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# Contents

<i>Preface</i>	vii
<i>About the authors</i>	viii
<b>1 Risk perception and decision-making</b>	<b>1</b>
1 Introduction	1
1.1 Judgement	1
1.2 Risk perception	2
1.3 Heuristics	3
1.3.1 The availability heuristic	3
1.4 Sanitising the world of hazards	4
1.5 Success to failure	4
1.6 Ignoring warning signs	5
1.7 Hindsight bias	5
1.8 Cognitive dissonance	6
1.9 Groupthink	7
1.10 Hidden influences	8
1.11 Defensive tactics	9
1.12 Conclusions	9
<b>2 The management of risk</b>	<b>12</b>
2 Introduction	12
2.1 Development of risk management	12
2.2 Good management is risk management	13
2.3 Problems in risk management	15
2.4 Prevention of failure model	16
2.5 Terminology	18
2.6 Benefits of risk management	18
2.7 Risk and quality management	20
2.8 Civil litigation	21
<b>3 Disasters as systems failures</b>	<b>24</b>
3 Introduction	24
3.1 From act of God to technical failure?	24
3.2 Socio-technical systems	25

3.3	Safety culture	25
3.4	Systems concepts	27
3.5	A failure of hindsight	27
3.6	Organisational learning – helping change safety culture	29
3.7	Systems failure models	30
3.7.1	Systems failure and cultural readjustment model (SFCRM Figure 3.1)	30
3.7.2	The SFCRM model in detail	30
3.7.3	Turner’s model	33
3.8	Feedback within the socio-technical system – positive and negative	33
3.9	Negative feedback	34
<b>4</b>	<b>Methodology</b>	<b>38</b>
4	Introduction	38
4.1	Methodological perspective	38
4.2	Choice of methodology	38
4.2.1	Data collection	39
4.2.2	Analysis	39
4.3	Operational methodology	40
4.4	Data analysis	41
<b>5</b>	<b>Generation of hindsight</b>	<b>42</b>
5	Introduction	42
5.1	Public inquiries into disasters	42
5.2	Public inquiry procedures	43
5.3	Criticisms of public inquiries	43
5.3.1	Political problems	43
5.3.2	Terms of reference	44
5.3.3	Blame and truth	45
5.4	Are public inquiries appropriate?	45
5.5	Analysis of recommendations	46
5.5.1	Aims of recommendation types	47
5.5.2	Groups of recommendation types	50
5.6	Schematic report analysis	52
5.6.1	Properties of a schematic report analysis diagram	52
5.6.2	Preparation of a schematic report analysis diagram	54
5.6.3	Specific examples of SRAD	55
5.6.4	Computer application of SRAD	60
5.7	Conclusions	63

<b>6</b>	<b>General organisational learning</b>	65
6	Introduction	65
6.1	Learning from disasters	65
6.2	Levels of learning	65
6.3	Active learning	66
6.4	General and specific learning	67
6.5	General concepts defined	68
	6.5.1 Discussion of general concepts	68
6.6	Types of organisations	69
6.7	Discussion of general concepts	72
	6.7.1 Isomorphism	72
	6.7.2 Emotional impact	75
	6.7.3 Chance and disasters	77
	6.7.4 Attempted foresight	78
	6.7.5 Hindsight	80
	6.7.6 Organisational reactions	81
	6.7.7 Safety by compulsion	82
	6.7.8 Safety philosophy	83
	6.7.9 Change in safety philosophy	85
6.8	Conclusions	85
<b>7</b>	<b>Specific organisational learning</b>	88
7	Introduction	88
7.1	Organisation-specific concepts defined	88
7.2	Steps to active learning	89
7.3	Conditions for disasters	90
	7.3.1 Latent errors developed in the design stage	90
	7.3.2 Decision making in conditions of ignorance	91
	7.3.2.1 Interpretation	92
	7.3.2.2 Organisational change	93
	7.3.2.3 Complexity	93
	7.3.2.4 Demarcation of activities	94
7.4	Information and disasters	95
	7.4.1 Mass media	95
	7.4.2 Public inquiry reports	96
	7.4.3 Dissemination of inquiry information	96
	7.4.3.1 Departmental conferences	97
	7.4.3.2 Revision of information	97
	7.4.3.3 Effects of organisation size	97
	7.4.3.4 Exchanges of information	98
	7.4.3.5 Organisational memory and people	99
	7.4.3.6 Loss of organisational memory	99
	7.4.3.7 Advice ignored	100
	7.4.3.8 Poor internal communications	100
7.5	Safety by regulation	100

7.5.1	Interpretation of regulations	101
7.5.2	Review of existing rules	102
7.5.3	Limitation of rules	102
7.5.3.1	Rule breaking	103
7.6	Personnel	103
7.6.1	Passive and active training	104
7.6.2	Supervision	105
7.6.2.1	Behaviour of supervised	105
7.6.2.2	Supervisor-to-supervised ratio	105
7.6.2.3	Supervisory failure	106
7.6.2.4	Safety programmes	106
7.7	Organisational economics	107
7.8	Organisational responses to public inquiry recommendations	109
7.9	Lessons learned about fires	112
7.10	Conclusions	113
<b>8</b>	<b>Case studies</b>	<b>115</b>
8	Introduction	115
8.1	Coldharbour Hospital	115
8.1.1	Summary of the incubation period	115
8.2	Dudgeons Wharf	118
8.2.1	Summary of the incubation period	118
8.3	Fairfield Home	119
8.3.1	Summary of the incubation period	120
8.4	Summerland	122
8.4.1	Summary of the incubation period	122
8.5	Taunton railway fire	124
8.5.1	Summary of the incubation period	124
<b>9</b>	<b>Discussion and conclusions</b>	<b>126</b>
9	Introduction	126
9.1	Fundamental themes	126
9.2	Review of the research	126
9.2.1	Are public inquiries appropriate?	126
9.2.2	Better utilisation of inquiry information	127
9.2.3	Summary	127
9.2.4	Models of active learning	128
9.3	Model for the future	129
9.3.1	Model of an organisational learning system	130
9.3.2	Expanded model	131
9.3.3	Model discussion	134
9.4	Conclusions	135
<b>Index</b>		<b>137</b>

# Risk perception and decision-making

## Introduction

This chapter discusses a number of potentially dysfunctional socio-psychological mechanisms that appear able to affect the perception of risk and the decision-making ability of both individuals and groups of people. It is argued that these influences, if not explicitly managed, can prevent people from making the most appropriate decision and thus increase the risk of a disaster or an unwanted incident occurring. A number of tactics to prevent or ameliorate the affects of these mechanisms are discussed.

