32 Moral Emotions as Guide to Acceptable Risk

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Abstract: Risks arising from technologies raise important ethical issues for people living in the twenty-first century. Although technologies such as nanotechnology, biotechnology, ICT, and nuclear energy can improve human well-being, they may also convey risks due to, for example, accidents and pollution. As a consequence of such side effects, technologies can trigger emotions, including fear and indignation, which often leads to conflicts between experts and laypeople. Emotions are generally seen to be a disturbing factor in debates about risky technologies as they are taken to be irrational and immune to factual information. This chapter reviews the psychological literature that seems to support this idea. It then presents an alternative account according to which this is due to a wrong understanding of emotions. Emotions can be a source of practical rationality. Emotions such as fear, sympathy, and compassion help to grasp morally salient features of risky technologies, such as fairness, justice, equity, and autonomy that get overlooked in conventional, technocratic approaches to risk. Emotions should be taken seriously in debates about risky technologies. This will lead to a more balanced debate in which all parties are taken seriously, which increases the chances to be willing to listen to each other and give and take. This is needed in order to come to well-grounded policies on how to deal with risky technologies. The chapter discusses various recent examples of hotly debated risky technologies and how an alternative approach of emotions can help to improve debates about the moral acceptability of these technologies. The chapter ends with suggestions for future research in the areas of financial risks and security risks.

Introduction

Risky technologies often give rise to intensive public debates. Examples of risks that spark heated and emotional debates are cloning, GM-foods, vaccination programs, carbon capture and storage, and nuclear energy. While large parts of the public are often afraid of possible unwanted consequences of such technologies, experts typically emphasize that the risks are negligible. They often accuse the public of being emotional, irrational, and wary to objective information. Policy makers usually respond to this gap between experts and public in either of two ways: by neglecting the emotional concerns of the public in favor of the experts or by accepting the emotions of the public as an inevitable fact and as a reason to prohibit a controversial technological development. Both of these responses are grounded on the assumption that the emotions of the public are irrational and block the possibility of a genuine debate. However, the assumption that emotions are irrational is far from obvious. To the contrary, many contemporary emotion scholars challenge the conventional dichotomy between reason and emotion. They argue that emotions are a form or source of practical rationality. This chapter argues that this alternative view of emotions can lead to a different understanding of emotional responses to risk. Risk emotions (i.e., emotions evoked by or related to risk or risk perception) can draw attention to morally salient aspects of risks that would otherwise escape our view. This alternative approach can shed new light on various controversial debates about risky technologies by showing the reasonableness of risk emotions. In addition, it can provide for a new approach on how to address emotions in debates about risky technologies. By taking the emotions of the public seriously, the gap between experts and laypeople can eventually be overcome, leading to more fruitful discussions and decision making.

Historical Developments

Research into public risk perceptions started in the late 1960s and early 1970s with the rise of empirical decision theory. The initial focus was not so much on emotions, but on the way people make judgments under risk and uncertainty. It turned out that the risk judgments of people deviate substantially from the then academically dominant approach of rational decision theory, which was based on formal methods (see Part 3: "Decision Theory and Risk" of this handbook). Not only laypeople, but also experts, turned out to make decisions in ways that deviated from these strict rules, and to have problems processing statistical information (Tversky and Kahneman 1974, also see Gigerenzer 2002). This gave rise to a whole industry of investigations into the biases to which people are prone in risk judgments, under the header "heuristics and biases." This research would eventually result in a Noble Prize in economics for Daniel Kahneman in 2002.

