The Moral Problem of Risk Impositions: A Survey of the Literature

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Abstract: This paper surveys the current philosophical discussion of the ethics of risk imposition, placing it in the context of relevant work in psychology, economics and social theory. The central philosophical problem starts from the observation that it is not practically possible to assign people individual rights not to be exposed to risk, as virtually all activity imposes some risk on others. This is the 'problem of paralysis'. However, the obvious alternative theory that exposure to risk is justified when its total benefits exceed its total costs faces the standard distributional challenges of consequentialism. Forms of contractualism have been proposed as a solution, but how exactly such theories can be formulated remains problematic, especially when confronted with the difficult cases of mass, novel, risk such as climate change.

1. Introduction

John Stuart Mill famously argued that:

> Whenever, in short, there is a definite damage, or a definite risk of damage, either to an individual or to the public, the case is taken out of the province of liberty, and placed in that of morality or law. (Mill 1859/2008: 91)

Yet as Andreas Teuber notes:

> Philosophers have paid surprisingly little attention to the permissibility of risk impositions. If, as we seem to believe, it is wrong to cause another person *harm* without that person's consent, is it wrong to impose a *risk* of harm without consent? (Teuber 1990: 236)

Standard ethical theories run into difficulties when the actions in questions merely bring about a risk for harm, damage, or loss. Broadly, consequentialism can often seem too permissive, making hard cases too easy, in that it appears to allow any risk provided that the benefits outweigh the costs, even when the aggregated benefits (however small the benefit to each person) outweigh the aggregated costs (however serious the risks, and wherever they fall). Rights theory can seem too restrictive, leading to what we will here call *the problem of paralysis*. Virtually every action carries with it some risk, however small, of serious harm to others, and so assigning individuals the right not to be subjected to risk, without their consent, is an impossible position. How, then do we determine which risks to allow, and, even more importantly from a philosophical point of view, on what grounds?

2. Historical Background to the Ethics of Risk

Although Teuber is correct to note that philosophers have given little attention to the *ethics* of risk, it would be wrong to suppose that philosophers have not been interested in questions of risk. Indeed, the idea of the steps needed to obtain security is at the centre of Hobbes's political philosophy (Hobbes, 1660/1996), while the notion of moral luck is much discussed in moral philosophy. (Nagel 1976, Williams 1976, Nussbaum 1986). Furthermore, technical questions concerning the nature of probability have been fundamental to epistemology and the philosophy of science at least since the writings of Hume (Hume 1739-40/2000). Nevertheless, there has been little systematic discussion of the ethics of risk: when it is morally acceptable for one

party to impose a new risk on another, or to permit the continuance of an avoidable situation which imposes risks.

More broadly, the study of risk under the name of 'risk' is a fairly recent development evolving from two distinct disciplines: natural hazard studies, where geographers became interested in social response to natural hazards, and technological safety analysis which focuses on risks created by new human activities (Otway and Thomas 1982: 70f).

While risk has always been part of the human situation, our ability both to impose risks on each other, and, potentially, to mitigate those risks, has grown exponentially with scientific and technological development. In pre-modern society human beings faced a wide variety of hazards – 'dangers', as the anthropologist Mary Douglas puts it (Douglas 1992) – both natural, from disease and environment, and man-made, through deliberate human actions including war and assault. Yet risk as a side-effect of deliberate human action, and the ability to take effective steps to mitigate such risks, was much rarer in pre-industrial society.

For this reason sociologist Ulrich Beck has suggested that we now live in a 'Risk Society'. 'Anyone who set out to discover new countries and continents – like Columbus – certainly accepted "risks" But these were personal risks, not global dangers like those that arise for all of humanity from nuclear fission or the storage of

radioactive waste. In the earlier period, the word ‘risk’ had a note of bravery and adventure, not the threat of self-destruction of all life on Earth.’ (Beck 1986/1992: 21, see also Giddens 1990).

Beck advances a number of claims. First, risk is now considered largely negative. Second, many risks are created by human action. Third, many are global in scale and cannot be contained. Fourth, many are imperceptible, such as radiation, or invisible gasses, and we must rely on expert judgement even to come to believe that we are at risk.

Risk management and moral philosophy inevitably plays ‘catch-up’ with the development of technology. Laws regulating the industrial workplace date back, in the UK, to the early 1800s. An early attempt to regulate transport safety in the UK, for example, was the ‘Locomotive Act’ of 1861, also known as the ‘red flag’ act. Such regulations were initially based on intuitive judgements of what was reasonable, rather than on any explicit analysis. However, over time, forms of cost-benefit analysis have been introduced into analysis and regulation, in which both the potential benefit of regulation and its costs are calculated in order to inform decisions about stringency of regulation.

