporting Konfortion et al, 2014). The 1996 -2000 peak is notably different comparted to other reporting peaks which generally signify specific years of press focus on Health risk-stories. For example, the reporting peak in 1989 seemingly corresponds with emergent reporting on BSE, while the 2013 peak corresponds with reporting on the Horse Meat Scandal.

Peaks in risk reporting provide reasonable grounds to assume that these are the specific moments where risk amplification is most likely to be located. The existence of peak moments of risk reporting across periods of risk reporting provides an opportunity for comparative qualitative analysis which assesses how the nature of amplified Health risk reporting has changed over time (see chapter five). However, when the volume of Health risk-reporting is disaggregated according to popular field of health reporting, the general profile of Health risk-reporting becomes more refined (fig 5).

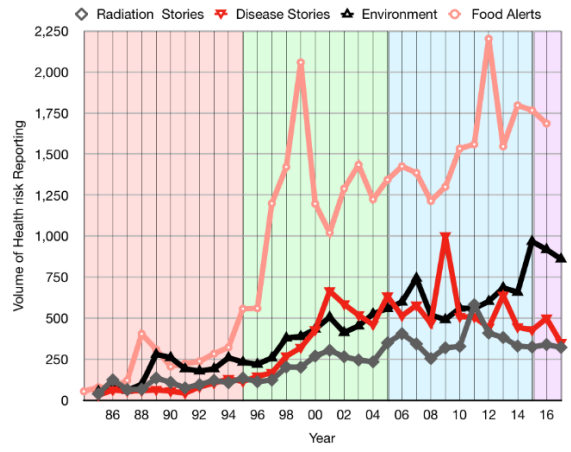

Fig 5. Proliferative changes of popular fields of Health risk reporting across periods of risk reporting.

Overall, 49.8% of Health Risk-reporting is constituted by Food Alert stories (n= 33,030), suggesting that the general profile of amplified health risk-reporting is going to be biased towards Food Alert stories. However, there were changes in the proportional constituents of Health Risk-reporting over time which suggests that there are temporal differences in the value that specific fields of popular health reporting contribute towards the profile of risk reporting.

Within the first period, Food Alert stories constituted 30.5% of Health Risk-reporting, while Radiation Risk stories constituted 22.1% of reporting, Vaccine and Disease stories constituted 16.9% of reporting, and Environmental Pollution stories constituted 30.5% of reporting. Such a relatively equitable distribution of news stories across the four popular fields of Health reporting provides some evidence to suggest that the British press quite evenly allocated resources towards covering a range of issues. To assess the robustness of this data, a set of further analyses were conducted with substituted the target phrases with appropriate synonyms (i.e., Atomic instead of Nuclear / Radiation, Bug and Jab instead of Disease / Vaccine, Diet and Consumption instead of Food, and Chemical instead of Environment / Pollution). In many cases it was found that the target phrases returned the optimal set of results, with substituted phrases either returning comparatively suppressed results or were demonstrated to lack a degree of specificity upon further interrogation. However, it was noted that the phrase Atomic was far more common in news reporting between the 1950s to the 1980s. This finding would greatly benefit further archival research conducted upon an older data set.

Within the first period, two notable peaks in reporting were observed. There was one peak in 1986, which was primarily constituted by Radiation Risk reporting (36.5%) and appears to be related to coverage of the Chernobyl disaster. The second notable peak occurred in 1989, which was primarily constituted by Food Alert stories (45.9%) and appears to be related to coverage of emerging concerns around BSE and wider concerns about meat safety standards. Within the second period, the proportion of Food Alert stories grew to constitute 40.1% of reporting, while Radiation Risk stories declined to 16.8%, Vaccine and Disease stories declined to 14.2%, and Environmental Pollution stories declined to 28.9%. The shift in proportional distribution between the four different fields of health reporting lends evidence to suggest that, within the second period, risk reporters began to dedicate resources towards reporting on stories which were believed to resonate better with general news audiences.

Within the second period, there appears to be an extended peak across 2000 and 2001. In the 2000 peak, the reporting overwhelmingly consisted of Food Alert stories (64.6%) and seemingly coincides with concerns over GM foods and the publication of the Phillips report - a public inquiry into the BSE crisis. Also, within the 2000 peak, the proportion of Radiation risk stories represented 9.7% of reporting, while Vaccine and Disease stories and Environmental Pollution stories represented 13.4% and 13.6% respectively. In the 2001 peak, the proportion of Food Alert stories declined to 44.8%, while the proportion of Radiation Risk stories increased to 11.4% of reporting, Vaccine and Disease increased to 24.9% of reporting, and Environmental Pollution

stories increased to 18.9% of reporting. The data suggests that the 2000 peak was predicated primarily upon reporting around the MMR triple vaccine controversy. This data suggests that, for the British press, Food Alert stories are a key driver for risk amplification, followed closely by Vaccination and Disease stories.

This observation is further reinforced by data from the third period, where Food Alert stories represented 56.4% of news stories within the 2013 peak. The 2013 peak appears to coincide with reporting around the Horse Meat Scandal, which was unexpected as the core focus of the Horse Meat scandal was around the lackadaisical enforcement of government (and EU) regulation rather than the specific threat to health from tainted meat products (for a more detailed analysis, see chapter six). Furthermore, when the reporting around other major risk events was analysed, it was observed that Vaccine and Disease stories represented 33.3% of reporting during the 2009 Swine Flu Pandemic, but Radiation Risk stories only represented 18.3% of reporting during the 2011 Fukushima Nuclear Disaster. Such data lends evidence to suggest that, by the third period, the British Press had come to understand that there was a differential value held by specific fields of Health risk reporting, with some being seen as more appealing to news audiences than others.

Despite the observations regarding the shifting profile of Health risk reporting over time, such data should be considered alongside analysis conducted earlier in this chapter which highlighted the declining preference for Health Risk reporting over time. For instance, during the 2000 peak, Health Risk reporting represented 22% of Health reporting as a news genre. The reporting in 2013, which was seen as the ultimate peak in Health Risk reporting, only constituted 11% of Health reporting as a wider news genre. Such changes in the proportional profile of Health Risk reporting may be illustrative of observable reorientations within news texts (which will be further analysed in chapter six). The data presented within this chapter lends some tentative support to the suggestion that Health Risk reporting had become increasingly individualistic over time (Cadburnay et al, 2003; Clarke and Van Amerom, 2008; Malikhao and Servaes, 2011).

The increased proliferation of Food Alert reporting supports this claim, as the proportion of Diet-Based stories increased from 32% of Food Alert reporting in the first and second periods to 39% in the third period and 51% in the emergent fourth period. The increasing emphasis on diet within Food Alert stories may be a result of both a wider acknowledgement that government regulation can only do so much to impact health through dietary controls, and that market forces

are more readily able to provide journalists with stories regarding new popular diets which purport to address modern health risks from poor diet. At the same time, and perhaps contradictorily, the British press may have become increasingly aware of the need for new government policies in situations where individual control over risk exposure is a virtual impossibility (Anderson, 2009; Schmidt, et al; 2013; Schäfer et al, 2014).

It was observed that, over time, Environmental Pollution stories grew from representing an average of 19.7% of Health Risk stories during the second period to representing an average of 26.5% of stories in the emergent fourth period - becoming the second most common field of Health Risk reporting. Furthermore, the proportion of Environmental Pollution stories which were focused on Climate Change grew from 6.2% of stories in the second period, to 23,7% of stories in the emergent fourth period. The degree to which Environmental Pollution reporting, and Climate Change reporting, reflects a wider demand for regulatory control over risk exposure is embedded within the argument put forward by Beck (1996) which suggests that there is little ability for the individual to control their exposure to the environmental risks which are produced by globalised industrial output. Within a British context, those individuals who are increasingly at risk from seasonal flooding resulting from adverse weather events have little ability to protect themselves and are reliant upon environmental policy reforms which aim to address environmental risks. While the data suggests that the British press has become less inclined towards amplifying emergent risks, there is some evidence to suggest that the pandemic potential of novel diseases still holds the potential for amplification.

The data from within Vaccine and Disease stories across the third and fourth periods describes several moments of media interest which correspond with reporting around Bird Flu (2006), Swine Flu (2009) and the Zika Virus (2016). Frost *et al* suggests that stories around potential pandemics hold greater value to the press then more general epidemiological issues as they provide journalists with the opportunity to explore a contested political arena where news sources debate the provision of healthcare resources, the legitimacy of expert assessment, and the presumed effectiveness of risk management policies. While research into the contested nature to disease prevention strategies has primarily focused on developing nations (see Upton, 2011; Kennedy, 2016; Martinez-Bravo, 2017), the data presented within this thesis suggests that there is scope to explore such issues within Western nations. Outside of emergent diseases, news media appears to have declining interest in general reporting stories regarding pathogenic risks, and an increasing preference for stories regarding carcinogenic risks. For example, during the first period of risk reporting there was only 7.1% more Cancer-based stories compared with

Disease-based stories. Within the second period of risk reporting, the difference grew to 33.8% more Cancer-based stories compared to Disease-based stories. Within the third period of risk reporting, there was 48.3% more Cancer-based stories compared to Disease-based stories. The overrepresentation of Cancer-based stories within the Health risk corpus does lend some further evidence to explain why Food Alert stories are also overrepresented, as diet is readily linked personal management of cancer risks (see Boyle *et al*, 2008).

Changes in Amplifying Language Across Newspaper Reporting on Risk

Research has demonstrated that *sensationalist* and *politicising* language within news reporting can amplify risk information across social stations (Frewer *et al,* 1998). However, these linguistic markers of risk amplification have yet to be subjected to longitudinal enquiry across the periods of risk reporting. *Sensationalist* language has been identified as a narrative modifier of amplification. By juxtaposing risk information alongside alarming phrases, risk reporting can confer an exaggerated sense of impending danger (Kitzinger, 1999; Gorney, 1992). It has also been identified that risk reporters seek to provide balance within their news stories by including news sources who seek to offer reassuring statements (Frewer *et al,* 2002). Reassuring phrases are expected attenuate the amplification of risk information by conferring a sense of safety and control, especially in relation to risk management policies (Sandman, 1994; and Ungar, 2008). *Politicising* language is another narrative modifier of risk amplification. By juxtaposing risk information alongside political terms, risk reporters appear to be constructing news stories which intertwine risk information with political angles regarding control and risk management, rather than simple reporting on health risks.

Analysing Sensationalist Language

Analysis indicates a linear increase in the expression of both alarming and reassuring phrases within risk reporting (fig 6). Across the entire corpus of Health risk reporting, there was 23,036 instances of alarming phrases, and 17,482 instances of reassuring phrases. There are periodic differences in sensationalism which suggests that expression of risk amplifying language is bound by temporal contexts. Across the first and second periods of risk reporting, the proportional difference between alarming and reassuring phrases increased from 20.6% to 33.7%. *This data suggests that the use of alarming language underwent a period of rapid proliferation between 1995 to 2004. Following this, the proportional difference between alarming and reassuring phrases decreased to 25.2% in the third period.* There was near parity of sensationalist language within the emergent fourth period of risk reporting, with reassuring phrases being expressed 0.2% more than alarming phrases. The observation that alarming and reassuring language became more equitable between 2005 to 2017 lends some evidence to suggest that the use of alarming language became increasingly unpopular within risk reporting after 2005.

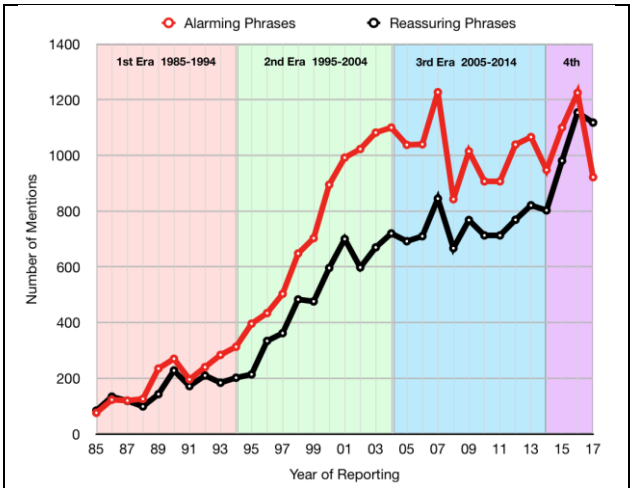

Fig 6. Count of references to institutional sources within the Health risk corpus across the periods of risk reporting

Within the first period of risk reporting the use of alarming phrases increased by an average of 5.9% per year. In total, there were 1983 instances of alarming phrases between 1985 and 1994. There were two years where a disproportionate proliferation of alarming phrases was observed. In 1986 and 1989, the use of alarming phrases increased by 61.8% and 86.5% respectively. These years of high alarm appear to correlate with the news reporting on the Chernobyl disaster and BSE. The use of reassuring phrases increased by an average of 1,6% per year across the first period of risk reporting. In total, there were 1575 instances of reassuring words between 1985 and 1994.There was also two years with a disproportionate increase in reassuring phrases. In 1986 and 1990 the use of alarming phrases increased by 59.5% and 59.4% respectively. Again, this proliferative increase in reassuring phrases appears to coincide with reporting on Chernobyl and BSE. This data appears to suggest that, during the first period, peak moments of risk reporting reflect an increased use of alarming and reassuring language.

Within the second period of risk reporting, there was a steady, and rapid, increase in the use of *alarming* and *reassuring* phrases. Across the second period of risk reporting, the use of *alarming* phrases increased by a yearly average of 13.8%, resulting in a total 7,776 recorded instances for the decade. Conversely, the use of *reassuring* phrases increased by a yearly average of 12.4%, resulting in a total of 5,153 recorded instances for the decade. In 1996 there was an observable peak in the use of reassuring phrases which represented a 56.1% increase from the previous year. From interrogating the news reporting, it appears that much of this increased use of reassuring phrases was based upon incorporating official safety assurances into the reporting on BSE related deaths. Across the third period of risk reporting, the use of alarming phrases declined by an average of 0.3% per year. In total there were 10,073 instances of alarming words between 2005 and 2014. The declining rate of proliferation for the use of use of alarming words was mirrored by a 1.9% growth in the average yearly use of reassuring words. The declining rate of proliferation for alarming words lends further evidence to suggest between 2005 and 2014 was a period of reorientation for the British press in how they reported on risk information. Data from the emergent fourth period suggests that further changes are becoming more apparent. For instance, while the use of alarming phrases increased by an average of 0.9% per year, the use of reassuring phrases increased by an average of 12.2% per year. The proliferative rate of reassuring phrases during the emergent fourth period is comparable to the proliferative rate during the second period of risk reporting.

Analysing Politicising Language

Institutional sources

P*oliticising* phrases were clustered according to apparent themes to enable comparative analysis across the reporting period. The first thematic cluster that was identified regarded the expression of institutional sources of risk information within the corpus of Health risk reporting. It was observed that the expression of both Scientific sources and Government sources increased at a linear rate, although Government sources were more likely to exhibit more notable peaks across the reporting periods (fig 7). Across the news reporting, there appeared to be a general attempt at balancing information provided by Governmental and Scientific institutions as sources of information for hazards and risk management. Overall, there were 37,951 references to Government and 20,272 references to Science. Across the four periods of risk reporting the proportional differences in expression between Government and Scientific sources generally declined. During the first period of risk reporting, Government constituted an average of 66.1% of institutional references per year. However, there were some years where the proportional

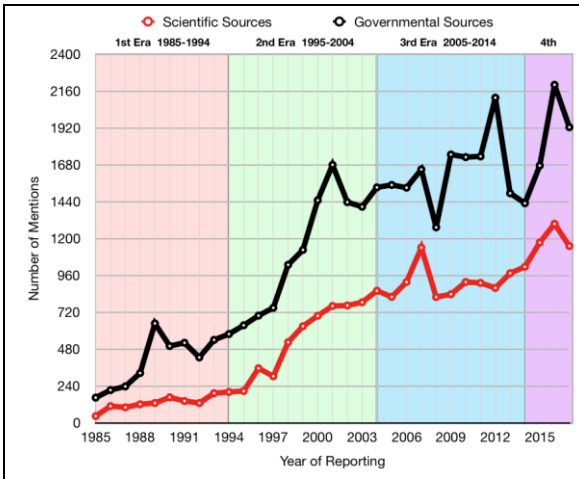

Fig 7 Count of references to institutional sources within Health risk-reporting across the reporting periods.

difference appeared particularly skewed. In 1989, Government constituted 80.1% of institutional references. Conversely, Government only constituted 48.8% of references in 1986.

The degree of discrepancy between institutional source attribution appears to be influenced by the nature of amplified risk issue. For example, during the coverage of Chernobyl in 1986, risk reporters appear to highlight scientific voices to address residual uncertainties regarding nuclear energy. Furthermore, during the coverage of BSE in 1989, risk reporters appear to highlight (and dispute) government safety assurances regarding the safety of British beef. Within the second period of risk reporting Government constituted an average of 51.1% of institutional references per year. Within the second period of risk reporting a more general trend could be observed where references to scientific institutions became more popular over time. For example, in 1995 Scientific institutions represented only 32.6% of all institutional references. By 2004, references to Scientific institutions grew to represent 56.1% of all institutional references. The general growth of references to scientific institutions lends evidence to suggest that, by the end of the second period of risk reporting, risk reporters had become more accustomed to including scientific sources to balance news reporting on risk issues (for a more detailed analysis, see chapter 5). Within the third period of risk reporting, references to Government institutions represented a yearly average of 42.3% for all mentions of hierarchical institutions. This lends evidence to suggest that risk reporting in the third period tended to better represent scientific views, rather than relying upon statements from government departments.

There does not appear to be a stable trend in the diminishing references to Government institutions across the third period of risk reporting. Between 2005 and 2015 the proportion of references to government generally ranged from between 29.0% to 52.1%, depending upon the year. This lends evidence to suggest that the proportional difference between references to Governmental or Scientific institutions is dependent upon the sociopolitical nature of risk being reported on by the media. For example, in 2009, references to Government represented a disproportionate 58.5% of all institutional references. From interrogating the newspaper

reporting, there is evidence to suggest that the disproportionate representation of Government institutions was based upon concerns regarding Government stockpiles and distribution of Tamiflu during peak news coverage of the Swine flu pandemic. However, in 2013 the proportion of references to Government institutions declined to 34.8%. The low presentation of Government institutions within risk reporting for 2013 was unique as this year exhibited the largest peak across the Health risk corpus, which was mostly predicated upon the reporting of the Horse Meat scandal. From the reporting, it was revealed that risk reporters did not appear to amplify the risks from phenylbutyrate within tainted meat products, and mostly emphasised the role of organised criminal gangs in circumventing food standards regulations. Both cases lend some evidence to suggest that the policies and procedures of Government can further amplify risk where they can be blamed for failing in their duty to protect the public from a speculated health crisis (for a more detailed analysis, see chapter 5). Within the emergent fourth period of risk reporting references to Government institutions was at a historic low, representing an average of 37.1% for institutional references per year. However, unlike the previous two period, the proportion of Governmental references increased over time from 29.9% in 2015 to 40.2% in 2015. This data lends some evidence to suggest that there may be an emerging trend where news reporters begin to re-focus their attention on the role of government institutions in managing risk, information, and public safety.