## 1.1 Judgement

Einstein's  $E=MC^2$  is perhaps one of the best-known mathematical equations. However, as anyone who has tried to explore its power will inform you, this elegant solution, so well known, conceals a web of mathematical and philosophical complexity. In a similar manner, the simple term 'risk management' camouflages the complex nature of managing risk within organisational settings. People, the organisations in which they work and the environments in which they exist are dynamic and non-linear in nature. However, when those who manage organisations, whether public or private, discuss the risks that they face the talk is often about the type of insurance policies, financial instruments or risk management techniques that they could adopt for dealing with them. It is almost as if they believe that all the risks facing them can be envisaged, and that as a consequence the future trajectory of the organisation is on the whole reasonably predictable. What is rarely, if ever, discussed or questioned are the innate decision-making processes that we all use when making decisions regarding risks in such settings, and whether or not our judgment can be compromised.

People make decisions scores of times each day, for example when deciding at what point to cross a busy road or (while at work) whether to act immediately and risk making a mistake or wait for more information and miss a golden opportunity. Thus, as Pollock *et al* rightly point out:

Judgement should not be underestimated – it is after all an essential requirement of life.<sup>1</sup>

Similarly, the United Kingdom Cabinet Office makes the point that:

Successful risk handling rests on good judgement supported by sound processes and systems.<sup>2</sup>

Regrettably however, there is evidence to suggest that there are a number of 'hidden' socio-psychological pathologies that can affect our ability to perceive the world appropriately, and it is some of these factors that will be discussed here.

## 1.2 Risk perception

Human judgement is a complex phenomenon, and is affected by a myriad of factors, with Simon and Newell suggesting that:

Man is a mirror of the universe in which he lives, and all that he knows shapes his psychology, not just in superficial ways but almost indefinitely and subject only to a few basic constraints.<sup>3</sup>

Otway and Pahner observe that, in individuals:

The perception of risks is a crucial factor in forming attitudes; obviously people respond to a threatening situation based upon what they perceive it to be.<sup>4</sup>

Douglas and Wildavsky<sup>5</sup> argue in a similar vein that different societies, and the individuals of which they are composed, create their own sets of criteria against which the risks associated with a particular hazardous circumstance will be interpreted and measured. The use of such social and individual reference schema suggests that the risks perceived by a given society or individual are not objective but subjective.

Several authors have subsequently elaborated on this theme, for example Reid proposes that:

...it is unrealistic to presume that the fundamental processes of risk assessment are objective.<sup>6</sup>

Shrader-Frechette has stated that:

All judgments about hazards or risks are value-laden.<sup>7</sup>

The most radical position is that taken by Paul Slovic, who has suggested that:

There is no such thing as 'real risk' or 'objective risk'.<sup>8</sup>

Berger and Luckmann, meanwhile, argue that reality is socially constructed.<sup>9</sup> Drawing upon these assertions, it can be postulated that all risks are to some extent subjective in nature, as suggested by Pidgeon *et al*,<sup>10</sup> and hence for human beings perception is all.

Thus, if our perception of a particular risk is different from 'reality' then the judgements we make and the actions that are decided upon may turn out in hindsight to have been unfortunate. For example, millions of people in Southeast Asia believed that they were safe from harm from the sea in the areas where they lived. However, that belief was brutally shattered when on the 26<sup>th</sup> December 2004 an earthquake struck, with an epicentre about 150 kilometres off the west coast of the Indonesian island of Sumatra. It was the world's most powerful earthquake in four decades, measuring nine on the Richter scale. The energy released by the earthquake created a tsunami (a powerful and destructive series of waves) that was responsible for the deaths of over 250,000 people, many of them children, and for the destruction of countless homes.<sup>11</sup>

## 1.3 Heuristics

Psychological research has shown that when human beings are asked to make judgements about risks where no statistical data is available, they make inferences regarding the risk by drawing upon what they have heard or seen. The rules of thumb that are used to draw such inferences are known as 'heuristics', and are designed to reduce what is essentially a complex cognitive problem into a much simpler one. Unfortunately, while heuristics are helpful on many occasions, they can lead to large and persistent biases, with serious implications for risk assessment.

### 1.3.1 The availability heuristic

Rolfe suggests that:

The human observer sees the world in relation to his past experience. In consequence, what he perceives is partly determined by what he expects to see...An individual, therefore, has expectations regarding what is likely to happen in a frequently encountered situation.<sup>12</sup>

Thus, it can be argued, when organisations carry out assessments of the risks that face them their choice of what to address will be guided by their knowledge of what has happened in the past. Tentative support for this observation can be drawn from a series of experiments undertaken by Tversky and Kahneman, where they asked subjects to judge the arithmetic probability of a number of different risks taking place. In the course of the research, they found that the probabilities for the risks that the subjects arrived at were affected by factors unrelated to the actual frequency of the events. In their experiments they observed that:

...any incident that makes the occurrence of an event easy to imagine or to recall is likely to enhance its perceived frequency.<sup>13</sup>

Therefore, the easier it was for the subjects to recall a particular risk the more likely it was that they would perceive the frequency of its occurrence to be greater than it actually was. The two factors that appeared to create this affect were emotional ties to a risk and how recently subjects had had a particular risk brought to their attention. For example, if the relative or friend of a subject in the experiment had died of cancer, the subject would rate the frequency with which the disease struck as significantly greater than a subject who had not had that experience. Similarly, if a subject had been asked to judge the frequency of a risk recently highlighted in the media, then once again the subject's assessment of that risk was higher than the actual reported frequency.

Clearly, the availability heuristic has profound implications for the assessment of risks, for this psychological bias operates without a person being aware of it. Hence, when asked to identify the risks associated with a particular operation a person could unknowingly be captured by their own biases. As a consequence it is possible for organisations to be deceived into believing they should address risks that in reality may not require the first call on their resources.