Risk Perception

Since the 1970s, Paul Slovic and his colleagues have conducted numerous psychometric studies into the risk perceptions of laypeople. This research began with the assumption that in so far as risk perceptions deviate from rational decision theory, they are biases. However, eventually Slovic started to develop an alternative hypothesis, namely, that it was possible that laypeople not so much have a *wrong* perception of risk, but rather a *different* perception of risk than experts. Maybe there was something to be learned from laypeople's risk perceptions (Slovic 2000, p. 191). This hypothesis was supported by the finding that if asked to judge annual fatalities due to certain activities or technologies, laypeople's estimates came close to those of experts. However, when asked to judge the *risks* of a certain activity or technology, laypeople's estimates differed significantly from those of experts. Experts define risk as the probability of an unwanted effect, and most commonly, as annual fatality, so they perceive the two notions as by and large the same. However, apparently, for laypeople, these are different notions. They seem to have different connotations with the notion of risk that go beyond annual fatalities (Slovic 2000, pp. 113, 114). Slovic and his colleagues then started to conduct studies with which they tried to disentangle which additional considerations played a role in laypeople's risk perceptions. They eventually developed a list of 18 additional considerations, including a fair distribution of risks and benefits, voluntariness, available alternatives, and catastrophic versus chronic risks (Slovic 2000, p. 86).

The question remains whether these considerations are reasonable concerns that should be included in risk assessments. The answer by sociologists and philosophers of risk to this question is positive. Whether a risk is acceptable is not just a matter of quantitative information but also involves important ethical considerations (see Chap. 3, The Concepts of Risk and Safety, by Möller in this handbook) (cf. Krimsky and Golding 1992; Shrader-Frechette 1991; Hansson 2004). In the literature on ethical aspects of risk, the same considerations are brought forward as the ones that play a role in risk perceptions of laypeople.

Technocratic approaches to risk are based on the definition of risk as the probability of an unwanted effect and cost-benefit or risk-benefit analysis. Cost-benefit analysis resembles utilitarian theories in ethics, which state that we should maximize aggregate benefits or minimize unwanted outcomes. However, such approaches are subject to severe criticism in moral philosophy. Common objections against utilitarianism are that it ignores issues of fair

distribution, justice, autonomy, and motives. The same objections can be raised against cost-benefit analysis (Asveld and Roeser 2009). It is a morally important consideration how risks and benefits are distributed within a society (fairness, equality) (see also ❯ Chap. 36, What Is a Fair Distribution of Risk?, by Hayenhjelm in this handbook). Risks that are imposed against people's will are morally questionable (autonomy, cf. Asveld 2007). It is morally important whether a risk is due to intentional actions, negligence, or has occurred despite responsible conduct (motives) (see also ❯ Chap. 33, Risk and Virtue Ethics, by Ross and Athanassoulis, and ❯ Chap. 35, Risk and Responsibility, by Van de Poel and Nihlén Fahlquist in this handbook). A one-shot, catastrophic risk can be morally more problematic than a chronic, relatively small risk, even though the respective products of probability and effect might be similar. This is because in the case of a chronic risk, such as traffic risks, there are opportunities to improve outcomes, whereas in the case of a catastrophic risk, such as a nuclear meltdown, once it manifests itself, it can prove impossible to stop it, and the consequences can be disastrous for generations to come (Roeser 2006, 2007).

Hence, interestingly, laypeople, psychologists, social scientists, and philosophers share many of the same concerns when it comes to the moral acceptability of risk.

The Affect Heuristic

Recently, another aspect of laypeople's risk perceptions has been investigated, namely, emotions. Melissa Finucane, Paul Slovic, and other empirical scholars have started to study the role of emotions, feelings, or affect in risk perception (cf. for example Alhakami and Slovic 1994; Finucane et al. 2000; Loewenstein et al. 2001; Slovic et al. 2002, 2004, and Slovic 2010). They have coined the terms "the affect heuristic" or "risk as feeling" to describe these perceptions (see ❯ Chap. 26, The Role of Feelings in Perceived Risk, by Finucane in this handbook) (several journals have devoted special issues on this topic: *Risk Management* 2008, no. 3; *The Journal of Risk Research* 2006, no. 2). It turns out that emotions such as dread or fear significantly influence laypeople's risk perceptions. Some scholars see this as a reason to resist laypeople's risk perceptions, as they take emotions to be a disturbing factor for risk perception. Cass Sunstein (2005) emphasizes that emotions lead to what he calls "probability neglect." He proposes to use quantitative methods such as cost-benefit or risk-benefit analysis in order to come to a rational evaluation of risks. Paul Slovic thinks that "risk as feeling" should be corrected by "risk as analysis" (Slovic et al. 2004, p. 320). Others argue that we should respect the emotions of laypeople because we live in a democracy (Loewenstein et al. 2001), or for instrumental reasons, in order to create support for a technology (De Hollander and Hanemaaijer 2003). Hence, it seems like risk emotions constitute the following puzzle: the fact that emotions play an important role in laypeople's risk perceptions threatens to undermine the earlier claims about the broader risk rationality of laypeople. However, Slovic and his colleagues point out that emotions show us what we value (Slovic et al. 2004). It is this line of argument that this chapter explores in more detail in what follows.