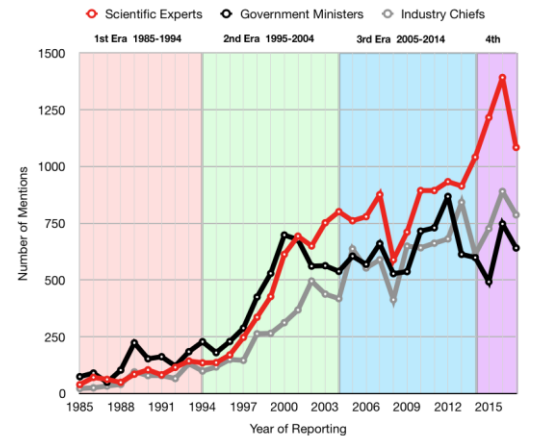

Fig 8 Count of references to institutional actors within Health risk-reporting across the reporting periods.

Institutional Actors

Analysis revealed that there were several key phrases which identified specific classes of institutional actor within the risk reporting. Ministers of government departments, scientific Experts, and industry Chiefs are regularly highlighted within risk reporting as having some responsibility for, or influence upon, risk management policies and (re)distribution of apparent technological dangers across society. By mapping the count of references to Ministers, Experts, and Chiefs, it was possible to conduct a more refined analysis on the changes to politicising language (fig 8). In total, there was 14,380 references to Ministers (32.3% of sample), 17,813 references to Experts (40% of sample), and 12,325 references to Chiefs (27.7% of sample) across the entire corpus of Health risk reporting. There were changes in comparative distribution of identified political actors which further suggests that risk reporting is influenced by a periodisation effect. Within the first period of risk

reporting, 'Minister' was the most well represented political actor, representing 47.2% of all mentions. The number of mentions for Minister increased at an average rate of 25.3% per year. 'Expert' received the second most attention from risk reporters, reflecting 30.1% of all mentions and growing at an average rate of 20.2% per year. 'Chief' received the least amount of attention from risk reporters during the first period, representing 22.7% of all mentions. However, 'Chief' was the fastest growing political actor, increasing at an average rate of 27.2% per year across the first period of risk reporting. Within the second period of risk reporting, 'Minister' was again the most well represented political actor within risk reporting however the overall proportion of mentions decreased to 37.6%. The proliferative rate for mentions of Minister also decreased to an average of 11.2% per year across the second period of risk reporting. The proportional share for mentions of Expert grew to comprise 38.6% of references to political actors within the second period of risk reporting. The proliferative rate for Experts was also the highest for all three political actors, with an average increase of 20.7% per year. However, the proliferative rate of mentions for Experts was the highest for all political actors during the second period of risk reporting, with an average growth of 20.7% mentions per year. The proportional share for Chief increased slightly to 23.8% of mentions within the second period of risk reporting. However, the proliferative rate declined to an average increase of 17.9% per year. Within the third period of risk reporting, Experts became the most popular political actor, representing 39.8% of mentions for all expert actors.

This data provides evidence to suggest that the share of mentions for Chief underwent a slight increase to represent 29.7% of references to political actors. The average yearly rate of proliferation sharply declined across all three classes of political actors during the third period of risk reporting. In general, the average rate of proliferation for references to Expert, Ministerial, and Chief political actors declined to 4.0%, 2.7%, and 7.4% respectively. The data generated from the third period of risk reporting lends evidence to suggest that there had been a paradigm shift within risk reporting. This paradigm describes a change in professional practice, where risk reporters had become *more inclined to highlight risk information generated by scientific Experts than other classes of political actor*. This data lends evidence to support the claims from media observers such as Fiona Fox (director of the Science Media Centre) who has previously identified a concerted effort from within the British establishment to raise the profile of expert voices within risk-based news reporting (Fox and St Louis, 2013).

The observable decline in proliferation of mentions across all three classes of political actors lends evidence to suggest that there is an observable plateauing effect on the production of risk

reporting within the third period. Within the emergent fourth period of risk reporting the proportional share of mentions for Expert political actors continued to increase; representing 46.3% of the sample. The proportional mentions of Chief increased to 30.1%, becoming the second most popular political actor within the emergent fourth period. Finally, the proportion of Ministerial mentions continued declining to represent 32.6% of the sample. The data provided by this analysis provides evidence to suggest a periodisation effect on the role of political actors to disseminate risk information within news reporting. The proportional changes in source attribution between Ministerial and Expert sources suggests a shift in professional attitudes towards the underlying value of risk information from specific classes of political actor. *Across the first and second period of risk reporting, the press appears to hold the authority of government minsters in high regard as a source of risk information. However, from the third period of risk reporting onwards, scientific credentials appear to have become far more valuable to risk reporters*. The relative under-representation of industry Chiefs as information sources during the second and third periods of risk reporting appear to suggest that news reporters were more concerned with publishing a polarised debate on risk issues between government authority and scientific expertise, rather than incorporating the perspectives from a broader selection of hierarchical risk managers (Boykoff, 2007; and Nisbet and Fahy, 2015).

Institutional publication

The seeming conflict between Ministerial and Scientific sources (outlined above) appears to represent definitional battles over risk information embedded within institutional Reports. A word count analysis revealed that "Report" was a popular phrase across amplified risk reporting and signified the medium by which risk information was made public. From interrogating the news reporting, it was revealed that the phrase "report" was contextualised by two key prefixal modifiers - Governmental Reports or Scientific Reports. A word count analysis revealed that there were 20,605 instances of "Government Report", and 20,945 instances of "Scientific Report" across the corpus of Health risk reporting. Observable changes across the reporting periods (fig 9) demonstrate that risk reporters became increasingly more accustomed to prioritising risk information embedded within Scientific Reports over Government Reports across the chronology of risk reporting. Within the first period of risk reporting, Scientific Reports was underrepresented within risk reporting. Scientific reports only constituted 36.7% for all mentions of institutional reports. There was also a large disparity in the rate of proliferation as the average mentions for Scientific Reports increased by 14.1% per year, while the average mentions for Government Reports increased by 22.9% per year. Within the second period of risk

reporting, the proportion of mentions for Scientific Reports increased to 47.4% of reporting. This increase in mentions for Scientific Reports is explained by an increase in the average proliferative rate to 14.6% increase per year.

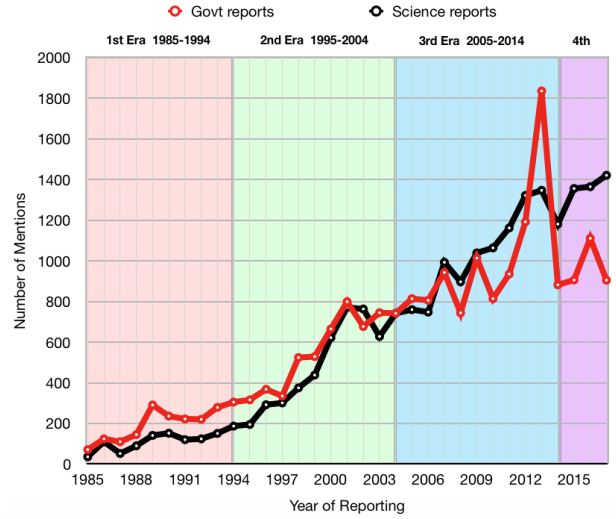

Fig 9 Count of references to institutional publications within Health risk-reporting across the reporting periods.

Conversely, the proliferative rate for mentions of Government reports declined to 10.9% per year across the reporting period. Within the third period of risk reporting, there was relative parity in the proportion of mentions between institutional reports. The proportion of mentions for Scientific Reports continued to increase to 51.3% of all mentions. However, the average proliferative rate for both Scientific Reports and Government Reports declined, falling to 5.5% and 6.6% respectively.

Within the emergent fourth period, Scientific Reports emerged as the dominant form of institutional report, increasing the proportional share to 58.6% of mentions. There was also a deviation in the change of proliferative rate, with the number of mentions for Scientific Reports increasing to an average of 6.5% per year, while the number of mentions for Government Reports declined to an average of 2.3% per year. From this data there is evidence to suggest that, across the reporting periods, the press had increasingly chosen to prioritise risk information embedded within Scientific Reports over that of Government Reports. There is further evidence to suggest that the first and second periods of risk reporting were moments of particularly high proliferation of risk information within news reporting, and that there was a relative stagnation in the proliferation of risk information across the third and emergent fourth periods.

Conclusion

This chapter aimed to investigate the changes to the amplification of risk by assessing the volume of information, the expression of sensationalist language, and the expression of politicising language. Across this chapter, evidence was provided which demonstrated that risk reporting is subject to temporally bound influences that describe distinct periods of risk reporting. The first period of risk reporting extends from 1985 to 1994 and is characterised by a relatively

low volume of information, relatively low sensationalism, and relatively high politicisation. The high degrees of politicisation appear to correspond with a number of peak years of reporting, where the volume of information and sensationalist language are disproportionately high. From the data, two years of peak reporting emerge, one in 1986 and one in 1989. The 1986 peak in reporting corresponds with news coverage of the Chernobyl disaster. It is characterised by disproportional expression of reassuring language, and an emphasis upon both governmental and expert news sources.

The 1989 peak in reporting corresponds with news coverage of BSE. It is characterised by an emphasis on Governmental news sources, and the disproportional expression of alarming language. The second period of risk reporting extends from 1995 to 2004 and is characterised by a rapid proliferation in volume of risk information, disproportionately high expression of sensationalist language, and increasing levels of politicisation. From the data, it was revealed that the rapid proliferation in the volume of risk information was heavily influenced by ongoing media attention towards Food Alert stories. Across the second period of risk reporting, news stories incorporated increasingly alarmist language when reporting on risk information. It was also observed that, during the second period, risk reporting became more focused on utilising the risk information provided by governmental and scientific sources. However, across the second period, risk reporters began to prioritise risk information from scientific sources over official government reports. The third period of risk reporting extends from 2005 to 2014 and is characterised by a high volume of information, declining sensationalism, and decreasing politicisation. The high volume of risk information was primarily due to risk reporters maintaining a focus on Food Alert stories. Furthermore, risk reporters began to prioritise Environmental Pollution stories within the reporting.

Despite the high volume of risk information, there was a general stagnation in the proliferation of news stories across the third period of risk reporting. Furthermore, the trajectory of published Vaccine & Disease stories generally declined across the third period of risk reporting. The decline in sensationalism was expressed as a general decline in the proportion of alarming language, and subsequent increase in reassuring language, across the third period of risk reporting. The decline in politicisation was observed as the increased prioritisation of scientific experts as news sources within risk reporting. Risk reporters also continued to emphasise the role of scientific reports and academic research papers as the key source for risk information. Furthermore, across the third period of risk reporting, risk reporters became more accustomed to including the statements from industry sources regarding risk management. The emergent fourth period extends from 2015 onwards and is characterised by a declining volume of

risk reporting, low levels of both sensationalism and politicisation. Within the emergent fourth period of risk reporting, both the overall volume of risk reporting and the proliferative rate of risk reporting exhibited a general decline. The emergent period of risk reporting was also the first moment across the entire corpus of Health risk reporting where there was near parity in the expression of alarming and reassuring phrases. Finally, the utilisation of scientific sources for risk information was at its highest during the emergent fourth period of risk reporting. Despite the apparent changes within the emergent fourth period, it must be reiterated that these observations are based on a limited sample and are speculative at best.

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Chapter 5 - Narrative Changes to Risk Reporting

Introduction

This chapter analyses the data generated from the qualitative content analysis performed across moments of peak news reporting. The qualitative content analysis sought to explore changes to risk amplifying narratives across the different periods of risk reporting (identified within chapter 4). Changes to risk news narratives were investigated by assessing shifts in the framing of risk information and rhetoric of risk reporting across sixteen highly amplified news cycles identified using the peak reporting data for each of the four strands of popular risk reporting obtained in the previous chapter (table8). The highly amplified news cycles were identified as a six-week period of news reporting which extended one week before and five weeks following am instigating news item. The framing analysis was conducted across seven media frames of risk amplification: Uncertainty, Certainty, Blame, Trust, Dread, and Stigmatisation. The rhetoric analysis was performed using the three traditional concepts of rhetoric: *logos* (reason), *ethos* (credibility) and *pathos* (emotion).

	1st Period Peak	2nd Period Peak	3rd Period Peak	4th Period Peak	Total peak articles per field of risk
Food Alert	**56 articles** Jan 1990	**143 articles** Oct 2000	**145 articles** Feb 2013	**193 articles** Aug 2017	537 articles
Radiation Risk	**45 articles** May 1986	**55 articles** Jan 2001	**193 articles** Mar 2011	**39 articles** Oct 2015	332 articles
Vaccine & Disease	**27 articles** Oct 1994	**113 articles** Jan 2001	**140 articles** Oct 2005	**72 articles** Feb 2016	352 articles
Env. and Pollution	**36 articles** Jan 1990	**54 articles** May 2000	**73 articles** Oct 2013	**107 articles** Feb 2017	270 articles
Total peak articles per period	164 articles	365 articles	551 articles	411 articles	1,491 articles

Table 8. Moments of peak publication of risk-based news across each of the reporting periods. Includes the number of articles used for content analysis.

Shifting Expression of Risk Amplifying News Frames

Across the reporting periods, it was observed that the number of news articles contained within amplified news cycles reflects the proliferative trends observed within the previous chapter. Overall, there were 1,491 news articles included in this study. As fig 10 illustrates, Uncertainty, Certainty, and Blame appear to be commonly exhibited frames within risk reporting across all four periods, while Trust, Dread, and Stigma were rarely expressed. This data suggests that a

media template may exist which guides the conventions around selecting news sources who more readily frame risk as an ongoing dispute over health management as it is presumed to resonate better with audiences regardless of temporal context (Kitzinger, 2000; De Vreese, 2005; Nisbet, 2009).

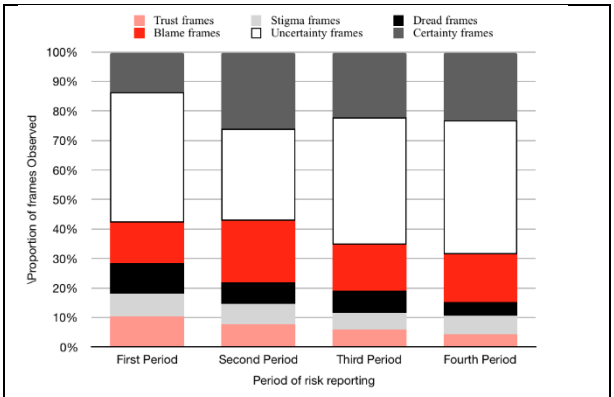

Fig 10 Proportions of observable risk amplifying frames across the periods of Health risk reporting.

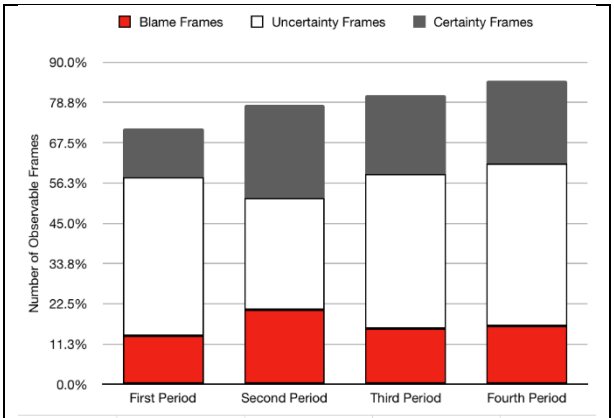

Fig 11 Proportions of common frames across the periods of Health risk reporting.

There generally seemed to be little variation in expression of Uncertainty, Certainty, and Blame frames across temporal periods. However, expression of these frames within the second period appears uncharacteristic and lend further evidence to suggest that the second period was a moment of particularly high risk amplification (fig 11).

Expression of Uncertainty characteristically ranged from between 44.2% to 45.5%. However, expression of Uncertainty declined to 31.2% in the second period. Expression of Certainty increased from 13.6% in the first period to 26.0% in the second period, before declining to between 22.1% to 23.1% in the third and fourth periods. Expression of Blame also increased from 13.6% in the first period to 20.9% in the second period, before declining to between 15.6% and 16.3% in the third and fourth period. This data lends some evidence to suggest that the relationship between Uncertainty, Certainty and Blame is a key motivator for the amplification of risk information within news reporting (see Clarkson *et al,* 2008; Liu and Zhang, 2018; Holton *et al,* 2018). The uncharacteristic expression of common frames within the second period suggests that, within the media template on risk, Uncertainty may function to mitigate risk amplification while Certainty and Blame may be more directly related to risk amplification. It is acknowledged that this observation regarding Uncertainty frames is contentious and disputes pervious research that has linked the concept of uncertainty with risk amplification (see Pidgeon *et al,* 2003; Petts and Niemeyer, 2004; Fjaeran and Avan, 2019). As such, there is a need to further explore the relationship between Uncertainty, Certainty, and Blame frames within this study.

Framing Certainty

From the analysis conducted so far within the thesis, there is evidence to suggest that the framing of Certainty is more closely aligned to risk amplification than previously expected. There appears to be a confluence between the high expression of Certainty frames and the rapid proliferation of risk-based news stories within the second period of risk reporting. There is further evidence to suggest that the second period of risk reporting was a decade where professional conventions were adopted which amplify risk information within news stories. The first convention regarded the choice of modal verbs used to communicate scientific evidence. Modal verbs are subjective linguistic markers of probabilistic harm and range from more-certain signifiers (such as can cause and could cause) to less-certain signifiers (such as might cause and may cause) (Katz *et al,* 2020). The Certainty expressed by more-certain modal verbs may amplify risk by confirming readers expectations that the likelihood of harm is more than likely true (Rubin, 2010). The example below demonstrates how modal verbs (italicised) can modulate the presentation of risk information to suggest an increased likelihood of harm:

The research follows [Dr Singh's] previous study which *showed that* exposing some babies to measles and herpes viruses *could* cause their immune systems to malfunction. (Johnson and Fletcher, 2001 - The Sunday Express, January 28)

A word count analysis revealed that across the entire corpus of Health risk reporting, the more-certain modal verbs were greatly overrepresented (30,390 mentions) compared to the less-certain modal verbs (824 mentions). Within the second period of risk reporting, the expression of more-certain modal verbs proliferated by an average of 14.8% per year. However, within the third period of risk reporting, the expression of more-certain modal verbs declined to an average increase of 0.6% per year. There is further evidence which demonstrates a decline in the expression of more-certain modal verbs. It was calculated that there was around one more-certain modal verb for every two published articles of risk reporting during the second period of risk reporting (calculated average rate = 0.6 mentions per article). However, within the third period, it was calculated that there was around one more-certain modal verb for every three published articles of risk reporting (calculated average rate = 0.4 mentions per article). This data provides some evidence to suggest that, within the third period of risk reporting, *a professional convention emerged where the press began to shy away from using modal verbs when linking risk information to possible harms.*

While it may have been expected for a decline in use of more-certain modal verbs would have been mirrored by a notable increase in less-certain modal verbs, there was little evidence to support such a claim. Kitzinger (1999) provides one potential explanation for this observation, as it is uncommon for risk reporters to write stories which do not suggest a future possible risk of harm of an identified object. Considering this point, it was contended that perhaps risk reporters had begun to move away from using 'cause' to forecast potential future harms and move towards using 'caused' in the past tense in an attempt to better report on the facts of a news story by linking an object to a provable negative impact on health. However, it was discovered that the use of 'caused' notably declined over time in relation to 'caused'. Across the second period of risk reporting, 'caused' was used an average of 42.3% less than 'cause'. Across the third period of risk reporting, 'caused' was used an average of 47.1% less than 'cause'. This data suggests that journalists may have moved away from using different linguistic forms of 'cause' (either future or past tense) to communicate risk potentials to their audience. The declining use of modified forms of 'cause' over time (both future and past tense) may be related to the deterministic connotations of the phrase. It may be a case that journalists have selected more ambiguous terminology to imagineer risk potentials for their audience. However, despite close interrogation of the corpus across several forms of analysis, no generally recognisable term has been identified.