## 1.4 Sanitising the world of hazards

It is often suggested, following some form of highly publicised loss (whatever the industry concerned), that warning signals were ignored by those involved. For example, following the collapse of Barings the headlines in the *Financial Times* noted:

Barings was warned of Leeson risk.<sup>14</sup>

When discussing why such warnings of disaster are sometimes ignored, Turner and Pidgeon point to the work of the psychiatrist Martha Wolfenstein, who suggests that one of the reasons for such behaviour is:

...the sense of personal invulnerability which is essential for most individuals to maintain if they are to be able to go about their daily business without constantly worrying about all the possible dangers that could threaten them.<sup>15</sup>

One empirical example of such thinking can be found in the words of Dr Brooke, who was a member of the in-house team that responded to a fire at the Allied Colloids chemical plant, Bradford, West Yorkshire in 1992:

Never in my worst nightmare did I think that sort of thing could happen, and I'm sure you think that about your organisation. But there it was – happening.<sup>16</sup>

Similarly, W. Lucas, a mining financier who had called in the liquidators to one of the companies in which he had invested, was reported as stating that:

In mining you are always saying there is a risk the roof will fall in and you'll be left without a mine at all. But you don't expect it to actually happen.<sup>17</sup>

Thus, this ability of people to expunge potentially injurious events from their consciousness in order to make the world seem a safer place could cause individuals to become over-confident about the risks they face, and hence fail to recognise the significance of warning signals – thereby paradoxically allowing a dangerous situation to get worse.

## 1.5 Success to failure

In a series of experiments Wason<sup>18</sup> found that when subjects were presented with a simple conceptual task, the solution to which could be found most efficiently by them eliminating hypotheses, i.e. learning from negative outcomes, the subjects demonstrated a strong aversion to the use of such a strategy, preferring instead to search for evidence that would confirm their hypothesis, i.e. learning from a positive association.

Wason observed that such a defensive mechanism allows intelligent individuals to stick to their own hypotheses and seek out confirmatory evidence to support their worldview, rather than accept challenges to it. Consequently, where such an aversion to learning from negative events is strong it may be difficult for individuals to learn from their own and other people's mistakes.

Similarly, Levett and March,<sup>19</sup> from their research into organisational learning, have come to the conclusion that in general people prefer to search for successful outcomes and then learn to copy that behaviour, rather than looking for actions they should avoid repeating.

However, as Miller observes:

Failure teaches leaders valuable lessons, but good results only reinforce their preconceptions and tether them more firmly to their ‘tried-and-true’ recipes.<sup>20</sup>

In a similar vein Lou Gerstner, the man who restored IBM’s fortunes, has reported that:

...the success virus...is a debilitating bug that gets into the blood stream of successful companies...and, unchecked, will bring about their downfall.<sup>21</sup>

Thus, success may eventually lead to organisational failure due to complacency. Consequently, it would appear that when we seek to make a decision regarding the viability of a project we should look for examples of both failure and success. For by adopting such a strategy we could avoid the errors of the past, have an opportunity to improve our proposed course of action and thus enhance our overall chances of success. Support for this position comes from Marc de Leval, who (writing in *The Lancet*) suggests that:

Trying to understand excellence rather than failure could be a more positive way to analyse human performance... [And] besides new facts, known errors could be taught in an equally positive way.<sup>22</sup>

## 1.6 Ignoring warning signs

Unfortunately, overconfidence and complacency as suggested above may lead people into excessively sanitising the world of hazards, and thereby ignoring timely signs of impending danger. For example, a report in *The Times* newspaper by Sage and O’Connell describes a tragedy in which:

A British skier was killed by an avalanche as his wife watched after he ignored his guide’s warnings while skiing off-piste in the French Alps.<sup>23</sup>

When discussing why warnings of disaster such as that noted above are sometimes ignored, Mary Douglas, the celebrated British anthropologist, notes that any tribal culture selects which danger to fear:

...and sets up demarcation lines to control it. It allows people to live contentedly with a hundred other dangers.<sup>24</sup>

Thus, where people decide that a particular activity is safe, they may continue to engage in it regardless of expert advice or the evidence. Support for this position comes from the findings of Slovic and Fischhoff, who argue that people’s beliefs are slow to change and can still persist even when presented with evidence that demonstrates their view is inappropriate.<sup>25</sup>

## 1.7 Hindsight bias

Following some form of untoward incident, it is often said that certain people are ‘wise after the event’, i.e. they claim that they knew before a proposed course of action took place that it would ultimately lead to some form of accident or loss. Frequently, such foresight is the

result of a phenomenon known as ‘hindsight bias’. This is to say that once the actual outcome of an action is known some individuals will often claim that they knew beforehand what the result would be. People are typically not aware that they are experiencing hindsight bias, and believe quite sincerely that had they been asked they could have predicted the untoward result before the event took place.<sup>26</sup>

Thus when evaluating the results of someone else’s mistake perhaps it would be useful if society as a whole reflected on the observation made by Turner and Pidgeon:

...if we are looking back upon a decision which has been taken, as most decisions, in the absence of complete information, it is important that we should not assess the actions of decision-makers too harshly in the light of the knowledge which hindsight gives us.<sup>27</sup>

## 1.8 Cognitive dissonance

Another influence that can affect our decision-making is a phenomenon first identified by Leon Festinger, and known as ‘cognitive dissonance’.<sup>28</sup> Festinger argues that people do not like to have inconsistencies between their attitude (cognition) and behaviour and that when such a situation does arise they react by suffering an unpleasant feeling, known as ‘dissonance’. For example, a young man who is firmly committed to supporting his wife’s career after the birth of their baby is on a visit to his grandmother when she asks: “You won’t let your wife go back to work following the birth of the baby, will you?” However, although that he does strongly believe his wife should go back to work if that is what she wants to do, rather than upset the grandmother he dearly loves the man replies: “No, I want her to stay at home.” The conversation continues but time after time it returns to the topic of his wife staying at home after the birth of the baby, and the young man in order not to hurt his grandmother is forced repeatedly to state an opinion he does not hold. He thus suffers a great deal of dissonance.

There are a number of ways in which the dissonance the young man is feeling can be reduced, one of which is for him to rationalise his inconsistent behaviour so that it does become consistent with his views. Thus he might think: “I’m only saying these things I don’t believe in order to make my grandmother happy.” Since he loves his grandmother this fits well with his actual views, and the dissonance would be reduced. Another way in which the dissonance could be reduced would be if the young man changed his view about his wife going back to work and adopted his grandmother’s view.

This latter mechanism – changing one’s view to agree with the other person – is however potentially very dangerous in a work situation, where it would amount to deferring to another person’s opinion through hierarchy rather than because of love. For example, if a junior person approaches a senior manager with the view that a potentially dangerous situation exists, and if the manager now tells the junior member that in his/her his opinion there is no such danger, there is a possibility that the junior person would agree and the matter left at that.

The junior person, having now expressed a view contrary to the one he/she previously held, would to some extent experience dissonance. Thus, in order to reduce that feeling the junior person might well rationalise his/her change of mind as to the danger of the situation, for example to the effect that the manager has a great deal more experience, has more qualifications, is wiser in the ways of the world, and so on – thus rationalising the contradiction between the two views and so reducing the feeling of dissonance. However, if the junior employee were correct and a dangerous situation did exist, then the problem might only to be recognised after the untoward event occurred.

