Emotional Reflection About Risks

Sabine Roeser

> *. . . we make many claims for the affect heuristic, portraying it as the centerpiece of the experiential mode of thinking, the dominant mode of survival during the evolution of the human species. However, like other heuristics that provide efficient and generally adaptive responses but occasionally lead us astray, reliance on affect can also deceive us. Indeed, if it was always optimal to follow our affective and experiential instincts, there would have been no need for the rational/analytic system of thinking to have evolved and become so prominent in human affairs (Slovic et al. 2002, p. 416).*

1 Introduction

Emotions can mislead us in our judgments about risks. They can blur our understanding of quantitative information about risks, but they can also bias us in our judgment of the evaluative aspects of risk. In the literature on risk and emotion, the emphasis is on the former phenomenon. That is why most authors propose that if necessary, risk-emotions should be corrected by rational and scientific methods. However, when it comes to emotional biases of our moral understanding of risks, it is far from obvious that pure rationality will help us out. In this paper I will discuss both kinds of biases. I will argue that not all supposedly emotional biases about the quantitative aspects of risks are really due to emotions, and not all biases are really biases after all. If emotions bias our quantitative understanding of risk, we indeed need proper (accessibly presented) quantitative information. However, concerning the second kind of bias, concerning the moral evaluation of risks, I will argue that we need emotions in order to correct our immoral emotions.

S. Roeser (✉)
Department of Philosophy, Delft University of Technology, Delft, The Netherlands
e-mail: s.roeser@tudelft.nl

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2 The Blind Spots of Risk-Emotions

> . . . the affect heuristic enables us to be rational actors in many important situations. But not in all situations. It works beautifully when our experience enables us to anticipate accurately how we will like the consequences of our decisions. It fails miserably when the consequences turn out to be much different in character than we anticipated (Slovic et al. 2002, p. 420).

Apparently emotions are an important guide when it comes to determining our preferences, or when we make value judgments. But Slovic et al. seem to suggest that emotions can be prejudiced and not open for new information. Several authors who write about emotions and risk emphasize the tendency of emotions to blur our vision for certain aspects of risk. As Loewenstein et al. (2001, p. 271) write: "the risk as feeling hypothesis posits that . . . emotions often produce behavioral responses that depart from what individuals view as the best course of action". As Slovic et al. summarize:

> Among the factors that appear to influence risky behaviors by acting on feelings rather than cognitions are background mood (e.g., Johnson and Tversky 1983, Isen 1993), the time interval between decisions and their outcomes (Loewenstein 1987), vividness (Hendrickx et al. 1989), and evolutionary preparedness (Loewenstein et al. 2001).

In this section I will discuss the "blind spots" that the various authors have identified. I will examine whether all these blind spots are indeed due to emotions. In so far as they are, I will examine in the remainder of the paper how these blind spots of emotions can be corrected. My claim will be that while some of these blind spots have to be corrected by "rational" or scientific methods, others should be corrected by other emotions.

2.1 Emotions and Risk Attitudes

The first bias that I wish to discuss is the general observation made by various scholars that emotions very much determine one's judgments about risks and benefits:

> [P]eople base their judgments of an activity or a technology not only on what they *think* about it but also on how they *feel* about it. If their feelings towards an activity are favorable, they are moved toward judging the risks as low and the benefits as high; if their feelings toward it are unfavorable, they tend to judge the opposite – high risk and low benefit. Under this model, affect comes prior to, and directs, judgments of risk and benefit, much as Zajonc proposed (Slovic et al. 2004, p. 315; italics in original).

Hence, a feeling towards an activity determines somebody's risk judgment. However, even more general moods to a large degree determine one's judgments about risks and benefits. This was a finding in a study by Eisenberg, Baron and Seligman (1996) which Lowenstein et al. (2001) report about:

> The researchers found that trait anxiety was strongly and positively correlated with risk aversion, whereas depression was related to a preference for options that did not involve taking an action (Lowenstein et al. 2001, p. 273).

I think we can explain these findings as follows: depressive people prefer the status quo because this means that no action needs to be performed, which fits the profile of a depressive person, and, not surprisingly, anxious people are risk averse. Hence, somebody's affective traits determine one's risk attitude. Schwarz (2002) also emphasizes the importance of moods for decision making in general.

