

Storytelling or theory building? Hopkins' sociology of safety

Jean-Christophe Le Coze

► **To cite this version:**

Jean-Christophe Le Coze. Storytelling or theory building? Hopkins' sociology of safety. Safety Science, Elsevier, 2019, 120, pp.735-744. 10.1016/j.ssci.2019.08.003 . ineris-03319110

HAL Id: ineris-03319110

<https://hal-ineris.archives-ouvertes.fr/ineris-03319110>

Submitted on 11 Aug 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Storytelling or theory building? Hopkins' sociology of safety

Jean Christophe Le Coze
Institut National de l'environnement industriel et des risques
Parc Alata
60550 Verneuil en Halatte
Phd

Email jean-christophe.lecoze@ineris.fr

Storytelling or theory building?

Hopkins' sociology of safety

Abstract

In the past two decades, Andrew Hopkins has been a very successful analyst of technological disasters and an acclaimed storyteller. In this article, I argue that he is also a theorist, and that he has developed over 40 years a normative sociological model of safety for studying major events. To do so, I first situate his contribution through a historical perspective going back to the 1970s and 1980s, a time during which Hopkins established core elements of a research program on catastrophic events subsequently deployed in late the 1990s onwards. Initially inspired in the 1970s and 1980s by the crime of the powerful, white-collar crime literature and a Marxist socio-legal perspective of society, he developed what I define as a white-collar crime model of accident (WCC-MA). He then moves in the 1990s and 2000s on to a more organisational and practical sociology of safety elaborated in his retrospective accounts of disasters. To ground this assertion, I explain how his storytelling success results from the invention of a specific narrative structure which is based on a repeated sequence of description (1), assumption (2), explanation (3), comparison (4), recommendation (5) and counterfactual reasoning (6), applied to many articulated topics. From there, I extract a (normative) sociological model of safety built over two decades, and then discuss some of the findings of this study.

1. Introduction

For many of his readers, Andrew Hopkins is a great storyteller. I argue in this article that he is also a theory builder. James Reason wrote in a preface, "*Andrew Hopkins is a consummate storyteller as well as being an internationally known expert on the breakdown of hazardous socio-technical systems. I believe that only stories such as those told here can capture the subtle influences of organisational culture and embrace the complex interactions between causes and conditions*" (Reason, 2005, vi).

The reason for this is that Hopkins' books are read very easily and built on the basis of very persuasive accounts or narratives about the organisational nature of disasters. **But beyond the acclaimed storyteller, Hopkins is also and foremost a critical sociologist. He**

believes accidents are preventable and writes book to convince his readers about it. And he is also, this point is probably more surprising, a theorist, but a kind of theorist to be defined. In relation to this background quickly sketched, Hopkins has in fact felt necessary to make the first point clearer to his readers, namely that he is a sociologist¹.

This is done in a personal account of his own research history with a book published in 2016 entitled "*Quiet Outrage, The way of a sociologist*". As argued in a review of the book (Le Coze, 2017), it is a wonderful insight into the making of a prominent writer with 40 years of publications in the field of occupational safety (Hopkins, 1995), but mainly, industrial safety (13 books, 45 articles, about 2500 pages). As such, Hopkins features alongside other pioneers such as James Reason, Jens Rasmussen, or other sociologists such as Ron Westrum, Charles Perrow, Barry Turner or Diane Vaughan, although his influence is felt much later than these authors.

These writers built their argument and developed their models widely known in the 1980s (e.g. Incubation Model, Normal Accident Theory, Model of Migration, Swiss Cheese Model). In comparison, Hopkins' extensive contribution to safety research becomes widely visible only some twenty years later, early 2000's. This, however, does not mean that Hopkins simply applies existing theories to case studies, quite the opposite. His quarrel with Perrow's Normal Accident Theory (NAT) is the most obvious case in point (Hopkins, 1999, 2001).

Hopkins is a sociologist storyteller because of his use of case studies to produce persuasive narratives to get his message across: disasters are organisational failures, and are preventable. Although this is a very important first point to make, this article goes one step further by arguing about the second point indicated above, namely that his extensive use of case studies combines analytical rigor and normative intent which makes of Hopkins also a theorist, and not only a storyteller. **By normative, one should read proposition of principles to be applied by people in organisations.** One discovers indeed the presence over 40 years of research a recurring, systematic, pattern of conceptual developments tested and applied to case studies of disasters.

¹ Sociology provides specific lenses which differ from other disciplines in safety research (e.g. engineering, psychology). The sociology of safety (or disaster) is characterised by the use of these lenses.

This side of Hopkins' work is not quite acknowledged I believe, and the purpose of this article is to explain the value of exploiting further Hopkins' contribution in this direction. For this reason, I am interested first in deciphering Hopkins' narrative success, and second, his theory of safety. In a first section, I explain how one needs to start with going back in time, in the 1970s and 1980s. In a second section, I reveal Hopkins' narrative structure behind the quality of his accounts, and its success. In a third section, I show that Hopkins is not only a storyteller, but also a theory builder. I then discuss some of the implications of revealing Hopkins' theory for safety research.

2. Methodology

In order to ground the arguments introduced above, I have read Hopkins' articles and books over a 40 years period (Hopkins, 1978a, 2016), and followed a strategy developed and applied in other historical and analytical retrospectives of key authors in the field of safety (e.g. Le Coze, 2015a, b). One outcome is that several possible ways of reading Hopkins' contribution to safety research and to the sociology of safety appear to be equally interesting (Le Coze, 2018).

First, the most obvious is the reading of Hopkins' writings as persuasive stories about the organisational dimension of accidents if one considers mainly his accidents' books which are at the heart of his popularity (Hopkins, 1999, 2000, 2005, 2007, 2008, 2012, Hayes, Hopkins, 2014). This is I believe how Hopkins is mainly read, as cases of accidents' analysis, which, in Hopkins' eyes, could have been prevented.

A second reading is about Hopkins' craft, his ability to rely on a successful narrative structure which underpins his retrospective analysis of disasters and its ability to reach both more academic and practitioners' audience (industry, regulator, consultants).

Third, another reading consists in surfacing the normative theory underpinning his analysis of disasters because there is no, philosophically speaking, possibility of observing from nowhere, namely, without a conceptual background (whether explicit or not).

Fourth, there is the reading of Hopkins work as an example of sociology of safety in the making, creating the contours of an extended understanding of safety from an empirical and conceptual perspectives alongside the well-established psychological, cognitive, ergonomic and system traditions. Fifth, there is a reading to find out about author's own

thinking evolution over the years, book after book, as an indication of the complexity of the topic of disaster and safety.

A sixth reading option is to relate the previous points to the way Hopkins visualises his ideas, in particular, how he draws accidents (using for instance Accimap of Rasmussen, 1997). Finally, a last possible reading of Hopkins' stories is their translation of macro trends, in the field of organisation and regulation of high-risk systems in the last 30 years, linked to globalisation. In this article, I focus on the second and third readings by, first, deciphering a powerful narrative structure, and second, revealing the theory supporting this narrative structure, a theory which appears to be a normative sociology of safety. To do so, I start with Hopkins' sociological background, in the 1970s.