The serious adverse event described below draws heavily upon the Toft report.<sup>29</sup> It should be noted, however, that it is not being suggested that cognitive dissonance was the only influence

or even the main one having an affect during the crucial discourse that took place just prior to a drug being administered by the wrong route. But as can be observed from the evidence presented below, at one level of analysis the serious adverse event appears to follow one of the routes of the theoretical pattern discussed above regarding the reduction of cognitive dissonance, i.e. a person rationalising why he/she should not openly express a view to a senior manager.

A day-case patient attended a hospital in the Midlands and was prepared for an intrathecal (spinal) administration of chemotherapy, as part of his medical maintenance programme following successful treatment of leukaemia.

After carrying out a lumbar puncture and administering the correct cytotoxic therapy (Cytosine) under the supervision of a specialist registrar (SpR), a senior house officer (SHO) was passed a second drug by the SpR to administer to the patient, which he subsequently did. However, the second drug, Vincristine, should never be administered by the intrathecal route, being almost always fatal. Unfortunately neither doctor was sufficiently aware of this fact until a consultant informed them once the mistake had been recognised.

Unfortunately, although emergency treatment was very quickly provided in an effort to rectify the error, the patient subsequently died.

During the patient's treatment, the SHO (he told the review team) had rhetorically questioned the SpR about the advisability of giving the Vincristine intrathecally. In fact, on being handed the drug to administer, the SHO said: "Vincristine?", to the SpR in a questioning manner. The latter replied in the affirmative. The SHO then said: "Intrathecal Vincristine?", again in a questioning manner. Again the SpR replied in the affirmative, and after this second confirmation that the Vincristine should indeed be given to the patient, the SHO administered the drug.

When the review team asked the SHO why he had not challenged the SpR regarding the decision to administer the Vincristine intrathecally if he thought something was wrong, he stated that:

First of all, I was not in a position to challenge on the basis of my limited experience of this type of treatment. Second, I was an SHO and did what I was told to do by the registrar. He was supervising me and I assumed he had the knowledge to know what was being done. [Dr X] was employed as a Registrar by QMC, which is a centre for excellence, and I did not intend to challenge him.

It should also be noted that the SpR stated in evidence that he could not remember a query being raised by the SHO about the Vincristine, but added that:

I would have told him to proceed in any case, believing in my own mind it was correct to do so.

Thus, under these circumstances it would appear that this particular serious adverse event could only have been prevented if the SHO had refused to carry out the instruction of the SpR and made sure that the Vincristine could not be administered by anyone else.

## 1.9 Groupthink

Following research into the dynamics of group behaviour, Irvin Janis suggested that when people share the same set of values, are all working towards a common goal and are seeking to reach agreement, they can engage in a dysfunctional behaviour that he termed 'groupthink'. Unfortunately, this condition can lead:

...to the development of group norms that bolster morale at the expense of critical thinking [which can then cause] ...a deterioration in mental efficiency, reality testing and moral judgements as a result of group pressures.<sup>30</sup>

However, it should be noted that the groupthink phenomenon is an unconscious one, i.e. those subjected to its influence typically do not recognise the condition, nor that:

The more cohesive the group, the greater the inner compulsion on the part of each member to avoid creating disunity, which inclines him to believe in the soundness of whatever proposals are promoted by the leader or by a majority of the group's members.<sup>31</sup>

This leads to another damaging characteristic of the groupthink phenomenon: where members of a group are subject to its influence, they will tend to apply direct pressure to any member of the group who raises questions or does not show support for the view favoured by the majority. This can clearly prevent open discussion of any evidence that might point to a weakness in a decision, and as a result could lead to inappropriate action.

Indeed, the influence of the groupthink phenomenon has been posited as one of the reasons for the flawed decision to press ahead with the launch of the ill-fated space shuttle *Challenger*, on the 28th January 1986.<sup>32</sup> The rationale for this hypothesis is that the solid rocket booster engineers at Morton Thiokol had recommended that the shuttle should not be launched if the predicted O-ring temperature was less than 53 degrees Fahrenheit. However, on the morning the shuttle was launched the temperature was in the mid-20s Fahrenheit – much colder than at any previous launch. Thus, although there had been a strong recommendation to delay the launch by solid booster rocket experts, the NASA launch decision-making group failed to heed the warning (one of the output characteristics of groupthink) and delay the flight. In the event, 73 seconds into the launch flight sequence the *Challenger* exploded, and all seven astronauts on board were killed.

Similarly, in his review of the Human Fertilisation and Embryology Authority (HFEA), Toft<sup>33</sup> argued that 'groupthink' had inadvertently become part of the HFEA's culture and this had made it difficult for some of their licence committees to censure centres offering assisted conception services to the public, by using the full extent of the regulatory tools available to them. It should therefore be remembered that whilst the continuity of personnel within an organisation can be a considerable advantage, if groupthink should inadvertently become established then the longer the members of that group remain together the greater the opportunity for a flawed decision to be made.

## 1.10 Hidden influences

Protecting an organisation from adverse events is totally dependent first on hazards being perceived in the first place and then on how the risk of a particular incident occurring is evaluated. The issues discussed earlier, concerning the way in which people perceive risks, become overconfident, ignore warning signs and can generate groupthink are seldom made explicit. They are part of the human condition and generally go unnoticed, but nonetheless influence people both in the decisions they make about reality and in the behaviour they engage in to control the risks that they do perceive. Thus everyone needs to be aware of the problems that can inadvertently arise from these dysfunctional processes and of the ways in which their affects can potentially be ameliorated.

## 1.11 Defensive tactics

In the first instance, however, it should be noted that everyone needs to ensure that the way in which they address the issues considered above do so within the context of their own circumstances. A failure to take account of local conditions and problems may well create difficulties that increase the risk of failure from other, unperceived sources.

Some of the ways in which the issues above might be ameliorated include the carrying out of ‘what-if’ scenarios, i.e. thinking the unthinkable, and then searching for both quantitative and qualitative evidence to support decisions. Members of any decision-making group should critically debate the positive and negative aspects of the available data and ensure that all members of the group contribute to the discussion. It should also be made clear that a challenge to any individual’s ideas by another member of the group is not seen as an act of disloyalty but a way of potentially improving the decision to be made.