I think that moods should indeed be seen as a bias, since moods are not directed towards anything in particular. Hence, they are not responses to a risky activity and yet they determine our attitude towards it. However, feelings that are specifically directed towards a possibly risky acitivity and determine our risk judgments are not necessarily biased. Our emotions are able to pick out evaluative considerations about risk that by definition cannot be captured by more quantitative approaches towards risk (cf. Roeser 2009). It is by now a common place in the sociological and philosophical literature about risk that risk is not only a quantitative notion but also an evaluative notion (cf. e.g. Fischhoff et al. 1981; Shrader-Frechette 1991; Krimsky and Golding 1992), and that risk attitudes of laypeople comprise a richer understanding of risks (Slovic 2000, cf. Roeser 2007 for a normative-ethical defense of this claim). However, it is quite surprising that in the literature on risk and emotion, these points tend to get forgotten and emotions are mainly discussed in relation to quantitative issues about risks. We will also see that concerning the literature on the other biases that I will discuss in this section.

2.2 Probability Neglect or Availability

The next blind spot that I wish to discuss is what Cass Sunstein calls "probability neglect" and what Paul Slovic calls "availability".

Sunstein (2005) argues that emotions are especially prone to let laypeople neglect probabilities:

> Probability neglect is especially large when people focus on the worst possible case or otherwise are subject to strong emotions. When such emotions are at work, people do not give sufficient consideration to the likelihood that the worst case will occur (Sunstein 2005, p. 68).

Slovic et al. understand availability as a heuristic that lets us focus on a risk that is easily imaginable, even though it might not be a very important risk. Slovic et al. (2002, p. 414) argue that imagery is more effective than information about relative frequencies:

> Availability may work not only through *ease* of recall or imaginability, but because remembered and imagined images come tagged with affect . . . . The highly publicized causes [of death, SR] appear to be more affectively charged, that is, more sensational, and this may account both for their prominence in the media and their relatively overestimated frequencies (Slovic et al. 2002, p. 414).

Slovic et al. say here that "available", frequently published risks are often more sensational, and thereby more appealing to the imagination and more emotional than risks that get less attention in the media, which clouds our perception of reality. Slovic et al. review various studies that indicate that emotions dominate probabilistic thinking when what is at stake has a strong appeal to emotions, and that the opposite is the case if what is at stake is less affectively loaded:

> When the quantities or outcomes to which these probabilities apply are affectively pallid, probabilities carry much more weight in judgments and decisions. Just the opposite occurs when the outcomes have precise and strong affective meanings – variations in probability carry too little weight (Slovic et al. 2002, p. 410).

Emotions can blind us for quantitative considerations. For example, people who suffer from fear of flying are focused on plane crashes, even though these are extremely rare.

2.3 Framing

The third blind spot that I wish to discuss is "framing". "Framing" refers to the phenomenon that the way (risk-)information is presented to a large degree determines people's evaluations about that information (Tversky and Kahneman 1974; Slovic 2000; Gigerenzer 2002). This is a phenomenon that holds for both laypeople and experts. Tversky and Kahneman (1974) for example let doctors judge if they would recommend a cancer treatment to a patient. One group of doctors got the information about the effectiveness of the treatment in terms of probability of survival, the other group in terms of probability of death, where the information was statistically equivalent. Representation in terms of probability of survival lead to significantly more positive evaluations of the treatment than representation in terms of probability of death. In this example, "framing" seems to be indeed due to emotions, i.e. positive emotions connected with survival and negative emotions connected with death. However, "framing" is not always due to emotions but can also be caused by other possible sources of irrationality. Gigerenzer (2002) shows that Bayesian representations of probabilities are more confusing (for laypeople and experts) than representations in natural frequencies. This has nothing to do with emotions but with the fact that Bayesian representations require more mathematical insight.

2.4 Manipulation

Another blind spot of risk-emotions that Slovic et al. discuss is manipulation. Manipulation is related to framing but it is broader and presupposes that the sender of the information has the intention to steer the receiver of the information in a certain direction, whereas framing can happen without any such intentions.

According to Slovic et al. (2002), affect can misguide us through manipulation by others. For example, people with attractive names are valued higher, background

music in movies conveys affect and enhances meaning, models in catalogs are smiling to convey positive affect to the products they are selling, food products carry "affective tags" such as "new", "natural" etc in order to increase the likelihood to be bought. GMOs are called "enhanced" by proponents and "Frankenfood" by opponents (Slovic et al. 2002, pp. 416–417). However, are these really emotions or mere gut feelings? And what is the difference between the two? I will come back to this further on.

