

Choices and rationalities under radical uncertainty: Ideals and principles behind responses to risks and risk information

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Abstract

We investigate the role of ideas, ideals and principles in responses to risks. Focusing on human health risks, we scrutinize the notions that “irrational” risk perceptions and behavior can frequently harm health, and that such perceptions and also risk-increasing responses to information and societal “nudges” need correction. To develop a more thoughtful and less normative theory of what makes a response rational or harmful, we rely on the collective experience in risk assessment and risk governance in the EU and the US, and use literature reviews, conceptual models and cases such as seafood consumption. Our approach implies a departure from common positivist methods in risk analysis. We outline types and roles of ideas and principles in relation to risks, to those responding and to their societal contexts, emphasizing alternative development paths and notions of risk significance. We then deconstruct rationality and harm in risk behavior, stressing the difficulties in defining non-equivocally such behavior and ‘corrective’ approaches. We replace the ideal of optimality in choosing between risks with acceptability of processes and outcomes, and substantive with communicative rationality. We examine the impacts of world-views on risk behavior, including asymmetric responses, and the importance of the qualities of the risk and of the context. In conclusion, we offer suggestions for

deeper and more many-sided understanding and development of responses to risks and of related ideas and principles.

Keywords: Risk, choice, ideas, principles, rationality

1 INTRODUCTION

In order to grasp how people perceive and respond to risks, and why they do so – in order, perhaps, to have any basis for ascribing “irrationality” to them or their responses -, one needs to truly understand not only the risks and apparent responses, but also these people and their choices in socio-cultural contexts (Douglas, 1996; Wilkinson, 2001; Finkel, 2008a; Weber and Morris, 2010). Such understanding needs to appreciate the fundamental importance of uncertainty and inter-individual variability in risk, and also to be non-constrained by unwarranted preconceptions and predetermined valuations regarding the rationality and desirability of responses to risks. Even more broadly, the understanding should grow to encompass choices, including the costs and benefits and also other such as social and political properties and impacts of accepting, controlling, or eliminating risks. Such broad perspectives on choices are needed because risks do not exist in a vacuum, detached from human responses, and people are largely concerned about those choices, not (only) about risks as abstractions and objects of fear.

The importance of ideas and world-views in understanding policy changes as an alternative to cognitive and normative frames has been shown (Surel, 2000). Ideas, ideals and principles hold key positions also between perceptions of and responses to risks. Indeed, it has been postulated that risk in itself has become a constitutive idea in ‘postmodern’ globalized society (Beck, 1986, 2008), though such claims have been criticized (Elliott, 2002; Mythen, 2007). As socio-cultural constructs of biophysical and mental realities, ideas and ideals in any case influence the weights put on risks and benefits (Finkel, 2008b); actions chosen; outcomes; even the ‘scientific facts’. A corollary of this is that risk management is hard to reduce to responses that try to maximize utility and certainty via positivist and expert-driven approaches (cf. Fischhoff, 1982).

Historically, ideas specifically about risks have involved tensions between biophysical and social outlooks and between an exclusive focus on objective factors versus giving subjective individual notions legitimacy (e.g., Fischhoff, 1977; Bernstein, 1988). The history of risk perception research may be summarized as being narrowly occupied with the divergence on how people “should” respond and how they do; and as having over-interpreted results to fit preconceived idea(l)s in a “hunt for rationality” (Finkel, 2008a). The same applies to formal and practical risk assessment: in the NRC (2008) guidance for instance there is little on stakeholder involvement and deliberation, compared e.g. with IRGC (2005) frameworks. Varied perspectives on risks thus need to be better reconciled (Avén and Kristensen, 2005). As stated by Kahn (1973): *“Decision and policy making pose crucial problems research is rarely forced to face: the need for a broad, multifaceted vision of phenomena; coping imaginatively and realistically with future circumstances that can only vaguely be distinguished”*, with the goal of an integrated solution of *“broad and future-oriented studies, institutionalized in interdisciplinary systems, and the crucial position of scenarios and propaedeutic and heuristic methodologies”*. It is now clearer that also idea(l)s and principles need to be (examined as) part of the necessary “multifaceted vision and heuristics” and the longed-for “propaedeutic aids”.

Understanding ideals and principles of responses to risks thus requires more inclusive knowledge that can be gained from studies in socio-psychology, ethics, law and politics, among other fields. New studies are also needed on these key aspects of risks and of responses to them (Kahan, 2012; Choma et al., 2013), to better define what “risky risk perceptions” and “adverse responses” entail, and how to develop the “sound decisions” also called for.

We address two closely-related key themes and implicit (but partly even explicated) claims that are still very common: (1) “irrational” risk perceptions and behaviors can be bad for health; and, in particular, (2) risk-increasing responses to risk information and to “nudges” or other societal influences need also to be identified and corrected before they do too much damage (on nudges,

see Thaler and Sunstein, 2008). Theme 1 is in line with the idea that “there is nothing either good or bad, but thinking makes it so” (*Hamlet*), pursued among others by Ropeik (2010) talking about “the fear of fear” being worse than the ‘real’ risk, with implicit assumptions of what is real and what is worse. These criticisms and correctional pursuits can be seen as linked with the above “rationality-hunting” mainstream, and also as part of larger debates about authority.

Theme 2 concerns the claim that irrationality can cause a cycle of risk-and-response with positive rather than the negative feedback we expect and hope. In other words, risks can get worse because of responses to them. This prospect deserves careful scrutiny to avoid narrow judgments. For instance, people can understand the risk well and still respond ‘inappropriately’ for some other reasons, as perhaps in believing a product is safe but avoiding it because it “puts money in hands I dislike”. That is also a preference although not one based on the particular risk but on some other impacts or decision attributes and perhaps associated risks, underlining the need for broad framing of issues and concerns – and choices.

2 METHODOLOGICAL APPROACHES AND SCOPE

We analyze and discuss ideas and principles behind and emerging from responses to risks, especially individual (yet socially conditioned) behavior. We explore these ideas from multiple perspectives based on critical evaluations of common presuppositions and strands of thought. We address idea(l)s and guiding principles in political-ethical and scientific-epistemic realms, and the interactions of these. Specifically, we investigate grounds for what are ‘irrational’ and ‘harmful’ risk perceptions and responses, for whom and why, and what the implications are.