As if by the backdoor, therefore, risk management has implicitly adopted a consequentialist framework. Such practices, however, in turn throw up both

philosophical and technical questions. Is it right to adopt a consequentialist framework, and, if there is doubt, is there a morally superior alternative that could be used to inform policy? (Hansson 1993, Hansson 2007a). How, exactly, are the different outcomes to be measured, and how should probabilities be taken into account? Arguably both sets of problems became urgent with the discovery of nuclear power, the introduction of the first commercial nuclear power stations in the 1950s, and renewed interest in alternative energy sources after the oil crisis of the 1970s, together with an appreciation of the hidden environmental and human costs of new technology (Carson 1962/2000).

However, even if issues of risk came to prominence in the context of exotic new technologies, much government action concerns questions of how to deal with the ordinary hazards of everyday life: illness; unemployment; dangerous goods and services and so on. Public spending decisions will often be, in effect, be decisions to redistribute exposure to risk, either explicitly or implicitly. Therefore the ethics of risk is at the centre of our lives, and it is surprising that its discussion has not been more prominent.

3. Risk in Contemporary Philosophy and Social Science

While sociologists, anthropologists, economists, lawyers and psychologists have grappled with questions of risk for decades, moral philosophy has been relatively late to the debate. One of the first substantial discussions appears in Nozick's *Anarchy, State and Utopia*, in 1974, where, to Nozick's credit, he appreciates the difficulties for

a rights-based theory in deriving a satisfactory approach to risk. Nozick's discussion still remains relevant, and we will return to it below (Nozick 1974).

Among the most significant and enduring contributions are two volumes published in collaboration with the Centre for Philosophy and Public Policy at the University of Maryland, College Park. *To Breathe Freely*, edited by Mary Gibson (Gibson 1985) and *Values at Risk*, edited by Douglas MacLean (MacLean 1986), were funded by the US National Science Foundation's program on Technology Assessment and Risk Analysis, and contain papers by an impressive group of philosophers, including Samuel Scheffler, Peter Railton, Judith Jarvis Thomson, Annette Baier, Alan Gibbard, Ian Hacking and Amartya Sen, as well as leading social scientists.

It is striking, however, that having contributed to these volumes, few of the philosophers involved published more widely on risk (Judith Thomson being the main exception, see Thomson 1986). Indeed the research programme on the ethics of risk in moral philosophy did not take hold to any great extent as a topic in its own right, unlike the topic of risk in decision theory which has flourished as an important sub-discipline within philosophy. However, many of the issues of the ethics of risk have been explored in the context of environmental philosophy (such as Shrader-Frechette 2002) and philosophy of science and technology (Shrader-Frechette 1980, 1985, 1991), or on the borders of law and philosophy (for example Perry 1995, 2001, Sunstein 2002, 2005, and Cranor 1997). The most significant current research group on the ethics of risk is probably that led by Sven Ove Hansson, at the Royal Institute of Technology in Sweden, who are significantly represented in a recent collection *Risk: Philosophical Perspectives*, edited by Tim Lewens, (Lewens 2007) and also in a Danish-Swedish volume on philosophy and risk *Risk & Risici* (Persson and Sahlins

2008). The most recent contribution to the ethics of risk is a volume on technological risk edited by Sabine Roeser and Lotte Asvald (Roeser and Asvalt 2009).

4. The Definition of Risk

Question of the ethics of risk must start at least with the question of what do we mean by 'risk'. The problem is that there is no unified agreement about the concept, but several different meanings are in use.

On a general everyday level 'risk' simply refers to the possibility or likelihood of a possible negative outcome, such as a loss, injury, harm, or death. The concept of risk thus entails both a negative effect and an acknowledged possibility of it coming about. In contrast to this everyday concept there is the statistical or technical concept of 'risk' that is numerical: a risk is then the numerical value of the effect (its cost) and the estimated numerical probability that it will occur. The shift is here from a general uncertainty to what will happen to an uncertainty of a more precise kind – we do not know what will happen, but have an estimate of how probable the different possible outcomes are, and thus have an idea of how probable the unwanted outcome is.