2.5 Natural Limitations

Another blind spot are so-called "natural limitations" of our understanding of risks. According to Slovic, the experiential system that also comprises affect is subject to inherent biases:

> . . . the affective system seems designed to sensitize us to small changes in our environment (e.g., the difference between 0 and 1 deaths) at the cost of making us less able to appreciate and respond appropriately to larger changes (e.g., the difference between 570 deaths and 670 deaths). Fetherstonhaugh et al. (1997) referred to this insensitivity as *psychophysical numbing*.
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> Similar problems arise when the outcomes that we must evaluate change very slowly over time, are remote in time, or are visceral in nature (Slovic et al. 2002, p. 418).

Slovic et al. give the example of nicotine addiction: "a condition that young smokers recognize by name as a consequence of smoking but do not understand experientially until they are caught up in it" (Slovic et al. 2002, p. 418). Slovic explains this as follows: "Utility predicted or expected at the time of decision often differs greatly from the quality and intensity of the hedonic experience that actually occurs" (Slovic et al. 2002, p. 419). However, the example of smoking also indicates the failure of the analytical system[1]: apparently, our abstract knowledge is often not very effective in guiding our behavior.

2.6 Proportion Dominance

A last blind spot in our thinking about risks that I wish to discuss and that according to Slovic et al. is due to emotions is proportion (or probability) dominance:

> Ratings of a gamble's attractiveness were determined much more strongly by the probabilities of winning and losing than by the monetary outcomes. [. . .] We hypothesize that these curious findings can be explained by reference to the notion of affective mapping. According to this view, a probability maps relatively precisely onto the attractiveness scale, because it has an upper and lower bound and people know where a given value falls within that range. In contrast, the mapping of a dollar outcome (e.g., $9) onto the scale is diffuse,

[1] Slovic assumes that there are two mental systems, the affective and the analytical system. This is also what defenders of "Dual Process Theory" argue for. In Roeser (2009) I criticize this approach for being overly simplistic.

> reflecting a failure to know whether $9 is good or bad, attractive or unattractive (Slovic et al. 2004, p. 317).

This is an interesting observation. However, I am not sure what it says about rationality. It seems only reasonable to be agnostic about assessing the value of a certain number if the scale and the upper and lower bounds are unknown. Furthermore, I am not sure in how far this phenomenon really says something about the involvement of affect or emotion. What is the empirical evidence that in the case where bounds are known, evaluations are based on emotions? Maybe the explanation is that Slovic et al. equate ratings of attractiveness with emotional ratings, but whether these are really the same is an open question that should be empirically tested. It is not an analytical claim and it is philosophically controversial whether evaluative judgments are made by reason or emotion or both.

To conclude this section: it is clear that there are many blind spots about risks and probabilities, but they are not all as blind as they seem, and they are not all clearly based on emotions, despite claims to the contrary. Often in debates about bounded rationality, the culprit is by definition "emotion", without further analysis whether it is indeed emotions that undermine our rationality. Not all spontaneous responses are by definition emotional, yet, this seems to be the hidden assumption (for a critique of this, cf. Roeser 2009). In the next section I will first discuss how the aforementioned authors propose to address the blind spots that have been identified, and I will evaluate in how far these proposals seem justified. In Section 4 I will propose an alternative approach for correcting emotions, namely by emotions themselves.

3 Addressing the Blind Spots

Most authors propose to correct "risk as feeling" by "risk as analysis" (cf. Slovic et al. 2004), by for example scientific information. Sunstein thinks that misguiding emotions should be corrected by cost-benefit analysis:

> The role of cost-benefit analysis is straightforward here. Just as the Senate was designed to have a "cooling effect" on the passions of the House of Representatives, so cost-benefit analysis might ensure that policy is driven not by hysteria and alarm but by a full appreciation of the effects of relevant risks and their control. If the hysteria survives an investigation of consequences, then the hysteria is fully rational, and an immediate and intensive regulatory response is entirely appropriate (Sunstein 2002, p. 46).