Going beyond positivist approaches, we address “irrational” and “harmful” behaviors reflectively, to complement and challenge implicit assumptions, normative statements and narrow notions of knowledge (Finkel, 2008a). Our focus on choice does not imply a narrowly normative action-guiding approach, but an open heuristic (cf. Schueler, 2003). We develop frameworks by expanding cultural models of risk perception (Hampton, 1982; Douglas and Wildavsky, 1983; Dake, 1991) and social theories of risk (Luhmann, 1993) toward responses to complexity of risk (Assmuth et al., 2009) and politics in responses (Kahan, 2010, 2012). We also conduct literature studies and searches using the keywords ideas, ideals and principles, along with risks.

We apply the frameworks to discourses in environmental and human health risks, focusing on key controversies: about non-ambiguous objective rationality vs. other notions of rationality; about alarmism vs. complacency over risks and consequences of choices; about treating risks in strict symmetry as commensurable and quantifiable entities vs. qualitatively and allowing for asymmetry. We also examine some cases, mainly the risks and benefits of consuming fatty Baltic Sea fish (Assmuth and Jalonen, 2005, Assmuth, 2011).

3 RISKS, INFORMATION AND CHOICES: FRAMEWORKS FOR A NEW OUTLOOK

Choices in managing risks imply conscious actions by individuals, communities or societies. This consciousness varies from ‘gut feeling’ to well-planned responses. Risk choices likewise include technological and social responses on many levels from local to global. Regardless, the focus on choices implies a view of a dynamic continuum in the relation between risks and humans: Risks are not isolated entities that people and societies perceive without considering what to do about them, but are part of human processes, as are rights and responsibilities of choice (Sen, 2009, 22-24). Thus, while there are situations where risks may cause paralysis or haphazard responses

without much thought on choices, even in these situations choices made and offered or facilitated, or not so, are an essential element in risks.

Individuals and communities face a multitude of choices, all of which can be responses on risks but also involve risks. The consequences of choices are mostly imperfectly known, and even the universe of choices is often not completely known. What is more, those making the choices are not well-known, but remain partly surprises even to themselves, despite the illusions they often have regarding how much they know and why they think and act the way they do. Though private and political-level fears and responses can be distinguished (Robin, 2004), there are important links between these levels.

The nature of the risk manifestly influences the perceptions of it and responses to it. This has been studied extensively with regard to characteristics such as whether the risk is natural or man-made, technological or social, catastrophic or continuous, voluntary or not, and known or not. People cope for instance with information on genetic risks differently from other risks (Marteau and Weinman, 2006). Other important characteristics include the extent and complexity of the risks, ranging from local and specific to global and systemic (OECD, 2003; Renn, 2008), and their symbolic import, such as with risks from anthropogenic climate change, an example of a 'heavenly', global, long-term, complex risk that has an important ideological component (which along with the high stakes of this over-arching issue has much to do with its politicization).

Genetic engineering also of non-human organisms illustrates how positive images of the agents causing the risk shape how it is responded to, competing and interacting with negative images. Both may be associated with the idea that humans are "playing God". For instance with 'pharmacrops', plants engineered to produce pharmaceuticals, the promise of developing new drugs has helped to regard the technology favorably and even uncritically as 'white' medicinal

biotechnology by some, including beneficiaries among people with putative treatable diseases, offsetting some of the concerns for the use of such in some respects radically altered organisms (Assmuth and Krimsky, 2008). Under such radical uncertainty quantitative risk analysis becomes constrained (Giampietro, 2003), and resolving risk-risk and risk-benefit relationships to complement precaution (Goklany, 2002) requires new approaches (Starr, 2003; ter Meulen, 2005).

Risk behavior is thus shaped by a host of partly interrelated factors, including risk characteristics, 'hard' socio-economic realities, information and disinformation, socio-cultural factors (Wildavsky and Dake, 1990); jurisdictional divides (Wiener and Rogers, 2002), political and media influences, education and upbringing, as well as personal traits and history, all of these complementing and modifying, in part legitimately, the mere magnitude of the risk (Fig. 1). But in addition to these contextual (and actor-related) factors, risk magnitude is modified and can be even surpassed by characteristics of the choice – often primarily the cost of alternatives (and its distribution) but also other non-risk attributes, peripherally indicated by economic factors and conditions (Fig. 1).

The factors shaping risk behavior also include cultural and ethical ideas and world-views, political ideals, and legal and epistemic principles that underlie and permeate behavioral responses (Fig. 1). Principles, as more formal, stable and consensually defined encapsulations of 'valid' ideas and ideals, pertain more directly to reflection and to action, even in legal norms, and as such play a crucial role in grasping and responding to risks. The resulting multitude of factors, hard-wired or dynamically evolving, and the associated variations and uncertainties that are qualitatively different from standard models of rational decision-making, fundamentally constrain the notion of rational choice.

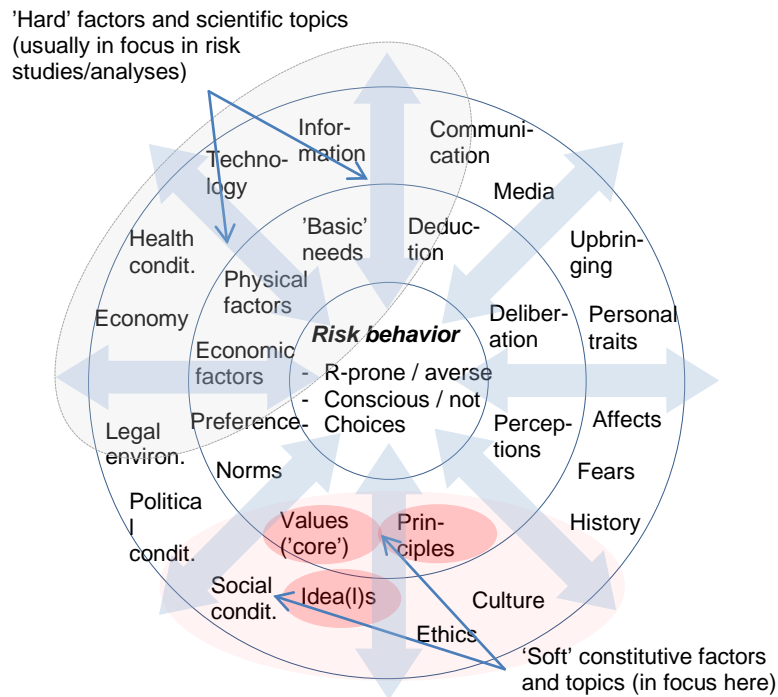


Figure 1. Influences on risk behavior in key 'soft' and 'hard' dimensions, in increasing specificity.