Journalistic balance is another press convention which appears to have influenced the disproportionately high expression of Certainty during the second period of risk reporting. There is evidence to suggest that the convention of journalistic balance primarily emphasised the risk information provided by Pressure Group Campaigners (PGC's) to challenge the risk information provided by institutional sources. Within the second period of risk reporting, PGC sources were referred to only 29% less than Ministerial sources. Furthermore, the use of PGC statements increased at a rate of 0.5% more per year than Ministerial statements across the second period. PGC sources often utilised curated facts to undermine Government safety assurances. Curated facts were usually presented as a mixture of empirical evidence and rhetorical argumentation that underpins a conclusory worldview on risk. Conclusory worldviews are statements which rely on a perspective of certainty that applied technologies are inherently dangerous and pose a threat to public health which has yet to be quantified (due to regulatory oversight).

Environmentalists further fear that humans eating meat or dairy products from livestock fed on GM crops could be at risk, although so far there is no evidence that bacteria in human guts have been affected.

However, earlier this year, The Observer revealed the work of a German scientist who had found that genes from GM crops could be found in bacteria in the guts of bees. (Barnett, 2000 - The Observer, October 15)

In the above example, the use of "Environmentalists further fear" presents a subordinate clause to the reader which may provide an interpretive schema to process the conclusory worldview. The above example reinforces the "fears" of environmental PGCs by suggesting that there is empirical support for their claims by 'revealing' the findings from "a German scientist" as a form of institutional authority. Also present within the second period of risk reporting is the specific framing of Government safety assurances as inherently falsifiable and myopic in scope, with further suggestions that Government had somehow manipulated scientific data to generate preferable policy outcomes:

An independent study… reveals that alien genes used by scientists to modify crops are surviving the manufacturing process which turns GM crops into animal food.

The report heightens fears that products …may be contaminated with modified genes if the animals they are from were raised on GM feed. Until now Ministers and industry bodies have reassured consumers that a heating process kills any DNA in animal fodder. (Barnett, 2000 - The Observer, October 15)

As the above example seemingly demonstrates, the core contention does not revolve around the hazards of "alien DNA in feedstock". Rather, the key issue appears to be that the perceived certainty by which Government sources are assured that GM DNA is "killed" was demonstrated to be false. The above example is representative of a convention within the second period of risk reporting, whereby apparent contradictions between Government safety assurances and PGC risk information drives a risk-based story. Where contractions between Government safety assurances and PGC risk information is made apparent, risk reporters are invited to utilise PGC sources to provide balance to institutional information, and further expound upon the issues by offering their conclusory worldview as a publishable statement. The apparent prioritisation of PGC risk information to balance news stories seems to have been generated from residual

concerns regarding the independence of scientific expertise from the influence of Government power. The residual concerns over scientific independence was a core theme across the entire reporting on BSE as "government scientists" seemed to agree that there was little evidence for cross-species transmission of BSE. This was proven to be a false assertion in 1996, when the Government admitted that nCJD was developed from human consumption of BSE tainted beef.

Framing Uncertainty

There is strong evidence to suggest that the expression of Uncertainty is linked to the utilisation of scientific sources within risk reporting. From the previous chapter, it was discovered that scientific Experts became the most popular source for risk information across the third, and emergent fourth, periods of risk reporting. This chapter provides data which demonstrates that the expression of Uncertainty frames constituted 43.3% and 45.5% of observable frames within the third and emergent fourth periods of risk reporting. One reason for the link between Experts and the framing of Uncertainty made by this chapter is the conventionally tentative language used by scientists to communicate risk information embedded within their research (Yore *et al,* 2002).

"The exact role that [Aircraft] noise exposure *may play* in ill health is *not well established*" Said Dr Hansell. "However, *it is plausible* that *it might be contributing*… The relative importance of daytime and night-time noise also *needs to be investigated further*". (Smyth, 2013 - The Times, October 9)

Within the above example, the verbatim statement provided by Dr Hansel exhibits several points of observable Uncertainty (italicised). These points of Uncertainty reflect the underlying convention of 'scientific uncertainty', which acknowledges the possibility that inferences drawn from individual scientific research papers may be based upon (unintentionally) incomplete, methodologically biased, or misinterpreted data (Shuchman and Wilkes, 2010). It appears that the role of scientific sources was to provide scientific balance to the safety assurances provided by governmental sources. However, from the third period of risk reporting onwards, there seems to be a move towards including balancing scientifically derived risk information across several scientific sources.

People who live close to an airport and are exposed to constant loud aircraft noise may face an increased risk of cardiovascular disease, according to studies from the UK and the US published on Tuesday night… The UK study was carried out by researchers at the UK Small Area Health Statistics Unit and MRC-PHE Centre for Environment and Health… The US study was carried out by scientists at the Harvard school of public health and Boston University school of public health…

Other scientists agreed that the studies showed a possible link between aircraft noise and cardiovascular disease, but said more evidence was needed if noise was to be established as the actual cause of illness… (Boseley, 2013 - The Guardian, October 8).

As the above example demonstrates, one news story can be built upon presenting the findings from across several scientific studies which mutually agreed each other's conclusions, even if the methodology varied somewhat. This approach to risk reporting emphasises the "scientific consensus" around risk information to narrow the Uncertainty inherent to tentative scientific language and suggest authoritative Certainty on the subject (Carvalho. 2007). Emphasising the scientific consensus within risk reporting became far more prevalent from the third period of risk reporting onwards. Evidence to support this claim is provided by the increased use of University sources across the reporting periods. A word count analysis within the Health risk corpus demonstrated that "University" was mentioned an average of 125 and 462 times per year across the first and second periods of risk reporting. Within the third and emergent fourth periods of risk reporting, the average mentions of "University" increased to 1049 and 1599 times per year. Another change in risk reporting which appears to have aided the increased use of scientific sources is the general increase in length of news articles over time. For example, within the first period of risk reporting, the average length of risk-based news stories was 683 words. The average length of risk-based news stories grew to 703 words by the emergent fourth period. While an average increase of twenty words across a thirty-three year time period may not seem like a large increase, it may provide risk reporters with enough space to include further reference to scientific research. For instance, the following example uses just 22 words to signify that risk pertinent risk information was derived from scientific collaboration between two leading research Universities, but is otherwise superfluous to the overall story:

The US study was carried out by scientists at the Harvard school of public health and Boston University school of public health… (Bosley, 2013 - The Guardian, October 8)

Framing Blame

The expression of Blame frames also demonstrated a notable change between the second and third periods of risk reporting. The proportion of Blame frames decreased by 5.4% between the second and third period of risk reporting, lending evidence to suggest that *risk reporters became less interested in utilising blame within risk reporting over time*. Like Certainty frames, the expression of Blame frames appears to be dependent upon the use of statements provided by PGC, and other non-institutional sources. "Parents" were one of the key non-institutional sources exhibited across the reporting. Within the second period of risk reporting, the expression of "Parents" increased by an average proliferative rate of 13% per year. The average proliferative rate for the expression of Parents declined to 3.1% within the third period of risk reporting, and further declined to -0.3% within the emergent fourth period. This data provides evidence to suggest that, over time, "Parents" became less integral as news sources within risk reporting. As non-institutional news sources, Parents appear to play a key role within the second period of risk reporting, usually by directly blaming the Government for policy failings, and suppressing information, which has resulted in their children being exposed to risks (Jewell, 2001). Parents also appeared more likely to offer harsh criticism aimed at the government for apparent hypocrisies whereby the families of Government ministers were believed to receive privileged protections which are unavailable to ordinary people. Often, these two strands of Blame were combined into a single statement reported within risk-based news stores, for example:

Sarah, of Billericay, Essex, believes the Government is to blame. She said: "The Government tend to sweep things under the carpet… The Government want children to be vaccinated but if it is not 100 per cent safe why should we? They're just saving money. It'll be interesting to see if Leo Blair is vaccinated " (The Express, January 13 - 2001)

By contrast, during the third period of risk reporting, University-based scientific sources appeared to demonstrate a tendency to blame Government for failing risk management policies. The Blame provided by expert sources usually referred to missed targets and improper allocation of funds, often legitimised by expert recommendations on policy improvements (see Hood, 2006;. McKean, 2015).

Professor Jonathan Grigg said: "The introduction of the low emission zone in London, UK, has had little effect on concentration of particulate matter… UK policymakers have

shied away from radical solutions to the issue, such as changing diesel-powered black cabs (which contribute 20% of London's locally generated particulate matter) to cleaner petrol-powered alternatives. (Bosley, The Guardian - October 15).

The above examples demonstrate how the framing of Blame changed between the second and third reporting periods. The prioritisation of Expert sources, at the expense of non-institutional voices, appears to have brought about a shift in the language used when Blaming the government within risk reporting. Within the first example, the government is Blamed for "sweeping things under the carpet", reflecting a resonant concern during the second period of risk reporting regarding Government secrecy, and the manipulation of scientific data to suit policy aims. Within the third period of risk reporting, the general shift in language appears to have brought about accusations that the government "shied away" from their precautionary duty to protect the public from harm (Cross*,* 1996*)* . The idea that the Government is failing to address pertinent risk issues draws upon resonant concerns during the third period of risk reporting that Government policy aims may be misplaced, or that there is a lack of political will to use "radical solutions" to reduce the publics exposure to risks (Owens, 2000).

It was observed that much of the reduction of Blame frames was brought about by the shift away from public, PGC, news sources towards prioritising the statements provided by scientific experts within risk reporting. Much like the expression of Uncertainty, the conventionally tentative language of scientific experts often forgoes directly blaming the Government for policy failures, and instead recommends policy improvements. The decision to prioritise scientific experts as news sources within the third period of risk reporting appears to coincide with a rapid proliferation of news stories based upon the initiatives of professional healthcare organisations (PHOs). For example, references to the 'World Health Organisation' increased by 72% within the third era of risk reporting. The average yearly rate of proliferation for World Health Organisation sources also increased from 18.5% in the second period, to 21.1% in the third period of risk reporting (this data does not account for the 'WHO' appreciation). Risk information provided by PHOs is often rapidly received by risk reporters and combines empirical data on hazards with personal experiences of danger that aids the story writing process (Shih *et al,* 2011). This contrasts with the statements provided by PGCs, which often tends to twin social facts on risk with the personal outrage felt by PGC members towards institutional risk management, for example:

Jackie Fletcher, founder of pressure group JABS, which is campaigning for single vaccines to be available on the NHS, said: "We have parents who are so desperate to get single vaccines they are travelling to other countries or paying extortionate prices to private doctors. The Government says there is an epidemic on the doorstep because children aren't being inoculated. Why on earth don't they give us the choice? (Johnston and Fletcher, 2001 - Sunday Express, January 28)

While PGCs may have been de-prioritised as news sources within the third period of risk reporting, the role they fulfilled as a representative of the public voice was adopted by Opinion Writers. Within their columns, it was observed that Opinion Writers (usually from the politically right wing newspapers) would position themselves as the 'common sense' voice of the general public. Opinion Writers often blamed intuitional risk managers for restricting civil liberties drawn from their own observation, without the need to corroborate their statements. One of the key issues for Opinion Writers was the prospective reduction in civil liberties believed to be caused by the precautionary measures put forward by government minsters and scientific experts when managing risk, for example:

Much of [The Food Standards Agency's] time, however, was spent promoting healthy food, in a manner that many saw as the worse form of nannyism. During the most recent football World Cup it published a guide to encourage fans to drink fizzy water with a slice of lemon while watching the games in their local pub." (Wallop, 2013 - Daily Telegraph, Feburary 14).

the UK's chief medical officer Dame Sally Davies said she thought about the raised risk of breast cancer every time she reached for a glass of wine…

… [Drinking] a glass of wine a night is probably only as risky as driving to work every day. When it comes to breast cancer, the research shows that drinking one glass of wine per day causes about three extra women out of every 100 to develop breast cancer - that's 14 rather than 11 women. So it's up to you to decide if that's a risk worth taking. (Jones, 2017 - The Mirror, August 29)

As the above two examples illustrate, both columnists (Harry Wallop and Caroline Jones, respectively) blame the UK's health and safety apparatus for promoting risk puritanism; where risk information is amplified by elite actors to control the public's responsible enjoyment of life's excesses. Both examples frame statements from the health and safety apparatus as being both culturally absurd and adhering to a radical worldview of extreme risk aversion (FØrde, 1998). The crux of most risk-based opinion columns is that state sponsored positions of radical risk aversion undermine public trust in government by constructing an 'Us vs Them' paradigm. Within this paradigm it is commonly suggested that elite social actors are granted privileged access to risk information, which is then used to reduce civil. The reduction of civil liberties can take the form of policy controls but can also be through social coercion by stigmatising risk-seeking behaviours as culturally unacceptable (Bayer and Colgrove, 2002).

Narrative Shifts in Risky Rhetoric

During the qualitative content analysis, it became apparent that the risk information was incorporated into wider narratives on risk and social control through the utilisation of risk rhetoric within risk reporting (see Lupton, 1993; Russell and Babrow, 2011; and Dahlstrom, 2014). Risk rhetoric outlines a process by which the frame setting of risk amplifying frames is aided by *logos, ethos,* and *pathos* - the traditional forms of rhetoric within news narratives (Mral *et al,* 2010; Bakir 2007; McComas and Trumbo, 2001). There appeared to be a clear delineation in how coded instances of risk amplifying frames corresponded with the constituent forms of rhetoric. Coded instances of Certainty and Uncertainty generally presented narrative appeals to legitimise risk information from both empirical data and social facts, corresponding with conceptualisations of logos. Coded instances of Trust and Stigma generally presented narrative structures that sought to appraise the credibility (and believability) of sources of risk information, corresponding with conceptualisations of ethos. Coded instances of Blame and Dread generally presented narratives which impressed affective appeals which seemed to validate visceral responses of the readership, corresponding with conceptualisations of pathos.

Through conducting a selective coding of text for rhetorical themes within the text of risk amplifying frames, sociohistorical narratives emerged from the sample. From this thematic analysis, the coded documents were treated to a narrative analysis to explore if and how the rhetorical structures altered across reporting periods. The broad temporal range of selected news texts aids the generalisability of the narrative analysis by expanding the scope of investigation beyond specific news cycles. Where possible, this analysis also incorporated word count methods

to better substantiate the generalisability of observations between key cases to the wider corpus of risk reporting.

Longitudinal content analyses of logos, ethos, and pathos seemingly demonstrates that *risk-based narratives revolve around an ongoing chronology of failure*. Generally, the ongoing chronology of failure proposes that sociohistorical narratives, of Government's inability to protect the public from harm, are embedded within journalistic conventions to writing risk-based news stories. Each of the rhetorical forms appear to work in concert across risk amplifying news stories to (re)establish and (re)enforce the ongoing chronology of failure. Drawing from historical failures, risk reporters were able to employ rhetorical structures to help reinterpret developing events to contextualise sociopolitical concerns over risk governance for the general public. *This appears to have entrenched a professional convention whereby risk information is recontextuliased around social facts to aid speculation on future damages.* There also appears to be intentional ambiguity around 'future damages' which can include physical harm, but often includes suspected erosions to civil liberties and democratic harms. The example (below) from Peter Hitchens (Opinion Writer, Daily Mail) demonstrates how *logos* (bold), *ethos* (underlined), and *pathos* (*italicised*) outline the chronology of failure to seemingly undermine confidence in the safety of technological developments and further legitimise scepticism towards institutional risk management:

Trust us, for we know better. This is an astonishing piece of State bossiness in an age that has seen **a catalogue of mistakes, panics, and mysteries in the world of disease and medicine.**

They told us thalidomide was safe. They said that we would all get AIDS… *The wise person responds with deep caution to the words* 'Trust me, I'm a doctor', and with even more caution to the words 'Trust us, we're the Government'. (Hitchens, 2001 - Daily Mail, January 28)

In this example, Hitchens appears to use *logos* to suggest a historiological order to risk events arising from failures of governance. By using "a catalogue of mistakes", Hitchens proposes that the number of risk events has been recorded, indexed, and traced to a point of origin. While this "age" of risk is ambiguously framed, Hitchens asserts that the Thalidomide case (1950s/1960s) provides a logical start to the ongoing chronology of failure. Next, Hitchens appears to use *ethos* to highlight the damaged credibility of institutional risk managers. As a rhetorical form the use of "They told us" suggests that the institutional messaging around risk information has repeatedly shown to be untrue, and that the public has little reason to trust institutional sources.

Furthermore, it is suggested that privileged institutional access to information should no longer be considered as a factor of credibility, especially if the resultant messaging endorses public behaviour which could be harmful. This appears to draw from wider sociopolitical concerns around the use of risk information within institutional messaging that supports hidden agendas and policy goals. For example, some media outlets have contended that the US-led 'War on Terror' in Iraq / Afghanistan relied on messaging around the risks of nuclear war to covertly prosecute military intervention that supported US oil interests (Juhasz, 2013 - CNN).

Finally, Hitchens seemingly uses *pathos* as affective motivation for personal precaution against institutional misinformation. By stating that the "wise person" responds with caution to government messaging on risk, Hitchens appears to validate readers who may feel deep scepticism towards government institutions. Hitchens' use of *pathos* reflects 'calls to action' apparent throughout risk reporting, where news sources place moral, ethical, or social currency on enacting precautionary behaviour. Hitchens' example illustrates how the rhetorical structures of risk draw from an ongoing chronology of failure to orchestrate narratives which assist readers with the interpretation and contextualisation of risk information. When *logos, ethos,* and *pathos* are analysed independently across the wider dataset of amplified risk reporting, changes become apparent within the rhetorical forms between the different reporting periods. While changes to the structure of rhetorical forms did not appear to impact the wider narrative of the ongoing chronology of failure, they do appear to indicate reorientations in press conventions around narrative construction.

The Narrative of *logos* within Risk Reporting

From the thematic analysis, it appears that *logos* provided risk reporters with a narrative tool for negotiating the 'facts' of risk information. This narrative seemingly contributes to the ongoing chronology of failure by presenting risk information as a contest between parallel perceptions of truth. Embedded within this narrative is the apparent sociopolitical concern that, if uncontested, institutional information (truths) will form policy responses to risk which endanger vulnerable publics. The narrative of *logos* appears to transition from considering how the public can know that institutional risk information is true within the earlier (first and second) periods, to establishing the truth of failed policy responses to risk within the latter (third and fourth) periods.

Within the earlier periods, narratives developed from *logos* generally revolved around a pervasive concern regarding the integrity of scientific data, public health management and institutional voices:

At the moment, the Government appears to be firmly on the mobile phone industry's side. Julie Matthew, joint coordinator of Mast Action, says this is because the Government sold mobile phone companies the licences needed to launch 3G services for a staggering Pounds 22.5 billion last April…

The guidelines - which were recommended by the government-sponsored Stewart report [on Mobile Phone Telecommunications and Health] last year - do not deal with cancer links because there is no evidence yet that masts can cause the disease. (Ayres, 2001 - The Times, January 6)

Within the above example, a pressure group source is apparently used by Ayres as a proxy for public scepticism over the completeness of data and institutional manipulation of risk information. This perception may be developed from a worldview which presumes that technical assessments of risk is inseparable from Government policy agenda. While the wider article does not outrightly support this perception, it is possible for risk reporters to be sympathetic to the sociopolitical concerns voiced by pressure group sources and may have their perceptions of truth influenced during the story writing process (Ropeik, 2002). As highlighted by the Chernobyl reporting, in situations of limited, contradictory, or incomplete information provided by institutional sources, risk reporters may have been inclined to develop professional scepticism over the relationship between government and risk. This may have impacted risk reporting by prompting coverage, which was amenable to sceptical positions, and placed significant focus upon sceptical news sources as a proxy for their own concerns.