Current Developments

The idea that reason and emotion are diametrically opposed is deeply ingrained in our cultural and intellectual heritage, so much so that it is taken for granted and rarely questioned.

The same dichotomy can also been seen in the academic literature on risk and emotion. However, over the last decades, emotion-scholars have challenged the dichotomy between reason and emotion. Many leading philosophers and psychologists who study emotions argue that we need emotions in order to be practically rational. This idea can shed new light on the study of risk and emotion, which will be discussed in this section. This section will first discuss Dual Process Theory, the dominant approach to risk emotions. It will then discuss objections to this approach and present an alternative view.

Dual Process Theory

The dominant approach in research into risk emotions is Dual Process Theory (DPT; cf. Epstein 1994; Sloman 1996; 2002; Stanovich and West 2002). According to DPT, people apprehend reality in two distinct ways: system 1 is emotional, affective, intuitive, spontaneous, and evolutionarily prior. System 2 is rational, analytical, computational, and occurred later in our evolution. System 1 helps us to navigate smoothly through a complex world, but it is not reliable, it provides us with heuristics, but also biases (cf. Gilovich et al. 2002). If we want to have reliable knowledge, we have to use system 2, but it takes more time and effort.

Neurological research by Joshua Greene is meant to support the framework of DPT. People who make utilitarian, cost-benefit moral judgments use rational parts of their brain; people who make deontological, respect-for-persons judgments use emotional parts of their brain (Greene 2003, 2007; Greene and Haidt 2002). Greene and also Peter Singer (2005) argue that this shows that utilitarian judgments are superior to deontological judgments, as the source of utilitarian judgments is superior, namely, reason rather than emotion.

DPT reflects the common dichotomy between reason and emotion: emotions are spontaneous gut reactions, but highly unreliable, reason is the ultimate source of objective knowledge, but it comes with the price of requiring more effort. This approach is commonly adopted by various scholars who study risk and emotion (e.g., Slovic 2010; Sunstein 2005). But the question is whether this is justified.

Against DPT

There are developments in emotion research that cast serious doubt on DPT. Emotions are not contrary to knowledge and rationality, rather, they are a specific form of knowledge and rationality. Many contemporary emotion-scholars see emotions as a source of practical knowledge and rationality.

Groundbreaking research by Antonio Damasio (1994) has shown that people with a specific brain defect (to their amygdala in the prefrontal cortex; see Chap. 27, Emotion, Warnings, and the Ethics of Risk Communication, by Buck and Ferrer in this handbook) have two problems: (1) They do not feel emotions anymore. (2) They cannot make concrete practical and concrete moral judgments anymore. This specific brain defect does not impair abstract rationality; people score equally high on IQ tests as they did before the injury or illness that caused the damage. These patients also still know abstractly that one should not lie, steal, or kill, etc. Their abstract moral knowledge and their abstract rationality are still intact. However, in concrete circumstances, these people do not know how to behave. They were initially virtuous, pleasurable people, but due to the brain defect, they changed into rude

people who act without consideration for others and cannot make concrete moral judgments. Their risk behavior is also affected. Damasio and his colleagues have developed the so-called Iowa-gambling task: an experiment in which people gamble in a lab setting. Where people without amygdala defects fall within a normal range of risk seekingness and risk aversion, amygdala patients have no risk inhibitions. They are willing to take major risks that normal people find unacceptable. Apparently, our emotions prevent us from taking outrageous risks, and they are necessary for making concrete moral judgments.