3. Intellectual and historical context

3.1. white collar crime (WCC)

In the 1970s, there was a surge of studies on the topic of white-collar crime (WCC). This new concept was initially framed by the American sociologist and criminologist, Sutherland, in a book published in 1949 (Sutherland, 1949). Although much debate ensued about who this category was to be applied to, his main message was that powerful people in corporations committed crimes of a different nature than street crimes, but crimes nonetheless. However, protected by their high social status in society, hiding behind the complexity of corporations' structures and rather invisible to the public eyes in comparison with the physical harm and violence associated with street crimes, white collar criminals very often escaped strong scrutiny, and punishment.

The issue of corporations breaking the laws designed by societies to control their behaviour (e.g. business monopoly, price fixing, embezzlement, employee well-being, environment, safety and health of workers and consumers, etc) has become then, following Sutherland's publication in the mid-twentieth century, an important topic for the social sciences, albeit a particularly complex one because of the problem of data access and power of the individuals of the corporations studied. Empirical and theoretical developments by psychologists, sociologists, legal scholars or political scientists gradually stabilised core controversies, orientations and a broad understanding of the problem of WCC in the literature.

One particularly relevant development in this field in relation to Hopkins' research is the combination of organisational theory with the study of the crimes of powerful. Because analysing corporations requires to conceptualise organisations, the link between the two areas was established in the 1970s. In this respect, a landmark book developing a combined organisational, corporate, legal and sociological analysis of WCC is the one of Christopher Stone (Stone, 1975), a strong influence in Hopkins' own thinking (more about below).

3.2. Australia

An aspect of this background worth mentioning is Australia. In this country, a group of academics was quite active in the 1970s and 1980s in the WCC area, extensively contributing with a rather critical perspective, but also promoting an organisational perspective. Two collective books are quite representative of this Australian dynamism, (Wilson, Braithwaite, 1978, Grabosky, Sutton, 1989), in which Hopkins published two original studies (Hopkins, 1978b, 1989).

The first is an organisational analysis of corporate crime, the second about an occupational accident. Throughout the years, one researcher of this group of academics has become highly influential worldwide, John Braithwaite. His work on the regulation of crimes combines, in this period then subsequently, a series of empirical studies (for instance in mining or pharmacy, Braithwaite, 1984, 1985) with practical and innovative regulatory and justice principles such as enforced self-regulation (Ayres, Braithwaite, 1992) or restorative justice (Braithwaite, 2002).

It is important to situate Hopkins in this Australian intellectual and geographical context. First, because of the intense mining activity in Australia, the prevention of catastrophic events was (and remains) a highly relevant topic for social scientists. It provided indeed a particularly suitable area of investigation, one for which a sociological analysis could potentially greatly contribute to help think and improve safety practices.

This, both Braithwaite (Braithwaite, 1985) and Hopkins (Hopkins, 1981, 1984) did in parallel in the 1980s. Braithwaite's study was however at the time extensive and provided an important background for Hopkins own analysis, as shown in his review of Braithwaite's book back then (Hopkins, 1985).

3.3. A socio-legal research tradition

It is particularly interesting to notice that these developments were independent from the European (e.g. Turner, Reason, Rasmussen) or US (e.g. Perrow, Roberts, La Porte) safety research. In Europe, Turner developed the incubation model (Turner, 1978, Turner, Pidgeon, Blockley, 1989), Reason produced a successful interpretation of human error and accidents (Reason, Mycielska, 1982, Reason, 1987, 1990) while Rasmussen initiated cognitive (system) engineering and explicit complex sociotechnical views (Rasmussen, 1984, 1987, 1990).

In US, La Porte, Roberts and Weick (Rochlin, La Porte, Roberts, 1987, Weick, 1987, Roberts, 1989) were the proponents of high-reliability (seeking) organisations while Perrow made the idea of the inevitability of accidents a controversial topic (Perrow, 1984).

In the 1980s, there is no trace of these authors and ideas in Hopkins. Only much later, in the mid-1990s for Reason (Hopkins, 1995) then late 1990s (Hopkins, 1999, 2000) would Hopkins discover these writers, their theories and debate about their value for his own analyses of accidents.

This is what makes also of Hopkins a quite interesting author to study: his ideas have developed from a different perspective than most visible writers in US and Europe at the time, during the 1980s. As a distinguished research tradition, it has a critical and socio-legal point of departure anchored in an analysis of the crime of the powerful, something strongly shaping his model of accidents.

Second, this critical view of WCC in Australia and its associated debates offered a favourable intellectual background to frame the issue of accident in mines. What is this background? Some of it has been introduced above, let's briefly develop it. A critical approach to WCC considers that society is composed of a dominating capitalist class who has the power to maintain the structure producing this dominating position.

The law is central in this structure because it can precisely translate the interests of the powerful at the expense of the powerless. Studying how the law is produced and enforced is therefore a fruitful way to critically analyse society. WCC is a great

opportunity to observe the inner working of modern societies, and in this respect, Hopkins' sociology is also partly one of the law (Hopkins, 1978a).

3.4. Hopkins' four key articles of the 1980s

This broad critical framing is actually quite explicit in a series of Hopkins' four articles published in the 1980s dedicated to the topic of accident in coal mines (Hopkins, 1981; Hopkins, 1984; Hopkins, Parnell, 1984; Hopkins, Paulser, 1987). Rather than separate articles, I contend that each of them corresponds instead to a specific aspect of this WCC sociological interpretation of the conditions under which accidents are made possible. These articles are systematically linked to the macro, critical and sociological interpretation as developed in the WCC literature.

How does this macro, critical and sociological interpretation translate in Hopkins' approach of accidents? The titles of his articles set the tone. "*Crime without punishment*" (1981); "*Blood Money? The effect of bonus pay on safety in coal mines*" (1984); "*Why coal mine safety regulations in Australia are not enforced*" (1984); "*The causes of coal mines accidents.*" (1987). Let's comment them very briefly, then reveal the conceptual structure which connects them.

Crime without punishment

The first article, *Crime without punishment*, is about the problem of powerful actors of organisations escaping punishment after deadly events such as the Appin mine disaster killing 14 miners in 1979 in Australia, New South Wales (Hopkins, 1981). For Hopkins and from his critical WCC perspective, this is a typical example of "class bias" in the law as Hopkins had argued in a previous publication when comparing the interpretation of the law and sentencing by judges between street crimes and white-collar crime (Hopkins, 1978a).

His analysis of the Appin disaster through the judicial enquiry and the verdict is very clear. For Hopkins, top managers were blatantly responsible for the catastrophe, "*In the light of these findings, it is obvious that top management had not used "all reasonable means" to enforce the rule which the electrician had breached. Management was therefore liable for his offence*" (Hopkins, 1981, 163). But despite this evidence, justice deliberated otherwise, and they were not punished, "*as far as the judge and the Minister are*

concerned, then, vicarious liability is a dead letter and colliery owners need have no fear of the law ever being enforced in this respect" (Hopkins, 1981, 165).

Blood Money?

The second article, *Blood Money?* explores the problem of designing bonuses that push miners to cut corners at the expense of safety and in favour of production. Here, it is the idea that compliance with the law which is the central problem. The premise is that compliance with the law helps prevent accidents, a premise which is supported by Braithwaite's study which showed that the majority of accidents would have been avoided if only the law had been applied (Braithwaite, 1984, Hopkins, 1985).