This thesis has previously established that risk reporters appear to have developed their stories around information provided by institutional and non-institutional news sources. However, the narrative analysis suggests that each type of news source offers a distinct version of 'the truth' (Covello, 1992), leaving risk reporters in the position to negotiate between disputed positions with limited information. It is this role of truth negotiation which appears to underpin the convention of journalistic balance exhibited in the earlier periods. It appears that risk reporters aimed to present a select range of possible truths to their audience in the expectation that individual readers would assess the statements on their merits and reach their own conclusions on the reality of risk. Readers were generally presented with contradictory truths on

risk based upon technical assessment, ministerial assurances, and social facts. However, the narrative discourses which appear to arise from a convention of journalistic balance often appeared to privilege statements from news sources which presented skewed perceptions of events to readers. It was observed that, during the earlier periods, emerging narratives around institutional sources of information commonly suggested that scientific actors were being coerced by government to obfuscate risk information that was damaging to policy agendas. Conversely, emerging narratives around the social facts from non-institutional sources commonly suggested to be an honest attempt at truth-seeking exercises by members of the public to debunk ministerial safety assertions.

Then, with magnificent timing, someone leaked a four-year-old report warning the British army that soldiers exposed to dust from DU [Depleted Uranium] ammunition risked developing lung, lymph and brain cancer.

The Government responded by dismissing the report as inaccurate, but could not dispel suspicions of a cover-up.

The World Health Organisation says there has been no rise in leukaemia among Kosovan Albanians… Yet Nato troops were photographed in white radiation suits and masks last week…

So does the debris pose a danger or not? (Smith, 2001 -Independent on Sunday, January 14)

In the above example, Smith highlights how contradictions between news sources facilitated the narrative around *logos* within amplified risk reporting. Smith's example identifies two key contradictions: (1) Contradictions between institutionally accepted safety levels and seemingly contrary social facts. (2) Contradictions between institutional actors over safety levels. Smith juxtaposes the Government's dismissal of a leaked army report with photographs of NATO troops in safety equipment to illustrate a contradiction where the Government's (presumedly) evidence-based response does not reflect the reality that people were taking risk precautions. Smith also juxtaposes the risk claims made within the leaked Army report with the Government's dismissal of the report to illustrate contradictions over acceptable safety levels between institutional actors. Discovering such contradictions may have aided narratives around *logos* by providing a fundamental basis of public interest in the story as behaviours from different institutional sources appear discordant with one another, signifying possible scandal.

Within the later periods of risk reporting, the narrative of *logos* appears to have undergone notable reorientation, becoming more focused on how risk information can be used to publicly assess government risk management policies. The public assessment of risk appears to inform the narrative of *logos* primarily by relying upon scientific credibility to identify where precautionary policies had failed, and secondly by using statements from credible scientific sources to speculate upon future damages.

Sir Liam Donaldson [Chief Medical Officer] said [bird flu] would kill some 50,000 people in the UK… Health spokesman Andrew Lansley accused the Government of complacency and being too slow to stockpile antiviral drugs…

Sir Liam [said]…it was 'not impossible' that 750,000 Britons could die [from Bird flu]. Sir Liam admitted that the Government had some way to go to meet its target for stockpiling 14.6million doses of the Tamiflu drug…'

…Dr Martin Wiselka, consultant in infectious diseases at Leicester Royal Infirmary [said] it was an 'unanswered question' whether the virus would mutate sufficiently. (Wooding, 2005 - The Daily Mail, October 17)

In the above example, Wooding seemingly relies on a narrative hook revolving around the Government's inability to "meet its target for stockpiling Tamiflu". Following this narrative hook, Wooding compiles several statements from credible sources which reinforce the narrative focus of the story, while providing supplementary information that broadens the impact of risk facing the public. It was also noted that non-institutional sources were absent from the wider story, reinforcing evidence provided earlier in this chapter that risk reporters began to prioritise institutional voices in the later periods. Wooding's example reflects general trends of the later periods which suggests that the press transitioned towards a professional convention of providing scientific balance within risk reporting.

Unlike the journalistic balance of earlier periods, the prioritisation of scientific balance appears to rely upon a principle that upholds scientific processes, empirical evidence, and expert interpretations, as an inherently more accurate method to assess risk information; rather than

extrapolating insights from social facts (Murcott and Williams 2013; Fox, 2012; Fox, 2016). By upholding scientific integrity within risk reporting, the press have seemingly shifted towards adopting scientific accuracy as a more truthful ontology compared to constructivism around social facts of risk. The scientific ontology appears to suggest that public understanding of risk is distilled, by news media, from an accurate scientific authority. The assumed accuracy of scientific authorities, which legitimises risk information, appears to rely upon several key presumptions that underpins scientific modes of knowledge transfer. First is the presumption that scientific credibility is conferred by the peer-review process in academic publications (Goldbeck-Wood, 1999). Within the analysis, "peer-review" was observed to be generally used as a narrative short-hand to signify the integrity of scientific expertise. "Peer review", as a term, appears to encapsulate wider concepts of objectivity, clarity and the reproducibility of data to assure readers of scientific accuracy. A word count analysis conducted upon the corpus of Health risk reporting demonstrated that the average number of news articles which mentioned "peer review" increased from 72 stories in the earlier periods of risk reporting to 554 in the later periods. However, some contention was noted regarding the journalistic value of peer-review

Peer review is the modern sacred cow. "Has it been peer-reviewed?" people ask, breathlessly, when presented with a finding. But peer review is not definitive…

…You might suppose no scientist would publish a brilliant new idea ("vitamin supplements kill you") without comprehensively validating it, yet the vitamin paper did not report what the patients died of. (Kealey, 2008 - The Times, April 28)

Peer review, the process by which the merit of scientific ideas is judged, is regarded as a certificate of excellence. Peer-reviewed journals set the standard; peer-reviewed grant applications are supposed to be proof positive against bias or conflict of interest…

..It is a tribute to the essential honesty of almost all scientists that the system works at all. The temptation to turn down a piece of work that undermines a referee's pet theory, or to reject a grant award from a deadly rival, must at times be overwhelming. Yet examples are hard to find. (Hawkes, 2008 - The Times, March 12)

Both above examples seemingly illustrate resonant dissatisfaction towards the assumptions made of peer-review as a process to ensure scientific accuracy. However, they perhaps present the best evidence to demonstrate how integral the use of peer-review had become within the latter periods of risk reporting. Both examples outline the core contention that journalists

seemingly relied upon the respectability of peer-review, rather than considering how human flaws that can influence the accuracy of published risk information (for a more detailed analysis of such concerns, see chapter 6). Despite these concerns peer-review remained a key tool for risk reporters to communicate the scientific accuracy of their news stories, possibly demonstrating a change within newsrooms to prioritise scientific voices (rather than disputing them) within risk reporting.

The second aspect of scientific credibility is the presumption that scientific news sources are politically independent social actors. Political independence is considered to be a cornerstone of scientific integrity (Grunwald, 2006). Data from analysis within this chapter suggests that news narratives within the earlier periods were more inclined to suggest that science was a tool of government power, which news narratives in the latter periods were more inclined to suggest that science was an independent watchdog of government. One possible reason for this was possibly due to the increased profile of professional health organisations (PHOs) as news sources in the latter periods. Supranational organisations such as the World Health Organisation (WHO), the European Health Care Agency (EHCA) and the International Monetary Fund (IMF) were just some of the PHO sources identified during the narrative analysis. Such PHO sources may aid the perceived political independence of science by being information sources which produces evidential information and are independent of domestic policy goals (McCoy *et al,* 2009). Furthermore, such PHO sources may hold some authority to sanction national governments which fail regulatory commitments (Portela, 2010; Gowlland-Debbas and Tehindrazanarivelo, 2004). Additionally, PHO sources may provide a better standard of scientific evidence by drawing upon large, geographically diverse, datasets to generate inferential statistics.

The Narrative of *ethos* within Risk Reporting

From the thematic analysis, it appears that *ethos* provided risk reporters with a narrative tool for establishing the 'authority' of scientists to speak on risk issues (Sagal and Richardson, 2003; Miller, 2003). It was observed that narratives of *ethos* were subject to change between the earlier and later reporting periods as scientific sources became viewed as more credible and politically independent. Within the narrative of *ethos,* the image of scientists was initially intertwined with narratives of dogmatic technocrats who were willing to introduce hidden risks for the sake of technological development. In the latter periods, narratives around scientists became more focused on the image of hope, that technology would be able to find solutions to our

contemporary risk issues. Within the earlier periods, scientific information was usually disseminated to the public in official reports and usually accompanied by a statement from the relevant minister. Scientists rarely commented on their findings and were generally absent as news sources, unless they were particularly media friendly (for further analysis, see chapter six). The seeming closeness between modes of scientific production and ministerial power may have formed the bases for journalistic scepticism towards 'government science' (Durant, 1999).

The signifier of 'government science' was used as a narrative shorthand by risk reporters to suggest that governmental policy agendas had influenced the scientific assessment of risk in the early periods of risk reporting. It was seemingly presumed that 'government science' reached conclusions where the dangers surrounding particular risk objects were omitted to ensure the profitability of particular industries. "Government science" carried narrative connotations across news cycles, suggesting that scientists were generally willing to abandon scientific principles to either forward their own career or avoid punitive reactions from government ministers. This appears to have facilitated narratives which questioned the trust afforded to scientists from the public:

Scientists, too, have been affected. They used to rank close to the top in the trust ratings, but in the post-BSE era they have lost their place. A striking aspect of the debate over genetically modified food is the way in which scientific advice is not trusted to settle the matter: consumers dismiss official statements as mere "opinions", not much more valid than their own. Government scientists told them beef was safe when it wasn't - and consumers won't be fooled again." (Freeland, 2000 - The Guardian, October 4).

Freeland's characterisation (above) of scientists as seemingly villainous actors appears to have been contrasted by the seemingly heroic characterisation of maverick scientists (Seale, 2003). Within the earlier periods of risk reporting, maverick scientists presented an appealing hero to the story by appearing as lone voices of dissent against the power of "government science". Maverick scientists were generally seen to be presented as wise, prophetic, and trustworthy characters, who risked their career to provide the public with revelatory knowledge of hidden risks. Dr Richard Lacey and Andrew Wakefield are two key maverick scientists which appear to map the rise and fall of the narrative tool. Both Lacey and Wakefield were portrayed as 'noble crusaders' of truth against governments safety assertions (Eldridge and Reilly, 2003). Lacey claimed in the late 1980s that BSE was potentially transferrable across species, and

Wakefield claimed in the late 1990s that the MMR vaccine could potentially cause neurological issues in children. While both Lacey's and Wakefield's claims were granted trustworthiness by being dissident in nature, Wakefield's claims were offered further credibility by being published in the Lancet:

[Wakefield] first provoked a storm in 1998, when he and leading colleagues published a paper in the medical journal The Lancet describing a new form of serious bowel damage in 12 children with autism and reported that several parents had said their child's physical and mental decline followed MMR vaccination. (Fraser, 2001 - Sunday Telegraph, January 21)

The heroic characterisation of Maverick Scientists in the early periods appears reliant upon a cultural favourability towards dissenting scientific voices. Galileo's heliocentric solar model and Einstein's rejection of Nazism serve as two key examples of principled scientists rejecting authority, being on the right side of history, and contributing to popular scientific folklore for doing so (Lessl, 1999; Rowe; 2012). The cultural mythologisation of maverick scientists may have entrenched a professional, journalistic, heuristic which views maverick scientists in a similar fashion to Whistleblowers - Institutional actors who dissent against authority who appear to be suppressing information (Santoro and Kumar, 2018). In the case of BSE, this approach served the press well, enabling newspapers to promote themselves as champions of the people for being seen to pressure the government into finally admitting what they suspected was true - that there was a causative link between BSE and nCJD (Burgess, 2010). However, during the coverage of MMR, risk reporters appear to have prematurely concluded that Wakefield's findings were indicative of a government mis-step in withdrawing the Measles, Mumps, and Rubella single jabs form the NHS. News reporting heavily emphasised Wakefield's proposal to reinstate the single jabs and give parents the option to choose which vaccination regime they would prefer for their children (Lewis and Speers, 2003). While the concept of parental choice within a liberal western democracy had value to right-leaning newspaper newspapers, left-leaning newspapers generally sided with the mounting evidence suggesting that the MMR vaccine was safer than the potential diseases. Fragmentation of the press over MMR was unprecedented. During the BSE coverage, the British Press presented a unified front against the government by spotlighting and supporting the claims of Richard Lacy. Press divergence over the Wakefield affair lends evidence to suggest that the role of maverick scientists within media campaigning on risk had begun to shift.

Within the later periods of risk reporting there was a notable change in the characterisation of maverick scientists by the press. It seemingly became commonplace for maverick scientists to be characterised as crackpots and scientific oddities, individuals who should not be taken seriously, but whose apparently absurd claims offer a sense of entertainment for a discerning audience:

Last week a thrilling but unsettling goal appeared to have come a step closer with the announcement by Craig Venter, the maverick scientist, that his laboratory had constructed the world's first completely synthetic genome…

The feelings [Venter] provokes are so intense that one profile in The New Yorker magazine from 2000 began with a quote from a string of fellow scientists, saying: "Craig Venter is an asshole. He's an idiot. He is a thorn in people's sides and an egomaniac." (Leake, 2008 - The Sunday Times, January 27 - 2008)

As Leake's example illustrates, Venter's known reputation as a maverick scientist appears to directly de-legitimise his reputation. Although the story, and Venter's maverick profile appear to be engaging enough to publish within the British press, the overt caveat is that Venter's "breakthrough" should be considered with scepticism as it breaks from the scientific consensus on what is possible.

The role of the scientific consensus within the narrative of *ethos* became more apparent over time. For instance, there were 543 stories in the early periods which featured "scientific consensus"and 2,902 within the latter periods.

If there is a scientific consensus that what you do is bad for you - smoking, drinking yourself into a stupor every night, eating chips, shagging Kimberly Fortier - then I'm afraid you have to give it up. Don't look at me like that, it's not my fault (Mangan, 2005 - The Guardian, January 3)

While global warming is affecting the entire planet, there is a scientific consensus that it is impacting the Arctic much faster… Scientists tell us that polar bears, ice living seals, walrus, and some birds are very likely to decline. (Watt-Cloutier, 2005 - The Guardian, January)

The above examples seemingly illustrate how appeals to a scientific consensus exhibits trust towards scientific risk information through the narrative of *ethos.* This is achieved by suggesting that risk information has been authenticated by a global network of professionals who desire

positive social change. The examples do, however, exhibit the rhetorical tactics of this narrative as appeals to the scientific consensus are stated and not evidenced. Mangan's article demonstrates this by juxtaposing two irrefutable risks - smoking and binge eating - before claiming there is scientific consensus on the risks of "shagging Kimberly Fortier". While this appears to be an attempt at tongue-in-cheek humour, it appears to demonstrate how integral scientific credibility had become to the narrative of *ethos* in building a relationship between reporters and their audience over risk information. Watt-Cloutier's example illustrates how allusions to scientific consensus can help promote a biased position on social activism over risk. Watt-Cloutier asserts that a scientific consensus exists over the risk of global warming to the Arctic, without contextualising the statement with information from the wider research community over the risks to vulnerable global populations from climate change. (Rosenzweig *et al,* 2001; Carmine *et al,* 2012). Both examples seemingly rely upon appealing to an ambiguous scientific authority for the purpose of improving the prestige of the story for their audience. Utilising the scientific consensus in such a manner may amplify the agreeableness of the story by situating the core contentions of the article within the domain of 'settled science' (Segal and Richardson, 2003). For news sources, this may provide them with rhetorical leverage to defend their claims by refuting criticism as being anti-science or conspiratorial in nature.

The Narrative of *pathos* within Risk Reporting

From the thematic analysis, it appears that *pathos* provided risk reporters with narrative tool to 'recall' salient emotional states to serve lessons for the future (Langman, 2003). It was noted that narratives of *pathos* more robust than narratives of *logos and ethos* and altered little between the early and later periods of risk reporting. Narratives of *pathos* exhibited a well-used structure, where select moments of British risk history were used to forecast potential events within the ongoing chronology of failure. The criteria used by risk reporters when selecting key moments of British risk history is unclear. However, a resonant theme of 'risks to women and children' emerged from the news stories. This suggests that narratives of *pathos* provide the press with a media template when writing risk-based news stories. Kitzinger (2000) suggests that media templates are a standard approach to news production which helps readers to make sense of risk information by replicating themes between news cycles. By focusing on risks to women and children, reporters may effectively prime their audiences for affective responses to risk, while easing the degree necessary cognitive labour to perceive the risk as important to manage.

Within amplified risk reporting, the Thalidomide scandal (1958-1962) emerges as a repeated point of reference. A word count analysis demonstrated that, across the wider corpus, there were 97 news stories in the earlier periods and 175 news satires in the later periods which mentioned Thalidomide. It was also noted that the majority of mentions for Thalidomide occurred within peak periods of risk reporting, suggesting a relationship between amplified risk reporting and the selection of Thalidomide within narratives of *pathos.* For risk reporters, the Thalidomide scandal presents a foundation for a robust media template on risk, Thalidomide provides an early example of where regulatory oversights and unconditional trust in institutions resulted in a novel healthcare technology having a profoundly negative impact on 'normal life' for many families (Chisholm, 2019).:

"I took Thalidomide regularly during the pregnancy. My GP prescribed it, not for morning sickness, but as a sedative because I was having trouble sleeping…

We often felt as if we were in a running battle with the authorities and the medical profession… They gave her false arms, horrible plastic ones, but Mandy hated them. (Welch, 2008 - The Daily Mail, July 8)

In the above example, Walsh goes beyond detailing the risks associated with taking Thalidomide during pregnancy to depict how 'normal' life was subverted by the drug. Rather than blaming the mother for taking the drug, Walsh portrays the mother as another victim of Thalidomide, alongside her daughter. In the example, victimisation begins with the doctor intervening in the 'normal' discomforts of pregnancy and reoccurs through the lack of government support and mental anguish at raising a physically deformed child. When analysing the broader themes within narratives of *pathos,* subversion of 'the normal' appears constituted by three distinct elements: (1) The hidden threat of technology to progeny. (2) The permanency of damage to 'normal life' from risks. (3) The struggle for recognition from government faced by victims of risk.

In many cases, the hidden risk of technology to progeny is identified as direct risks to children (Kitzinger, 2000). However, as the analysis revealed, risks often is presented as a threat to more abstract aspects of reproduction such as a woman's sexual attractiveness or fertility (Kitzinger, 2004). Within the narrative of *pathos,* themes emerged which suggested that *readers* who adhere to a precautionary logic around risk will be rewarded by avoiding damage to their ability to attract a partner, bare children, and/or raise a family. The press appears to rely upon a media template where technology risks significantly diminishing a woman's 'normal' physiology

by introducing bodily trauma that renders them less (attractive, fertile, sexual) than precautious women. Such a template was particularly notable in stories around ruptured breast implants, breast cancer and mastectomy, and the Zika virus.