Other emotion scholars emphasize that emotions are not contrary to cognition but involve cognitive aspects (philosophers: e.g., de Sousa 1987; Greenspan 1988; Solomon 1993; Blum 1994; Little 1995, Stocker and Hegemann 1996, Goldie 2000; Ben Ze'ev 2000, psychologists: e.g., Scherer 1984; Frijda 1987; Lazarus 1991; Damasio 1994). Some scholars think that cognitions precede feelings which together constitute emotions (Reid 1969[1788]). Others propose the opposite model: Emotions are constituted by feelings that give rise to cognitions (Zajonc 1980; Haidt 2001). There are also scholars who argue that emotions are constituted by affective and cognitive aspects that cannot be pulled apart; they are two sides of the same coin (Zagzebski 2003; Roberts 2003; Roeser 2011a). Take the emotion of guilt. Experiencing this emotion involves feeling the "pangs of guilt." Without the "pangs," it is not genuine guilt. But it also means holding the belief that one did something wrong. The feeling aspect and the cognitive aspect of emotions go hand in hand. Emotions make us aware of moral saliences that would otherwise escape our attention (Little 1995; Blum 1994).

These insights can also shed new light on the research by Joshua Greene mentioned in the previous section. The fact that deontological judgments involve emotions does not undermine their status. Rather, this points to the limitations of utilitarianism and cost-benefit analysis, which is the predominant approach in conventional risk analysis. Making decisions based on utilitarian reasoning might sometimes be inevitable, but there are situations in which respect for persons should be the guiding line, for example in order to avoid deliberately sacrificing people to provide for a benefit for others (Roeser 2010a).

Based on this alternative understanding of emotions, we can say that moral emotions are needed in order to grasp moral aspects of risk, such as justice, fairness, and autonomy – aspects that cannot be captured by purely quantitative approaches such as cost-benefit analysis (Roeser 2006). Hence, rather than constituting a *puzzle* (see section The Affect Heuristic), emotions are the *explanation* why laypeople have a broader, ethically more adequate understanding of risk than experts: Because their risk perceptions involve emotions, they are more sensitive to the moral aspects of risk than the experts who mainly rely on quantitative methods (cf. Kahan 2008; Roeser 2010b).

Emotional Reflection and Correction

The claim that emotions are necessary for moral judgments about risk does not entail that they are infallible. As with all sources of knowledge, emotions can misguide us. But whereas we can use glasses or contact lenses to correct our imperfect vision, there are not such obvious tools to correct our emotions. However, emotions can themselves have critical potential (Lacewing 2005). Sympathy, empathy, and compassion allow us to take on other points of view and critically reflect on our initial emotional responses. We can even train our reflective emotional capacities through works of fiction (Nussbaum 2001).

These ideas show how to correct misguided *moral* emotions. However, there are also emotions that are misguided about *factual* information, which may be especially poignant in the case of risk-emotions, because the information is complex and inherently uncertain.

In addition, there are ambiguous risk-emotions: emotions that can point out important moral considerations, but that can also be notoriously misleading. Prime candidates are fear and disgust. The question arises how we can distinguish between those forms of, for example, fear and disgust that point out moral saliences versus those that are based on stereotypes and phobias, and how to distinguish between them in political debates about risks.

The most visible and controversial emotion that is triggered by technological risks is fear (or worry or dread; cf. Slovic 2000). Ethical objections to new technologies such as cloning, human–animal hybrids, cyborgs, or brain implants are often linked to reactions of disgust. Where the alternative framework of emotions presented in this chapter can rather easily establish why moral emotions such as sympathy, empathy, and indignation should play an important role in political debates about the moral acceptability of risk, fear and disgust are more complicated. Fear and disgust are less clearly focused on moral aspects of risk, they can also be responses to perceived threats that might be based on wrong factual information. Fear and disgust might just reflect our unfounded prejudices and phobias, such as the fear of flying. Even in the light of contrary moral or factual evidence, we might still feel fear or disgust (cf. Sunstein 2005 for the irrationality of fear; cf. Haidt and Graham 2007 for the irrationality of disgust).