Following an empirical study in the mine of practices based on observations and interviews of miners, Hopkins infers that there are many other reasons to cut corners than bonuses, including problems of design but also of daily practices' conditions. *"Miners do unsafe things, not for the sake of bonus, but for a number of other reasons, the most prominent being the desire to make a dirty, boring, physically demanding job a little easier than it would otherwise be. Furthermore, no amount of exhortation is likely to alter this situation. (Hopkins, 1984, 46).*

However, the conclusion of this article targets explicitly management, and not workers themselves because design issues and ensuring employees' motivation as well as control of work practices is the duty of the highest level of the organisation. So, if Hopkins is nuanced about the reasons for non-compliance, it remains that *"what lies behind this management failure is as might be expected, the quest for profit. (...) it shows very clearly the way in which the production pressure maintained by top management generates illegal and unsafe behaviour"* (Hopkins, 1984, 46), indeed, *"in any case, any accidents and certainly the most explosions which occur underground are ultimately attributable to unsafe practices for which management must bear primary responsibility"* (Hopkins, 1984, 45).

Why coal mine safety regulations in Australia are not enforced

The third article is one concerned with the making of the law and its enforcement by regulatory agencies. Here the insights are, again, quite critical. Consistently with a guiding assumption that the law and inspectors favour the interest of the capitalist class,

Hopkins finds some answers as to why regulations are not enforced in the context of coal mine safety. As a start and as a general statement, valid for a wide range of topics, *“enactment and enforcement are two different matters. A defeat for ruling class interests at the legislative level may have no practical outcome at the level of enforcement at all (Hopkins, Parnell, 1984, 179).* The first answer is that the law, the health and safety Act, has inherent built-in principles which restricts the possibility of finding owners responsible. One example is the principle of *“as far as reasonably practicable”*.

Retrospectively, it is indeed a matter of judgment to declare whether one has done as much as what was possible in order to avoid an accident from happening. In one case, Hopkins found that *“the House of Lords judgment appears to be that safety regulations need not to be complied with where they involve significant expense to the company”* (Hopkins, 1984, 183). Indeed, with this principle, it is quite possible for the judge to favour the interest of the owner by admitting that it was not reasonably practicable to implement a safer design solution because, for instance, the costs involved would have jeopardized the business. But it is also a problem of enforcement by inspectors, that he describes as being co-opted, namely being captured by the interest of the industry, and preferring to persuade, rather than to punish.

The causes of coal mine accidents

Finally, the last article of this series of four articles published in the 1980s explores the causes of coal mine accidents. This study starts with a crucial statement. *“Theories about the causes of industrial accidents can be classified into two broad types: those which emphasize the personal characteristics of the worker themselves and those which locate the causes in the wider social organisational and technological environment. The former is conveniently termed blaming-the-victim and the latter, blaming the system.”* (Hopkins, Palser, 1987, 26). Exploring the correlation between a diversity of variables for which data are available (e.g. geology, size of company, organisation structure, type of incentives, number of incidents, age of workforce), Hopkins introduces important distinctions between measuring occupational safety and catastrophic accident, but also the limitations of an approach targeting workers instead of the system, and in particular the role of management.

But there is one more thing worth specifying about Hopkins' analysis of causes of accidents. If these events are clearly organisational, it is communication, both horizontal and vertical, which plays a crucial role in this respect. I contend that Stone's book (1975) played a determining role in Hopkins' framing of this problem, and beyond. Without much available literature at the time in the 1980's in Australia to explain accident from a sociological point of view (remember that Hopkins does not know yet Turner or Perrow), Stone's study provided Hopkins with a fundamental starting point and insight.

He writes, "*Stone argues that one specific defect which is invariably a feature of corporate offences is inadequate information flow systems within the corporation*" (Hopkins, 1978b, 218). Several times in Hopkins' writings of this period (e.g. Hopkins, 1978b) and his first books analysing disasters (e.g. Hopkins, 1999, 2000) one finds this sentence from Stone.

"In literally every case of corporate wrongdoing that was autopsied by myself and a group of USC law students, it turned out that someone down the corporate hierarchy was aware that trouble was brewing (...). But for a variety of reasons, the bad news never landed on the desk of someone who had both the authority and the inclination to do something about it" (Stone, 1975, 87). This statement is a core one to capture an essential feature of Hopkins' reasoning, an element of thinking about the explanation of disasters but also normative ways of preventing them, included in the series of models of safety to be introduced in the next sections.

A synthesis: the 1980s' white-collar crime accident model (WCC-MA)

It seems reasonable to hypothesise that Hopkins in fact systematically tried in the 1980s, with these studies, one after the other (Hopkins, 1981; Hopkins, 1984; Hopkins, Parnell, 1984; Hopkins, Paulser, 1987), to build an explanation for accidents understood as a product of the interactions, within the Australian social system, between several key actors and institutions, applying a macro, critical and sociological interpretation of WCC. These actors and institutions are workers in plants, managers and owners of companies in capitalist markets, inspectors in regulatory agencies and judges in justice courts.

Quite interesting, both from a history of safety science and Hopkins' research point of view, is this systematic empirical and conceptual investigation of accidents in mines which considers altogether workforce, private companies, regulation and justice. Indeed, this, in my view, is the heart of a good grasp of Hopkins' contribution to safety research

following the 1980s. Thus, these four interlinked articles are each, one by one, a brick in a critical WCC model of accident. Let's attempt to capture the basic assumptions underpinning this model. The critical view can be read (box 1) and visualised as follows (figure 1).

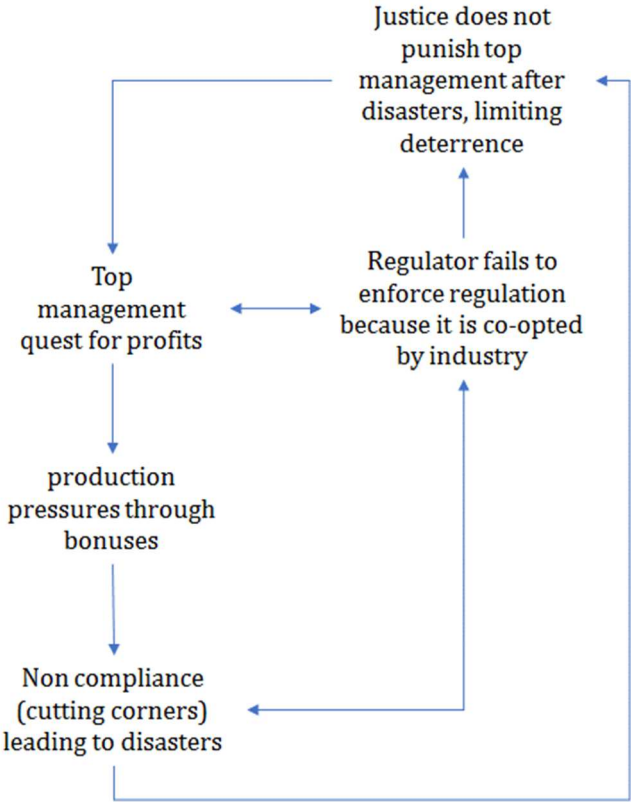


Figure 1. Hopkins' 1980s critical WCC accident model

Box 2. The critical WCC model of accident (linked to 1980s articles)

In the mining industry, disasters happen because employees cut corners under companies' production pressures in the quest for profit incorporated in incentives to do so (*Blood money?*). One problem is that these safety violations which lead to such events are not punished beforehand by inspectorate following their visits because they are co-opted by the industry and do not enforce the expected level of rule compliance that the law and public would expect (*Why are regulations not enforced*). Despite this, neither managers nor inspectors are prosecuted in the aftermath of a disaster for the pain they inflict to the families of the loved ones who perished at work, which also contribute to undermine the deterrent purpose of the law, and therefore the prevention of disasters (*Crime without punishment*). Moreover, behaviours of workers are often unfairly targeted by companies (sometimes regulators) as the primary cause of these events whereas it is foremost a design and organisational issue which managers are entirely responsible for (*the causes of coal mine disasters*).