Sunstein presupposes that cost-benefit analysis is an ultimate arbiter when it comes to evaluations of policies and concomitant emotions. However, cost-benefit analysis has been under severe attack (e.g. Fischhoff et al. 1981; Shrader-Frechette 1991; Slovic 2000, the contributions to Asveld and Roeser 2009). I have argued elsewhere that cost-benefit analysis has to be corrected and completed by ethical intuitions that are also present in risk judgments of laypeople (Roeser 2007) and that these ethical intuitions are based on moral emotions (Roeser 2006). There has to be

a reflective process between technocratic and emotional, explicitly ethical assessments of risks. Hysteria can make us blind, but fear can open our eyes for dangers to which we would otherwise not be sensitive. Slovic et al. (2004, pp. 320, 321) as well argue that a technocratic or analytical approach can benefit from an affect-based approach. Affect can be more suited to convey the meaning that sheer numbers fail to communicate. They mention the examples of literary works and works of art that are better suited than statistics in letting us understand the horrors of the Holocaust and other catastrophes.

Sandman proposes the following solutions: 1. teach people about hazards, 2. make serious hazards outrageous, and 3.:

> we have to stop contributing to the outrage of insignificant hazards. As long as government and industry manage low-hazard risks in genuinely outrageous ways – without consulting the community, for example – citizens will continue to overestimate these risks and activists will continue to mobilize against them (Sandman 1989, p. 49).

Hence, Sandman seems to suggest that outrage can actually be created or enhanced by concealing information, and it can be taken away by involving the public. Involving the public creates trust (cf. Slovic 1999; Asveld 2009). This is interesting, since often experts tend to not inform the public about scientific data because they think that the public will not understand them anyway, or because they are afraid of a lawsuit in case their estimates turn out to be wrong, or in case a hazard manifests of which they claimed that it was very unlikely. However, if Sandman and Slovic are right, it is in the own interest of experts to involve the public. Little information creates distrust, which can lead people to opt for a precautionary approach: "better be safe than sorry". If experts are convinced that a certain technology is worth undertaking, they should share with the public their knowledge about the quantitative risks and benefits and also their ethical concerns. The notion of trust brings me to the following point: namely, that emotions should be corrected by emotions.

4 Correcting Emotion Through Emotion

As said previously, not all the biases the various authors discuss really are instances of affect or emotion. Evaluative responses are not necessarily emotional, and neither are all spontaneous responses. However, this seems to be the hidden assumption in a lot of empirical work on risk and emotion. This assumption is in line with dual process theory (DPT), which serves as a theoretical background for much of the empirical work on risk and emotion. According to DPT, we apprehend reality in two different ways: system 1 is rapid, affective and intuitive, system 2 is slow, analytical and rational (cf. Epstein 1994; Sloman 1996, 2002; Stanovich and West 2002). As I have argued elsewhere (Roeser 2009), this is a much too simplistic conception of the relationship between reason and emotion. Not all spontaneous responses are emotional, and not all emotional responses are spontaneous and a-rational. Even in so far as spontaneous responses are emotional, that does not mean that they cannot

be based on reasons. Some responses that initially involved a process of deliberation can get internalized and evoked spontaneously without reflection in every single instance (cf. Gigerenzer 2007).

Not all emotions are spontaneous, and they are not all unreflected gut reactions. Hence, not all claims that the previously mentioned authors make are strictly speaking about emotions. Spontaneous responses can be characterized as "gut reactions", but those are not the same as the more cognitive, deliberated emotions that can be the product of lengthy processes of reflection (Roeser 2010). Many contemporary philosophers and psychologists who study emotions defend that emotions can be cognitive and can play a role in reflection and deliberation (cf. e.g., Frijda 1987; de Sousa 1987; Greenspan 1988; Solomon 1993; Stocker 1996; Goldie 2000; Ben Ze'ev 2000; Nussbaum 2001; Roberts 2003).

In any case, to the extend that emotions are involved in biases about risks, the question is how we should examine them and in so far necessary, correct them. In cases where emotions blind us for empirical facts, they should be corrected by scientific methods. However, as said before, the notion of risk is not only a quantitative but also an evaluative notion. I have argued elswhere that emotions are necessary in order to obtain moral knowledge concerning risks (Roeser 2006, 2009). However, this does not imply that emotions are infallible as a normative guide. Emotions can help us to focus on certain salient aspects, but they can also lead us to overlook other aspects. For example, engineers might be misled by their emotions: their enthusiasm about a product can lead them to overlook certain risks. Policy makers might be tempted to overlook risks because of the desire for economic prosperity for their region that is promised by a certain technology. The public might be ill-informed and hence only focus on risks and overlook certain benefits. They might wrongly estimate the purely quantitative amount of a risk because they perceive it as threatening. All involved parties might be biased, and their emotions might reinforce those biases.