The everyday concept of risk shifts between referring to an activity or action that is potentially dangerous (i.e. the source of the risk), the actual negative outcome that may occur (i.e. the possible harm), and the degree of probability or likelihood of it happening. Hansson has identified no less than five different usages of the notion of 'risk':

1. An *unwanted event* which may or may not occur.

2. The *cause* of an unwanted event which may or may not occur.

3. The *probability* of an unwanted event which may or may not occur.

4. The *statistical expected value* of unwantedevents which may or may not occur.

5. The fact that a decision is made under conditions of *known probabilities* [for different possible outcomes that may occur] (Hansson 2004a: 10, italics added).

In general, however, it would seem that little turns on how 'risk' is understood, with the important exception of a distinction between decisions under risk, with known probabilities for different outcomes, and uncertainty, where the possible outcomes are known, but their probabilities are not. Decisions under uncertainty create particular difficulties for decision theory as calculations of expected utility cannot be made. The ethics of risk in moral philosophy however generally covers both (see e.g. Altham 1983-4: 15). In cases where the sources of risk is a new one the state of ignorance could be even greater: we may know that at least one possible outcome is harmful, but lack knowledge about whether there are other harmful outcomes not yet taken into consideration. We can also add cases where we have merely partial or very limited knowledge not only of probabilities but also about the range of possible outcomes of a particular activity (Sahlin and Persson 1994). It has plausibly been suggested that most real life decisions involve some level of radical uncertainty (Hansson 2009), which raises the question of the applicability of decision-theoretical models to real life.

In the sociological literature there is a tendency towards scepticism about the existence of 'risks' suggesting that they are 'socially constructed' rather than objective facts (Beck 1986/1992). But, clearly, expected and predictable harms exist as well as actions that may bring about such harms. The psychological literature, naturally enough, is especially interested in question of risk perception, and how factors such as novelty and familiarity lead to risk perception that may differ wildly from scientific analysis (Slovic et al 1982, Slovic 1999). We will look at this in more detail in the next section.

A different issue concerns how to individuate risks, and whether we should be concerned with the question of whether what is of concern is a type of risky action, such as the emission of a particular chemical pollutant, or whether we should be concerned with the total level of risk individuals are subject to. A person may be put at a trivial level of risk from a number of different sources, but, put together, total exposure reaches problematic levels, as, for example, in environmental risk It seems reasonable to be concerned both about types of risky activities and total risk exposure, although in philosophy the tendency has been to discuss the moral acceptability of the risk of particular kinds of activities, rather than total exposure.

5. What is So Bad about Being Subject to Risk?

It is not difficult to understand why it is problematic to impose harms on others. Yet there is something more troubling about the question of what is so bad about being subject to risk. Of course, if the unwanted event happens then harm will occur. But if

it does not, then, it appears, no harm has been done. Our question, then, could possibly be put as 'when is hypothetical harm a form of harm'?

Believing that one is at risk can, however, clearly be detrimental to well-being. First, a person may fear, or be anxious, about the risk. Second, they may feel that they need to take costly or difficult precautions to reduce the probability of the hazard occurring. Third, the hazard may have further negative effects, and so they may feel that they need to take steps, again, which may be costly or difficult, to minimize the spread of the hazard. Believing oneself to be at risk, therefore, can be highly damaging in a number of identifiable ways. (For further discussion see Wolff and de-Shalit 2007). Gauthier makes a more general point that one may take pleasure or displeasure in being subject to chance (Gauthier 1986: 43). However, if the person subject to the risk does not have knowledge of the risk, are they harmed in any way?

Stephen Perry has argued that imposing a risk is not, in itself to impose a harm. (Perry 2007) Perry's argument starts from the relative frequency theory of probability, which is commonly assumed in discussions of risk. We will discuss this in more detail below. According to the frequency theory to know what risk I face I need to know my reference class. Consider, for example, one's risk of developing a certain disease. Suppose it is known how frequently this disease strikes members of the population. However, it may be different for males and females, and further segmented for social class, genetic endowment, environment and behaviour. Each of these can be divided further. The question then arises of which is the 'correct' reference class for me. There seems no obvious answer. If it is thought, plausibly, that the most specific reference class is the correct one, then this leaves me in a reference class of one person – myself. And as Perry also points out, in a deterministic universe then I will

either get the disease or not, and hence all (objective) risk is eliminated, leaving only degrees of belief about risk. (Perry 2007: 196)

This is a very interesting argument, although what it shows is less clear. Perry has shown that on a frequency theory of probability there appears to be no non-arbitrary way of quantifying risk, which is a very important result. However why this also shows that subjecting someone to risk is not to harm them is not obvious. Perry himself accepts that 'subjecting B to a risk sets back an interest of B' (Perry 2007:193) but claims that setting back an interest is not sufficient for harm. (Although interestingly Mill's Harm Principle has been interpreted in terms of interests being set back). Perry also accepts that there can be reasons for attempting to prevent one party from imposing a risk on another. From the point of view of the ethics of risk this is the important point, whether or not imposing risk is considered a form of harm.