Risks *per se* influence behavior and choices through many dimensions, and also overlaps choices.

Who makes the choice is a key question but may be far from clear. The person nominally making it may be coerced, persuaded, instructed or otherwise influenced to do so. This involves principles and issues of autonomy: is a person able to make a conscious choice (e.g., infant, demented, disadvantaged)? Ambiguities in agency go even wider. There is no clear-cut divide between the fields and forms of behavior of many people, partly as they are in a flux from one group and setting to another, and sit on several chairs even simultaneously.

An implication is that responses to risk, be they risk-averse or risk-tolerant, cannot be claimed to be irrational as often and strongly as usual. The over-confidence of experts in the certainty of their estimates of risks is well-studied (Tversky and Kahneman, 1974) but uncertainties may also be inflated as a strategy to impede decisions and deflated to expedite them. Indeed, the common belief in the veracity of point estimates of risks (and of benefits) in itself is illusory and

misleading. This implies that all parties need to accept the inherent subjectivity and potential irrationality, to varying degree, of those involved, and that the assumptions and values influencing 'inflated' or 'deflated' estimates of risks (also their probability distributions) and uncertainties need to be defined more clearly.

Choices based on science and analysis may in general be assumed to be less irrational, other things being equal, than intuitive lay choices; but not in areas where science is not superior. Science may on the contrary suffer from other limitations due to the very insistence on rationality at the cost of other including ethical considerations, from everyday dilemmas in protecting borderline lives at costs claimed to be excessive, to the more extreme case of wars waged with 'optimal' tactics but without broad consideration of whether the victory was worth the human cost. It may be argued that irrationality is separate from ethics and thus need not be 'bad in itself'; a counter-argument might be that this separation is precisely the problem.

4 DECONSTRUCTING NOTIONS OF 'WRONG' RISK PERCEPTIONS OR RESPONSES

4.1 General considerations and an illustrative example

The key question in evaluating the claim or notion that people in some instance (or even generally) have 'wrong' and irrational perceptions of risks as well as of associated benefits, and are also capable of 'wrong' responses to risk information, even such that put them or others at risk, is: What makes a perception of a risk, or a response to it, "irrational"? We may note that the empirical support for radically differing lay and expert evaluations of risks, invoked as a basis for notions of irrational (lay) responses, has been challenged (Rowe and Wright, 2001).

One of the most basic and long-standing flaws in the risk perception literature and practice has been conflating the “body count” or population risk (R_p , a function of the average individual risk R_i and the number of persons at risk) with R_i . Much of the literature chiding persons and publics for irrational preoccupation with “small” risks ignores the fact that many risks with low mortality present large risks to identifiable persons, or to persons who correctly believe their risks to be higher than average. These prioritizations boil down to ethical principles such as individual rights versus common ‘greater good’ (Vineis, 2014) and the value of human life.

Now suppose that the critic is correctly focused on an “objective” measure of R_i versus the perception of it. Ponder the possibility: what if a response someone calls “irrational” because it (arguably) increases the expected value of R_i , actually does (at least also) something else, and something important? It could decrease the uncertainty about R_i , decrease ‘harm’ while not decreasing risk, or decrease cost. It could also increase joy or some other less tangible yet crucially important benefit, such as promoting social cohesion, trust in security, democracy (NRC, 1996), equal rights despite inequality, human dignity, the upholding of laws that happen to (and even need to) treat risks asymmetrically, respect for deep cultural values, or the like.

It is for instance easy to mock those who switched from flying to driving after 9/11 (Gaissmaier and Gigerenzer, 2012), but just saying that “they chose the more risky mode over the safer mode” is an extremely constipated vision of risky choice, both in itself and hugely amplified by the whole societal repercussions of the disaster – repercussions that are hard to factor in any allegedly rational and exact estimation of risks versus benefits. We may still fly, but understand and sympathize with those “irrational” people who feared the kind of death they faced in a plane (Finkel, 2008a, 129). We may also accept many other specific reasons for their decision, some of them inventive and intricate (e.g., the desire to take advantage of lower gas prices and to avoid the lines at the airport). We may further accept still more elusive and hard-quantified reasons for

switching to driving, for instance as part and a sign of mourning and of a changed life in a profoundly changed society – or at least understand their importance and value to many. Thus, also increased benefit /risk ratios for some individuals, for society, even humanity (and all of these) could come about in many ways, some of them beyond quantification.

4.2 Asymmetry and “bias” in responses: dreaded and welcomed risks

The aspects and impacts of ‘negative’ or ‘positive’ information about risks on behavior have been studied intensely (see Slovic et al., 2004). Some studies have corroborated the hypothesis that such information can contribute to asymmetric risk perception, meaning that the negative consequences of the risk loom larger than the positive ones of equal probability and magnitude, that is, the risks seem disproportionately big or small. Others have by contrast provided conflicting evidence, depending on the risk in question, those responding, and the context. This is a crucial issue concerning putative ‘irrational’ responses, and is also related to ideas and ideologies about risks and to their socio-psychological and cultural factors. It is in particular related to optimistic or pessimistic ideas about risks and about possibilities to manage them.

These ideas and their impacts are not clear-cut and uniform. For instance, people may seem pessimistic (toward a prospect of a risk or also of controls) when they are in fact expressing mistrust, or reacting to an individual risk that is high for them but low for others. Thus, pessimism and optimism about risks and solutions involve questions of aspirations (goals) and agency (who is at risk) and of commensurability of risks, as well as epistemic and yet also political questions of whether the deeper motivations for responses are (and can be) known, which has implications for whether to approach those perceiving and responding to risks only as objects, or also trying more interactively to learn from and with them about reasons for choices.

This multi-faceted phenomenon has individual and collective psychological and broader societal dimensions. There are for instance commonly do-gooder or ‘scout’ urges, and ‘doom prophet’ urges, that may boost perceptions and claims of risks even when they would not be great or urgent, and on the other hand boost beliefs in the ease to reduce or control risks, also those hard-controlled and even when the controls would not be desirable (in the scout metaphor, ‘helping the lady across the street when she doesn’t want it’). The control urge may be coupled with a belief in progress (technological and otherwise), and with a basic need to justify one’s existence and activity and to escape a sense of helplessness in the face of risks. It may also be coupled with a sense of responsibility that may be rational in the broader scheme of society (Sen, 2009), or ‘irrationally’ enhanced by feelings of fear, anger, guilt and shame for being exposed by, or part of, a community causing the risk. All of these factors affect and not infrequently constrain judgment.