While rationalists would claim that we should correct our emotions by reason, subjectivists would claim that emotions should rule. Instead, a cognitive theory of emotions allows for the idea that emotions themselves have critical potential. Reason and emotion should criticize each other, but emotions should also be used to critically examine other emotions, by trying to understand different perspectives through sympathy and empathy. For example, engineers should try to understand the perspective of the public and vice versa, and those who benefit from a technology should try to understand the perspective of those who are potential victims of the technology. Altruistic emotions can help to conquer egoistic emotions which for example play a role in the NIMBY-problem.

On the position that I defend emotions should themselves play a role in the critical examination of our moral views. Emotions are reflective. Feeling insecure about our moral viewpoint reflects that we have doubts whether we are right. Feeling outrage at a violation of a moral norm such as autonomy might reflect that we are rather confident of that norm. But in the light of thorough disagreement, we might consider reassessing our emotional moral belief, by trying out different points of

view through empathy and sympathy, by putting ourselves in somebody else's shoes and feeling compassion with somebody else. Emotions are not infallible guides to knowledge, but this holds for all our cognitive faculties. Even a rationalist cannot claim that reason always gets it right. In this respect, all epistemologies are in the same boat. However, emotions are often considered to be more notoriously misleading than other mental abilities. I think that this is a mistaken view. To the contrary, purely rational beings without emotions could not make proper moral judgments, especially when it comes to concrete moral judgments in particular situations, as is shown by the famous studies by Antonio Damasio (1994). Emotions are necessary for moral knowledge, but they are no guarantee for success. We need to critically examine our emotions, by exploiting the reflective and critical potential of emotions, which is given through their possibility of shifting points of view and caring for the wellbeing of others.

Furthermore, some of our moral emotions might be more prone to doubt than others. Moral emotions in dilemmatic or complex situations are more fallible, which can be reflected by feeling desperate about whether we made the right judgment or by being torn between two different emotions. Emotions are not infallible, but they *can* lead us to see what is morally right, and they are often better in doing so than our purely rational judgments. If we try to assess whether an emotion is correcting or corrupting our rational moral judgment, we need judgment and emotion as well. We might feel uncomfortable and that we are cheating when giving up a rational judgment based on an emotion, but we might also feel forced to reconsider our initial rational judgment and feel relieved once we have brought our judgment in line with our feeling about a certain case. Whereas the former feeling might point to a corruptive emotion, the latter might point to a corrective emotion.

Michael Lacewing (2005) makes a similar argument, based on ideas from psychoanalysis. He argues that we need to examine our emotions through "emotional self-awareness". According to Lacewing, this involves three things: 1. feeling the emotion, 2. being aware of so doing, and 3. normally, feeling a second-order emotional response to it. He adds a "dispositional fourth": an openness to emotions, which he explains as "a readiness to feel and acknowledge what emotions one has" (Lacewing 2005, 68). Through this process of emotional self-awareness we are able "to detect our anxiety which raises the possibility that our emotional response to the situation is being driven by defense mechanisms" (Lacewing 2005, p. 73). This is important because "[e]motions that are the product of defense mechanisms are not appropriate evaluative responses to the world" (Lacewing 2005, p. 73). A purely rationalist approach runs the danger of a form of intellectualization that "defends against anxiety partly by working with denial, isolation, or repression to simply not *feel* the emotion that arouses anxiety, and partly by using various means of avoiding the emotion's implications and personal significance" (Lacewing 2005, p. 75). As Lacewing emphasizes: "*[n]ot feeling any emotion does not mean one's thinking is undistorted*" (Lacewing 2005, p. 76; italics in original). In other words, rationalizations can us much be distortions as emotions. Lacewing argues that even in cases where emotions are disruptive, it can be important to examine why one feels that

emotion instead of just laying it aside. In such a case the emotional self-awareness can be "detached" but still "engaged" (Lacewing 2005, p. 80).