On the other hand, there are situations in which fear and disgust enable us to be aware of morally salient features. Interestingly, nanotechnology gives rise to greater worries within the scientific community than among the public (Scheufele et al. 2007). Given the newness of nanotechnology, we can assume that scientists are more knowledgeable than the public about nanotechnology and its concomitant risks. Apparently, their fears can be attributed to a rational understanding of the risks involved in nanotechnology. Fear can point to a source of danger to our well-being (Green 1992; Roberts 2003; Roeser 2009). In a similar way, disgust and the "uncanny" feelings we have concerning, for example, clones, cyborgs, human–animal hybrids and people with brain implants can point to our unclear moral responsibilities to them and the worry that they might develop in an unforeseen way. These are ethical concerns that need to be addressed in developing and dealing with such new technologies, and disgust can enable us to detect morally salient issues (cf. Miller 1997; Kahan 2000 on the rationality of disgust). Fear and disgust can be warning signs, making us aware of the moral values involved in new technologies. In so far as fear and disgust can sustain reflection (which can itself be an emotional process, cf. Lacewing 2005 and Roeser 2010c), they should inform our judgments.

Misguided risk emotions that are geared toward factual aspects of risk should be corrected by factual data. This is complicated by the fact that some risk-emotions function like stereotypes or phobias and can even be immune to factual information. Take the fear of flying; this emotion does not easily disappear in the light of evidence about the safety of plane travel. Factual information has to be presented in an emotionally accessible way in order to be able to correct misguided risk-emotions that are directed at factual aspects of risk (see Chap. 27, Emotion, Warnings, and the Ethics of Risk Communication, by Buck and Ferrer in this handbook). One strategy might be to point out the benefits of a technology in cases where people focus on small risks.

However, it should be noted that not all biases in risk theory that are currently attributed to emotions are really based on emotions (Roeser 2010c). This might again be due to the

presupposition of DPT that irrational perceptions must be due to system 1, hence, emotion, but as argued before, this is an unwarranted claim (cf. Roeser 2009).

Risk Emotions in Practice

This section discusses what the alternative approach to risk emotions means for the most important agents in risk society. Accordingly, it will discuss several areas of technology to illustrate how the alternative approach to risk emotions can shed new light on understanding the responses to these areas of technology. It will end with an alternative model for emotions in risk politics.

Emotions of Agents in Risk Society

Research on risk emotions can focus on three main groups, i.e., the public, the experts, and policy makers. Each group has its own concerns, emotions, and moral considerations, but is also prone to potential biases, which can affect debates about risky technologies.

Risk Emotions of the Public

Research on risk emotions mainly focuses on the public. In debates about risky technologies, public emotions are often the most visible and contrasted with the supposedly rational stance of experts. However, it is not clear that experts are free of emotions, nor is it clear that this is a bad thing, an idea that will be explored in the following section. In addition, as elaborated above, the fact that the public is emotional about risks might be the reason that they are capable of taking on a broader perspective on risk than the technocratic stance of experts and policy makers.

Risk Emotions of Experts

It might be thought that experts take a purely rational, detached stance to risky technologies. However, scientists can be deeply emotionally involved with the research and technologies they develop (cf. McAllister 2005). As previously stated, experts are more worried about nanotechnology than the public (Scheufele et al. 2007). Experts are more knowledgeable about the scientific facts than laypeople, but that can also lead to increased moral concern and worry. Arguably, experts should take these worries and concerns seriously, which should lead to additional precautions (Roeser 2011c).