Why is this critical WCC-MA central to the arguments of this article? First, a major proportion of Hopkins' research produced subsequently on safety derives from this perspective. These articles, their underlying model and associated empirical findings offered a nexus of problems to be explored with the intention to be both explanatory and practical in order to make a difference, arguing and convincing different audiences (managers, unions, judges, regulators, etc) about the possibility of studying accidents from a sociological perspective and the possibility of improving the prevention of catastrophic events.

Second, as already mentioned, this model has different roots than the classics of safety research produced in the 1980s because it is developed from the critical WCC literature. It differs from other sociological models of the same period (although far from incompatible), which are based on organisation theory such as Normal Accident (NA) by Perrow (1984) or the Incubation Model of Disaster (IMD) of Turner (1978), and belongs to a socio-legal research tradition of safety, for which one central problem is the design and compliance with the law (Le Coze, 2019).

Third, this model is designed to highlight and to consider as a primary factor top management decisions, but not only. On the one hand, it is top managers who create the conditions for events by exerting the pressures on workers who then cut corners. However, and on the other hand, it is also inspection and regulation which fail to create an adequate environment to require them to ensure compliance. So this model explicitly links several layers of description together from a macro sociological perspective.

Fourth, this model illustrates how theories act as some of these broad or generic models which structure one's interpretation. This is something which for instance helps explain Hopkins' appreciation of other sociological works such as Perrow, Turner or Beck when confronted to them for his own use (Hopkins, 1999, chapter 1; 2001). It helps characterise the kind of sociology of safety that Hopkins develops.

These articles show also therefore that Hopkins never performed his ethnographic type work (described his work as "*desktop ethnography*" Hopkins, 2006, 2016) without an already established conceptual background. It turns out, looking retrospectively, that one can see this pattern of systematic investigation of the topics that these early articles explored, a pattern which is explained in the third section of this article, and leading to

normative model of safety. But before, one needs to decipher Hopkins' narrative structure behind his storytelling success.

4. A narrative structure

If I argue that the development of a critical WCC-MA in the 1980s has been overlooked so far in safety science, I now want to again argue similarly that the narrative structure of his books has remained, so far, rather ignored. Perhaps that for many readers, storytelling is about the personal quality of a writer, a style maybe, something that can't be really analysed (see Reasons' quote earlier).

I believe that there is some truth in this but in the case of Hopkins, beyond style, there is much more to be said. In his personal retrospective, Hopkins insists much on this writing dimension (Hopkins, 2016, chapter 6). His view is one of writing with his intended readers in mind, of elaborating arguments as one would build a mathematical demonstration, and of choosing words carefully to explain without (sociological) jargon.

But reading carefully his books, one finds something more. One finds a narrative structure based on sequences associating descriptions (1), assumptions (2), explanations (3), comparisons (4), recommendations (5) and counterfactual reasoning (6). Hopkins is of course aware of the combination of analyses and recommendations in his accounts.

Commenting on his first disaster book, he writes "*The book was an examination of these failures coupled with suggestions for correcting them. Most of my subsequent books have followed this model.*" (Hopkins, 2016, 34). However, it proves interesting to go beyond this first level of characterisation. Note that this narrative structure remains an ideal that is not applied thoroughly as such across the themes put together in his disasters' books, or in this specific order, but functions as the engine behind the acclaimed Hopkins storytelling (Reason, 2005).

4.1. An example: communication

Let's illustrate it. In the following example, extracted from the Moura case study (Hopkins, 1999), the topic is communication. As contended earlier, communication, following Stone (1975) (then Turner, 1978), is for Hopkins one of his core analytical

issue. The narrative structure is presented in the following box (box 3), then commented.

Box 2. Illustration of the narrative structure applied to the topic communication (based on Moura, Hopkins, 1999).

Description (retrospective) (1)

"A critical instance of communication failure of this type occurred on the afternoon of Friday 24 June. On that shift a deputy noted a benzene smell and recorded this in his report. The oncoming deputy neither read nor signed this report (...) Deputy who filled out reports assumed that these reports would be taken seriously (...) Deputy thus had no way of knowing that their reports might not have received the attention they deserved" (Hopkins, 1999, 26)

Assumption (taken for granted in the case study) (2)

In this organisation, people seem to think that working while relying on the "grapevine" is fine, and that this achieves a sufficient level of coordination (the expression "*hearing it through the grapevine*" means that a piece of information is obtained via an informal contact)

Explanation (3)

"One of the recurrent findings in disaster research is that information that something was wrong was available somewhere within the organisation but was not communicated to relevant decision makers. Turner (1978) insists that all socio-technical disasters involve information or communication of this kind. They can be both horizontal - for example, the failure to transmit information between shifts, or vertical - the failure to pass bad news up the line to senior managers." (Hopkins, 2000, 54)

Comparison (with other cases of disasters) (4)

"This reliance by management on the grapevine is strikingly similar to the system of communication prevailing on Piper Alpha (...) Not surprisingly, communication failure was found to be one of the factors that contributed to that disaster" (Hopkins, 1999, 29)

Comparison (with good practices) (4)

"At Crinum, shift under managers meet regularly as a group. Moreover, production crews are briefed by their deputies underground at the beginning of every shift. They also have a weekly above-ground meeting." (Hopkins, 1999, 35)

Comparison (with safe properties as theorised in research) (4):

"The importance of making critical information highly visible has been brought out in the studies of high reliability organisations. This work has demonstrated that organisations which achieve disaster-free performance, despite the potential for disaster, do so by mobilising many pairs of eyes at crucial times" (Hopkins, 1999, 30)

Recommendations ("must") (5):

"It is not enough that people make reports or pass information up the line. The outcome must be fed back to the person who made the initial report (...) To be truly effective the

process must not terminate at this point. The next step is to require the person who initially raise the matter to indicate whether the action is taken satisfactory" (Hopkins, 1999, 31)

Counterfactual statement ("had it happened this way" ... "event might have been prevented") (6):

"had he been aware that his report had been dismissed on the basis that he had confused the two smells he would have objected. If this report had then cycled through the system again, as proposed above, it might have been given more credence and, when considered along with other indicators, it might have led to a somewhat different management response" (Hopkins, 1999, 32)

4.1.1. Description (1)

In this example, one sees clearly the point of departure which consists in a retrospective description (1) of what happened, here a problem of communication. This is very important as any investigation is supposed to start with some observations and facts (and this is a demanding one because the technical dimensions of events can require a quite complex analysis when one is not trained as an engineer, geologist, chemist or physicist with expertise in a specific industrial hazardous process).