Let us apply these ideas to emotions about risk. When thinking about the question whether we find a risk morally acceptable or not, we should reflect on our emotions about the risk, but also on our emotional responses to these emotions. If we are afraid of a given technology, can this be sustained by further reflection? Does our fear seem genuine to us? By using emotions such as sympathy and empathy, we can take a more general perspective and try to feel with the position of other people who are possible victims or beneficiaries of that technology. Do we think that overall, this technology is acceptable to society or not? It might be that such emotional reflection reveals that I myself feel upset about a certain technology, although I think that it is a desirable technology for society. This might indicate that I am more driven by egoistic views than by genuine moral concerns about that technology. This would be an example of the NIMBY-problem: I am not against the technology per se, I just don't want it "in my backyard". But of course if a technology which is overall desirable (the benefits somehow outweigh risks) but has certain negative side-effects these side-effect will have to affect some people, and it is only fair that everybody will at times be affected by these side-effects. If it is a genuine case of egoism, then higher order emotional reflection can point this out and help us overcome our egoism. This is argued for by the economist Robert Frank according to whom altruistic emotions can solve rational choice problems such as free-riding, i.e. not cooperating and taking advantage of others' cooperating. Sympathy and fellow-feeling can help overcome "cold-blooded" (i.e. supposedly rational) egoism and promote cooperation (Frank 1988). If we understand the NIMBY-problem as a case of free riding, then we can apply Frank's insights in order to understand how to solve such problems.

Alternatively, our unease with an overall desirable technology might point out that there can be better ways to deal with the negative side-effects than is initially proposed. In that case, the feeling of unease has to be taken seriously since it points to a morally important consideration. For example, it might be the case that risks and benefits are unfairly distributed, that the risks are involuntarily imposed on some people without giving them a chance to have a say in what is happening, that there are other, less risky and comparatively equally beneficial alternatives or that certain side effects might be unlikely, but that they could be so catastrophic that they are simply unacceptable to those who might be their victims. A test here should be to consider our emotional response if we abstract from the idea that we ourselves are the potential victims to imagining another person being the victim. If we still think that it is unfair, it is apparently not just an egoistic emotion.

This is of course tricky because one of the strategies of emotions such as sympathy is to understand the moral value of the situation of another person by imagining oneself in the role of that person, since that makes it easier to see what might be wrong in that situation. And now I am proposing the opposite procedure – maybe this is asking too much of our imaginative capacities. This concern is also supported by the fact that we tend to care more about the wellbeing of near and dear ones than

of distant others.[2] On the other hand, this might be a rather limited understanding of moral emotions such as sympathy. Nussbaum (2001) emphasizes that sympathy can broaden our "circle of concern", for example through reading works of fiction. I have defended elsewhere (Roeser and Willemsen 2004) that the purest form of sympathy is directly directed at the other person, without the need for a detour through our personal perspective.

The corrective potential of emotions should also be used in political decision making about risks. Emotions are generally excluded from political decision making (cf. Hall 2005; Kingston and Ferry 2007 for a critique of this). This also holds concerning political decision making about technological risks (Sunstein 2005 defends this; cf. Kahan 2008 and Kahan and Slovic 2006a; Kahan et al. 2006b for a critique). There the emotions are at most accepted as an unfortunate fact of life (Loewenstein et al. 2001, De Hollander and Hanemaaijer 2003; Wolff 2006 defend such a view). Sunstein criticizes policies that are based on fear of terror (cf. Sunstein 2005). However, the problem with such policies is that they don't take emotions seriously but use them instrumentally in order to serve a specific political agenda. Such policies respond to people's gut reactions without critical reflection on emotions. In direct contrast, I think that policy making about risky technologies should do justice to emotions as an invaluable source of ethical insight. Emotions should not be neglected or seen as a "given" that cannot be investigated any further, but they should be a trigger for discussion. Democratic decision making should not just be about counting votes. The arguments, reasons and considerations that are revealed by or lie behind emotional responses to technological risks and benefits have to be taken seriously. Of course the emotional responses of people can differ, but disagreement is nearly always a part of collective decision making, whether or not emotions are included. We should accept the possibly diverging emotions of people and discuss the concerns that lie behind them. Considering diverging emotions is an opportunity to develop more balanced judgments. Our emotions are not infallible, just like other sources of knowledge, emotions can also be mistaken. We should critically assess our emotions, but in doing so, we should take into account other emotions, those of ourselves and of other people.

5 Division of Labor: Scientific Information and Emotions

In the above discussion, I have restricted myself to moral emotions, i.e. to emotions that are involved in moral judgments about risks. However, the blind spots that have been mentioned in Section 2 mainly concerned emotions that distort our access to scientific evidence concerning the descriptive aspects of risk, not the normative aspects. There is need for a division of labor: misguided *moral* emotions should be corrected by the emotional procedures described in the previous section, but emotions that make us blind for *descriptive* facts should be corrected by scientific

[2]Thanks to Anca Gheaus for pressing me on this point.

evidence. It is important that such evidence is communicated in a way such that people can adjust their emotions to the facts, i.e. in an emotionally accessible way (cf. Buck and Davis, this volume). We saw previously that for example "probability neglect" is a notorious emotional bias in risk perception.