When suggesting the permanency of risk impacts on 'normal life', the press generally rely upon a presumed hegemony of cultural values underpinning audience understanding (Douglas and Wildavski, 1983; Sjöberg, 2000; Gramsci and Hoare, 1971; Sallach, 1974; Hall, 1978). Within risk reporting, this hegemonic sense of 'normal' is seemingly presumed to be an anticipated trajectory of symbolic life events. Risk reporting may encourage audiences to reflect on their status as a 'good citizen' by allowing readers to check what social benchmarks they have achieved across their personal biography (Richardson, 2004; D'Emilio, 2000; Lupton and Tulloch, 2001). Furthermore, by encouraging such a reflective exercise, risk reporting may also permit readers to consider the potential for socially deviant (risky) actors to disrupt (harm) their anticipated trajectory of symbolic life events. From analysing narratives of *pathos,* anticipated life events appear to describe six phases of life: (1) Develop as a child in a safe and loving family. (2) Acquire life and employment skills through education. (3) Secure financial independence through stable employment. (4) Form long term sexual relationships and have children. (5) Provide a safe and loving environment for children to grow. (6) Be supported in retirement by family and the social security apparatus.

Within narratives of *pathos,* when an applied technology is suspected to interrupt the expected flow of anticipated life events, and disrupt normality, risk reporters appear to respond with suspicion and cynicism. For example, there was a resonant concern across the reporting that industrialised farming methods would greatly impact different aspects of anticipated life events:

Meadows sing of the unfurling of spring and the bounty of late summer, reawakening the childlike sense of wonderment in each of us… I was brought up among the meadows of rural Somerset and my childhood memories are filled with these experiences. I wanted my daughter to grow up with them, too, but as a mother I found that the fields I loved had vanished… The decline of our meadows is due to modern, intensive agricultural practices and the conversion of pasture to arable land. (Pascoe, 2017 - The Guardian, Feburary 5)

In the above example, Pascoe draws upon her personal biography to suggest that her child's anticipated life events will have been negatively impacted by the loss of meadows from industrial

farming methods. Using this lens of nostalgia, Pascoe narratively bridges the loss of childhood 'wonderment' at the natural environment to suggest a loss of identity with cultural heritage is detrimental to personal biography (Routeledge, *et al;* 2011*)* Underpinning the technological scepticism in Pascoe's narrative further highlights a presumed disgust towards industrial farming methods, which renders food as little more than the systemic optimisation of sustenance through technological intervention (Scott *et al,* 2016). As such, technology is rendered as a degenerate social force which divorces children from their environment, heritage, and community. This is presumed to place children at risk from developing a stunted understanding of the world, which harms their ability to navigate through the phases of 'normal life'.

When outlining how victims of risk will struggle for state recognition, within narratives of *pathos, risk* reporters tended to spotlight events which undermined audience presumptions in the suitability of Britain's social security system (Berndsen and McGarty, 2010). The seeming invisibility of those reported to have been victimised by risk appeared to be a reason for extending news cycles beyond the initial reporting. Such reporting appeared intent on establishing a link between government policies which permitted the widespread use of untested (risky) technologies and the injustices faced by victims:

[Former Prime Minister John Major] said: "BSE… has been a dreadfully scarring experience, above all for the victims and families of victims of this terrible disease, who must have suffered an agony of mind and body we can barely imagine." Last night bereaved dad Roger Tomkins, whose vegetarian daughter Clare, 24, was reduced to howling 'like a sick animal', said: "At least now there is more protection for public health." (Prince and Hardy, 2000 - The Mirror, October 27)

In the above example, Prince and Hardy report on the outcomes of the BSE inquiry, drawing upon the statements made by a former Prime Minister in which he acknowledged the victimisation caused by nCJD. This is notable as a contrast to the general state of institutional denial of the risks surrounding British Beef, and by extension the cause of BSE being newer forms of cattle feed. It was the institutional obfuscation around BSE (presented earlier within this chapter) which appears to have prolonged news coverage of BSE over a decade. Institutional obfuscation over risks highlights how opaque institutional communications policies, general thoughtlessness about informing the public, or the intent to suppress public information (Dornbusch, 1998; Ford *et al,* 2013). Within narratives of *pathos,* such institutional obfuscation is often depicted upon a spectrum of frustration that ranged between annoyance at institutional irresponsibility to charges of institutional malfeasance. Perhaps one of the most egregious forms

of institutional obfuscation was when institutional news sources attempted to attenuate the dangers posed by applied technologies as being 'acceptable risks':

But the concept of acceptable risk, as highlighted by the BSE scandal, will always be subject to varying interpretations. And, the issue becomes even murkier when the impartiality of the quangos and bureaucrats is called into question. Consider how…the fact that the impartiality of the government's 'independent' committee of experts - which is advising the government on whether GM food is safe - has also been queried." (Born, 1999 - The Guardian, February 18)

As the above example seemingly illustrates, 'acceptable risks' raises journalistic questions over the methodology used by institutional actors to define risk, and therefore harm and victimisation (Chapman and Wutzke, 1997). For risk reporters, the methodology used to identify "acceptable risks" outlines a seemingly arbitrary process where a proportion of the population have been bureaucratically identified as unfortunate recipients of danger for the sake of technological development. Such an approach to defining risk renders those reportedly victimised by technology as being inconsequential, and not warranting social support (as demonstrated by the Thalidomide example earlier in this chapter).

Conclusion

This chapter synthesises a range of evidence to suggest that the framing and narrative rhetoric surrounding risk information was subject to temporal changes which roughly map upon the previously identified periods of risk reporting. The data presented within this chapter suggests that changes to the manner in which risk-based news was reported is likely to have occurred at the boundary between the second and third periods. From the framing analysis, a relationship was observed between Certainty and Blame which is likely influenced by selection of news sources by risk reporters. For instance, in the second period, there was an uncharacteristically high expression of Certainty and elevated expression of Blame which appears to be related to the platforming of non-institutional sources by the press. The expression of Certainty and Blame appears related to mediated confrontation between government ministers and pressure groups over assertions of safety and risk respectively. There is also evidence suggesting that decisions to raise the profile of pressure group sources within risk reporting was predicated upon proactive newspaper campaigns. The overlapping newspapers campaigns on risk within the second period appear to have been justified by, and an attempt to recapture, the press victory over BSE in the mid-90s.

It further appears that, following the fallout from the House of Lords third report and misreporting of risk information around MMR, the risk reporters sought to better represent the profile of scientific news sources. While this change came at the cost of effectively deplatforming non-institutional perspectives, there appears to have been a substantial shift towards providing scientific interpretations of risk information within the press. The decision to platform a more professional, credible, and tentative news sources appears to have influenced the character of the Uncertainty frame towards being built upon scientific uncertainty, rather than being built around a general state of public unknowingness. The increased profile for scientific sources appears to be a result of risk reporters moving away from prioritising journalistic balance towards scientific balance within news stories. However, there is some tentative evidence to suggest that the character of scientific balance has changed around the boundary between the third and fourth periods of risk reporting. Scientific news sources appear to have become more inclined to offer policy recommendations within their statements to the press, offering the presumption that their policy advice is drawn from a consensus on evidence.

There was also evidence suggesting that rhetorical narratives around risks were also subject to change over time. Again, the locus of change appears to be at the boundary between the second and third periods. The narrative elements of *logos* and *ethos* appear to be the most likely rhetorical structures to exhibit temporal changes. Narratives of *logos* appear to have shifted away from disputing science as a form of government power and towards relying upon scientific credentials to dispute government power. The function of peer-review emerged from the data as a narrative shorthand to confer acceptability and trust towards interpretations of risk information. However, there appear to have been contentions by journalists about the social currency placed upon peer-review, and credentialism as a whole, to provide accurate interpretations of risk. Such concerns seemingly raise journalistic questions around the objectivity of science when placed under pressures from neoliberal systems. Narratives of *ethos* also appear to have changed over time, reorientating around the respectability of credentialism. The value of renegade, controversial, or maverick scientists appears to have declined after the mid-2000s, while the value of the credible scientific consensus appears to have increased within risk reporting. This shift highlights a change in the nature of credibility within the press, moving away from individual voices which dispute ministerial statements on risk, towards prioritising the idea that policy decisions are based upon a well-considered evaluation of available data. Where statements from scientific news sources highlights areas of improper risk management, it may be presumed that an evidence-based re-evaluation of policy could ensure a proper precautionary approach. However, It was also noted that the scientific consensus, as an abstract

concept, can be used as a narrative short-hand for news sources to confer believability to their claims without necessarily providing scientific balance within their statements.

The narrative of *pathos* did not appear to have undergone any major changes over the reporting periods. Generally, narratives of *pathos* built upon an ongoing chronology of failure which sought to recast historic missteps of governance within contemporary contexts to forecast how disastrously risk events could resolve. There does, however, appear to be a well-established media template to narratives of *pathos,* which may be intended to produce visceral emotional responses within audience in an attempt to promote precautionary social organisation. This media template generally focuses upon risks to women and children and suggests that their victimisation by risk objects would leave them marginalised and disrupt their anticipated biography.

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Chapter 6 - Paradigmatic changes to Journalistic Conventions of Risk Reporting

Introduction

Whilst the two previous chapters in this thesis has provided evidence to establish at least four distinct periods of risk reporting, there has not been any substantial explanation as to why these periods can be observed. The aim of this chapter is to contextualise previous findings by drawing upon the lived experiences, professional observations, and expert knowledge from members of the British press. Drawing from interviews with interviews with twenty members of the British press, three distinct paradigms of risk reporting were suggested which comprise distinctly different approaches to risk-based newswork. The Traditionalist approach appears to have been the dominant form of risk reporting until the early 2000s, proceeded by the Scientific approach until the early 2010s, which was followed by the Digital approach in recent years.

Each approach outlines how press conventions appear to be largely guided by the presumptions made of audience attitudes towards science journalism, the contemporary pressures upon newswork, and the impact of technology on story writing. It is these changing press conventions over time which provides evidence to suggest paradigmatic changes in risk reporting over time. The remainder of this chapter will better establish these paradigms using interview data from British risk reporters.

The Traditional Paradigm of Risk Reporting - 1980s/1990s

Across the interviews, risk reporters generally contended that the key journalistic principles guided newswork. Interrogating the truth behind risk information, being an independent voice to critically evaluate institutional risk management, and providing a fair, representative, platform for debate were widely considered to be central to risk reporting (Hargreaves, 2003). However, interviews also acknowledged the the limitations and pressures of news creation often tempered such principled ideals. Interviewees suggested that, during the 1980s, a focus of risk reporting was to generate public *interest* in science journalism. The drive to generate *interest* appears to coincide with concerns over the *value* of science journalism to improve the profitability of newspapers. To develop *interest*, and produce *value,* risk reporters appear to have relied upon traditional media strategies of *sensationalism* and *politicisation* to make the story behind risk information more relatable to newspaper audiences (Schiro, 2016; Ahern and Connolly-Ahern, 2019). Interviewees suggested that, by using this strategy, scientific accuracy was sacrificed to

establish a linguistic framework which contextualised risk information within the presumed experiences of a general audience:

By calling it 'mad cow disease', which I know probably makes you cringe now, but it put BSE on the radar. it was kind of our best stab at getting the gist of the issue over to the readers… You know - It's much more subtle and interesting, the relationship between 'the truth' and the way things pan out in reality. So, strangely enough, journalists can get things on the agenda by sensationalising them so then they can be properly discussed. - Interview Delta

In the above example, the interviewee outlines a key convention to risk reporting within the Traditional paradigm that sensationalises risk information to illuminate potentially contentious policy and facilitate public debate. Given that, prior to the ubiquity of internet technologies, news media were the only viable platform to inform the public of risk information, this appears to have placed a particular value on the role of risk reporters as 'truth seekers' (Miller, 2001). As risk information was generally embedded within institutional reports during this period (see chapter five), and occluded from the public view, it seems likely that risk reporters were among a limited selection of the public that were capable (or willing) to access these reports. While interviewees acknowledged that, within the Traditional paradigm, the scientific literacy of the British press was limited they also contended that the traditional journalistic techniques to probe information was suitable to report on risk. The general scheme of newswork followed a structure where reporters would encounter risk information, assess if it warranted further examination, contact a range of sources to both contextualise the information and provide their own interpretations of the potential impacts. As such, interviewees placed particular emphasis on triangulation methods to verify if interpretations of risk information were largely accurate.

Interviewees largely agreed that the verification of risk information relied upon the range of available sources. As such, it was suggested that a professional expectation of risk reporters was to develop and maintain a network of sources which could provide authoritative statements on risk information when needed. However, pressures such as limited access to research scientists and tight deadlines, often encouraged risk reporters to rely upon readily available sources who appeared knowledgeable on matters of risk. Given that, during this period, the majority of Britain's national newspapers were headquartered at Fleet Street, London, this appears to have encouraged risk reporters to rely upon apparently knowledgeable news sources from pressure group organisations who intentionally sought them out in the local pubs:

When we was in Fleet Street you had, not only the head of the Central Electricity Generating Board, but the guys from Greenpeace and Friends of the Earth all meet up and have a pint in the Cheshire Cheese. Oh, the arguments we all used to have about nuclear power (laughs). I can't see that happening nowadays. I mean, information has never felt so tightly controlled as it seems today. - Interview Eta

There was this sort of innocence to the way things ran in the Eighties. It was much more, kind of, porous and leaky and slipshod back then. Back when people really did go out for lunch and get all the gossip from the day before. - Interview Delta

As the above examples suggest, Fleet Street's central location provided a hub for those looking to sell an *interesting* risk-based story to come into contact risk risk reporters. For journalists, being approached by a potential story lead may have been more exciting, and potentially rewarding, that repackaging information obtained from newswire services. After the press victory regarding BSE, the value of risk reporters to pressure group sources appears to have become more established. Several interviewees recounted events where there were approached by story leads looking to capitalise upon a risk-based media event or possibly developing one themselves:

Well, before Wakefield did his infamous Lancet Paper, he actually a patient my way. I remember doing the interview in the mid 90s. It was a straightforward patient case study, you know - 'Family torn asunder by mystery disease', human interest type thing. There was a very loose culture to health reporting back then. I mean, do you remember Cherie Blair and her healing crystals? I had a lot of people approaching me to do stories after that one. - Interview Eta

What the above example suggests is that, towards the end of the Traditionalist paradigm (late 90s) the value of risk reporters appears to have developed away from dogged truth seekers towards a possible marketing platform for pressure groups and other parties interested in profiteering.

The *politicisation* of risk information was another journalistic strategy, suggested by interviewees, which was integral to placing risk on the public agenda during the Traditionalist paradigm. The ability to *politicise* risk information apparently draws upon the privileged position of the press to broadcast political information. As a functionalist account of their job roles, interviewees contended that a key responsibility was to maintain awareness of political actors

who were suspected of influencing (presumedly surpassing) the institutional management of risky technologies. As such, the press operated as a de facto public watchdog by being aware of the political relationships that would be hidden from the general public (Trench, 2007):

On health scares, such as 'mad cow disease', the big issue for us was that Government didn't know who it was there for. It acted on behalf of industry and farmers, rather than the public. Only when [reporters] understood that, and saw every health scare in that context - through that lens - did we start reporting things accurately. [Reporters] started to think 'why have [the government] done that?'… [The Politicians] all came from a landed gentry background. They owed land, therefore they appreciate farming. So you got health crises because they saw things through that lens, and not through a lens of public protection. - Interview Alpha

As the above example seemingly illustrates, there was a resonant presumption that, across the 80s and 90s, politicians considered the application of risky technologies under a veil of secrecy. Generally, interviewees considered a dichotomy to risk-based news stories where the general public were being forced to accept novel health risks from applied technologies, and that the benefits of these technologies would accrue as profits for elite actors invested in the projects. Interviewees reported that, by the late 90s, there was increasing attempts at news management from institutional sources within government. Such news management was perceived as increasing restrictions in access to, and the framing of, risk information (otherwise called 'spin') (Quinn, 2012).

When 'spin' was perceived around institutional risk information, it apparently confirmed journalistic instincts of controversy, cover-up, or corruption within government. Such concerns legitimised the perception that the risk-based news story had 'legs' and was in the public interest to be reported on. However, the presumptions of secrecy around institutional relationships provided journalists with a cognitive framework to anticipate that *something* was being suppressed by institutional power, even if there was little evidence of institutional malfeasance initially. The *something* may have been completely unrelated to the actual hazard facing the general public, but may still be *interesting* to the readership (E.g. Abuses of power, misappropriation of funds, corruption). As such, the claims of risk from non-institutional actors appear to have provided a vehicle for journalistic probing into government wrongdoing, even if the claims of risk lacked factual substantiation. Trying to uncover what the *something* was seemingly formed a key aspect of risk reporting within the Traditionalist paradigm. Interviewees suggested that when one newspaper 'broke' a story over risk, other rival and sister newspaper would often marshal resources to pursue their own angles on the story. One reason for a cascade of risk reporting

around specific events may be because risk reporters shared a journalistic ethos of holding power to account (Kitzinger, 2009). Within a risk reporting cascade, each news desk at their respective newspaper would leverage their own, unique, collection of news sources in an attempt to 'break' new information on the developing situation:

Listen, as a journalist, you had a sense of being a part of some great tradition in which we had a responsibility to democracy. I mean, our responsibility was not to science - or even to our own proprietor - it's actually to the reader. That's what I meant by 'doing things properly'. You had to think very responsibly, and it might not be the same kind of 'responsibility' that a Research Council chief, or some Cambridge researcher would want, but they were not our chief concern. - Interview Mu

As the above example illustrates, risk reporters within the Traditionalist paradigm may have shared a sense of duty to interrogate the events around a risk-based news story in order to shed light on occluded decision making process for public scrutiny. However, this sense of duty appears to have informed amplified risk reporting as there appears to have also been a general permissiveness towards scientific inaccuracies, mistakes, and errors within risk reporting. During the Traditionalist paradigm, there seems to have been little emphasis on challenging the inaccurate statements from news sources, so long as those statements were accurately reported (Gunter *et al,* 1999*).* Interviewees suggested that there was a conventional presumption of audience ambivalence towards scientific accuracy at the time which dissuaded them from seeking higher standards of risk reporting. Furthermore, interviewees justified this position by suggesting that the time needed to ensure scientifically accurate reporting would have negatively impacted their ability to rapidly produce a high volume of news stories within tight deadlines (Adam, 2013). Interviewees identified five factors which were considered to have negatively impacted their ability to produce scientifically accurate risk reporting during the Traditionalist paradigm.

1) Time pressures

One of the key factors put forward by interviewees was that the time pressures of news production had a major impact on the scientific accuracy of risk reporting. Several interviewees suggested that they often were allocated mere hours to investigate an issue and write a story. They also claimed that they were expected to submit several stories a day. During the story writing process, interviewees often encountered conflicting, incomplete, or irrelevant information

and would have to rely upon their own intuition to make sense of events before embedding statements within the story. Time pressures may have been compounded by the limited communications technologies available in the 80s/90s (Winston, 1998). Interviewees suggested that potential scientific sources were often unreachable by telephone outside of office hours or would take too long to return calls. As such, risk reporters may have frequently discounted research scientists as ideal news sources and chose more reliable, readily available, sources who were somewhat knowledgeable on the topic in question (Conrad, 1999; Major and Atwood, 2004).

2) Lack of scientific background

Much of the daily risk reporting appears to have been conducted by dedicated science journalists who were attached to science, health, or environmental news desks. Interviewees gave the impression that their understanding of science was at an enthusiast level and were able to articulate complex scientific ideas. However, it should be noted that amplified risk reporting cascades often attracted reporters from other news desks such as politics, consumer affairs, or rural affairs (Ashe, 2013; Kitzinger, 2009). Interviewees suggested that the stories from non-specialist reporters often diversified the focus of reporting around risk events and exacerbated the degree to which risk was *sensationalised* and *politicised.* This impact may have been due to the broad socio-political connotations of risk extending beyond the scientific domain to incorporate issues which were of interest to non-specialist news desks.