Regardless of whether the mere risk of harm is a harm in itself or not, we may think that the distribution of risks and benefits are important. Even if a particular risk never materializes into harm, it would seem unfair if such risks are systematically imposed on those who do not have a share in the benefits resulting from such risks. Yet if everyone who did not have a share in the benefits of a particular risky activity had the right to moral veto that activity, the *problem of paralysis* returns.

The ethical worry is clearly put in the title of the influential paper: 'How Safe is Safe Enough?' (Fischhoff et al 1978). The classical problem of risk within risk management and risk was framed in terms of 'tolerable risk' and 'acceptable risk', assuming that the level of risk that was already accepted could be used as a benchmark for new risks (see e.g. Otway and von Winterfeldt 1982). The field of risk perception studies sprung up as a study of general acceptance and response to

different kinds of risks. The classical paper here is that of Chauncey Starr published in *Science* in 1969: with the revealing subtitle: 'what is our society willing to pay for safety?' (Starr 1969) Fischhoff and colleagues subsequently argued against the idea of a universal quantitative measure of an acceptable level of risk (Fischhoff et al 1981). Later risk perception research came to focus on explaining public attitudes to different kinds risk, rather than trying to map public preferences for a particular level of risk that could be applied to all sources of risk. Public attitudes to different sources of risks did not match the probability for death for each of those risks, so other factors explaining this otherwise seeming irrationality was proposed. The anthropologists Mary Douglas and Adam Wildavsky suggested four archetypical attitudes to risk in their initially influential Culture Theory (Douglas and Wildavsky 1982, see also Thompson, 1986 and Adams 1995). Paul Slovic and others instead proposed what later became the dominant 'psychometric' framework, taking a statistical quantitative approach to explain public attitudes through large surveys. Here ethical considerations seem to influence public perception of acceptability: the degree to which the risk is controllable; how well-known it is (to science); the novelty of the risk; how equitable the imposition of risk is; how voluntary; and the severity of consequences, such as irreversible consequences, consequences with global catastrophic impact, and risks affecting future generations (see e.g. Slovic, Fischhoff, and Lichtenstein 1982).

The public view can be summarized in the following terms. Some risky actions have such undesirable features that they should be be impermissible. Some are perceived of as of such low risk that they can be permitted without further concern. Between these is a range of potentially problematic cases, but numerous factors, and not just the probability and magnitude of possible harm, influence their acceptability (see also Wolff 2006).

6. Consequentialism

Although any attempt to classify theories into types may be an over-simplification, nevertheless it is possible to pick out a number of central approaches to the ethics of risk. Of course, each has variants, and any particular philosopher may draw on more than one source, but it is still useful to attempt to distinguish a number of different strategies. The first we shall look at is consequentialism, which, as we noted,has in effect become the default approach to the regulation of risk in public policy (see Hansson 1993 and 2007a for critical discussion).

The general idea within at least one main strand of consequentialism is that the moral evaluation of an action is solely determined by its outcome. Thus the actual outcome of an action is what makes it right or wrong compared to all actions available at the time. Whichever action causes the greater good over all other actions is permissible. However, since the actual outcome cannot be known at the time of deliberation about what to do, focus within consequentialism concerning permissibility and blameworthiness must shift to expected outcomes, in the sense of the range of possible outcomes and their probabilities, in order to guide action (Hansson 2003). Calculating the expected outcomes of different options has its obvious application to the context of risks, and various approaches in similar vein are common in formal decision theory and economics, as well as applied in policy making and risk management. In such an approach we need not know the actual outcome to determine what to do but merely how bad and how likely the harm will be, and compare this expected risk with its expected benefits and costs and against other alternatives. A risk cost-benefit analysis is conducted, and, in starkest form, a risk, or risky practice,

will be permitted if and only if its expected benefits exceed its expected costs, and provides the greatest sum of benefits compared to alternative options (Leonard and Zeckhauser, 1986, for critical discussion see e.g. Hansson 1993, 2003, 2004b, and 2007).