Another way forward might be for the members of a decision-making body to attempt to frame their questions so that the answers obtained might refute views that they currently hold. In a similar vein, the sponsor or chairperson of a group could ensure that its members are exposed to the ideas of different people. The leader of a group could hold back his/her views on the topic under discussion until all members of the group have had an opportunity to express theirs. A group might also have a critical evaluator assigned to them, or have any solutions produced by them tested by others outside the group. Members of the group and the leadership could be rotated and the views of professional advisors sought, so as to bring a wider perspective to the issues under discussion and to compensate for any internal bias that might be present.

## 1.12 Conclusions

Every day, people make scores of decisions, each trusting that they have made the most appropriate ones. Unfortunately, there are powerful socio-psychological processes that can affect individuals and groups of people. If these influences are not recognised and managed effectively, they can increase the risk of inappropriate decisions being made. Such erroneous decisions can on occasions lead to people carrying out actions that, with hindsight, are found to have had unwelcome consequences. However, it has also been argued that there are a number of tactics which could help to reduce the risk of inappropriate decisions being made, and hence improve the reality of an organisation’s success.

Finally, all those who manage organisations would be well served if, when explicitly addressing the risks they face, they remembered the caveat offered by the eminent American physicist Richard Feynman, who in his appendix to the report on the *Challenger* shuttle accident stated that:

...reality must take precedence over public relations, for nature cannot be fooled.<sup>34</sup>

The lessons to be drawn from the following chapters of this book reinforce this message, but also offer organisations and individuals ways of minimising the incidence of unwanted events.

## Notes

- 1 Pollock, A., Wilkie, M. and Macaulay, A. (1997) Use judgement effectively, *The Speculator*, 27 March, p 4.
- 2 Strategy Unit (2002) *Risk: Improving government's capability to handle risk and uncertainty*, summary report, November, Cabinet Office, ref. 254 205/1102/D56, p 3.
- 3 Simon, H and Newell, A. (1973) *Human Problem Solving*, Prentice Hall, p 95.
- 4 Otway, H. and Pahner, P. (1980) Risk assessment, in Dowie, J. and Lefrere, P. (eds.) *Risk and Chance: selected readings*, Open University Press, p 157.
- 5 Douglas, M. and Wildavsky, A. (1982) *Risk and Culture*, University of California Press.
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# Index

- Abercrombie, N., 70
- Aberfan disaster, 28, 42, 84
- Active foresight, 67–69, 89, 126, 128
- Active learning, 66, 69, 85, 88–90, 128–129, 135
- Active training, 104–105
- Acts of God, 93
- Acts of Parliament, *see* Laws, rules and regulations
- Administrative procedures, 48
- Adversarial form of public inquiries, 46
- Advice, ignoring of, 100
- Aircraft:
  - Lockerbie disaster, 76
  - Lockheed Tristar, 73
  - McDonnell Douglas DC10, 73
- Alarms, fires, 75, 112, 117, 123
- Allen, D.E., 18–19
- Alleviating organisations, 69, 71
- Allied Colloids fire, 4, 73
- American Airlines, 73
- Arber, S., 39
- Attempted foresight, *see* Foresight
- Authority-based recommendations of
  - public enquiries, 47–48, 50
- Auxiliary organisations, 69, 71, 84
- Availability heuristic, 3
  
- Barings, 4, 13
- Beckingham, H., 112
- Behrens, E.B., 81
- Berger, P and Luckmann, T., 2
- Bertalanffy, L. von, 27, 68, 72
- Birmingham smallpox occurrence, 43, 69
- Blame, 45
- Boats, *see* Shipping
- Boston, Coconut Grove night-club fire, 27
- Bradford stadium fire, 25, 27–28
- Bridges:
  - Melbourne, West Gate Bridge, 27
  - Tay Bridge collapse, 24
- British Coal (Corporation), 22, 73
- British Psychological Society, 76
- British Rail, 69, 73
- British Safety Council, 81
- Brooke, Dr, 4
- Building and construction systems, 31
- Building materials, fire resistance, 91, 93, 116, 123
- Building Regulations, 92, 101–102, 120–121
- Burwell, C.C., 129
- Bye-laws, *see* Laws, rules and regulations
  
- Cambrian Colliery accident, 53–57, 60–63
- Cargo doors, aircraft, 73
- Carver, J., 45
- Case studies, 115–125
- Central Fire Brigades Advisory Council, 98
- Certificates of competency, 48
- Challenger* space shuttle, 8, 24–25, 66
- Chance and disasters, 65, 68, 77–78, 93
- Changes:
  - to administrative procedures, 110–111
  - in environment of systems, 111
  - in organisations, *see* Organisations
  - of use of buildings, 93
- Chernobyl nuclear power plant, 25, 83
- Chicago, Iroquois Theatre fire, 27
- CHIRP, 46
- Civil Aviation (Investigation of Accidents) Regulations, 42
- Clapham Junction disaster, 17, 25, 28, 72
- Clustering of recommendations of public inquiries, 41, 50–51
- Coal mines, *see* Mines
- Coconut Grove nightclub fire, 27
- Codes of practice, 50, 101, *see also* Laws, rules and regulations
- Cognitive dissonance, 6–7
- Coldharbour fire, 42, 60, 70, 73, 75, 80, 91, 93, 102–103, 106, 112, 115–117
- Commissioning organisations, 70–71
- Common mode isomorphism, 73
- Communications:
  - failures, 95, 115, 117
  - within organisations, 48
  - recommendations of public inquiries, 48, 96–97
  - see also* Information
- Computer applications, 96
  - schematic report analysis diagrams (SRADs), 128
  - training, 128
- Conditions for disaster, 90–94
- Confidential Human Factors Incident Reporting Programme (CHIRP), 46
- Contingency fees, 21–22
- Control systems, 34, 45
- Corporate risk management, 13–14
- Cost-benefit analysis, 19–20
- Costs, 107–109, 129
  - of remedial action, 91, 98
- Cross-organisations isomorphism, 72–74
- Creutzfeldt-Jakob disease (CJD), 22
- Crown Property immunity, 82, 116