Complacent evaluations of risks based on optimism regarding progress involve another type of do-gooder impulse. However, also these people often are concerned about and opposed to some technology (or social phenomenon) at the cost of others. Thus, it is often not so much the risk in itself that divides reactions, but the context and valuations it evokes in the person(s) pondering it. Disputes on risks are consequently often more about cultural ideas such as optimism and liberty and moral principles such as rights and compassion than about facts (i.e., biophysical measures). This may not be wrong and irrational, despite the relative downgrading of scientific facts in the scheme of things, but it does pose challenges for reconciling the various perspectives. The ‘societal progress’ regularly invoked may look very different to those debating: some equate it with libertarianism or unbridled experimentation, others with autonomy of communities instead of enterprises, and with social support and regulation to check risks hitting the under-privileged.

These are particularly important factors in perceptions of and responses to risks, because there are structural reasons and incentives for individuals and organizations to buy into negative images

of risks and to positive images of their controllability, e.g. to strengthen one's position in related activities, along with a genuine will to do good, while there are likewise strong structural factors among others to refrain from controls and to retain the *status quo*, buying into positive images of risks and negative of controls. Risk utopias and dystopias are closely related to eschatological ideas. These involve the common tendency in radical social thought and movements to postulate urgent dangers and improvements to save those at risk. This is well-known both in Judeo-Christian (i.e., Messianic) and Marxist eschatology (Cohn, 1996; Hughes, 2008).

In our contemporary information (and disinformation) society characterized by drama, and perhaps 'Beck's' (1986) risk society, ideas of looming dangers and spectacular rescues are fueled by media and by other mechanisms of social amplification of risks (Kasperson et al., 1988), including 'engineered availability cascades' (Kuran and Sunstein, 1999). These ideas are also shaped by counter-acting attenuation mechanisms such as initial disqualification and forgetting (Lyytimäki et al., 2011) or "psychic numbing" (Slovic, 2007) for instance when facing information on genocides and other evils that hit many in unfathomable severity, or facing repeated "Cry Wolf" alarms. This may be linked with tendencies to downplay risks and management efforts based on attitudes of complacency and a conservative preference.

Pharmacrops (as GMOs in general) provide an example of images and attitudes to technologies, mixing "technological stigma" (Graham, 2014) with putative benefits to consumers (in this case through pharmaceuticals). Such stigmas may be more or less deserved; they may also reflect genuine (and factually supported) concerns that do not have to be secondary to potential economic gains. Here the political and ethical question again surfaces of the distribution of the benefits and the risks, and with it the ideas of distributive justice, fairness and social contract (Rawls, 1971). The evaluation of impacts is also dependent on socio-economic factors: instead of directly benefiting farmers, the benefits may go mainly to multinational companies, and the

redistribution of profits and trickling-down of welfare to local communities is uncertain (see Schurman and Kelso, 2003). It is then difficult to claim unambiguously that the technology would be a blessing or a curse, or whether its application is a race to the top or to the bottom – partly as the impacts on both nature and societies are complex and poorly known and poorly knowable, requiring distinctions of basic properties (Conko, 2004). Knowledge here has a strong political aspect: The technology may be particularly subject to socio-political barriers as exclusive know-how is needed (cf. Cranor, 2003). Thus, also claims that risk perceptions and responses – both pro and con the technology - are irrational or harmful, require closer scrutiny (Jasanoff, 2005).

5 RETHINKING APPROACHES TO INFLUENCING BEHAVIORS

The theme (2) above, i.e., that many behavioral responses to risks need correcting for preventive reasons, implies a powerful claim: that irrationality can cause a cycle of risk-and-response with positive rather than the negative feedback we expect and hope. In other words, risks can potentially "snowball" and get worse also in a vicious circle of pessimism and over-reaction because the fire is fueled by responses instead of being doused by them.

Arguably, governments have made some strides in not leaping to policies that increase rather than decrease risk (Keeney and Winterfeldt, 1986; Graham and Wiener, 1995; Sunstein, 1996; Wiener, 1998, Rascoff and Revesz, 2002). However, when individual behavior controls many risks, so too do we want to be careful how we nudge or otherwise influence people who may increase their own risks by "mis-responding" (cf. Thaler and Sunstein, 2008). We may also want to be entitled to "nudge again" to correct the 'harm' done by the initial nudge, in an adaptive process of joint learning. This however poses the tough issue spotted by Kolbert (2009): *"what if the "nudge" can't be depended on to recognize his own best interests, why stop at a nudge? Why not offer a*

“push,” or perhaps even a “shove”? And if people can't be trusted to make the right choices for themselves how can they possibly be trusted to make the right decisions for the rest of us?” Regardless, the societal mistake would be increasing R_p ; the individual mistake would be increasing R_i ; and as minimal R_p does not equal minima for all R_i , some individuals may easily be in conflict with others, even with populations. Either way, a strong normative position in influencing behavior would be problematic. What is pampering or patronizing somewhere may be social support or empowering elsewhere.

Such influences on behavior go to the heart of the functions and goals of society, and thus should be predicated on – and in turn feed back into - social and political philosophy and their principles and ideas. Is the direction towards a nanny state or a welfare state, to the Golden Rule or the law of the jungle? Again, this involves the collective and the individual level, and the context of risk information becomes important (Assmuth and Hildén, 2008). The key thing is that an objective definition of the “irrationality” or undesirability of behavior is, to a large extent and in many ways, a mirage. Valuations of behavior would benefit from insights and respect for the specific subjective situation and history of an individual and a collective, which are elusive. The ensuing need to loosen claims and requirements for objectivity is by definition particularly strong when defining and valuing the behavior of an individual. Instead, well-established concepts such as self-efficacy (in response to fear, Rogers, 1983) and the sense of coherence in the salutogenetic model of Antonovsky (1996) for coping could be utilized.

The importance of societal ideas in shaping behavioral responses is essentially that they underlie both the mindset of the persons involved and the surrounding communities and actor networks they are part of and conditioned by. Ideas even underlie and shape the information about the risk and management options, e.g. through the priorities set for research and development, though regularly this information is assumed to be objective, value-neutral and factual. These influences of ideals come about in many ways, such as upbringing and education, media and sociality.