The emotions of experts can also be potential biases, for example, due to enthusiasm about their technologies or due to self-interested concerns, such as pressure on securing funding, positions, and prestige. Experts can control for these potential biases by also considering themselves as part of the public and trying to empathize with the point of view of potential victims of their technologies (cf. Van der Burg and Van Gorp 2005 who make this point based on an argument from virtue-ethics, which is extended to emotions in Roeser 2011c).

The Role of Risk Policy Makers

Risk policy makers should ideally mediate between the insights of experts and the concerns of the public. However, in practice, there can be potential conflicts of interest that might be reinforced by emotions. For example, experts from industry lobby and often have close ties with the government when it comes to large infrastructural high-tech projects. Careers of policy makers can be at stake, which can lead to potential self-interested emotional biases. On the other hand, these same emotions can force politicians to follow the predominant views of the electorate. A virtuous policy maker should be someone who can balance the various considerations and emotions and take a wider perspective, based on feelings of responsibility and care for all members of society, in which risks and benefits of a technology and concomitant moral concerns are carefully balanced (cf. Nihlén Fahlquist 2009).

Emotions and Risky Technologies

This section discusses two salient cases that show the practical applications of the theoretical framework sketched in the previous section, namely, nuclear energy and climate change.

Emotions and Nuclear Energy

Due to the disaster at Fukushima, the debate about nuclear energy has taken an unexpected turn. In the last few years, there was a growing consensus that nuclear energy would be an important part of the solution to generate energy with decreased CO_2-emissions. The probability of an accident was said to be negligible. However, now that an accident has occurred, nuclear energy has become controversial again and people argue that we should abandon it (cf. e.g., Macilwain 2011). Germany immediately shut down several nuclear reactors, and the German Green Party achieved unprecedented results in local elections due to its antinuclear position.

Despite this shift in focus, there seems to be one constant factor in the debate about nuclear energy: proponents call opponents badly informed, emotional, and irrational, using these notions more or less as synonyms. However, such rhetoric is denigrating and hinders a real debate about nuclear energy. In addition, it is simply wrong to equate emotions with irrationality, as they can be a source of practical rationality. A fruitful debate about nuclear energy should do justice to quantitative, empirical information as much as emotional, moral considerations. It should allow the public a genuine voice in which their emotions and concerns are appreciated, listened to, and discussed. By discussing the concerns underlying emotions, justified concerns can be distinguished from – morally or empirically – unjustified concerns (cf. Roeser 2011b).

Emotions and Climate Change

Climate change is an urgent problem that will presumably affect the environment for generations to come, and it will also have effects on the health and way of life of present and future generations. Nevertheless, people seem to be unwilling to adapt their behavior. Several researchers who study the perceptions that people have of climate change have stated that

people lack a sense of urgency (Meijnders et al. 2001, Leiserowitz 2005, 2006; Lorenzoni et al. 2007, Lorenzoni and Pidgeon 2006).

Emotions are generally excluded from communication and political decision making about climate change, or they are used instrumentally to create support for a position. However, based on the account of emotions presented above, emotions can be seen as a necessary source of reflection and insight concerning the moral impact of climate change. In addition, emotional engagement also leads to a higher degree of motivation than a detached, rational stance on climate change (cf. Weber 2006). Hence, emotions might be the missing link in communication about climate change, in a twofold way: They lead us to more awareness of the problems and motivate people to do something about climate change (Roeser under review).

Emotions and Risk Politics

Currently, many debates about risky technologies result in either of two pitfalls, namely what can be called the technocratic pitfall and the populist pitfall. In the technocratic pitfall, the debate is dominated by statistical, quantitative information, leaving no room for emotions and moral concerns. In the populist pitfall, the emotions and concerns of the public are taken for granted and seen as inevitable. If there is no public support, a risky technology cannot be implemented. Both pitfalls are due to the assumption that reason and emotion are distinct faculties. The technocratic pitfall favors "system 2," reason and science. The populist pitfall favors "system 1," emotion and gut reactions.