- Crystal River nuclear plant, 28  
 Cullen, Lord, 29, 46  
 Culture of organisations, *see* Organisations  
 Cuts in services, 107
- Data collection for research, 38–39  
 Davidson, D., 38  
 Davis-Besse nuclear power plant, 28  
 DC10 aircraft, 73  
 Decision-making processes, 1  
 Defensive tactics, 9:  
   ‘what-if’ scenarios, 9  
 Demarcation within organisations, 49, 94, 135  
 Department of Health, 22  
 Department of Health and Social Security (DHSS), 116–117  
 Departmental conferences, 97  
 Design:  
   of buildings, fire risks, 84, 91, 100–102, 112  
   modifications to, 91  
 Design analysis, recommendations of public enquiries, 50  
 Design failures, computer software defects, 90  
 Design implementation, 130–131, 134  
 Design learning systems, 131, 134  
 Design process, 131  
 Design specifications, 130–131  
 Design systems, 30–31, 131  
 Disaster cycles, 30  
 Disaster Sequence Model (Turner), 33  
 Dissemination of information, *see* Information  
 Douglas (IOM) Corporation, 122  
 Douglas, M., 5, 135  
 Douglas, M. and Wildavsky, A., 2  
 Dudgeons Wharf fire, 94, 115, 118–119  
 Dysfunctional disturbances, 34, 55, 105, 116
- Earthquake off Sumatra, 2  
 Emergency procedures, 49, 102  
 Emergency Services, 69, 100, *see also* Fire brigades  
 Emotional impact of disasters, 65, 68, 70, 75–76, 85  
 Enquiries, *see* Inquiries, Public Inquiries  
 European Community (EC), Seveso Directive, 29  
 European exchange rate mechanism (ERM), 13  
 Evacuation of buildings, 112, 117, 121, 133  
 Evidence to public inquiries, 52, 57  
 Exchange of information, 98  
 Experience, *see* Learning  
 Experimental investigations, 50
- Factory and warehouse fires, 73, 82  
 Fairfield Home fire, 29, 44, 76, 79, 82, 84, 91–93, 97–98, 101–102, 106–107, 111, 115, 119–122
- Feedback, 31, 33, 96  
   in learning, 89  
   negative, 30, 34, 105  
   positive, 34, 105  
   in SFCRM, 33
- Fennell, D., 26  
 Festinger, L., 6  
 Feynman, R.P., 9  
 Fiering, M. and Wilson, R., 75  
 Finance, *see* Costs  
*Financial Times, The*, 4, 13  
 Fink, S., 22
- Fire brigades, 69, 84, 100  
   and buildings design, 116  
   and Crown immunity, 82, 116  
   and explosive materials, 118  
   and hospital fires, 82  
   and polyurethane foam, 73
- Fire doors, 35, 80, 103, 109, 120, 123  
 Fire exits, 35, 80, 107, 121  
 Fire officers, 104, 110  
 Fire Protection Association, 27–28, 50, 98  
 Fire Research Establishment, 73  
 Fire Research Station, 98, 116  
 Fire Protection Association, 50, 98  
 Fire resistance, 112  
   building materials, 91, 93, 116, 123  
   furniture/furnishings, 27, 35, 73–76, 81, 93, 115, 117, 121, 124
- Firedamp, Cambrian Colliery accident, 55–56
- Fires, 80–81, 90, 99  
   aircraft, 73  
   alarms, 75, 112, 117, 123  
   chemical, 4, 73  
   evacuation of buildings, 35, 112, 117, 121, 123  
   factories and warehouses, 82  
   hospitals, etc., *see* Hospitals and homes  
   learning about, 88–89, 109–111  
   leisure facilities, 27, 34–35, 69–70, 107, 115, 122–124  
   railways, 28, 73, 115, 124–125  
   spread of, 111, 117  
   stadia, 25, 27–28, 96  
   underground stations, 25, 26, 28, 66–67
- Fischhoff, B., 77, 79  
 Flammability, *see* Fire resistance
- Football stadia:  
   Bradford, 25, 27–28  
   Hillsborough, 25, 96
- Foresight, 69, 79–81, 135  
   active, 65–69, 89, 126, 128  
   attempted, 50, 65, 68  
   recommendations of public inquiries, 47  
   passive, 69
- Forgetfulness, *see* Memory
- Fumes from fires, 91–92, 108, 112, 115, 120, 124  
   smoke detectors, 79, 113, 121

- Furniture/furnishings, 75, 93  
 fire resistance, 27, 35, 73–76, 80–81, 93, 115, 117, 121, 124  
 polyurethane, 73–74, 76, 81
- Gerstner, L., 5
- Goode, W.J. and Hatt, P.K., 38
- Green Park underground fire, 67
- Grounded theory, 38–39
- Group norms, 77
- Groupthink, 7–8
- Hatt, P.K., 38
- Hayes, J., 26
- Health and Safety at Work Act (1974), 42–43
- Health and Safety Commission/Executive (HSC/HSE), 98, 102, 130
- Herald of Free Enterprise*, 70  
 Families Association, 70
- Heuristics, 3  
 availability heuristics, 3
- Heysham nuclear power plant, 28
- Hillsborough stadium, 25, 96
- Hindsight, 27–33, 35, 42–65, 68, 79–81, 135  
 hindsight bias, 5–6
- Hixon level crossing accident, 57–60, 69
- Hospitals and homes, 42, 70, 74–75, 80, 82, 84, 93, 100, 115  
 Coldharbour fire, 62, 70, 73, 91, 93, 102–103, 106, 112, 115–117  
 Crown immunity, 82  
 Fairfield Home fire, 29, 44, 76, 79, 82, 84, 91–93, 97–98, 101–102, 106–107, 111  
 Plymouth General Hospital, 106
- Horlick-Jones, T., 27
- House of Fraser, 74
- Human Fertility and Embryology Authority (HFEA), 8
- Human reliability analysis, 75
- IBM, 5
- ICI, 74
- Iconic learning, 66
- Ignorance and decision-making, 91
- Implementation of lessons, 109–110
- Incubation period of disasters, 30, 33, 51, 69, 83, 90, 115
- Information,  
 about accidents, 95  
 and decision-making, 79, 91  
 and disasters, 88–89, 95  
 dissemination of, 96–100, 129  
 exchange of, 100  
 feedback, *see* Feedback  
 misleading, 95  
 recommendations of public inquiries, 47–48, 50, 55, 89, 127  
 revision of, 97  
 withholding of, 95, 102
- Inquiries, 33, *see also* Public inquiries
- Institute of Chemical Engineers, 98, 130
- Institute of Fire Engineers, 98
- Institutional homes, *see* Hospitals and homes
- Instruction manuals, *see* Manuals
- Instructions, recommendations of public inquiries, 48
- Insurance costs, 108
- Interest groups, *see* Pressure groups
- Interpretation of laws, rules and regulations, 101–102
- Interviews, semi-structured, 38, 39, 41
- Iroquois Theatre fire, Chicago, 27
- Isle of Man, Summerland fire, 34–35, 45, 69–70, 107
- Isomorphic learning, 65–66, 72–126
- Isomorphism, 72–75, 127  
 cross-organisational, 112  
 organisational, 27  
 self-isomorphism, 73
- Janis, I.L., 7–8, 77
- Jenkin, P., 43
- Johnson, B.B., 26
- Joint Fire Research Station, 116
- Judgement of risks, 1
- King's Cross underground fire, 25–26, 28, 66–67
- Kletz, T., 99
- Lagadec, P., 65, 94
- Lancet, The*, 5
- Lamont, N., 13
- Langer, E., 77
- Laws, rules and regulations, 42, 51, 68, 97, 101  
 and attitudes, 81  
 breaking/evasion of, 83, 89, 103  
 Building Regulations, 92, 101–102, 120–121  
 fire safety, 82  
 Health and Safety at Work Act (1994), 42–43  
 hospital buildings, 82  
 implementation of, 35  
 interpretation of, 92, 102  
 limitations of, 83, 102  
 recommendations of public inquiries, 48  
 review of, 48  
 revision of, 48  
 safety by regulation, 29, 92, 100, 118
- Law Society's Accident Line, 22
- Learning, 63, 135  
 active, 66, 69, 85, 88–90, 128–129, 135  
 from disasters, 24, 35, 46, 65, 99–100  
 and experience, 86, 103, 111