The assumptions about the rationality and desirability of behavior also have an economic dimension. In evaluating this, attention needs to be paid to the boundaries and structure of the models used, fusing quantitative and qualitative aspects in ways not often made in utility optimization centered analyses (Cranor and Finkel, submitted). Are for instance benefits from the avoidance of some harm and the costs from accepting it as big and certain as alleged? To whom do these benefits incur, when (pending on discount rates), and how? On the other hand, are the costs and benefits from business-as-usual and alternative options and courses comparable – and how big and certain are they? Notably, are there indirect impacts including benefits and risks or costs e.g. through communication and learning? Also other standard considerations in policy and decision analysis need regularly to be included, such as the irreversibility or flexibility of consequences, the transparency and accountability of policies, and the uncertainty of actions. Efficiency and optimality (also of costs) then take a very different form, more extensive, multi-faceted and open-to-debate, compared to body counts and financial bottom lines.

6 CASE: RISKS AND BENEFITS FROM CONSUMING FATTY BALTIC SEA FISH

Principles in governance of risks can be analyzed based on assessments of dioxin-like compounds (DLCs) and beneficial poly-unsaturated fatty acids (PUFAs) in Baltic Sea fish, a high-profile case of risk-benefit trade-offs (Assmuth and Jalonon, 2005). Mercury is not an issue in the Baltic Sea as it does not bio-accumulate in the key species consumed (herring and salmon), unlike in tuna and other economic ocean species and also in many freshwater fish – an example of the need to specify the risks addressed. However, many issues with dioxins in fish are similar to those of mercury in fish, in a general sense, such as the importance of high-risk and high-benefit groups (Ponce et al.; 2000; EFSA, 2005; Mozaffarian, 2006; Antonijevic et al., 2007; Oken et al., 2008) and of dietary options (SAC, 2004; Cohen et al., 2005; IOM, 2006; Hoekstra et al., 2013).

The focus of official assessments and regulations of the risks and benefits from seafood consumption has been on human health, based e.g. on the EU's guideline values for food and feed concentrations of dioxins and PCBs, but these drivers are also predicated (not as explicitly) on economic factors such as market harmonization. Also in the debates between countries, sectors and actors, socio-economic risks and impacts (including labor impacts) on communities have played an important (but non-transparent) role, whereas ecological effects have not – a case of anthropocentrism that also reminds us of the need to consider framings and principles.

The complexity of these risks and choices is illustrated by arguments used in risk-benefit comparisons. Indirect influences, uncertainties and dynamics in the behavioral response system need to be considered. For example, people might misunderstand the information about contaminants in seafood, eat less fish, and have strokes that impair their cognition far more than the contaminants could (and raise health care costs more). On the other hand, this may be a hypothetical risk spiral or in any case a tolerable counter-veiling risk in comparison with the added safety of reduced contaminant intakes especially if win-win dietary options are introduced. Also the scales and levels of risks and choices need to be considered, as attempts to steer consumer behavior e.g. through fish advisories are embedded in a broader management context including an array of options from food-chain regulation to preventing further contaminants from entering the system, involving multiple time dimensions. The decreased trends of exposures, the lags in risks, benefits and responses, and the uncertainties regarding the efficiency of actions (Oken et al., 2003) influence all options, from advisories and other information-based nudges to market restrictions, and need to be better factored in, preferably in more holistic and adaptive multi-level governance and social learning taking place on many frontiers.

It has been shown (Assmuth and Jalonen, 2005) that structured and contextualized treatment of uncertainties and ambiguities in a participatory and reflective approach (in European

terminology, ‘reflexive’, see Wynne 1996; Craye et al., 2010) could help balancing wide and narrow focus, and evidence and precaution (Assmuth and Hildén, 2008; Assmuth et al., 2010). With complex risk and risk–benefit issues such as with seafood consumption, a rigid approach based on illusory certainty needs to be complemented by a more flexible, deliberative and evolutionary approach. This could also help refocusing on issues found to be salient, such as distributions and qualities of risk–benefit comparisons including e.g. particular groups such as those specified in diet advisories (SAC, 2004, EFSA, 2005), as intermediates between R_i and R_p , trends, and strategic alternatives. Regarding choices between risks and benefits, ways to resolve tensions between flexibility and consistency in policy and assessment should be deliberated.

Risk governance here is also about the ability of people to get information on risks and benefits of their dietary choices, and their rights to choose what to eat (as opposed to the involuntary EU regulations controlling the risks through markets), and the palette of dietary choices available. These include n-PUFA supplements that hold the promise of conferring fatty fish benefits without contamination risks, and have been found beneficial among populations such as cardiac patients (as has fatty fish), but as a ‘pill’ option are constrained by the loss of other benefits even to health from consuming actual fish instead. The balance of complacency and urgency in going for alternatives to fish depends heavily on the weights on policy principles, and legal principles, and also on broader socio-cultural ideas about risks and uncertainties. In devising efficient and acceptable management strategies, consideration should for instance be given also to those unable to choose, such as fetuses and children, to clarify the relative merits of strategies and help find sufficiently certain no-regret options (Domingo, 2007; Genuis, 2008; see also Assmuth and Jalonen, 2005 for broader discussion of related strategies and options).

7 DISCUSSION

7.1 Political dimensions in judgments on risk choices

There is an important political dimension in the notions of rational or irrational responses to risks and risk information. Notwithstanding well-meaning and even well-deserved attempts to dispel some ‘truly’ irrational and even harmful perceptions of risks (e.g. rumor-based fears proliferating in the blogosphere), the general thrust of proving people wrong, and of insisting on definite risk estimates and rankings, can backfire and can also be principally wrong, a form of pontification. It can also be misused as a (perhaps unconscious) strategy to promote some more general political ideas and agendas. For instance, the notion that helping people can hurt people (and hence that some precautionary interventions do more harm than good), criticized by Hirschman (1991), while true in some cases, if generalized may contradict fundamental societal values. More recent critiques by Kahan et al. (2006) have focused on the disregard of democratic processes from an insistence on narrow risk-risk, risk-benefit and risk-cost comparisons, and likewise on the “tyranny of econometrics” (Kahan, 2003), indicating that even allegedly neutral methodological choices may have significant political elements.