4.1.2. Assumption (2)

Then, an assumption (2) which is prevalent in the company involved in the accident is indicated, in this illustration, the notion of grapevine. This is a very important narrative step through which the chance to connect with professional readers increases. The taken for granted idea targeted in the text might actually be shared within an industry or across industries, beyond the specific organisation involved in the particular case. A reader who recognises this assumption held in his or her own company is potentially being challenged while reading about the limitations of this belief, or comforted in his or her feeling that this assumption should be exposed to critics, as done by Hopkins.

4.1.3. Explanation (3)

The description of a particular type of failure (1) associated with an assumption that is seen as working fine in an organisation (2) is followed by an explanation (3). In principle, one can expect to find concepts or models in the social sciences to situate a

specific phenomenon in relation to existing scientific knowledge (e.g. groupthink). In the chosen example, Hopkins could have referred explicitly (as done in the following book) to the notion of incubation as developed by Turner (1978), for which information and communication go hand in hand. This sequence brings science into the analysis. Science is introduced both as a way to elucidate the problem and to challenge the taken for granted practice.

The reader feels now that the mode of operating described in the analysis does not rely on an existing body knowledge, questioning and undermining its rationale and legitimacy. Why maintaining something while science tells us that it is likely to fail or not good enough? This is all the more relevant that many readers are not social scientists but engineers often turned managers, and have had limited access throughout their career to sociological findings and theories, or, more generally, to knowledge directly relevant to safety and disasters derived from the social sciences (most of their ideas in this area are framed by consultants mostly promoting individualistic views of safety).

4.1.4. Comparisons (4)

Following this explanation, a series of comparisons (4) are offered with, either, similar events in previous investigations of disasters (here, Piper Alpha), known good safety practices in other companies (in this case, Crinum) and research findings on safety (for this analysis, high reliability organisations) or, sometimes, all together. Again, this is another crucial phase of the sequence because it, on the one hand, motivates further Hopkins' argument that people such as accident investigators, professionals in safety critical companies and/or social scientists studying safety already know about this kind of failure and, on the other hand, it prepares the reader for what is coming just after.

An additional aspect to this is that, by naming different companies and their safety practices, Hopkins links them, stimulating at the same time a network of people in different organisations who could share their ideas on the matter. The next stage in the sequence consists in providing a recommendation (5) which is justified on the basis of the explanation and the comparisons.

4.1.5. Recommendation (5)

The practitioner finds here practical recommendations or solutions to what might be similar problems met in his or her own workplace and organisation. Whether it is possible or not to apply it as such might well be a problem, but it provides at least some clues of how a particular situation could be improved. It does not stop at the explanatory stage, but moves forward, and offers potential ideas to people in the field (beyond this accident) who want to provoke changes in their own organisations of what they believe to be unsatisfactory situations.

4.1.6. Counterfactual reasoning (6)

Finally, the last sequence of the narrative structure attempts to convince the reader of how useful these recommendations would have been to prevent the events if only they had been applied in the circumstances preceding the accident. This is the counterfactual reasoning using the “*had it happened this way...things would have been different*” formula (6). This last stage completes this rhetoric designed to prove that it is possible to do much better, and most importantly, that it is possible to prevent catastrophic events. It is the final contribution to achieve or secure this feeling for the reader.

4.2. Second example: auditing

But, and as noticed earlier, if this narrative structure contains some principles creating both analytical and practical value, these are not applied thoroughly as such across the themes. See for instance the auditing theme in the Longford book (Hopkins, 2000) below (box 3), for which there is no counterfactual sentence associated. Nevertheless, the argument about the limits of auditing, and the reasons for these limits, builds, again, as for the importance of communication above (box 2), a strong case about the deficiencies of the corporation involved in the disaster.

Box 3. Illustration of the narrative structure applied to the topic auditing, based on Longford (Hopkins, 2000)

Description (retrospective) (1)

“It is clear that there was plenty of bad news around, plenty of news which, had it reached the highest levels of the company and had been acted on, would have averted the incident. But the Exxon audit missed it all” (2000, 93)

Assumption (taken for granted in the case study) (2)

In the organisation, auditing serves to rank sites through score cards. *“Six months prior to the explosions, Esso’s health and safety management system (called OIMS – Operational Integrity Management System) was audited by a team from Esso’s corporate owner, Exxon (...) Esso’s managing director reported to the inquiry that the audit had shown that most elements of the safety management system were functioning at level three or better”* (Hopkins, 2000, 81). The assumption is that this auditing strategy is an effective way of preventing major accident.

Explanation (3)

Auditing organised along this principle does not adequately target major hazards. *“It is worth pointing out that an audit whose purpose is to identify hazards which have been missed does not lend itself to this score card approach”* (Hopkins, 2000, 86), and as a consequence, *“one of the central conclusions of most disaster inquiries is that the auditing of safety management systems was defective (...)”* (Hopkins, 2000, 54).

Comparison (with other cases of disasters) (4)

“Following the fire on the Piper Alpha oil platform in the North Sea in 1987 in which 167 men died, the official inquiry found numerous defects in the safety management system which had not been picked up in company auditing” (1999, 29)

Comparison (with good practices) (4)

“BHP coal had clearly learnt the lesson of its previous auditing failure. It had understood that the hallmark of a good audit is that it must be thorough enough to uncover the bad news about safety and convey it upwards to the top of the corporation.” (1999, 35)

Comparison (with safe properties as theorised in research) (4):

“The strategy which HROs adopt is collective mindfulness. The essence of this idea is that no system can guarantee safety once and for all. Rather, it is necessary for the organisation to cultivate a state of continuous mindfulness of the possibility of disaster (Hopkins, 2000, 140) but in the case of Longford “safety auditing, an ideal opportunity to focus on the possibility of failure, was turned into an opportunity to celebrate success” (Hopkins, 2000, 142).

Recommendations (“must”) (5):

“A rigorous audit needs to examine the hazard identification strategy and make some effort to seek out hazards which may have been missed, so as to be able to make a judgement about how effectively hazard identification and control is being carried out” (Hopkins, 2000, 86)

In this second example, one finds again a point of departure, a description (1) of what happened. This time, it is a problem of auditing. It contrasts on the one hand the presence of many bad news available when interviewing people retrospectively, with, on the other hand, positive auditing results. An assumption (2) of the organisation and

associated with auditing is then introduced. This assumption considers that a good principle of auditing is to rank sites with score card (from 1 to 5) based on predefined level of compliance to a defined standard. Again, this is a narrative step increasing the likelihood of echoing practitioners' experience, beyond the specific organisation involved in a particular case.

Consulting companies and corporations in many industries have indeed devised such practices to ensure the monitoring of safety critical operations. Different levels of achievement can be expected, and are audited by auditors, often through minimum time spent in the field, checking paperwork instead. This is a warning to any readers who feel the same, or to other who are content with their current auditing strategies, despite their flaws.