3) Editorial oversight

Interviewees suggested that the primary role of editors during the Traditionalist paradigm was to set an *interesting* direction for their news desk. Interviewees readily described how editors endorsed stories which were expected to draw and maintain readers attention, with the ultimate goal being awarded a front-page status. However, if a story was viewed as being less valuable by editors, it was expected that the story would be heavily edited and positioned towards the end of the newspaper. Interviewees raised a notable point of contention being that editors would often request risk reporters to write stories on seemingly facile issues such as fad diets, homeopathic practices, and pseudo-scientific oddities (such as crop circles). Due to their perceived precarious employment, interviewees admitted they were often reluctant to refuse such assignments and applied the same level of professionalism to stories they knew to be scientifically baseless:

It happens with alarming frequency. You'll have editors walk past your desk and ask you to do a story on something you know is complete and utter bollocks. But, you gotta do your job. And if you

keep refusing to do your job, you suddenly find yourself out of a job. I've seen it happen far, far, too often. - (Interview Delta).

Another contentious issue was that the headlines which accompanied news stories was often written by sub-editors. Interviewees felt that headlines were constructed without input from the reporter, who would be named in the by-line. While interviewees felt that headlines served the purpose of being *interesting,* they often misrepresented the story and amplified risk in their own regard. One final point of contention was editorial absence during holiday periods around summer and Christmas. Some interviewees described these periods as the 'silly season', suggesting that particularly low-quality risk-based reporting was more than likely to be published than at other points in the year. Some interviewees recounted examples where newspapers would have to issue retractions of stories which completely lacked scientific and journalistic merit but were otherwise published due to the lack of editorial oversight. The summer 'silly season' was particularly notable for interviewees as it coincided with the parliamentary recess, providing reporters from political news desks the opportunity to try their hand and risk reporting in lieu of emerging stories from their traditional news beat.

4) The transience of newspapers.

When reflecting upon the Traditionalist paradigm, interviewees candidly suggested that audiences lacked general interest in the science of risk reporting. It was apparently presumed that reporting on the scientific intricacies of risk was too boring for general readers (Reed, 2001). Interviewees further suggested that the general lack of objections from audiences over scientific concerns provided evidence to confirm that the science of risk was not *interesting* aspects of the story. Where letters to the Editor did object to scientific misinformation, these were usually from readers with scientific credentials and were perceived as a fastidious nuisance which ignored the pressures of newswork.

The intended disposability of newspapers may have also encouraged risk amplifying approaches to newswork. Some interviewees emphasised that the purpose of risk reporting within newspapers was to be a cheap thrill, which was likely to be forgotten when the reader disposed of their newspaper (Obsolescence AND Lewis, 2010. As such, risk reporters may have justified modes of working which encouraged a permissive attitude towards amplification through providing exaggerated interpretations of risk information. Given that physical newspapers were rarely archived by the general public, risk reporters may have felt that previous

stories which exaggerated risk would only be scrutinised by small academic circles and not the general public.

The Scientific Paradigm of Risk Reporting - 2000s

All interviewees considered the fallout from the MMR coverage (see chapter five) to have been instrumental in facilitating major changes to modes of newswork around risk reporting (Dobson, 2003; Jackson, 2003; McCartney, 2013). This resulted in the dominance of a Scientific paradigm of risk reporting which extended from the early 2000s into the early 2010s. Interviewees suggested that a turn towards the Scientific paradigm was based upon concerns that the British press needed to repair its reputation by producing scientifically accurate risk reporting and that there was an emerging market of readers who were specifically interested in science-led stories.

Interviewees described how reputation is a significant social currency for the press as it is seen to facilitate trust and confidence in readers that their chosen newspaper produces truthful stories (Shmatikov and Talcott, 2005; Jempson, 2005). There appears to be a concern that, if a newspapers reputation is tarnished by inaccurate, misleading, and false reporting, then readers would begin purchasing papers from competitor news organisations. However, some interviewees made the distinction between journalistic accuracy and scientific accuracy to highlight the decision-making process of some risk reporters which may lend itself towards misrepresenting science within news stories:

Ok, so you can brought up to IPSO (Independent Press Standards Organisation) **for 'inaccurate reporting'. But, and here's the trick, 'accuracy' doesn't mean 'scientific'. Lets say, hypothetically, I am interviewing you right now. And you say something silly like 'eating cheese causes cancer'. Well, in my story, I write 'UK Academic suggests that eating cheese causes cancer'. My story is accurate, I am accurately reporting your statement. But, scientifically, it's false. Accurate, but false. That's what needed to change. - Interview Tau.**

The distinction between scientific accuracy and journalistic accuracy has not been addressed within British press standards. While journalistic accuracy is outlined as the good faith interpretation of statements provided by news sources (Editor's Codebook, 2019), scientific accuracy is the suggestion that the press interprets scientific information in accordance with a well-established scientific consensus (National Research Council, 1989). While interviewees identified the MMR coverage as particularly damaging to the reputation of the British press,

others were quick to mitigate responsibility for their reporting. This was achieved by highlighting how the credibility of Wakefield's claims were conferred by being published in the Lancet:

The MMR story had the same spark as BSE, but with different ingredients. Basically you had sick babies, autism, devastated parents. Easy pictures. Easy Human interest interviews. And umm - actually, to be fair on the reporters back then, the reason that story took off back then was because the Lancet ran it and made it a big thing…For Science journalists, their benchmark is - 'has the claims been published in a peer-reviewed journal', or is it being discusses in a conference of decent standing, or whatever. And the Lancet publishing the paper was a big, big, thing to lift off the whole debate. - Interview Lambda

If the MMR claims hadn't appeared in the Lancet, it wouldn't have been covered. If the GM food story hadn't appeared in the Lancet, it wouldn't have been covered…it was purely the prestige of the Lancet itself which made a huge difference. I mean, if the Lancet publishes something, that's obviously the top journal. It has a lot of credibility. Perhaps it shouldn't, but it does. So, on that basis it was very har to say to a journalist 'oh, you can't believe the Lancet' and it was just very difficult for journalists to actually stand in the way of a story like that. -Interview Kappa

The examples above perhaps best demonstrate why notions of scientific accuracy have yet to be codified within press standards. Whilst it is simple to suggest that risk reporters draw from a scientific consensus as a benchmark of scientific accuracy, there are still few guidelines on how this may be achieved. It would be similarly simplistic to assert that risk reporters should be up to date with the contemporary literature across scientific disciplines. Such a suggestion would presume that risk reporters become experts across all fields of science and have the resources to access all scientific journals.

It was suggested that increased public scrutiny of the press was one of the major reasons for the change towards science-led risk reporting. For some newspapers, particularly *The Guardian,* it appears that there were editorial decisions to appeal directly towards an emerging market of readers looking for more scientifically detailed coverage of risk-based news stories. Interviewees contended that Dr Ben Goldacre's *Bad Science* column (published in the Guardian between 2003-2011) was a hallmark of excellence for a wider public movement which sought to challenge and debunk some of the more egregious forms of scientifically misleading risk amplification (Bonetta, 2007; Krimsky, 2007; Colson, 2011):

One of the more helpful innovations was actually down to the Guardian, funny enough. It was Ben Goldacre and his *Bad Science* column. It essentially, I mean, he actually told us what it was we should and shouldn't be doing with statistics and science and that. He then proceeded, in his column and blog, to ruthlessly vilify all those who defended the status quo. And that, of course, included the popular papers. - Interview Alpha

You know, it's funny, because around that time Ben Goldacre started his column - *Bad Science* - which was doing, in a very explicit way, what was needed to be done in journalism - calling out the really bad coverage at that point. And it was something that I was trying to do too, just slightly more gently (laughs). - Interview Delta

Similar to many other forms of public scrutiny of risk reporting, *Bad Science* was originally published as a blog in the early 2000's. *The Guardian* syndicated *Bad Science* as a dedicated column which spanned the entirety of the Scientific paradigm. The draw of *Bad Science* for *Guardian* readers appears to be the novelty of witnessing a scientific expert passionately excoriate the press on the appropriate use of facts, scientific balance and the principles of the scientific methods - all couched in the language of sardonic humour (Best, 2015). *Bad Science* may also have provided readers the chance to see their own objections towards amplified risk reporting being addressed by a newspaper, without the need to write letters to the editor. Within *Bad Science,* Goldacre encouraged his audience to submit examples as the basis for his upcoming articles. By working in partnership with his audience to act as a media watchdog, Goldacre may have empowered other news audiences to demand higher standards of risk reporting from other newspapers (Jönsson and Örnebring, 2011; Lewis *et al,* 2010). For journalists, *Bad Science* represented a shift public attitude away from the *sensationalisation* and *politicisation* of risk, which was common within the Traditional paradigm, towards a more measured treatment of scientific information within risk reporting which characterised the Scientific paradigm (Colson, 2011).

The elevation of *Bad Science* from fringe internet blog to a mainstream newspaper column seemingly represents an acknowledgement from the press that scientific discourse had become integral to public discussions around risk. It also acknowledges that prior modes of risk reporting could produce problematic coverage of risk events that negatively impacts risk perceptions (Bauer, 2005; Massarani and Moreira, 2004). Being published on the Guardian's website also provided Goldacre's column with a highly visible archive of press failings. For risk reporters, this may have been an uncomfortable stimulus to produce science-led reporting by posing a risk to

career progression, as being exhibited on *bad science* may have been unattractive to potential employers.

Interviewees also suggested that Goldacre did not limit his involvement with risk reporting to just documenting poor examples on *bad science.* They suggested that, once Goldacre became published in *the Guardian,* he sought to embed himself in the wider journalistic community. It was suggested that Goldacre offered guidance and practical advice in personal conversations with journalists who were amenable to science-led risk reporting. Goldacre's advice appears to have followed best practice guidelines outlined by Science Communication research and included a better understanding of statistics, understanding the principles of scientific investigation, an appreciation of the scientific consensus, the value of scientific credibility, and the need for scientific balance (Spiegelhalter, 2008; Spiegelhalter, 2017; Homig, 1993; Nisbet and Scheufele; 2009; Ceccarelli, 2011; Clarke, 2008).

While interviewees identified Goldacre as a highly visible influence on the British press, it cannot be suggested that he was the sole actor campaigning for press reform. The Science Media Centre (SMC) was established as a response to the House of Lords third report on Science and Technology with the stated goal of improving British risk reporting, which mirrored the intent of other organisations such as Sense About Science (SAS) (Fox, 2012). While the scale of involvement by these social actors is difficult to assess, even by the methods used in this thesis, it appears that such actors helped orchestrate the establishment of the Scientific paradigm of risk reporting. The central convention of the Scientific paradigm was to shift away from describing *what* the potential dangers of applied technology could be, towards explaining *how* applied technologies could help manage the risks facing society. Interviewees suggested that developments in communications technologies assisted with changes to the conventional approach to risk reporting. Interviewees identified the ubiquity of mobile phones, and later smart phones, across the 2000s as a liberating force for risk reporting. Such technologies improved the ability of risk reporters to contact suitable scientific experts at all times of the day to help contextualise risk information and provide impactful statements (Reich, 2013). Coupled with the decentralisation of newspaper headquarters away from Fleet Street, interviewees suggested that they became less dependent upon the availability of seemingly knowledgeable sources to provide risk information. The ubiquity of Email within the 2000s also assisted risk reporters broaden the range of potential sources to a global pool of scientific expertise, who had apparently become increasingly eager to speak to the press:

What has made a fantastic difference to [journalist's] lives is email and the internet. It has become quite easy to get hold of someone. Once upon a time, we would never have dreamt to contact a professor in Tuckahoe, or wherever, and ask them about the astrophysics of a blackhole. But now, it's easy to get hold of him, or the Harvard, or the Smithsonian people. And, of course, the Oxford and Cambridge lot too. So, in that sense, science has become much more democratised and it's much - much - easier to get hold of an expert. - Interview Gamma

[British Universities] were not very good at public relations, and the European universities were unspeakably bad. I tell you, the number of times there would be some professor who had a paper out in Nature, or the Lancet, but they wouldn't be there to be questioned - They'd gone away! You'd ring a university switchboard you'd they operator hadn't ever heard of a Professor So-and-so. All this has changed in a big way since the internet. Now you have press departments who actually email out press releases, all in English! It's so different now. I mean, once upon a time, it was the role of the press office to keep a University's name out of the paper, now they are all looking to make sure they get good publicity - Interview Beta

The developments in communications technologies also appears to have impacted the public sharing of scientific information. Aside from blogs dedicated to debunking bad science, a wider cultural movement appears to have emerged in the early 2000s which sought to prioritise facts, logic, and scientific knowledge. Dubbed the 'New Atheist Movement' this counter-cultural identity seemingly sought to challenge anti-science religiosity which was perceived to have become entrenched within the decision-making processes of Western governments (Pigliucci, 2013). For New Atheists, the apparent relationship between evangelicalism and political power was problematic as it was fired that appeals to divine authority would undermine evidence-based decision making across policy domains (Schulzke, 2013). Perhaps the most poignant example would be, then US president, George W Bush's claim that God had instructed him to "end the tyranny in Iraq" as a justification for the War of Terror (MacAskill, 2005). In a more abstract sense, there were wider concerns that the dominance of evangelical religiosity would encourage structural support for anti-science positions around creationism, anti-vaccination movements, and climate change denial (Kettell, 2013; Amarasingam and Brewster, 2016; Pucci *et al,* 2018). While some of these concerns are drawn particularly from American social contexts, internet access provided a nexus by which the British public could engage in these debates.

Similarly, to the debunking strategy of Goldacre's *Bad Science* blog, New Atheist actors also used internet platforms to identify, and excoriate, outrageous examples of anti-scientific decision

making. (Cimino and Smith, 2010). By producing discursive content which contested religious claims with scientific facts, appeals to scientific authority, and logical thought exercises, New Atheists were seemingly able to establish a social identity which seemingly challenged powerful institutions (Cimino and Smith, 2011). The growth of New Atheism online appears to have fostered an offline consumer market, which was seeking to engage with more professionally produced material from credible and popular scientific sources (Bullivant, 2010; Amarasingam, 2010). Publishers of popular science books appear to have capitalised upon this market trend by (re)publishing works by controversial, pro-science authors, which directly attacked superstitious irrationality (Pigliucci, 2013). While it is not suggested that perceived irrationality of risk reporting, and public risk responses (Frewer, 2004), was developed from religiosity, there may have been enough overlap in terms of scientific illiteracy to conflate both issues as evidence for the public being in need of better scientific understanding.

While the New Atheist movement was largely an American phenomenon, cross-cultural adoption of a pro-science cultural identity may be linked to public disquiet towards the British-American 'special relationship', which involved Britain in the US-led War of Terror (Marsh, 2012). Across the 2000s, the British press had increasingly introduced the British public to American policy issues, posing a journalistic critique of the US as the Western cultural hegemon (DeFoster, 2010; De Benedictis *et al;* 2019).

While newspapers sought to critique the seemingly illogical American resistance to liberalism over issues of gun control, abortion, and gay marriage (Clements, 2012; Clements and Field, 2018), pro-science voices appeared to critique the seemingly harmful American healthcare system. Goldacre's column (and subsequent popular science books *Bad Science* (2010) and *Bad Pharma (*2014) highlighted some of the questionable practices of American pharmaceutical firms and health insurance companies, which appeared to be anathema to the British cultural context entrenched in the lionisation of the NHS.

By establishing an online presence during the 2000s, Newspapers were granted virtually unlimited space to spotlight the idiosyncrasies between British and American policy decisions and to provide context to risk information that sought to improve the public understanding of science (Shema and Bar-lain, 2011). During the Scientific paradigm, almost every newspaper featured a dedicated science blog which offered supplements and highly detailed reporting on a range of scientific issues. Newspaper science blogs were often given a broad remit, limited

editorial oversight, and uncontested press freedom to pursue the issues the news-desk fancied (Wolinsky, 2011):

It was the bloggers, really. They changed things. The Freelancers, and other such people who were independent and particularly interested in scientific topics. They were the ones who really put the effort in and were actually giving out the correct information. So, they they were kind of a free-market counterbalance within journalism as a whole. - Interview Zeta

Press releases are a great resource for freelancers. You kind of get all the correct information you need to update your blog - data, facts, quotes. Everything really. It's good to help you get work. Although, once get are commissioned, the editors expect you to go beyond the press release. - Interview Iota

As the above examples illustrate, the virtual freedom afforded to journalists by newspaper blogs enabled them to engage in risk reporting on their own terms. It appears that science-led risk reporting was the preferred mode of newswork, and that the institutional orientation of the 2000s facilitated it. Furthermore, interviewees suggested that, by engaging with science-led risk reporting, they were able to build relationships with scientific organisations. Such networking appears to have encouraged a good faith transmutation of information, with risk reporters increasingly encountering scientific press releases being emailed directly to them. This process of direct email appears to have replaced the reliance upon newswire services, which was common within the Traditionalist paradigm. Both press releases and newswires contained all the basic information necessary to write risk-based news stories. One of the key differences appears to be that press releases were written by dedicated personnel who understood the needs of risk reporters when writing science-led stories, while newswires were aimed at more generic reporting and highlighted the political aspects of risk.

The Digital Paradigm of Risk Amplification - 2010s

All interviewees suggested that, by the 2010s, news reporting had become well integrated into the framework of ubiquitous internet technologies. (Doyle, 2013). Interviewees suggested that their stories were developed from online risk information, information sources were contacted via the internet, and that stories were published online first before being repackaged for physical newspapers. However, while this Digital paradigm of newswork was seen to have expedited news production cycles, Interviewees identified several issues of contemporary risk reporting that appear to have helped establish a post-truth perspective on risk: (1) the struggle

generating revenue online. (2) the routinisation of risk reporting. (3) the uncritical handling of risk information.

The key issue for interviewees was that the difficulties generating revenue online had negatively impacted the resources available to health, science, and environmental news desks for risk reporting. It was suggested that, as news audiences increasingly preferred to read news stories online for free over purchasing newspapers this had caused a decline in revenue for news organisations. It was further suggested that declining revenue had caused the reduction of news teams dedicated to risk reporting and the shuttering of services such as blogs and other science-led feature writing. A resonant theme emerged where interviewees felt that risk reporting had become a public relations platform for science, rather than a journalistic platform:

That's the thing with this 'post-truth reality', or whatever it is we're in now. Science is governed by money, and reporting *on* science is governed by money. People these days don't know what to believe when they read it." - Interview Nu

"That's where this whole 'post-truth' aspect comes into play. People don't trust the experts any more, but the experts don't know that. Sometimes even we forget that, and then we say '*this* is right and it's good and you have to listen. - Interview Xi

As the above examples illustrate, interviewees generally felt that the generally pro-science messaging around risk reporting in the Scientific paradigm has helped develop a public perception of mistrust towards scientific institutions. Interviewees further suggested that risk was becoming antagonistically amplified by alternative media platforms which act as public watchdogs over the apparent relationship between scientific, journalistic, and political institutions (Cooke, 2017).