In such political and ethical considerations of risks, benefits and the relative merits of responses, a key question is to whom these supposedly greater benefits and merits accrue. A corollary question is how these benefits (of reduced ‘net’ risks) would be accrued. These should be standard considerations in impact assessments within policy analysis, but in fact rarely are (Cranor and Finkel, submitted). Too often the supposed consequences are based on abstract “averages” across the population without consideration of distribution (incidence) and on preconceived interpretations. Thus risks of apparently risk-exaggerating behavior (of concerned citizens) can be downplayed, just like the risks of apparently beneficial or risk-neutral behavior of

them can be downplayed. But it is one thing when the citizens do this out of ignorance; another when experts or politicians do it. For instance, the ‘availability cascades’ influencing the uptake of solutions through informational and “reputational” factors are not only engineered by opponents to new technologies (Kuran and Sunstein, 1999), but also by those advocating such technologies, often with more powerful means of influence at their disposal. As stated by Sen (2009, 4): *“Reticence has appealed throughout history to those with a governing role, ... who are unsure of the grounds for action, or unwilling to scrutinize the basis of their policies.”*

Alternatives arising from criticisms of pontification and of the exclusive power that often goes with it (Proctor, 1991) – and from an emphasis on democratic choices in risk governance - do introduce further political problems. It is not clear whether the (democratic) choices people and communities make are in fact justifiable. For instance, a mother consuming contaminated fish, believing (probably correctly) its health benefits to outweigh the risks to herself, may put her fetus at much greater risk due to its particular sensitivity, despite the simultaneous benefits also to the growing individual. The information used for these decisions may be insufficient, and definite answers for precise (personalized) protection unavailable, also as there are no bright lines about the levels of beneficial and adverse effects. Although the ambivalence of people can be a form of engagement (Kearnes and Wynne, 2007), it can be problematic for them too.

Liberalism aiming at securing the rights of and reducing the risks to the under-privileged, instead of primarily those to the privileged as in neo-liberalism (or extreme individualism), may also go astray if omitting the limitations due to insufficient information, to strong emotions or other reasons (such as resistance of a risk symbolizing something quite else as the issue opposed to). These challenges are accentuated by the weakening or ambiguity of knowledge, (sector) institutions and accepted rules, calling for deliberative democracy and governance (Hajer, 2003).

However, redefining rationality as a tentative property approximated in communication processes (Habermas, 1984), instead of an objective substantive property, we can at least escape futile rationality-irrationality shouting contests. Instead of going for some new type of pontification (e.g., by demanding uncritical adherence to all risk claims or a ‘terror of the loudest’), the way out can thus be dialogue and open deliberation. Thereby also the reasons for the fears and hopes of those concerned and engaged can be better articulated, discussed and decided upon – however provisionally - in a constructive spirit and as part of an adaptive processes which all parties genuinely feel as promoting social cohesion and some shared ideals.

7.3 The role of ideas and world-views

The general ideas and ideals and the political, legal and epistemic principles found to be relevant for risk responses are summarized by differentiating between those dominating in risk analysis and in alternative approaches, and by focusing on the impacts of behavioral responses (Figure 2).

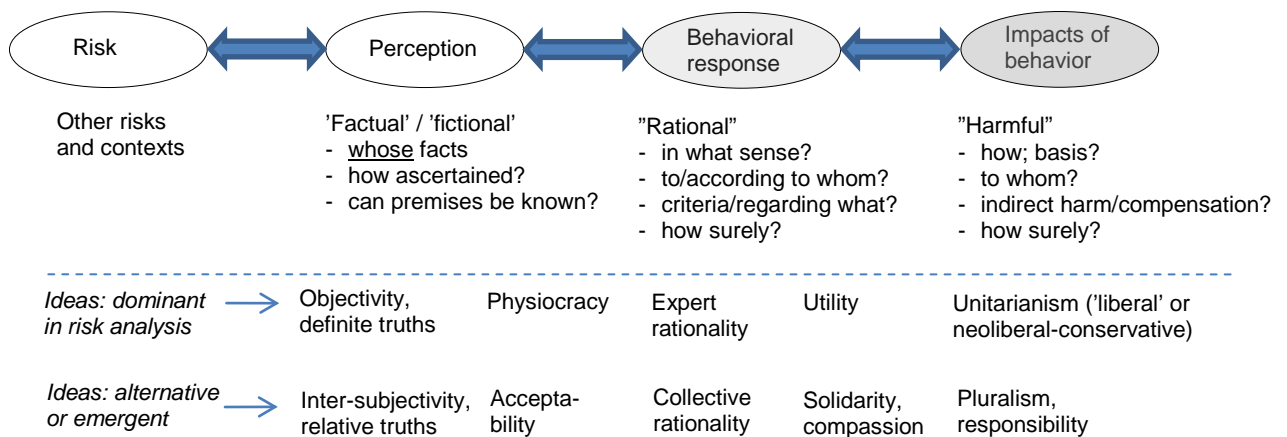


Figure 2. The transformation of risks to responses and their impacts, and how different analytical takes approach the question of irrationality and harmfulness of these responses and impacts.

In this cascade of ideals and principles accompanying responses, enthusiasms and anxieties blend (Kearnes and Wynne, 2007) in complex ways, constraining judgments of desirable or undesirable responses and of “right” ideals and principles. For instance, when responses to ‘legitimacy crises’ of feared technologies challenge positivism, they can themselves resemble positivistic agendas. Yet, on such structuring framework it becomes clearer how non-contextualized (and tactical or rhetorical) notions of irrational responses to risks are limited.

The constitutive and functional roles of ideas in risk perception and in responses to risks, as identified above, has been noted also with regard to ideas of health as a metaphor sustaining the interactions of the private and the social (Wiener, 1997). Such roles could be further structured by using socio-cultural models. The role of ideas and principles in shaping risks and choices is related to world-views as orienting dispositions, hypothesized by Dake (1991) and supported empirically e.g. by Peters and Slovic (1996), using the typology of individualists, egalitarians, fatalists and hierarchists. However, as noted also by these authors, this typology allows alternative interpretations due in part to the ambiguity of such crude categories. They can be extended to account for complexity in risk and for pluralism in approach (Assmuth et al., 2009). In order to link them to choices, plurality could encompass principles of inclusion and tolerance of diversity, as outlined and discussed by Kahan (2010, 2012).

We may further structure ideas and principles identified in risk responses and related discourses in subsequent levels or stages from risk perception to behavioral and policy responses, examining extreme positivist and extreme relativist takes and an intermediate or hybrid approach (Table I).

Table I. A typology of approaches to risks, caricaturing two extremes and a middle ground.