Description (1) and assumption (2) are followed by an explanation (3). Auditing without a field strategy combined with an understanding of the technological risks involved in a particular process plant becomes a shaky exercise as no link is established between real practices, preventive measures and hazardous scenarios. First, auditors relying on paperwork miss the operational realities of daily context, second, without sufficient knowledge about the hazardous processes and their designed preventive barriers, they cannot assess a situation.

Comparing (4) this situation with events in previous investigations of disasters (Piper Alpha), known good safety practices in other companies (in this case, BHP) and research findings on safety (collective mindfulness) show how the organisation can be seen as having failed to learn, first, from the findings of previous accidents, and failed second, to achieve a degree of success which is achieved elsewhere, in other companies. It emphasises the idea that disasters do not happen very often precisely because other companies do far better than this. It also is reassuring to know that a problem can be fixed.

Recommendation (5) are then built up on the previous sequence of description (1), assumption (2), explanation (3) and comparison (4). In the case of auditing and current limitations, the proposition is to increase time spent in the field by powerful auditors in relation to targeted observations connected to major hazard prevention. This is another example of sequence of the narrative structure applied to auditing. Hopkins' chapters do

not always follow neatly the order described here, but the persuasive rhetorical effect is obtained by articulating these different narrative sequence, or narratives modes.

4.3. Persuasive disasters’ accounts

As much as Hopkins’ books are disturbing because they reveal the cold bureaucratic processes triggered by organisations’ leaders leading to the death of workers, they also exhibit a reassuring dimension conveyed by the narrative structure. By imagining what could have happened if certain things had been done a different way (as made obvious in sequences of explanation and comparison turned into recommendation), it becomes very likely that another fate was entirely plausible. Deaths could have been avoided.

This narrative structure combining the sequence (1) to (6) when articulated in a broader analysis (see next section) is thus highly persuasive (table 1). It invites the reader throughout a journey from a series of problems to a series of solutions while providing novel insights into a set of issues faced daily by practitioners of the industry or the regulators. For social scientists with an interest in safety research, it is an exciting read showing how relevant a social scientist can be to a much wider audience than professional sociologists.

Table &. Hopkins’ narrative structure, some issues discussed

Narrative sequence	Short presentation
Description	Provides facts about what happened from a sociological perspective
Assumption	Introduces taken for granted idea in companies about practices
Explanation	Brings social sciences insights to make sense of the phenomenon described
Comparison	Creates links with other cases of disaster (1), safe practices as found in industry (2) or described by researchers (3)
Recommendation	Suggests solutions of improvement based on explanation and comparison

Counterfactual argument	Convinces readers how possible it was to avoid the catastrophe “ <i>had this been done, things would have been different</i> ”
-------------------------	--

The result of this is that “*people working in other companies in the same industry as the company about which I have written often tell me many of my descriptions are applicable to their own company. I might as well have been writing about their organisation, they say. This makes them exceedingly uncomfortable since they recognise that their organization is at risk of suffering the same kind of accident.*” (Hopkins, 2016, 95). But deciphering this narrative structure has also another virtue for a study of the legacy of Hopkins’ work.

5. A (normative) sociological theory of safety

What appears indeed particularly clearly when contemplating Hopkins’ writings with this structure in mind is the long-term systematic research to design principles for managing safety. In this light, these writings open a window to Hopkins’ theoretical mind and craft as I have claimed that they can be understood as a refinement of the critical WCC-MA (box 1, figure 1). But, in what consists this refinement?

To move one step even closer to the theory builder behind the storyteller, another level of analysis is needed, relying, this time, on the exploration of the concepts and ideas regularly imported, introduced, discussed and developed book after book, sometimes in articles (which sometimes become books’ chapters) which contribute to a more sophisticated version of the WCC model of accident turned into a normative model of safety.

I highlight and summarise below several points that I believe to be the key building blocks that form Hopkins’ normative sociological model of safety, which have been developed over 40 years of research, starting in the 1980s (figure 1, box 1) and stabilised in the early 2010s (figure 2, box 2).

This framing is based on a careful study of his writings (Le coze, 2018), particularly Hopkins (1999, 2000, 2005, 2007, 2008, 2012) and Hayes, Hopkins, (2014), a study of which the details are not reproduced here. This framing simply is the opposite of the critical and descriptive initial version (fig. 1), namely more positively and practically

oriented. It can be represented (fig. 2) and read as follows (box 2), as an operational and normative response to the 1980s model. Let's comment it briefly.

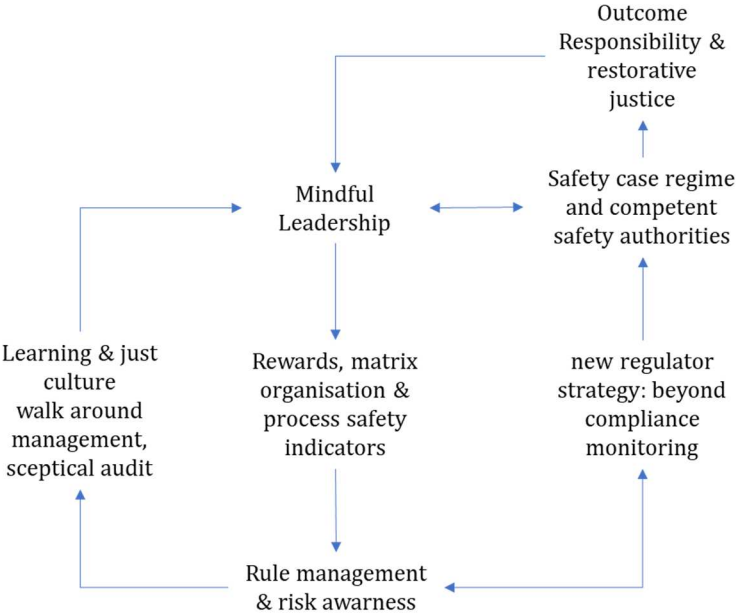


Figure 2. Hopkins later models of safety

Box 2. Hopkins' (normative) sociological model of safety

Mindful leadership must promote, with the help of carefully designed senior managers rewards schemes, matrix structures and process safety indicators, a risk awareness among companies' employees, also based on rule management. Internally, mindful leadership should rely on walk-around management and learning principles which include the handling of blame through just culture, and the need for adequate practice of audits, promoting sceptical principles. Externally, mindful leadership should be facilitated by inspections which go beyond compliance thanks to safety case regimes, principles of restorative justice and outcome responsibility.

Top management quest for profit (fig. 1) becomes mindful leadership (fig. 2) which must rely on walk around management, learning and just culture but also sceptical audits (see box 3 on problems with audits). Through careful attention to the details of operations, mindful leaders remain aware of concrete problems met in plants or sites. They do not trust the absence of problems to be a sign of success but an issue in the flow of communication, and they do not trust paperwork audit exercises.

Production pressure through bonuses (fig. 1) becomes reward scheme, matrix structure and process safety indicators (fig. 2) which are designed to ensure the balance between achieving production targets while not sacrificing safety. Structure of organisations should allow engineering and safety departments to be heard at the highest levels, top managers should not be financially rewarded (by markets) to meet short term objectives and indicators should refer to process safety, and not only occupational safety.