- feedback in, 89
  - about fires, 88–89, 109–111
  - general, 35, 65–86
  - isomorphic 65–66, 72, 126, 129
  - from mistakes, 80, 85
  - organisational:
    - general, 35, 65–66, 68
    - specific, 65–66, 68
  - from public inquiry, 52, 94
  - recommendations, 52
  - specific, 65–66, 68
- Legislation, *see* Laws, rules and regulations
- Leisure facilities, fires, 34–35, 69–70, 107, 115, 122–124
- Lessons, *see* Learning
- Leval, M. de, 5
- Levitt, B. and Marsh, G., 4, 77, 111, 127, 129, 135
- Lewis, H.W., 78
- Litigation, 9–10, 40
- Lockerbie air disaster, 76
- Lockheed Tristar, 73
- London Fire Brigade, 66
- London Regional Transport, 66
- London Underground Ltd (LUL), 66
- London Underground railway fires, 25–26
- Loss Prevention Bulletin*, 98, 130
- Lucas, W., 4
- Luck, *see* Chance and disasters
  
- Macintosh Filevision, 60
- Manuals, 106, 134
  - recommendations of public inquiries, 48
  - revision of, 97
- March, G., 77, 111, 127, 129, 135
- Marchioness* sinking, 25, 70
  - Action Group, 70
- Marshall, 39
- Martin, P.Y. and Turner, B.A., 39
- Mass media reporting, 95–96
- McDonnell Douglas DC10, 73
- McLay, W.D.S., 76
- Media reporting, 95–96
- Medical Research Council, 22
- Melbourne, West Gate Bridge, 27
- Memory:
  - of events, 48, 76, 99–100
  - organisational, 99–100
- Methane, *see* Firedamp, Cambrian Colliery accident
- Methodology of research, 38–42
- Miller, D., 5
- Mines, 42
  - accidents, public inquiries, 52–66
  - Cambrian colliery accident, 53–57, 60–63
- Mines and Quarries Act, 42
- Ministry of Education, 120
- Misleading information, 118–1119
- Mississauga (Ont) accident, 95
- Mitchell, M., 76
- Modifications to design, 91
- Monitoring of procedures, 51
  - recommendations of public inquiries, 49
- Morland, Mr Justice, 22
- Morton Thiokol, 8
  
- NASA, 8
- National Health Service, 74
- National Westminster Bank, 18
- Nautical Institute, 130
- Negative feedback, 17, 30, 34, 105
  - In SFCRM, 33
- No win – no fee services, 21–22
- Nottinghamshire, 76
  - Chief Architect of, 76
- Nuclear power industry:
  - learning in, 83, 129
  - plant failures, 25, 27–28, 83
- Nuclear Regulatory Commission, 28
  
- Onset of disasters, 33
- Organisational economics, *see* Costs
- Organisational isomorphism, 65, 68
- Organisational reactions, 65, 68
- Organisations:
  - behaviour, 35
  - boundaries within, 49, 94
  - change, 1113, 85, 100, 104, 111–112
    - following disasters, 77
    - and perceptions of disasters, 77
  - communications within, 48, 97
  - culture, 25–26, 30, 33, 35, 84–85, 111, 128
    - changing, 35, 111
  - holistic nature, 94
  - learning, 29, 89, 113, 127–128, 130, 135
    - general, 35, 65–86, 101, 111
    - specific, 65–66, 68
  - memory of, 99–100
  - size of, 73, 97
  - system failure, 34
  - types of, 69–71, 85
- Orogas, 123
- Otway, H. and Pahner, P., 2
- Overreaction to disasters, 82
- Oxford Circus underground fire, 66
  
- Parallels, *see* Isomorphism
- Passive foresight, 69
- Passive learning, 66
- Passive training, 104–105
- Perception of stability unit (PSU), 16–17, 34, 89, 128
- Personnel, 82, 88–89, 104, 103–105