<i>Level</i>	<i>Positivist takes</i>	<i>Relativist takes</i>	<i>Intermediate / combined</i>
Perception	Objective scientific truths; Fixed, definable criteria on 'right' perceptions; 'Body count' (R_p) is the risk	Risks are cultural products ^a ; Emotions, subjectivity are valid; Any perception may be equally right; No fact-value distinction; Marginalized science (yet required; uncertainty paradox ^d)	No perception is irrational is it regards R_i within reasonable bounds of true R_i ; Not just outcomes matter but the (‘reasonable’) personal valuation of it; No clear fact-value divide ^b ; Cultural cognition of risk ^c ; Taking all perceptions <i>seriously</i> ; Emotional intelligence and decisions; Contextualized hybrid view of risks ^e
Behavioral response	Nudging; Instruction, information steering by experts; Criteria based on (natural) science; Emphasis on proof;	Autonomic, unquestionable justification of risk claims; Intuitive and narrative approaches to risk communication;	Education and social support; Multiple steering instruments; Focus on understanding behaviors through participation (or, to treat) ^f ; Emphasis on dialogue; Including social sciences ^g
Policy response	Comprehensive planning ^h ; Evidence-based reflection; Social engineering	Incremental planning ^h , experimentation; Precautionary principle, proactivity	Heuristics, pluralism; Structured, ‘epistemic’ precaution ^{i,k,l} ; Adaptive governance; Accountability ^m

^a Wynne (1992); ^b Putnam, 2002; ^c Kahan 2010; ^d Van Asselt & Vos (2005); ^e Horlick-Jones (1998), ^f Doctor (2004) on understanding violent behavior; ^g Risk regulator concept (Glass and McAtee, 2006); ^h Hildén (1997); ⁱ John (2007); ^k Avén (2011); ^l Peterson (2007); ^m Ashford (2004).

7.3 Methodological choices in relation to ideas, principles and political aspects

In addressing the central question we set out from, i.e. how can irrationality and harmfulness in risk responses be defined, the following results can be gained:

1. We need a narrower (and better specified) definition of "irrational response." In some ways the distinction between 'false alarms' and 'true warnings' can be made only with hindsight (Mazur, 2004), but *a priori* definitions are needed too. We suggest a bottom up approach to this, first seeking agreement about the kinds of responses that nearly all observers can agree are irrational. Cox (2014) has a point in stating that responses that turn a blind eye to (free) information as a rule are irrational, though this rule can be qualified: information as such is not a panacea (it may be futile, excessive, misleading or harmful, e.g. paralyzing or frightening). We might also agree that if a response increases average R_i without doing any other salutary things then it truly is "against one's own interest", even against interests of society - noting that these may not match. But we should be still much more careful to dictate what "against interest" is. A broad community might agree that there are some responses all would admit are "irrational" (such as perhaps exposing your baby to tobacco smoke). However, it may be rational and justified for an individual, group or society to worry about a small increment of some risk while ignoring another larger one (e.g., we may not give up the right – even the responsibility - to oppose texting-while-driving just because we also like to ski). There may be any number of 'rational' and otherwise legitimate criteria based on such comparative characteristics of risks; there are additionally rational criteria pertaining to those unique persons responding to risk; and further criteria pertaining to the decision situation and the socio-cultural setting, such as with seafood. Some of these criteria we may have not even come to think of; and having done so, non-equivocal decision rules and related values are still elusive, partly because of the impacts of choices. We thus would need to regard such rules as tentative and subject to deliberation, in a process that can be rewarding in itself (also through better awareness of disagreements and values).

2. At the same time, we need a broader definition of what people are responding to. This is related to the kinds of risks but also to the general conditions surrounding and permeating the

risk and the people - they live and the risks occur amidst and often in interaction with other societal and life processes. Thus, for instance the responses to a risk that in isolation can be considered small may be a legitimate cause of concern and opposition - and behavioral and management response - if the risk is an integral part of a system exposing people extensively and severely, i.e. if it has a symbolic (and perhaps a sentinel) function in society. In an over-generalization, powerless people may as a whole fear risks as factors directly affecting their health, while powerful people may as a whole fear costs from risks or their management. Thus, in order to be even-handed we would need to catalog the kinds of mistakes people make when they irrationally fear the possibility that someone might take their money (fear of regulation).

3. Finally, we need to emphasize that individual risks are both uncertain and variable, due largely to the uniqueness of the individuals and their situations. This is crucial for instance in the food risk area as realized by Rheinberger and Hammitt (2014): "Since [food-borne illnesses] present a health risk over which consumers have some degree of self-control, it may be perfectly rational for them to hold a risk belief different from the population average risk." Also Falzer (2014) took on this issue: an action can be contrary to the standard of care (for the population) and yet the right thing for a particular real person. This need to balance the individual (particular) and collective (general) and also to balance prescriptive advice (or generally influence) with voluntariness is crucial not only in principle but also as a care-promoting strategy. Of course, on the level of health policies these variable individuals may need to be aggregated (or treated only as anonymous tails of distributions or risk or beneficiary groups). However, this does not contradict but in fact complements the clinical level risk assessment and management taking account of the real person – together with the real person, in a multi-dimensional, partly intuitive and adaptive manner not very well tractable by definite analysis.

The choices between approaches to risks are case-dependent and different takes often mix. This can be fruitful, realizing that the process of reflection, deliberation and experimentation in itself is a key part in developing sustainable responses. Thus, the way to go would seem to be uniting different methods and approaches, such as broad and focused framing and quantitative and qualitative consideration of risks – and avoiding artificial divisions between social and technical considerations in assessments (Rayner and Cantor, 1987). This has virtues and implications beyond the immediate benefits of such syntheses, through deliberation. A fundamental idea and justification of this is that also values and goals, and means, can evolve in such an open process. A shift in this direction in addressing risks may indeed be ongoing, perhaps not a paradigm shift as it rests on proven approaches (Kuhn, 1977), but an important and promising – and challenging – path. In seeking such new approaches to rationality, construction and constraint need to be balanced (McMullen, 1988). Irrationality-hunting seems of little value here – and a too easy target. As stated by Kolbert (2008) *“irrationality is not always altogether a bad thing. What we most value in other people, after all, has little to do with the values of economics. (Who wants a friend or a lover who is too precise a calculator?)”*.