Like all forms of consequentialism, risk cost-benefit analysis appears vulnerable to worries about the distribution of costs and benefits. In practice it is likely that the greatest risks would fall on those least able to influence the decision procedure or protect themselves in other ways. Hence there is a worry that risk cost-benefit analysis will pile up risks for the vulnerable while the benefits accrue elsewhere. It is, however, possible, as Leonard and Zeckhauser note, to modify consequentialist so that more weight is given to costs and benefits that accrue to the badly off, thereby deriving some form of risk 'prioritarianism'. It is also possible to go even further and say that some risks are too severe to allow, unless there are special circumstances, whatever the benefits. (See the UK regulatory guidance HSE 2001: 51 for the example of banning lead glazes in pottery for such reasons).

Risk cost-benefit analysis, as a form of consequentialism, would appear most naturally to be justified in terms of arguments in favour of maximizing the good. It is interesting, however, that at least within economic theory its main justification is not a direct argument from maximizing the good, but from dealing with market failure. In an approach arguably deriving from the economist Thomas Schelling (Schelling 1968/1984), Leonard and Zeckhauser explain:

> Since many important risks cannot be exchanged on a voluntary basis, it is essential to have a centralized decision process that will regulate or determine their levels. In choosing among alternative projects that create different levels

> of risk, the government (or other responsible decision-makers) should seek the outcomes that fully informed individuals would choose for themselves if voluntary exchange were feasible. Risks are not different in principle from other commodities, such as park services, public transit, or housing. (Leonard and Zeckhauser 1986: 33)

Sunstein, attempting to avoid foundational questions, argues that cost-benefit analysis, it is simply the most rational tool for making decision on a governmental level and that any other method would lead to less desirable results. 'For the moment, let us understand cost-benefit analysis to entail *a full accounting of the consequences of risk reduction, in both quantitative and qualitative terms*.' (Sunstein 2002) His argument stems from the shortcomings in public risk perception and the difficulties in understanding probabilities that Tversky and Kahneman's very influential work has suggested (see e.g. Tversky and Kahneman 1974, 1981). He writes:

> The goal is to overcome cognitive limitations by ensuring that people have full, rather than limited, sense of what is at stake. People often miss the systemic effects of risk regulation; cost-benefit analysis is a way of putting those effects squarely on-screen. …[and] overcome problems with availability heuristic… (Sunstein 2002: 107)

It is clear from these remarks that defenders of the consequentialist approach consider the topic from the point of view of government action or policy-making. This is not, therefore, intended as a direct contribution to the moral question of how one individual should act with respect to imposing risks on others. It does not seem that one individual has a right to impose uncompensated risks on one party for the sake of greater benefits to another, unless doing so follows from existing regulation, as in the

case of driving, or of workplace safety. There is no suggestion, for example, that an ordinary citizen should carry out a cost-benefit analysis before acting. Rather the citizen's duty, on such a view, is to obey the laws and regulations, which should be based, according to the theory, on the deliberations of cost-benefit analysis.

To return to the criticisms of the theory, even if consequentialism is modified to be more sensitive to distributional issues, there are, nevertheless, a number of difficulties it must confront. The process of applying consequentialism requires a certain type of calculation, which in turn requires a good deal of information. Independently of the question of the moral justification of the method, we must ask whether the information it requires exists or is available. (See e.g. Hansson 2007a, Fischhoff et al 1981).The issues we raise are not all uniquely problems for consequentialism. However consequentialism does bring them into sharp focus.

I) Establishing causal correlation between action and possible harm.

The first question will always have to be whether there is reason to believe that the action or program under consideration does raise the chance of an adverse effect.

Some cases are fairly straightforward such as traffic and road accidents, or an explosion in a factory employing dangerous materials, or other kinds of fairly immediate harm. In other cases it is less clear whether there is a hazard at all, as when there is a statistical correlation between a possible source of harm and harm in a large data set, with many possible inter-acting or counter-acting components, such as in cases of leukemia clusters, or carbon emissions. In such cases we need a scientific

theory to link action to consequences, and, of course, such scientific claims may be controversial.

To what extent should a decision about risk, based upon a weighing of benefits and risks, take into account not yet established but merely possible risks for harm? How should we treat activities that are only potentially harmful when interacting with other sources of harm? We will return to this when discussing the 'precautionary principle' below.

II) Assessing the probability for harm.