The routinisation of risk reporting was suggested to be a direct result of the difficulties generating revenue from online news reporting. It appears that the time pressures on risk reporters to turn over stories had increased far beyond the pressures experienced during the Traditionalist paradigm. These new time pressures were viewed as antithetical to the modes of newswork established during the Scientific paradigm where risk reporters were encouraged to dedicate time to fully exploring the scientific contexts behind risk-based news stories:

Nowadays you don't have the same problem of 'space' when it comes to writing a story, but there's a 'time' problem. It's become very important to be the first with news on the web. If you can publish a story ten seconds before the others, then you have scored. But, doing it quickly isn't the same as doing it properly. I mean, right now, you have all the sources for your story already available on the web, so it's become bloody difficult to come up with anything new. - Interview Alpha

As the above example suggests, a new convention has emerged within risk reporting which prioritises rapidity and turnover of news stories which caters to an increasingly online audience that is dependent upon the algorithmic selection of news stories by online search engines (Nielsen, 2016; Carlson, 2007). Interviewees also suggested that Search Engine Optimisation (SEO) has become the primary focus of risk reporting, indicating that risk reporters may be inclined to (rapidly) produce stories which fit a specific template that ensures the maximum possible visibility from search engine results (Guan and Cutrell, 2007). As such, interviewees admitted that they were largely dependent upon press releases from scientific institutions as they often contain all of the necessary elements to write a risk-based news story as quickly as possible. Interviewees further suggested that, during periods of intense media focus on specific risks, they would often be inundated with a range of press releases which shared similar language that made the process of SEO optimisation easier to achieve. As such, some interviewees felt that risk reporting within the Digital paradigm was more akin to 'churnalism', which blurs the lines between journalistic integrity and organic marketing campaigns (Jackson and Moloney, 2016).

The suggestion that the uncritical handling of risk information is endemic to the Digital paradigm is one of the more problematic themes emerging from the interviews. It was suggested that, as a result of 'churnalism', reporters were simply repackaging risk information embedded within press releases without taking the appropriate steps to verify the claims:

You know, I don't like that assertion. The quality of science reporting hasn't improved at all. Twenty years ago there were big science teams producing pages and pages of coverage every day. Today, it all looks a bit broken down, you know? Blogs have gone by the wayside. There are far, far, fewer correspondents. Now, we just have the sort of science journalism where people are copying and pasting press releases It doesn't look all that great to me. What I've seen with my own eyes is the loss of British Science Journalism, and it has been replaced with advocacy. Pure science PR advocacy. - Interview Gamma

As the above example illustrates, there appears to be a professional distinction between more inquisitive science journalism and less inquisitive science writing. The boundaries between these two professional identities appears to be located at the trust afforded towards scientific institutions to be truthful about the risks from technology and the idealistic prospect for science to mitigate contemporary risks. Those risk reporters who tended to be sceptical of the power of scientific institutions (or at least the capitalist incentives underpinning scientific research and technological applications) tended to self-identify as science journalists, while risk reporters who generally trusted scientific institutions to provide the best solutions for social progress tended to self-identify as science writers. Within interviews, self-identifying science journalists suggested that being critical of scientific power was detrimental to career progression and have since transitioned into freelance journalism or out of journalism completely. Furthermore, those interviewees suggested that, due to financial pressures on news organisation, they were actively encouraged to leave mainstream journalism as editors wished to replace older science journalists with younger (and less expensive) science writers. Such a perspective was corroborated, in part, by science writers who admitted to accepting precarious, underpaid, positions or unpaid internships at mainstream newspapers. One interviewee suggested that, due to their lack of experience, science writers often exhibited a skills deficit when it came to interrogating risk information. Again, this was corroborated by science writers who contended that the lack of senior journalists within newsrooms had produced a culture which lacked suitable routes for mentorship:

Now, another trend I have noticed is the growing innumeracy within science reporters today. They are utterly unable to figure out a graph, or compare two data points and come to a sensible answer. It often leads to them making these large, exaggerated, claims. They can write *about* science, sure. They have degrees in it. But they don't come with the mathematic or scientific wherewithal to interrogate data. So now you are seeing selection bias and political bias from young reporters. It annoys me, this lack of systematic thinking. It's easy nowadays, you see a statistic in a press release from a supposedly reputable source and just not think too much about it, and write the story. That's the kind of attitude which comes from people being forced to work harder in smaller teams - Interview Sigma

The one thing that would really help me is a mentor. It's daunting to try and find really good stories. Sometimes I really don't know where to start. I know the older science journalists - that's a lot of what they had to do. They kind of learnt as they went along. But it's difficult because science writing isn't exactly growing. We're at a bit of a bottle-neck and we don't seem to have the jobs available, so the older ones just sort of move on. - Interview Upsilon

Both of the above examples above provides evidence which disputes the idea that science training has particular value in improving the quality of risk reporting (Waksman, 1991; Reed and Walker, 2001; Besley and Tanner, 2011) for research which supports the evidence within this chapter, see Dunwoody, 2004). It appears that currently, training in science writing do not incorporate the full range of necessary journalistic skills into their curricula. Several interviewees recounted their experiences of science writing training at university. They suggested that there was an over-emphasis on press failings around risk reporting (such as MMR) rather than a focus on data inquiry, data visualisation, and general employability skills:

One of the big ideas they have is that 'all you need is better science training for your journalists to write better health risk articles'. And, I mean, there is definitely a long way to go on this. We get told that we 'should be aware of basic statistics', not taught how to do statistics. We get told about misinterpreting data, not taught how to avoid it. We get told about biased data, and not what to do when data confirms our own bias. And then, we go off to some press conference, and everyone else there is young, you know? And we just sit there and nod. Sometimes it's like, are we even *doing* journalism? - Interview Pi

As the above example suggests, interviewees who self-identified as science writers also feel that they are lacking the necessary journalistic skills to probe, and question risk information provided by institutional scientific sources. Furthermore, these interviewees generally agreed that the lack of available, and approachable, senior journalists at news desks has produced a culture which lacks mentorship and skills development.

Almost all interviewees identified the over-reliance on press releases as a problematic hallmark of risk reporting within the Digital paradigm. While press releases were seen as as aiding risk reporting within the Scientific paradigm by containing and contextualising scientific information, interviewees suggested that the structure of press releases changed by the Digital paradigm and are more likely to contain partially complete stories. Based upon the credentials of scientific institutions, some interviewees admitted that there was little reason to verify risk information presented within press releases as scientific accuracy could be presumed. A handful of interviewees who appeared knowledgeable of University processes claimed that the phenomena of press releases presenting to risk reporters as partially complete news stories had become more common since British Universities adopted the Research Excellence Framework in around 2010. Other interviewees claimed that, more recently, university press officers have become conditioned to writing *sensational* press releases which attempt to attract media attention and satisfy the REF's 'impact' criteria:

Look, there's a lot of pressure now on scientists to be really dramatic. I think that's one of the real driving factors of this 'post-truth' reality that's coming our way. One pressure is managerial, the other is financial. Over the past few years there are socially constructed pressures to be dramatic with your findings and attract funding. I mean, the government want to be able to demonstrate a return on investment, right? They put taxpayer money into universities, and now universities are judged by the impact factor of their research. You now have the REF which is all about measuring performance in terms of social impact. It's all gone very 'metrics' in the past five year. like everything else in business, it's problematic. - Interview Theta

Concerns over the relationship between the *sensationalism* of university press releases and the uncritical management of press releases by the press has previously been addressed within academic critiques of the REF (see Smith et al, 2011; Martin, 2011, Sousa and Brennan, 2014). There has also been some evidence suggest that University press releases exaggerate research findings and that news reporters are not inclined to dispute press releases (Sumner *et al,* 2014; 2016).

The social media amplification of risk was identified by interviewees as the final hallmark of poor risk reporting in the Digital paradigm. Whilst it was not intended for the research to explore this dimension of risk reporting. The relationship between social media and the risk-based newswork emerged as a substantial concern for all interviewees. Identifying social media as a democratising force for discussions around risk, interviewees suggested that, within the Digital paradigm, the general public have acquired access to their own political voice, circumventing the need for mainstream news to platform their perceptions (Mythen, 2010). As such, for risk reporters, social media platforms provides both an information rich source for newswork and a litmus test of public opinion for their own reporting. Some interviewees suggested that social media was a positive technology which championed a 'marketplace of ideas', where fact-checking is crowdsourced by truly independent actors.

Ultimately, social media is a force for good. You know that there is an army of people out there who are ready to take to social media and point out where risk has been misinterpreted, or a particular angle has sensationalised risk. It's good. It acts as a check and balance for the press, and for government - Interview Beta

However, the majority of interviewees were more pessimistic. They argued that social media encouraged 'echo chambers' which reinforced biases, perceptions and worldviews on risk. Such

echo-chambers are conceptualised as selective communities online which reinforce risk perceptions by developing conspiratorial narratives around risk management and presumed intent of political power (Walter *et al,* 2018; Del Vicario *et al,* 2016a). One of the common tactics of 'echo-chambers' is to view institutional risk information as a manipulative tactic of powerful institutions which aims to nudge public perception to coerce public behaviour which suits elite agendas (Del Vicario *et al,* 2016b, Quattrociocchi *et al,* 2016; Törnberg, 2018). Online 'echo-chambers' tend to readily exhibit selection bias which favours radical interpretations of risk information, while outlining discourses that delegitimises the framing of risk presented by mainstream news platforms (Sasahara *et al,* 2019; Van Dalen, 2019). Furthermore, 'echo-chambers' are often in conflict with one another, seeking to legitimise their own perceptions over their idealogical rivals in order to reinforce group cohesion (Edwards, 2001). Some interviewees suggested that this fragmented social media landscape had produced an ontological crisis in the public perception of risk, where information becomes interpreted through identitarian lenses:

The worrying thing about social media is that people tend to only listen to other people who share their outlook. So you can get two completely parallel streams of commentary on risk issues on social media. Look at vaccines for example. Now you have researchers saying 'vaccines are safe, don't be an idiot, protect your children'. On the other hand, you have the anti-vaxxers saying 'The scientists are liars for big-pharma. Look at all the side effects Vaccines can cause. Don't trust them, they just want to make a profit off your kids'. Completely parallel streams of information with absolutely zero overlap, and often little to do with the actual science. - Interview Alpha

Some interviewees contended that the monetisation of social media platforms was instrumental in amplifying risk and fostering identarian division. By permitting users to generate revenue though becoming 'influencers', social media platforms had effectively permitted the capitalisation of conspiracy on an unprecedented scale (Conway, 2020). By being able to engage in risk reporting at a fraction of the cost compared to mainstream news outlets, these social media influencers may be able to compete with mainstream media platforms, in terms of reach. By presenting audiences with content which blurs the boundaries between scientific entertainment and politically incorrect showmanship, social media influencers may amplify risk with the intent to achieve internet virility and further boost their audience:

The legacy media is having real trouble at the moment with making money in a digital world. Everyone can find anything out for free. Right now, people just don't want to read science content. It's boring. But fake news? Now that's exciting. Look at the meteoric rise of conspiracy theorists like Alex Jones. He's a showman. He'll say things like 'the Government are turning fricking frogs gay with chemicals'. Then he'll slap a journal article on screen where scientists used a chemical which

stimulated hermaphroditic developments in frogs like it's proof of some nefarious plot. How can we compete with that? (Laughs). - Interview Delta

Journalists have a duty to represent people's views, even if they are quite wacky. At the moment, we are failing to do that. We got too concerned about not platforming the wackos, rather than disproving them. So, now you have personalities like Alex Jones who are actively courting fringe ideas and are getting popular off them. The wackos have social media on lock-down because they know exactly what they are doing. They are amplifying risk for attention. And, that's because most experts and journalists don't see science as something entertaining, but rather as a black and white part of the job. Ok, sure, you have Brian Cox but he's too dull and overproduced. Those scientists with quiet voices are trying to be rational and give you context, but they are being drowned out by people yelling about gay frogs and globalist agendas. - Interview Epsilon

As news production moves increasingly into the Digital paradigm, interviewees expressed some concern that mainstream news platforms will lose the authoritative voice to disseminate risk information as the public begins to trust fringe, but seemingly authentic, information sources (Lews, 2018). This produces a dilemma for risk reporters who appear stuck between the institutional demands for accuracy (outlined by the House of Lords Report) and a growing public appetite for news narratives which satisfy their risk perceptions. The social media amplification of risk signifies a substantial shift in risk reporting where the general public have begun to write their own stories on risk, and risk reporters may feel increasingly disenfranchised to correct the record.

Conclusion

This chapter provided evidence from the lived experiences and observations of risk reporters which contextualised the observable changes in risk-based news stories (chapters 4 and 5). Three distinct paradigms of risk reporting appear to have established, which roughly correspond with the temporal ubiquity of communications technologies. The evidence provided by this chapter illustrates the impact of communications technologies on the process of newswork and risk reporting. Furthermore, this chapter outlines how the limitations of technology aided the amplification of risk prior to the 2000s (the Traditional paradigm), and that personal communication technologies assisted in deamplifying risk reporting across the 2000s. However, the deamplifying impacts of personal communication technology appears to be dependent upon the resources made available to risk reporters which encourages long-form reportage of science,

health, and environmental risk issues. This chapter also provides evidence which suggests that the media amplification of risk may also be cyclical as new audience markets emerge which may demand different forms of risk interpretation within their media content.

Transition from the Traditionalist to Scientific paradigms appears lately influenced by efforts to adhere to the recommendations made within House of Lords third report on science and technology. While the work of organisations such as the Science Media Centre does not appear to have directly influenced modes of work for interviewees, it does appear that well entrenched actors may have a profound effect on altering journalistic practice by drawing attention to the shoddy work of their peers. The dispersal of newspaper headquarters across London appears to have had an impact on amplified risk reporting, as journalists became increasingly unapproachable to those from pressure group organisations. Additionally, the increased willingness of scientific sources to speak to the press appears to have a profound impact on risk reporting, encouraging risk reporters to rely upon scientific expertise as a highly valuable news source.

There is evidence to suggest that developments across the 2010s has resulted in a Digital paradigm which has placed risk reporting in a more precarious position. The transition towards online delivery of news stories appears to have resulted in difficulties in generating revenue for news platforms, which has led to a loss of journalistic skill in risk reporting. Demands for cheaper labour appears to have encouraged the hiring of inexperienced science writers who lack the confidence to be critical of scientific power and are overly reliant upon press releases for their risk-based news stories. Conversely, internet technologies appear to have encouraged alternative media structures which are able to produce risk-based content which can compete with mainstream media. Furthermore, there appears to be a new media market emerge which actively seeks bias-confirming content from alternative media structures which amplifies conspiratorial interpretations of risk information.

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Chapter 7 - Conclusions and Limitations

Conclusions

This thesis explored the changes to risk reporting within the British daily newspapers between 1985 to 2017. The aim of this study was to use a mixed methods analysis to identify linguistic markers of change for amplified risk reporting and contextualise textual observations through the lived experiences of risk reporters. This thesis fills a prominent gap in existing knowledge by substantiating observations that risk reporting within the British press has changed over time. This thesis further affirms that amplification is not simply given by the scale or frequency of events but is the product of a complex interplay between amplification factors, previous experience of risk events, and the context of trust in institutions of risk management.

With the changes over time, four distinct periods of risk reporting were observed which reflect different conventions in risk-based news work. Each of the four different periods of risk reporting reveal differentiated expression of key markers for the amplification of risk. The first period of risk reporting was characterised by a low volume of published risk reporting, and high uncertainty within news stories over the meaning of scientific information. Risk reporters explained that the limited availability of scientific expertise as a news source and a general lack of oversight were major contributing factors to the narrative framing of risk information during this period. The second period of risk reporting was characterised by a rapid proliferation of risk-based news across the decade, mirrored by increasing *sensationalism* and *politicisation* of risk reporting. The rapid proliferation of risk reporting appears to follow the media victory of BSE, where media campaigning on the risks of British Beef forced the Government to retract their previous assurances of safety. Linguistic markers demonstrated that there was a disproportionate expression of *alarming* language, alongside news narratives which sought to blame the government for failing to keep the public safe from harm. At the time, risk reporters felt a need to amplify risk information within their news reporting to draw public attention to the perceived abuses of power and corruption from government. Within amplified news narratives, a framing contest were readily observed where inexpert and Maverick news sources actively disputed Government safety assurances with their own perspectives on risk and danger.

The third period of risk reporting signifies a notable change in amplified risk reporting. The third period was characterised by a high volume of risk reporting, but a stabilisation in the rate of

proliferation, *sensationalist,* and *politicising* language. Also observed within the third period of risk reporting was a decline of *alarming* language and an increase in expression of uncertainty. These linguistic changes were linked to a prioritisation of scientific sources within risk reporting. Statements provided by scientific sources were generally observed to be more tentative in nature, often framing risk information in ambiguous possibility and downplaying the likelihood of harm. Furthermore, scientific sources were less inclined to blame the government for failing to protect the public from harm but were more inclined to blame the government for failing to achieve safety targets.

The prioritisation of scientific sources within risk reporting appears to have emerged an emerging scientific convention of risk reporting which sought to better utilise credible scientific expertise and better represent scientific balance within news stories. The scientific approach to risk reporting was aided by the increasing ubiquity of advanced communications technologies such as mobile phones, email, and the internet. Improved access to communications technologies allowed risk reporters to more easily, and swiftly, access credible, and substantiated, risk information from reputable scientific sources. University press releases and mobile phones were specifically highlighted as facilitating the ease of access to scientific sources of information. Another impetus for change within the British press was the perceived damage to professional reputations caused by the MMR triple vaccine debate, which coincided with public calls for improved scientific quality within risk reporting from institutions, bloggers, and the public.

Dr Ben Goldacre's *Bad Science* column in the Guardian was identified as a key mechanism of self-regulation for the press, as it provided a critical oversight of the general press failings regarding poor quality risk reporting. While there was only a limited amount of data available for the emergent fourth period of risk reporting, there still exists enough data to suggest some speculatory trends. The emergent fourth period is characterised by a high volume of risk reporting, and rapidly declining rates of *sensationalism.* Within the emergent fourth period, the was a tendency for the press to use *reassuring* language when reporting on risk. However, emergent conventions around digital publishing have highlighted some concerns regarding the journalistic quality of risk reporting. It has been suggested that, while the scientific quality of risk reporting has improved, news production has become increasingly precarious, uncritical of scientific institutions, and politically identarian. It is feared that poor journalistic quality in risk reporting will further amplify risks, as the general public become increasingly distrustful of mainstream media and begin seeking alternative facts from social media platforms.

Aside from the observable periodic changes to risk reporting, this thesis highlights some other general trends of risk reporting which may impact future risk research. First, is the acknowledgement that the overall volume of risk reporting generally increased over time. It should not be presumed that the general increase in risk reporting can be conflated with a general increase in amplified risk reporting. It appears that the general increase in risk reporting over time was influenced by a move towards daily background reporting on risk. The daily background reporting on risk was generally linked to a media focus on the lifestyle choices which are linked with cancer. The second general trend is that the British press disproportionately cover food and dietary risks. As such, any general analysis on risk reporting should consider how analysis can be skewed by the chosen data collection methods. There is still academic value in analysing risk amplification across different scientific disciplines (e.g., Nuclear issues), however it should be acknowledged that such issues only represent a fragment of overall British risk reporting. The third general trend is that analysis into risk communication should consider how the availability of communications technologies influences a journalist's access to information. News sources play the primary tole in framing risk information as journalists tend to build their stories around statements, rather than data. The available communications technologies facilitate a journalist's ability to access institutional scientific sources, who would otherwise be discounted from the public debate.