Non-compliance (cutting corners) leading to disasters (fig. 1) becomes risk awareness and rule management (fig. 2) because, first, operators need to know sufficiently the hazards they are dealing with or to know when to refer to engineers when unsure (risk awareness), and second, managers need to adapt rules when needed for adaptation of expert practices in the field.

Regulators failing to enforce regulations because of co-optation (fig. 1) becomes a new regulator strategy and safety case regulatory regime (fig. 2) in order to make sure that regulators both require company to assess risk in order to design adequate prevention measures (safety case) and to verify if operational practices comply with the level of risk decided through these measures (inspection beyond compliance).

Finally, justice not punishing top managers and limiting deterrence (fi. 1) becomes outcome responsibility and restorative justice (fig 2.). Top leaders should be held accountable even when the complex structures of corporation make it possible for them to hide behind the argument that they didn't know (outcome responsibility) and they should be confronted with the suffering that they cause by meeting those who lost their loved ones in accidents (restorative justice).

This is a particularly elaborate and dense model of several features, which articulates many insights at different levels of social analysis. The sophistication of this model should not be underappreciated however, as it probably requires users to be familiar with social sciences background. Of course, it is only when embedded in a specific case study with the narrative structure that this normative model of safety becomes highly appealing, persuasive and convincing to most readers.

6. Discussion

6.1. The white-collar crime model of accident (WCC-MA)

An interesting outcome of this historical analysis is what now appears to be an analytical perspective elaborated from the late 1970s and during 1980s into the WWC accident model (WCC-MA), with quite a fair degree of independence and distinguished from mainstream European and US sociological works until the mid-1990s, best represented by Turner (1978) with the incubation model of accident (IMD) or Perrow (1984) with normal accident (NA).

Of course, these authors are far from incompatible, but could and should not, at the same time, be conflated. They share a sociological mindset surely but differ too. Hopkins' intellectual connection to the crime of the powerful literature conveys indeed a specific flavour to his angle of analysis, inspired for instance by Stone's important contribution (Stone, 1975) (but also a number of Australian colleagues, including Braithwaite, 1984).

As noted, Hopkins often quotes the following sentences from Stone. *"In literally every case of corporate wrongdoing that was autopsied by myself and a group of USC law students, it turned out that someone down the corporate hierarchy was aware that trouble was brewing (...). But for a variety of reasons, the bad news never landed on the desk of someone who had both the authority and the inclination to do something about it"* (Stone, 1975, 87).

This quote, emphasising communication and information flows from top to bottom makes him quite close to Turner's idea of incubation, because of the idea of signals available in organisations. But Hopkins is more critical about leaders than Turner is, more critical about their lack of compliance. His theoretical starting point is more Marxist than Turner's is (Turner, 1995). He is closer to Perrow in this respect when explicitly locating the causes of disasters at the top of organisation (where messages should be heard before it is too late) and at a macro level of society (i.e. regulator, justice) within this socio-legal tradition.

This, is now more obvious thanks to the historical, sociological and analytical background made available in this article. He now also appears to be quite aligned with the power view promoted by Perrow (Le Coze, 2015b), more so than the cultural one advocated by Turner (Le Coze, forthcoming). His grasp of culture, following Schein

(1992) in organisations is indeed one which derives from top leaders' discourses, practices and reactions to problems (Hopkins, 2005), so somehow, one shaped by power of those at the top. But his insistence on regulation, law and its enforcement by authorities also refers to a power view of society in relation to business, similarly than Perrow.

6.2. A normative sociological model of safety

However, this retrospective work also shows that he differs from both when he moves from description - whether from a more neutral and cultural (Turner) or critical (Perrow) views of disasters - towards prescriptions based on his narrative structure unfolded on a sociological model of safety, which offer reasons to believe that catastrophes can be, could be and should have been prevented. His sociology is not only cultural or critical, but practical.

One can add that this sociology of safety, with a strong normative side to it and because of its breadth, offers a much-needed support for researchers interested in moving towards a sociology of safety mixing analytical and practical relevance. Because of its sophistication when it comes to combining several levels of analysis together, Hopkins' sociological normative model of safety constitutes a framework which one can use for instance to sensitise studies of daily operations, but also to engage with practitioners about their activities from an organisational point of view. **Of course, his approach can inspire investigators who can follow the narrative structure described above.**

This normative, practical side perhaps contrasts with a popular view of sociology as for instance framed by Burawoy (2004), whose distinction between professional, critical, policy and public sociology can help situate Hopkins' work (as he himself suggests, Hopkins, 2016). In this model, Burawoy considers first, professional sociology to be theoretically developed among and for academic peers, second, sees critical sociology as a reflection of the moral, methodological and epistemological commitments of the discipline, third, describes policy sociology as supporting administrations and businesses and, finally, defines public sociology as the interaction of sociological theory and sociologists with civil society.

Looking closely into Hopkins' work, his normative approach is not one neatly divided between professional, critical, public or policy sociology, but is rather a mix of them. **It is**

a mix because it is readable by anyone from the civil society who would like to understand disasters (public sociology), but it is also written for practitioners in the industry or regulations and this is where Hopkins is certainly highly successful (policy sociology) but it is also a reflection about the relevance of sociology for the world outside of academics (critical sociology) while also being a discussion with theories of the field (professional sociology). It is also a mix because he does not develop a theory for professional sociologists first then discuss his findings with different audiences but develop together instead both analytical and practical insights for practitioners and ideas for regulators, just as a policy or public sociology would do. While doing so, at the same time, he also remains critical when assuming that the disaster could have been prevented.

In contrast, a sociologist like Vaughan operates more within Burawoy's distinctions, namely producing first a professional sociology (Vaughan, 1996, 1999), a step then followed by a public or policy sociology (Vaughan, 2003, 2006). It turns out that Vaughan was a source of inspiration to Burawoy's own ideas about the practice of sociology. So, Hopkins is an example of sociologist who cannot be sharply situated in this framework without ambiguity because of his normative stance. Yet, it is precisely this normativity linked to the narrative structure of Hopkins which has been an inspiring input to safety research.

7. Conclusion

Considering Hopkins' work from a historical perspective going 40 years back provides the depth needed to realise the extent and originality of his contribution to safety research. Three aspects are particularly emphasised in this article. First, Hopkins' success as a popular writer in the safety domain can be explained by his use of a narrative structure based on repeated sequences of description (1), assumption (2), explanation (3), comparison (4), recommendation (5) and counterfactual reasoning (6).

Second, this narrative structure unfolds within a theoretical framework derived from a critical, white-collar crime (macro) sociological interpretation of disasters (the WCC-MA), turned, over 40 years of research into a (normative) sociological model of safety. His contribution should be considered, alongside but also beyond those of Turner or Perrow (and some others), as an important input, albeit specific because of his white-

collar crime origin then subsequent more practically oriented and normative angle, to the development of a sociology of safety.