However, it is fallacious to think that in each case where probabilities are low, emotional resistance such as fear is irrational. There can be certain risks that have such catastrophic effects that probabilities become less significant. This is even more the case when there are available alternatives. This might play a role in the fear that many people feel towards nuclear energy. A nuclear meltdown might change large parts of our world for good, even though it is extremely unlikely to happen. And there are many sources of sustainable energy that have no such catastrophic side effects at all, they are even cleaner and less risky than conventional sources of energy (I discuss this in more detail in Roeser 2006). This is a good example of how a technocratic approach may lead to what I would like to call "complexity neglect". By merely focusing on e.g. annual fatalities we might overlook other morally relevant considerations which can be revealed through emotions such as fear. This example illustrates how risk-emotions can be based on reasonable concerns. These concerns should be taken seriously in debates about the acceptability of technological risks.

Note that various authors who write critically about risk-emotions still emphasize that without emotions, we would be without any guidance (often invoking the work by Damasio on the so-called "somatic marker-hypothesis"):

> Emotional reactions guide responses not only at their first occurrence, but also through conditioning and memory at later points in time, serving as somatic markers. Patient populations who lack these markers not only have difficulty making risky decisions, but they also choose in ways that turn their personal and professional lives to shambles. Thus, feelings may be more than just an important input into decision making under uncertainty; they may be necessary and, to a large degree, mediate the connection between cognitive evaluations of risk and risk-related behavior (Lowenstein et al. 2001, p. 274).

Hence, risk-emotions may have blind spots, but without emotions we would be completely blind. Apparently, emotions are an indispensable guide in making decisions about risks, but they are not infallible. Scientific methods with which to measure risks are important corrections to emotions if people tend to ignore scientific evidence because they are ceased by their emotions. Emotions and scientific methods should be in a good balance when thinking about risks: where science can inform us about magnitudes, emotions inform us about moral saliences. Both kinds of information are inevitable if we want to make well-grounded judgments about acceptable risks.[3]

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References

Asveld, L. 2009. Trust and criteria for proof of risk: The case of mobile phone technology in The Netherlands. In *The Ethics of Technological Risk*. L. Asveld, and S. (R.) Roeser eds., London: Earthscan.

Asveld, L., and S., Roeser. (Red.) 2009. *The Ethics of Technological Risk*. London: Earthscan.

Ben-Ze'ev, A. 2000. *The Subtlety of Emotions*. Cambridge, MA: MIT Press.

Damasio, A. 1994. *Descartes' Error*. New York: Putnam.

de Sousa, R. 1987. *The Rationality of Emotions*. Cambridge, MA: MIT-Press.

Eisenberg, A. E., J., Baron, and M. E. P., Seligman. 1996. Individual differences in risk aversion and anxiety. http://www.sas.upenn.edu/~baron/

Epstein, S. 1994. Integration of the cognitive and the psychodynamic unconscious. *American Psychologist* 49(8): 709–724.

Fischhoff, B., S., Lichtenstein, P., Slovic, S. L., Derby, and R., Keeney. 1981. *Acceptable Risk*. Cambridge: Cambridge University Press.

Frank, R. 1988. *Passions Within Reason: The Strategic Role of the Emotions*. New York: W. W. Norton.

Frijda, N. 1987. *The Emotions*. Cambridge: Cambridge University Press.

Gigerenzer, G. 2002. *Reckoning with Risk*. London: Penguin.

Gigerenzer, G. 2007. *Gut Feelings: The Intelligence of the Unconscious.* London: Viking.

Goldie, P. 2000. *The Emotions. A Philosophical Exploration*. Oxford: Oxford University Press.

Greenspan, P. 1988. *Emotions and Reasons: An Inquiry into Emotional Justification*. New York, London: Routledge.

Hall, C. 2005. *The Trouble with Passion: Political Theory Beyond the Reign of Reason*. New York: Routledge.

De Hollander, A. E. M. and Hanemaaijer, A. H. eds. 2003. *Nuchter omgaan met risico's*. Bilthoven: RIVM.

Kahan, D. M. 2008. Two conceptions of emotion in risk regulation. *University of Pennsylvania Law Review* 156: 741–766.