Sometimes both pitfalls occur in the same debate, for example, in the case of the debate about carbon capture and storage (CCS) in the Netherlands. Initially, CCS was to take place in Barendrecht. Experts told the concerned public that there were no risks involved. The concerns of the public were dismissed as being emotional and irrational. This can be seen as an instance of the technocratic pitfall. However, resistance was so strong that the initial plans were abandoned and rescheduled to the much less densely populated province of Groningen. However, the people there also rejected these plans from the start; why should they accept something that other people did not want in their backyard? Before there was even a genuine debate, politicians gave up this plan because there was apparently no "social support." This can be seen as an instance of the populist pitfall: The will of the public is taken to be definite, with no attempt for a genuine dialogue on pros and cons.

However, the approach argued for in the previous sections offers an alternative to these pitfalls, based on a rejection of the dichotomy between reason and emotion. Emotions can be a source of moral reflection and deliberation. This allows us to avoid the technocratic and the populist pitfalls. Instead, we should endorse an "emotional deliberation approach" to risk. Emotions should play an explicit role in debates about risky technologies in the process of people discussing their underlying concerns. This approach may reveal genuine ethical concerns that should be taken seriously; it might also show biases and irrational emotions that can be addressed by information that is presented in an emotionally accessible way. This will enable a genuine dialogue. It will lead to morally better decisions, but as a side effect, it will also contribute to a better understanding between experts and laypeople. It is reasonable to assume that there will be a greater willingness to give and take if both parties feel that they are taken seriously. This procedure might seem more costly. However, it is likely to be more effective, and hence more fruitful in the long run. Currently, many debates about risky technologies result in

an even wider gap between proponents and opponents and in rejections of technologies that could be useful if introduced in a morally sound way. Genuinely including emotional concerns in debates about risky technologies can help overcome such predictable stalemates.

Further Research

This section highlights a few possible topics for future research. The topics discussed in the previous sections are related to risky technologies. But the approach presented in this chapter might also shed new light on other debated risk issues in contemporary society, i.e., financial risks and the risks of terrorism (security risks).

Financial Risks

The financial crisis that hit the world in 2008 has generally been attributed to the irresponsible conduct of the financial sector that was interested in short-term, self-interested gains only and a general disregard to long-term negative consequences for society. Based on the framework presented in this chapter, we can understand this as an example of how ethical considerations were sacrificed for supposedly objective, rational number crunching. Interestingly, the ideal of rationality in economics is self-interest. But from a philosophical point of view, the limited form of self-interest often celebrated in economics is frequently used as a justification to perform unethical actions (Powell 2010). In addition, selfishness can be a state fed by emotions. Such egoistic emotions should be corrected by moral emotions such as compassion and feelings of responsibility (cf. Frank 1988).

Risk from Terrorism

Risks from terrorism (security risks) are often exaggerated and get disproportional attention as compared to other risks (cf. Sunstein 2005; De Graaf 2011). This phenomenon is usually blamed on emotions such as fear (Sunstein 2005). In response to terrorist risks, we can also observe the two pitfalls described earlier: either it is argued that we should ignore the fear of large parts of the population and respond to it with supposedly objective, factual, rational information (technocratic pitfall), or the societal unrest feeds into populist movements (populist pitfall). The approach presented in this chapter might open the way for an alternative approach, in which the emotions of the public are addressed in public debates but are open for revision. Such revisions could take place through factual information as much as through exercises in compassion with potential victims of measures that are supposed to limit the risks of terrorism but come at the price of xenophobia and disproportional measures that are insensitive to individual cases. Works of fiction might prove to be helpful for such exercises in compassion.

Conclusion

This chapter has explored the role emotions do and can play in debates about risky technologies. Most authors who write on risk emotions see them as a threat to rational decision

making about risks. However, based on recent developments in emotion research, an alternative picture of risk emotions is possible. Risk emotions might be a necessary source of insights into morally salient aspects of risk. This view allows for fruitful insights on how to improve public debates about risk, and to overcome the gap between experts and laypeople that currently so often leads to a deadlock in discussions about risky technologies.

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