Reference

- Ayres, I., Braithwaite, J. 1992. *Responsive Regulation: Transcending the Deregulation Debate*. New York: Oxford University Press.
- Braithwaite, J. 1984. *Corporate Crime in the Pharmaceutical Industry*. London and Boston: Routledge & Kegan Paul.
- Braithwaite, J. 2002. *Restorative Justice and Responsive Regulation*. New York: Oxford University Press.
- Burawoy, M. 2004. For public sociology. *American Review of Sociology*. 70.1.4-28.
- Grabosky, P., Sutton, A. 1989. (eds). *Stains on a White Collar: Case Studies in Corporate Crime and Corporate Harm* Sydney: Federation Press/Century Hutchinson, 1989.
- Hopkins, A. 1978a. The uses of law to sociology. *Australian and New Zealand Journal of Sociology*, Vol. 14, No. 3 (October).
- Hopkins, A. 1978b. The Anatomy of Corporate Crime. in P. Wilson and J. Braithwaite (eds.) *The Two Faces of Deviance*. University of Queensland Press. 214-31.
- Hopkins, A. 1981. Crime without Punishment: The Appin Mine Disaster, *Australian Quarterly*, 53 (4):455-466.
- Hopkins, A. 1984. Blood Money? The Effect of Bonus Pay on Safety in Coal Mines, *A.N.Z. Journal of Sociology*, 20(1):23-46.
- Hopkins, A. 1986. Review of John Braithwaite, *To Punish or Persuade: Enforcement of Coal Mine Safety*, in *A.N.Z. Journal of Sociology*, Vol. 22, No. 2, pp. 332-4.
- Hopkins, A. 1999. *Managing Major Hazards: the Lessons of the Moura Mine Disaster*, Sydney: Allen & Unwin
- Hopkins, A. 2000. *Lessons from Longford: The ESSO Gas Plant Explosion*, CCH, Sydney.
- Hopkins, A. 2001. Was Three Mile Island a Normal Accident?, *Journal of Contingencies and Crisis Management*, 9(2): 65-72
- Hopkins, A. 2005. *Safety, culture and risk. The organizational causes of accidents*. CCH. Sydney: CCH Australia.
- Hopkins, A. 2006. Studying organisational cultures and their effects on safety, *Safety Science*, 44, pp875-899
- Hopkins, A. 2007. *Lessons from Gretley: Mindful Leadership and the Law*. CCH:Sydney.
- Hopkins, A. 2008. *Failure to learn: the BP Texas City refinery disaster*. Sydney, NSW: CCH.
- Hopkins, A. 2009. *Learning from High Reliability Organisations* (CCH, Sydney) - Editor

- Hopkins, A. 2012. *Disastrous Decisions: The Human and Organisational Causes of the Gulf of Mexico Blowout*. CCH.
- Hopkins, A. 2016. *Quiet Outrage. The way of a sociologist*. Sidney, CCH Press.
- Hopkins, A., Palser, J. 1987. The cause of coal mine accidents, *Industrial Relations Journal*, Vol. 18, No. 1, (Spring), pp. 26-39.
- Hopkins, A., Parnell, N. 1984. Why coal mine safety regulations in Australia are not enforced, *International Journal of the Sociology of Law*, 12:179-94
- Le Coze, C. 2015a. Reflecting on Jens Rasmussen's legacy. A strong program for a hard problem. *Safety Science*. 71. 123-141.
- Le Coze, JC. 2015b. 1984-2014. Normal Accident. Was Charles Perrow right for the wrong reasons ? *Journal of Contingencies and Crisis Management*. 23 (4). 275-286.
- Le Coze, JC. 2017. *Quiet Outrage. The way of a sociologist. The sociology of Andrew Hopkins.. Journal of Contingencies and Crisis Management*.
- Le Coze, JC 2018. Reading Hopkins. Writings in safety socio-engineering. Unpublished manuscript.
- Le Coze, JC. 2019. Introduction. In Le Coze, JC (ed). *Safety science Research: Evolution, Challenges and New Directions*. Taylor and Francis. CRC Press.
- Le Coze, JC (forthcoming). In the footsteps of Turner, from grounded theory to conceptual ethnography in safety. In Pettersen-Gould, K., Macrae, C (eds). *Inside high-risk systems*. CRC. Taylor and Francis.
- Perrow, C. (1984). *Normal Accidents, Living with High-Risk Technologies*. first ed. Princeton University Press, Princeton.
- Rasmussen, J. 1984. Strategies for state identification and diagnosis in supervisory control tasks and design of computer-based support systems. in *advances in man machine systems research*, edited by Rouse. Greenwich
- Rasmussen, J. 1987. Cognitive control and human error mechanisms, in *New Technology and human error*, Rasmussen, Duncan, Leplat (eds) Wiley, London, 1987.
- Rasmussen, J. 1990a. Human Error and the Problem of Causality in Analysis of Accidents. *Philosophical Transactions of the Royal Society*. B 327. 449-462.
- Rasmussen, J. 1997. Risk management in a dynamic society: a modelling problem. *Safety Science* 27 (2/3), 183-213.
- Reason, J. (1990). *Human error*. Cambridge University Press.
- Reason, J. (2005). Preface, in Hopkins, A. *Safety, culture and risk. The organizational causes of accidents*. CCH. Sydney: *CCH Australia*.
- Reason, J. et Mycielska, K. (1982). *Absent-minded? The psychology of mental lapses and everyday errors*. Englewood Cliffs (NJ): Prentice Hall;

- Roberts, K, H. 1989. New challenges in organisational research: high reliability organizations. *Industrial Crisis Quaterly*, vol 3. 111-125.
- Rochlin, G, I., La Porte, T, R., Roberts, K, H. (1987). The Self-Designing High-Reliability Organization: Aircraft Carrier Flight Operations at Sea. *Naval War College Review* 40, no. 4. 76-90.
- Schein, E, H. 1992. *Organizational Culture and Leadership*, Jossey-Bass Publishers, San Francisco, CA.
- Stone, C. 1975. *Where the law ends. The social control of corporate behavior*. New York: Harper.
- Turner, B, A. (1978). *Man-made disaster. The Failure of Foresight*. Wykeham Science Press, London.
- Turner, B. 1995. A Personal Trajectory through Organization Studies, research in the sociology of organisations. vol 13 - 275-301.
- Turner, B.A., Pidgeon, N. Blockley, D. and Toft, B. (1989) Safety culture: its importance in future risk management, Position Paper for The Second World Bank Workshop on Safety Control and Risk.
- Vaughan, D. 1996. *The Challenger Launch Decision: Risky Technology, Culture and deviance at NASA*. Chicago: University of Chicago Press,.
- Vaughan, D. 1999. The Dark Side of Organizations: Mistake, Misconduct, and Disaster. *Annual Review of Sociology*. 25. 271-305.
- Vaughan, D. 2003. History as cause. Chapter 8. In Columbia Accident Investigation Board.
- Vaughan, D. 2003. NASA Revisited: Theory, Analogy, and Public Sociology." *American Journal of Sociology*. 112. 2.
- Weick, K. (1987). Organizational Culture as a Source of High Reliability. *California Management Review* 29, no. 2. 112-127.
- Wilson, P., Braithwaite, J (eds.). 1978. *The Two Faces of Deviance. Crimes of the powerless and the powerful*. University of Queensland Press.