The need to clarify the role of ideas in connection with perceptions of and responses to risks is related to scientific developments, such as the ‘emotive’ (or constructivist) turns in social sciences (Weber and Morris, 2010). A corresponding trend has been the increasing realization of the importance of the affect heuristics in risk studies (Finucane et al., 2000; Rottenstreich and Hsee, 2001; Slovic et al., 2004). These may also be seen as a response to overly mechanistic biophysical (e.g., neuro-scientific), psychometric and usual behaviorist approaches to risks (Finkel, 2008a). However, the consideration of ideas does not in itself require the abandonment of such scientific and quantitative perspectives on risks. Rather, these may fruitfully interact with studies and analyses of ideas and principles. For instance, behavioral research could instead pursue new syntheses with social sciences, and utilize interventions to develop concepts (Rothman, 2004).

It thus seems we need to steer a middle course(s) between (1) the simplistic debunking of allegedly irrational and harmful risk behaviors, predicated on a belief in unambiguously “real” risks (and sometimes on a self-elevating expert-educator-engineer mentality) that focuses too heavily on how people “fear the wrong things” and even supposedly contaminate all “progress” with this, and (2) the opposite extreme, which implies that all these fears and subjective out-of-size risk claims would be justified, sane, and even more generally valid – an outlook from relativism, often based on the ideal of supporting those unjustly exposed (and on opposition to a conceived hegemony of expertocracy and plutocracy). Both extremes miss key aspects of the multi-dimensionality of risks and responses, as well as opportunities in combining outlooks with a more open and less self-assured attitude. In both extremes, the needed moral considerations and discourses (Johnson, 2005) also turn to moralizing. It seems that an important part of such more many-sided reflection, self-reflection and deliberation is an understanding of the crucial role that is played, often in ways not explicated, by ideas, ideals and world-views, and the importance of analyzing, discussing and developing principles underlying and guiding perceptions, assessments and responses.

Table II. A simple matrix for initial evaluation of the irrationality of responses to risks, predicated on a multi-dimensional and comparative view of risks, responses and consequences.

Response	Immediate consequences	Indirect consequences	Modifying considerations
Response taken	Reducing the risk responded to?	Increasing another risk - to oneself or another	Type of risk; Opportunities available
Alternative response	Reducing risk more (easily) than alternative responses do? Increasing adjacent benefits?	Gaining another important salutary effect? Increasing adjacent benefits, e.g. adherence to norms, social cohesion?	Compassion and other principles as causes for reducing apparently smaller risks; Risk commensurability; Information/learning aspects

8 CONCLUSIONS AND RECOMMENDATIONS

In the dilemma between panic action and paralysis by analysis (or laziness) in the face of risks, new elements, problems and opportunities can be discerned based on studies of underlying ideas, ideals and principles. Aversions towards some risks (more than others) and enthusiasms about some responses (more than others) can be better understood if the idea(l) to protect valued entities and also the values themselves are included. Asymmetries and multi-dimensionality in responses to risks can thus also be better understood, for instance that precaution should also constrain solutions offered; or that in many issues people cannot be simply told what to do. While this does not necessarily lead to the removal of asymmetries as there may be legitimate reasons for them, again depending on principles, desirable and commonly acceptable symmetries as well as asymmetries can be better realized.

It seems important to adopt heuristic principles involving the suspension of both belief and disbelief, to avoid rigid adherence to any one stance and be open to revision. We find it particularly important to analyze conflicting principles and idea(l)s to identify crucial issues and to clarify reasons for and implications of disagreements, in order to find ways out of impasses in ‘wars on risks’ and between world-views. Searching for middle grounds or routes through minefields between camps, or at least ways to illuminate them, is natural because the topic of principles and ideas by itself benefits from pluralism. However, this pluralism does not mean that anything goes. In order to be fruitful it ought to be accompanied by criticism.

Our analyses lend support to the following generic conclusions:

- In many risk issues, fundamental ideas clash, such as optimism and pessimism about knowing and controlling the world. Also eschatological ideas of salvation from threats can be discerned.

- These ideas influence the framing of questions and answers, e.g. 'pet' risks, enemies, allies and weapons in risk conflicts and controversies.
- The importance of and application of idea(l)s and principles for responses to risks depends on: a) the risk; b) those at risk (or perceiving it, 'eye of the beholder'); c) the context and decision situation.
- Application of idea(l)s and principles to risks also depends on what information (experience) is needed, available and accepted, especially as responses are 'bought into'.

In more specific substantive terms, we arrive at the following conclusions:

- The type of rationality in responses to risks also depends on the risks, the (costs of) choices, those involved, and the situation and context, supporting the idea of collective rationality. In particular, rationality is influenced by ideals and political choices, e.g. regarding the distribution of risks, though these are often masked by claims of a definite and objective rationality.
- The idea and pursuit of such definite and objective answers to risk problems and of definitely optimal policies and decisions can be misleading as this leaves many important aspects of risks aside; specifically, in addition to criteria such as utility, other principles such as compassion and social cohesion need to be increasingly considered;
- The tendency to normatively prescribe risk behaviors is problematic both in principle and in practice and is often unfruitful. Specifically, the view of risks as something experts may grasp in non-equivocally rational terms, as opposed to irrational evaluations by others, excludes deliberation needed due to principles of democratic governance. Insistence on expertise also easily leads to an illusion of impartiality that is inherently limiting even for the expert.
- In all approaches to risks, attention to the social dimension is crucial; this is all the more (and not less) important in adversarial conditions, but would require the realization of inherent and frequently unconscious (or concealed) limitations and biases of all parties in such situations, and abandoning of automatic suspicion of and opposition to ideas;

- The crucial, often elusive role of ideas and ideals and world-views on risk perceptions and on behavioral and other responses to risks needs to be better realized; this requires overcoming psychological and cultural barriers due also to the insistence on a dominant positivist idea.

Based on these conclusions, the following tentative answers are offered for the leading (in dual sense) question of the conference: How could "potentially harmful behavioral responses to risk information" be discouraged?:

- by realizing: (1) that there are biases in both lay persons' and expert's risk perceptions; that behaviors are multi-dimensional, and (2) that some seemingly potentially harmful ones may have non-apparent, indirect motivations and justifications
- by entering and developing genuine dialogue with those concerned, to reduce both types of biases and limitations
- by loosening normative claims of a narrow quasi-objective definition of harmful behavior, while utilizing the rewards of science and professional experience, thus reconciling different perspectives on risks and rewards from (or motivations for) choices and behaviors
- by combining 'nudging' and other such steering approaches to supporting and empowering, and by learning in the process
- by wisely combining individual with generic and collective approaches
- by developing heuristics linked with risk communication and governance policies and practices; and
- by paying attention to the principle dimension and to idea(l)s inherent in these measures.

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