Kahan, D. M., and P., Slovic (2006a), Cultural Evaluations of Risk: "Values" or "Blunders"? Yale Law School, Public Law Working Paper No. 111

Kahan, D. M., S., Paul, G., John, and B., Donald. 2006b. Fear of democracy: A cultural evaluation of sunstein on risk. *Harvard Law Review* 119: 1071–1109.

Kingston, R. and Leonard F. (eds.) 2007. Bringing the passions back. In *The Emotions in Political Philosophy*. British Columbia: University of British Columbia Press.

Krimsky, S. and Golding, D. eds. 1992. *Social Theories of Risk*. Westport: Praeger Publishers.

Lacewing, M. 2005. Emotional self-awareness and ethical deliberation. *Ratio* 18: 65–81.

Loewenstein, G. F., E. U., Weber, C. K., Hsee, and N., Welch. 2001. Risk as feelings. *Psychological Bulletin* 127: 267–286.

Nussbaum, M. 2001. *Upheavals of Thought*. Cambridge: Cambridge University Press.

Roberts, R. C. 2003. *Emotions. An Essay in Aid of Moral Psychology*. Cambridge: Cambridge University Press.

Roeser, S. 2009. The relation between cognition and affect in moral judgments about risk. In *The Ethics of Technological Risks*. L. Asveld, and S. Roeser eds., 182–201, London: Earthscan.

Roeser, S. 2010. Intuitions, emotions and gut feelings in decisions about risks: Towards a different interpretation of 'neuroethics'. *The Journal of Risk Research* 13: 175–190.

Roeser, S. 2007. Ethical intuitions about risks. *Safety Science Monitor* 11: 1–30.

Roeser, S. 2006. The role of emotions in judging the moral acceptability of risks. *Safety Science* 44: 689–700.

Roeser, S., and M., Willemsen. January 2004. Compassie en verbeelding. *Algemeen Nederlands Tijdschrift voor Wijsbegeerte* 96(Nr. 1): 53–65.

Sandman, P. M. 1989. Hazard versus outrage in the public perception of risk. In *Effective Risk Communication: The Role and Responsibility of Government and Nongovernment*

Organizations. V. T. Covello, D. B. McCallum, and M. T. Pavlova eds., 45–49, New York, NY: Plenum Press.
Shrader-Frechette, K. 1991. *Risk and Rationality*. Berkeley: University of California Press.
Schwarz, N. 2002. Feelings as information: Moods influence judgments and processing strategies. In *Intuitive Judgment: Heuristics and Biases*. T. Gilovich, D. Griffin, D. Kahnemann, eds., 534–547, Cambridge: Cambridge University Press.
Sloman, S. A. 2002. Two systems of reasoning. In *Heuristics and Biases: The Psychology of Intuitive Judgment*. T. Gilovich, et al. eds., 379–396, Cambridge: Cambridge University Press.
Sloman, S. A. 1996. The empirical case for two systems of reasoning. *Psychological Bulletin* 119: 3–22.
Slovic, P. 1999. Trust, emotion, sex, politics, and science: Surveying the risk-assessment battlefield. *Risk Analysis*. 19: 689–701.
Slovic, P., M., Finucane, E., Peters, and D. G., MacGregor. 2004. Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis* 24: 311–322.
Slovic, P., M., Finucane, E., Peters, and D. G., MacGregor. 2002. The affect heuristic. In *Intuitive Judgment: Heuristics and Biases*. T. Gilovich, D. Griffin, and D. Kahnemann, eds., 397–420, Cambridge: Cambridge University Press.
Slovic, P. 2000. *The Perception of Risk*. London: Earthscan.
Solomon, R. 1993. *The Passions: Emotions and the Meaning of Life*. Indianapolis: Hackett.
Stanovich, K. E., and R. F., West. 2002. Individual differences in reasoning: Implications for the rationality debate? In *Heuristics and Biases: The Psychology of Intuitive Judgment*. T. Gilovich, et al., eds., 421–440, New York: Cambridge University Press.
Stocker, M. with Elizabeth Hegemann 1996. *Valuing Emotions*. Cambridge: Cambridge University Press.
Sunstein, C. R. 2005. *Laws of Fear*. Cambridge: Cambridge University Press.
Sunstein, C. R. 2002. *Risk and Reason. Safety, Law, and the Environment*. Cambridge: Cambridge University Press.
Tversky, A., and D., Kahneman. 1974. Judgment under uncertainty: Heuristics and biases. *Science* 185: 1124–1131.
Wolff, J. 2006. Risk, fear, blame, shame and the regulation of public safety. *Economics and Philosophy* 22: 409–427.