While the Social Amplification of Risk Framework (SARF) was the key theoretical approach to risk for this thesis, each of the four canonical approaches (the psychometric paradigm, the cultural theory approach, the governmentality perspective, and the risk society thesis) provided a degree of refinement to the analytical lens which aided different aspects of the analysis. For SARF, the conceptual structure of social amplification stations provided an anchor which grounded the analysis within cycles of news production that are embedded within distinct temporal moments. It is, perhaps, too easy to become immersed within news stories as documentary texts and forget the purposes by which risk-based news stories are written: (1) For the profitability of the newspaper, (2) to warrant the salary of the journalist, (3) for a journalist's own career trajectory, (4) for the reader's entertainment. SARF grounded this study by providing a consistent reminder that risk information flows between social stations of amplification, rather than privileging one specific social station as the ultimate arbiter of risk information. Where this became integral to this thesis was in dissuading interpretations of data which suggested that risk-based news stories were the result of top-down pressure from news organisations to promote a specific sociopolitical agenda and encourage analysis which contended that news stories were

produced as a collaborative exercise between journalists and information brokers (news sources) guided by market pressures. Such an approach encouraged reflexivity within analysis by circumventing researcher bias on the process of news creation and encouraging analysis which placed conventional approaches to risk reporting within temporally-bound restrictions around information. Perhaps the biggest weakness when utilising SARF to analyse news texts is that there is no available benchmark to determine whether (what is observed as) amplification is warranted, appropriate, or justified. SARF adopts a scientistic perspective on risk information, and contends that exaggerating risk levels promotes irrational behaviour. From the studies conducted within this thesis, it can be suggested that the press may exaggerate risk levels in order to initiate public debate around the governance of applied technologies and technocratic public coercion. Whilst this may be an uncouth tactic, issues pertaining to social health or environmental justice may require a degree of showmanship to instigate positive policy reform, or risk being facing parochial esotericism.

The psychometric paradigm offered of limited value to this thesis, as public perceptions of risk were not investigated. However, the theoretical insights developed from the psychometric paradigm did assist the methodological design of this study. Issues pertaining to risk perception and sociodemographic factors that have been identified within psychometric risk research - that white, financially secure, men tend to express lower perceptions of risk than other groups - were greatly considered during the interview analysis. While a relative degree of gender parity was achieved for the interviews, the vast majority of interviewees were white and financially secure. However, all participants appeared to be particularly sensitive to risk, or rather the sociopolitical ramifications of risk and public governance. It may be that future research within the psychometric paradigm that is applied to cosmopolitan groups (given their relative access to media influence) should consider how narratives around governance influence public perceptions of risk, rather than the potential health impacts of an identified hazard. Another contribution from the psychometric paradigm applied to this study was that the public perception of risk could not be presumed from the analysis of news texts. As outlined above, 'the public' does not exist as a hegemonic cognitive collective, nor so does a newspaper's readership. As risk perceptions are mediated by spatiotemporal proximity, such a consideration was useful in guiding the analysis to consider the relationship more readily between risk reporters and their audience, rather than between a newspaper's audience and their perception of risk. Whilst this approach prevented the analysis from addressing the higher order impacts and ripple effects of SARF, it installed a degree of robustness to the analysis by negating potentially coincidental links between risk reporting and public behaviour.

The cultural approach contributed, perhaps, some of the key theoretical insights to this thesis outside of SARF. The relativist perspective of the cultural approach unshackled the concept of risk information from scientific accuracy and permitted analysis which considered how different social actors embedded risk information within wider discourses around governance and social coercion. While the categorisation of social actors identified across the analysis was confined to a limited range (e.g., government sources, pressure group organisations, scientists, professional healthcare organisations, and risk reporters / newspapers) general characteristics emerged from the data which facilitated the analysis of news texts. The analysis of news texts became structured around the approaches used by social actors to define risk, and the further use of narrative techniques to reinforce their definition within a contested political arena. In essence, this thesis more heavily utilised the concept of risk as a forensic resource, in that it presumed that linguistic changes within news texts were a condition of shifting professional conventions within risk reporting.

The studies demonstrated that changes to the professional conventions around risk reporting were not just confined to newspapers, but also influenced how more professional risk information brokers addressed news media. Put simply, the technological advances of the internet enabled professional information brokers from more scientific establishments to provide risk reporters with information which was became more valuable to newspapers than non-professional sources. Under the cultural theory approach, it is perhaps more apt to suggest that professionally brokered risk information (which is independent of government) has, over time, become the culturally dominant form of defining risk. Whilst such a conclusion draws inspiration from the concept that risk is a forensic resource, this thesis does not acknowledge the grid / group typology for which the cultural theory is notably famed. While risk reporters, professional information brokers, scientists and politicians may share common demographical features which may allow categorisation as a cosmopolitan social identity, there is little evidence presented within this thesis to suggest if the cosmopolitan identity corresponds to one of the grid/group typologies, or if risk reporting has become a contest to define risk between different cosmopolitan tribes that correspond with different typological identities.

The risk society thesis offered rather limited theoretical contributions to this thesis. The claim that society has entered a state of reflexive modernity, in that we have become preoccupied with "the bads" of global industrialisation over production of "the goods" does not appear to be

substantiated within news texts. It is perhaps more accurate to suggest that, during the 90s, risk reporting was more concerned with amplifying "the bads", while risk reporting has become more orientated around forecasting "the potential goods" from novel applied technologies. Similarly, while there is evidence to suggest that contemporary risk reporting has adopted risk positions - in that ethical issues around particular issues such as climate change are more readily identifiable, there is little evidence to suggest that traditional class positions are less prominent within risk reporting. Traditional class structures (specifically gender and race) appear to be a key element within contemporary risk reporting and may be an attractive story hook of risk amplification in the same manner as sensationalism and politicisation. The concept of individualisation is also scrutinised by this thesis as there is evidence to suggest that there is a dichotomy within risk reporting which both emphasises the power of individuals to govern risk exposure through dietary / lifestyle management, whilst simultaneously contending that other issues such as environmental hazards require regulatory control. However, there is strong evidence that organised irresponsibility is central to risk amplification as health-risk based news stories appear to be structured around the contradiction between governments confidence in it's ability to control risk, and the reality where individuals are left victimised by risk exposure.

Limitations

Despite the robust attempts to mitigate methodological issues which may have influenced the analysis of data within this thesis, a range of limitations were encountered which need to be acknowledged and addressed. This section will approach each of the key studies in turn, beginning with the quantitative analyses conducted in chapter four, before addressing the limitations to the qualitative analyses conducted in chapter five, and finally addressing the limitations to the interviews conducted in chapter six.

Embedded within chapter four are some of the more major limitations of this thesis. One of the major limitations is that analysis of media amplification was limited only to newspaper articles. It is acknowledged that newspaper reporting only forms one aspect of the British media landscape (alongside, TV, Radio, and Internet news platforms), and that the general circulation for newspapers have declined over the timeframe of this study. These two factors do make it somewhat difficult to extrapolate findings to make a statement on the wider state of risk amplification outside of newspapers, or even to link news amplification more directly with the state of public perception of risk.

The decision to focus specifically upon news texts was reached after considering the wider methodological problems which would have been produced from including a more diverse data set. In short, the decision to focus specifically on news texts was the best of a bad situation. The first issue is that Newspapers are, perhaps, the only form news media which is archived to any reasonable degree. By comparison, the only potentially viable archive of (select) broadcast TV and radio programming in the UK appears to belong to the BBC. Even then, the BBC archives appear to be inaccessible without special permissions, which led to further questions regarding the ability to remove archived content from the BBC to be subject to linguistic analysis. For the analysis of TV/Radio news over the past thirty years, a method was considered which would have involved retrieving hundreds of gigabytes (if not terabytes) from the BBC archives and processing the content though third-party speech-to-text software. This would have produced a transcript that could have been then imported into NVivo for further linguistic analysis. While technologically feasible, the current state of copyright law is not clear enough regarding the reproduction of archived content, especially if speech-to-text services are located online. Due to the lack of access to archives, the confinement of UK media archives to the BBC, and potential copyright issues around the use of audio/visual content, the decision to focus upon newspaper reporting was reached. As it pertains to this thesis, there is no evidence available to make wider generalisations to the UK's broader media landscape. It is reasonable to suggest that the amplification of risk upon TV, radio, and digital platforms trace entirely different trajectories to that exhibited by British newspapers. Furthermore, it cannot be presumed that the pressures and conventions of risk-based newswork experienced by the press are translatable to other forms of journalism.

Even after it was decided that newspaper articles would form the corpus of analysis, further limitations were made apparent. It is acknowledged that both the linguistic and narrative framing analysis of risk amplification was conducted solely upon the text of news stories, and omitted images as a form of risk amplifying news text. The decision to omit semiotic, or other forms of image analysis, from the studies was due an unfortunate compromise between breadth of analysis or depth of analysis when selecting which newspaper archive would be appropriate for this thesis. As previously outlined (in chapter three) LexisNexis provided an unparalleled access to a broad range of newspapers within their archives while other services, such as GALE, only provided access to a limited number of newspapers. LexisNexis' archives better suited the aims of this research project by permitting comparative analysis across the broad range of national daily newspapers available in the UK, with the only key exception being the News of the World which folded in the 2011. The major drawback of LexisNexis was that images used within the newspaper were not included as accompaniments to the news texts. The lack of available images

meant that the value of graphical forms of risk amplification were not investigated within this thesis. Aside from the immediate signal value of images used to communicate risk, such as juxtaposing images of cattle against headlines regarding 'mad cow disease', there was also a lack of investigation into infographics, graphs, and other forms of epidemiological visualisation. As it pertains to this thesis, the general decline in amplification observed during the 2005 - 2014 period may be just a methodological artefact and that newspapers had turned towards images and graphics amplify risk. Such an outcome is certainly feasible, given that software packages are now readily available to large organisations which permits easy data visualisation through infographics and charts.

The decision to not incorporate web-based news was also a major limitation for this project. It is acknowledged that, with the relative ubiquity of internet technologies within society, market forces have encouraged newspapers to begin publishing content online. It is uncontroversial to suggest that, nowadays, online news publishing is prioritised by news organisations to access advertising revenue from global news markets. With such an acknowledgement, it may seem strange that this thesis actively chose to omit web-based news from analysis. While there is certainly a great value in investigating contemporary web-based news, it became apparent that there were too many methodological complications when attempting comparative analysis between physical news stories and web-based news.

One of the biggest methodological concerns was regarding an arbitrary distinction of "news" from online. While this thesis could have chosen to select online news from sources which also had a physical newspaper counterpart, this would have ignored valuable news contributions from newer forms of journalistic pursuits which rival traditional news platforms in terms of reach and penetration into the British news landscape (such as Buzzfeed or Vice). The question of "what counts as a news platform online?" was thoroughly considered, however a conclusion was reached where this thesis was not in the position to make such distinctions. Another issue arose when considering which news platforms are accessed by British news readers. While it could be presumed that traditional news audiences followed their newspaper of choice into the digital space, the same presumption can not be made for younger generations whose access to news may have only been through online platforms. As such, there is little guarantee that contemporary audiences only access British-based news platforms, as internet technologies have provided global news platforms the opportunity to be read by British audiences. As it pertains to this thesis, the decision to omit web-based news challenges the validity of results produced from 2010 onwards as there is the assumption that the stories published within physical newspapers

are just as integral to the public understanding of risk as stories published within earlier periods. Furthermore, it is difficult to generalise the conclusions generated by this thesis to encompass the wider digital media landscape (blogs, opinion pieces, or social media). There is also a lingering question of news selection when editors are deciding which online news articles to convert into physical newspaper stories. It is feasible to suggest that news editors may choose to physically publish less-amplifying stories within newspapers to maintain an image of respectability, while encouraging more-amplifying interpretations of information from guest / opinion columnists to be published online only.

Aside from the issues around news selection, the method used to build the corpus of analysis also presented some limitations. The corpus building method was beholden to the search algorithms employed by LexisNexis. While the search algorithms proved to be intuitive (especially after refinement using the 'major mention' tool), the specific approach to corpus building is occluded form the end user. As such, a trial-and-error method was employed during corpus building to ensure that the corpus that was representative of the British press, yet specific to the reporting on health risk stories. A trial-and-error method was employed where a range of potential search terms and optional modifiers were selected, and the results scrutinised for closeness of fit to the intent of this study. The 'Major Mentions' tool proved to be critical in separating news articles where health risks were the key component of the story, and news articles which simply mentioned the phrases "risk" and "health" somewhere within the story (e.g., Coverage of political party manifestos, non-specific opinion columns, or as rhetorical flair in non-health reporting). Although the "Major Mentions" tool was crucial to this thesis, there was no information available from LexisNexis which outlined the deterministic properties of this tool. It appears that the "Major Mentions" utilises an algorithm which weighs the uses of target phrases in linguistic context. Scoping exercises demonstrated that the "Major Mentions" tool was useful for disaggregating risk-based news stories from the 'background noise' of news stories which featured 'risk' as a phrase. Using the "Major Mentions" tool in conjunction with the four popular fields of popular health risk reporting appears to have produced a corpus that was a little too restrictive.

While such a method may have introduced restrictive redundancies into the corpus, it was considered beneficial to the overall aims of the thesis to develop a corpus that lent towards restricted items (and therefore specific to health risk reporting) than a corpus that was too broad (and therefore incorporated higher volumes of generic reporting of limited value). While the obvious approach to generating a more accurate corpus would have been the manual discount of

non-specific health risk stories, such an approach was unfeasible given the time and funding limitations of the project. As it pertains to this thesis, the limitations of the corpus building method produced a simulacrum of risk-based news reporting over the past thirty years. A reasonable criticism would be to suggest that the data gathering method produced an inaccurate corpus which omitted stories that may have evoked a risk amplifying / attenuating effect but did not include the phrases "Health AND Risk". It is possible that some risk reporters may have favoured reasonable substitutions for "risk" (such as "danger") which would have been missed by the data collection method, even if the phrase "health" were present in the article.

The framing and rhetorical analysis of news texts also presented some limitations which will be discussed in turn. With the framing analysis, one major limitation was that the different risk amplifying frames were not weighted regarding cognitive impact on risk perceptions. Due to this, certain frames (Uncertainty, Certainty, and Blame) were privileged within the analysis over other frames (Stigma, Trust, Dread) simply due to the differences in proportional expression of frames within news texts. Such an approach is somewhat reductive, in that it presumes that the most commonly expressed frames are key drivers for the news-led amplification of risk. The framing analysis did not consider the perspective that risk reporters are interpreters of risk information who are bound by codes of conduct to present the available 'facts' of a story.

Less apparent aspects of risk amplification such as Stigma, Trust, and Dread may present a fulcrum by which journalists are able to imagine a catastrophic future, aiding the process of news selection in the first place. Conversely, more apparent aspects of risk amplification such as Certainty, Uncertainty, and Blame may simply be more tangible social proofs which demarcate the limits of what is known, what is unknown, and who is (seemingly) culpable for wrongdoing. Without such social proofs available it may be difficult for a reporter to argue that a story 'has legs', resulting in a story that would be based upon fantasy and speculation - something reputable editors may not have any interest in publishing. As it pertains to this thesis, such a reductive perspective invites criticisms regarding the applicability of the framing analysis as the data was only drawn from moments of peak amplification and not compared with moments outside of peak amplification. Such comparative analysis may have permitted investigation which demonstrated which frames were specifically elevated or suppressed within moments of peak amplification. This may have provided a better evidential basis as to which frames were more integral to risk amplification (as a process) rather than identifying the frames which were more commonly expressed within moments of peak amplification. However, given the breadth of this study, drawing another sample of non-amplified texts risked drastically inflating the volume of

documents for analysis to an untenable number which could reasonably be assessed within the time constraints of this study.

The analysis of rhetoric also presented some limitations which impacted the qualitative aspects of this thesis. While the concepts of logos, ethos, and pathos are well defined structures of rhetoric, there presently does not exist a well substantiated method to exploring these concepts within risk-orientated literature. As such, the approach to analysing the rhetorical risk was guided by the grounded approach to data collection and analysis, which certainly invites criticism. The Narrative Policy Framework (NPF) was considered as a methodological tool to help guide the analysis, as the designers assert that the NPF can be applied to qualitative analysis to produce testable hypotheses which include the temporal changes to narrative structures over time. However, after interrogating the available literature on the NPF, it became apparent that the NPF needed further development before it could be used as an appropriate methodological tool for this study. The first issue was that although the NPF claims to help decode the 'science of stories' for sociological integration, there does not appear to be a dedicated acknowledgement for the purpose of rhetoric within narrative considered by the NPF. The second issue is that, while the NPF claims to be suitable for macro-level analysis (as performed by this thesis), the entirety of the research conducted under the NPF is performed at the micro and meso levels. The third issue may be one that is purely semantic, but is an issue nonetheless, in that the NPF appears to be primarily concerned with the interrelationship between narrative and policy, rather than the sociocultural interplay between risk and rhetoric. The end result was a concern that, if the NPF was used as a methodological tool for this study, then substantial portions of the analysis would have been spent demonstrating how the data corresponded with the NPF, rather than addressing the overall aims of this research. As such, it is possible to suggest that the analysis of risk rhetoric was inspired by, and aligns with, the goals of the NPF and may provide a suitable avenue for further analysis into the sociocultural relationship between rhetoric and narrative.

Finally, the interviews conducted within this thesis were also subject to limitations which may have impacted the overall analysis. The key issue which was not reasonably controlled for was that of expressed bias within interviewees. It was generally noticed that interviewees held either a positivity bias or negativity bias towards mainstream news publishing. Such biases appeared to correspond with responses which viewed changes to press conventions as having a positive or negative impact on risk reporting. While bias was a concern that was acknowledged from the outset of the study, there was little opportunity to initiate controls. Ideally, a psychometric

questionnaire would have been sent to participants to test for positivity / negativity bias prior to the interview. However, it was concluded that pragmatic steps were necessary to avoid burdening potential interviewees as much as possible, and supplementary questionnaires may have risked an increased rate of withdrawal from the study. Such a decision appears to have been the correct choice, as many participants presented as being very impatient with academic enquiry into journalistic practices. For example, several interviewees openly stated that their decision to participate was due to democratic principles of open scrutiny, rather than any real interest in the research project. Other interviewees chided the need to provide informed consent as bureaucratic busy-work which was taking up too much of their time. The pragmatic demand of facilitating the ease of communication took priority over methodological concerns.

This thesis may have included disproportionately more participants with negative bias than positive bias. It was noted that interviewees who generally expressed a more positive bias towards newsroom changes appeared to be those who were contractual employees of large organisations (I.e. Journalists, editors, columnists, communications directors, etc). Those who exhibited a more positive bias appeared to be more readily able to identify specific innovations and pronounce a positive impact on journalistic conventions around risk reporting (I.e. Ben Goldacre's *Bad Science* column). Conversely, interviewees who generally appeared to express a more negative bias towards newsroom changes appeared to be those who were not contractual employees of large organisations (I.e. Freelance journalists, retired journalists, younger 'science writers', etc). Those who exhibited a more negative bias appeared to be more readily able to identify general changes and suggest a negative impact on journalistic conventions (e.g., The interplay between press releases and the time pressures of online publishing). It was also noted that participants with a more positive bias were more likely to have been recruited from the Science Media Centre, while participants with a more negative bias were more likely to have been recruited from the Association of British Science Writers. Another limitation of the interview analysis was that it did not consider participants from other professional backgrounds who interface with the public but are not members of the press. Nurses, perhaps, may have been a suitable sample population as both media observers and frontline healthcare workers who encounter unwise decision making from patients as a regular occurrence. While interviews with nurses would not have produced any insights into the specific newsroom changes that may have impacted risk-based newswork, such interviews may have provided a means to corroborate or dispute claims from risk reporters that specific innovations or general changes had a profound impact upon risk amplification within the British press.