- recommendations of public inquiries, 47, 49–51, 94
- supervision, 105–106
- see also* Training
- Pidgeon, N., 51
- Pidgeon, N., Turner, B.A., Toft, B. and Blockley, D., 2, 26
- Piper Alpha disaster, 25–26, 29, 46
- Plymouth General Hospital, 106
- Police, emotional trauma, 76
- Political aspects:
  - public enquiries, 43–44
- Pollock, A. *et al.*, 1
- Polyurethane furniture/furnishings, 73–75, 76, 81
- Popper, K., 78
- Positive feedback, 17, 34, 105
- Post-traumatic stress disorder, 76
- Potential active learning, 89
- Power stations, *see* Nuclear power industry
- Precipitating events, 31
- Pressure groups, 70–71, 81
- Prevention of failure model, 16
- Primary organisations, 70–71
- Probability of events, *see also* Foresight
- Public Health Act (1936), 120
- Public inquiries, 31, 34–35, 43, 46, 70, 93, 96, 98
  - appropriateness of, 45, 126–127
  - criticisms of, 42–45, 127–128
  - procedures, 42–43, 127
  - recommendations, 35, 40, 46–47, 55, 60, 100, 109, 128
    - analysis of, 42, 127
    - responses to, 88–89, 109–112
  - reports, 43, 52, 55
- Railways:
  - Clapham Junction disaster, 28, 72
  - Green Park underground fire, 67
  - Hixon level crossing accident, 57–60, 69
  - Railway Inspectorate, 57
  - King's Cross underground fire, 25–26, 28, 66–67
  - Mississauga (Ont) accident, 95
  - Oxford Circus fire, 66
  - Taunton sleeping car fire, 28, 73, 106, 109, 115, 124–125
- Reason, J., 78
- Recall, *see* Memory
- Recommendations of public inquiries, 35, 40, 46, 51–52, 56, 96, 98
  - analysis of, 42
  - responses to, 108, 111
- Records, recommendations of public inquiries, 48
- Regulations, *see* Laws, rules and regulations
- Reid, S.G., 2
- Remembering, *see* Memory
- Remoteness, *see* Distance from disaster
- Reports of inquiries, 34, 79, 95–96, 110
  - schematic analysis, 55
- Rescue and salvage, 31–33
- Resources, *see* Costs
- Risks:
  - assessment of, 1–9
  - decision-making on, 1
  - judgement of, 1
  - management of, 1–9
  - perception of, 2
  - probability of events, *see* Foresight
- River safety, *see* Shipping
- Roberts, P.C. and Burwell, C.C., 129
- Rolfe, J.M., 3
- Royal Aeronautical Society, 130
- Royal Institute of British Architects, 50
- Royal Navy, 69
- Royal Society for the Prevention of Accidents, 70, 81
- Rules, *see* Laws, rules and regulations
- Rushworth *et al.*, 13
- Safety:
  - by compulsion, 65, 68–69, 82, 89, 128
  - culture, 25–26, 28, 35, 51, 55, 99, 104, 126, 128
  - excessive, 82
  - philosophy, 65, 68, 70, 83–85
  - precautions, recommendations, 48, 91
  - programmes, 106
  - by regulation, 88–89, 92, 100–101
- Sage, A. and O'Connell, A., 5
- Sandbox warehouse fire, 73
- Scanlon, J.T., 95
- Schematic report analysis, 51–63
- Schematic report analysis diagrams (SRADs), 52–63, 128
- Seccombe, I. and Ball, J., 13
- Self-isomorphism, 73
- Self-regulation, 83
- Semi-structured interviews, 39
- Seveso Directive, 29
- Shaw, T., 21–22
- Sheffield, Hillsborough stadium, 25, 96
- Shipping:
  - Marchioness* sinking, 25, 70
  - submarine *Thetis*, 42
  - Zeebrugge* ferry, 25
- Shrader-Frechette, K., 2
- Signal failures, railways, 72
- Signal passed at danger (SPAD), 72
- Similarities, *see* Isomorphism
- Simon, H. and Newell, A., 2
- Sleeping car fires, 28, 73, 103, 106, 109, 111, 115, 124–125

- Slovic, P., 2, 3, 77, 79  
 Slovic, P. and Fischhoff, B., 5  
 Smallpox occurrence, Birmingham, 43, 69  
 Smoke, *see* Fumes from fires  
 Smoke detectors, 79, 112, 121  
 Socio-psychological mechanisms, 1  
 Socio-technical systems and failures, 25, 31, 33–34, 42, 50–51, 63, 65–66, 74, 88–89, 93, 126–127, 129–134  
 Space shuttle *Challenger*, 24–25, 66  
 Stabilising action unit (SAU), 16–17, 34, 89, 128  
 Stadia, *see* Football stadia  
 Staff, *see* Personnel  
 Statutes, *see* Laws, rules and regulations  
 Stephenson, Mr Justice, 22  
 Strangers, evacuation of, 112  
 Strategy Unit, *see* United Kingdom Cabinet Office  
 Submarine *Thetis*, 42  
 Sumatra, 2  
 Summerland fire, 34–35, 45, 69–70, 107  
 Supervision, 49, 51, 110  
     of patients, 105–106  
     of staff, 105–106  
 Surprise at disasters, 84–85  
 Symes, A., 13  
 Systems, 27  
     failures, 30  
     models of, 30  
     organisational learning, 88  
     *see also* Socio-technical systems and failures  
 Systems failure and cultural readjustment model (SFCRM), 30–31, 34, 134  
  
 Taunton sleeping car fire, 28, 73, 106, 109, 115, 124–125  
 Tay Bridge collapse, 24  
 Taylor, A.J.W., 76  
 Technical failures, 51, 93, 115  
 Technical recommendations, public inquiries, 47–48, 50  
 Technological recommendations, public inquiries, 101  
 Terms of reference of public inquiries, 44  
 Thames, *Marchioness* sinking, 25, 70  
*Thetis* sinking, 42  
 Three Mile Island, 25, 28  
*Times, The*, 5  
 Toft, B., 8, 51, 134  
 Toft report, 6–7  
 Toxic fumes, *see* Fumes from fires  
 Trade unions, 70  
 Training, 86, 103–104  
     active, 104–105  
     change in procedures, 104, 110  
     passive, 104–105  
     recommendations of public inquiries, 49–51, 55  
 Trains, *see* Railways  
 Treasury Solicitors, 96  
 Triangle Shirtwaist fire, 82  
 Triangulation in data collection, 38–39  
 Tribunals of Inquiry (Evidence) Act (1921), 43  
 Trust House Forte, 70, 108  
 Tsunami in Indian Ocean, 2  
 Turkish Airlines, 73  
 Turner, B.A., 30–31, 35, 51–53, 56, 70, 83–84, 90, 92  
     on decision-making, 79  
     on evacuation, 112  
     on failure-derived information, 134  
     on grounded theory, 39  
     on perception of hazards, 83  
     on safety culture, 25–26  
     on socio-technical systems, 25  
     on Wolfenstein, 135  
 Turner, B.A. and Pidgeon, N., 4, 6  
 Turner, B.A. and Toft, B., 51, 134  
 Turner, B.A., Pigeon, N., Blockley, D. and Toft, B., 26  
 Tvetsky and Kahneman, 3  
  
 Underground railway fires,  
     Green Park underground fire, 67  
     King's Cross underground fire, 28, 25–26, 66–67  
     Oxford Circus fire, 66  
 Unionate organisations, 70–71  
 United Kingdom Cabinet Office, 1  
  
 Ventilation:  
     mines, 55–66  
     sleeping cars, 125  
 Vibration white finger (VWF), 22  
 von Bertalanffy, L., 27, 68, 72  
  
 Warehouse and factory fires, 73  
 Waring, A., 26  
 Wason, P.C., 4  
 Webb, E.J., 39  
 West Gate Bridge, Melbourne, 27  
 Wilson, R., 75  
 Witnesses, public inquiries, 46, 52, 63  
 Wolfenstein, M., 4, 135  
 Wrong-sided signal failures (WSFs), 72  
 Wynn Heavy Haulage, 69  
  
 Yom Kippur War, 52  
  
 Zeebrugge ferry, 25