Ultimately the issue of probability is fundamental for assessing risks. Within formal cost-benefit analysis it seems necessary not only to identify some increased possibility of some adverse effect, but to be able to give a reasonably precise estimate of that increase, both for the contemplated course of action and for its alternatives. For otherwise it would simply be impossible to know which course of action gives the greatest net expected benefits (Hansson 1993: 2009).

However, as we have already seen in the discussion of Perry's argument above, the notion of probability is not unproblematic. After all, any action or event either will, or will not, in fact cause an adverse consequence. How then, should we understand the idea that an event increases the probability of another event? It appears that there is no metaphysical property of actions themselves that are of the kind 'to cause a 0.1 probability of death'. Actions are not metaphysical entities that have perfectly calibrated roulette guns attached to them that, with mathematical precision, will release, or shoot off, a certain effect at a fixed percentage of the times it is performed.

In some areas it is in principle possible to apply a frequency theory of probability, for there are large data sets with fairly stable frequencies, in such areas as transport safety, although we must acknowledge the 'problem of the reference class' identified above. In other areas, such as nuclear power, it appears that there is a potential for a particular type of catastrophic event which in its precise details has happened perhaps only once (e.g. Chernobyl, or the very different circumstances at Fukushima). For other types no such incident has occurred, but it would be quite wrong to conclude that their probability is zero. To try to estimate probabilities it is sometimes possible to undertake a 'critical factor' analysis, looking at the probability of failure of critical components and the probability of several failing at once to create a disastrous result. For some factors frequency data may exist, but for others not, and estimates for new technology may be over-optimistic, so we return to the same problem. And we can never be sure that we have identified all the possible sources of failure (Shrader-Frechette 1990 for a similar point, and see also Chs 5, 6 in Shrader-Frechette 1985a and 1980: 83ff for discussion about estimating probabilities in risk assessments). In the end, analysts will depend on estimates based on theory and judgement which may have a confidence interval of orders of magnitude. In such circumstances, cost-benefit analysis, or indeed any form of quantified risk assessment, is highly problematic as it will rest on risk assessments that can be highly contentious.

III) Valuing risk/life

Perhaps even more problematic than the estimation of probabilities is the numerical evaluation of magnitude of the possible adverse outcome, or as this amounts to in

most cases, deciding how much money should be spent to save a life, however cold and inhumane this may seem.

In order to make such a programme appear less objectionable it is often pointed out that, first, in risk cost-benefit the cost is not actual death, but small risks of deaths spread out over many people (Schelling 1968/1984), and, second, in real life we are prepared to increase our risk of death for the sake even of the trivial benefit of crossing a road a few seconds before the signal indicates it is safer to do so. Equally, we are prepared to pay money to increase our safety, in buying smoke alarms, better quality products, and so on. Hence paying to reduce risk, or trading risk for convenience, is a perfectly ordinary part of life. It is this observation that lies behind Leonard and Zeckhauser's suggestion above that risk management should seek to mimic the market as far as possible (Leonard and Zeckhauser 1986). In the UK at the present time regulations suggest that if a safety modification would save a 'statistical life' (i.e. one fewer death can be expected) at a cost of less than about £1.3m then there is a statutory duty to introduce it. (For further discussion see Wolff 2006, 2007, Hansson 2007b).

One issue that immediately arises is how to put a financial value on risks to life and health. To pursue that in detail is beyond the scope of the present paper, but in brief, common methods base valuations on what individuals are prepared to pay to reduce small risks (willingness to pay – WTP), or the compensation they need to run them (willingness to accept compensation – WTA), either as revealed in their market behaviour (revealed preferences) or through hypothetical scenarios revealed in laboratory conditions. None of this, of course, is entirely straightforward (Jones-Lee et al 1985) and as even advocates of such approaches have pointed out, it is possible

to get a very wide range of values from studies, and hence the robustness of any particular figure is highly questionable, even if, as may not be the case, the general method is accepted (Beattie et al 1998, Wolff and Orr 2009).

In sum, then, consequentialist approaches to risk face two types of difficulties. First, there are philosophical doubts about the ethics of maximization given concerns about fair distribution of risk. Second there are a range of technical and philosophical questions about the derivation of the various numbers that need to be used in making the analysis of expected costs and benefits. This problem is amplified by Hansson's claim that in practice we generally face questions of uncertainty rather than risk, and in such cases cost-benefit analysis appears little help (Hansson 2009).

7. Deontological Approaches to Risk

In other moral contexts, rights based theory is often proposed as an alternative to consequentialism in order to avoid the problem of 'permitted unfairness'. It is tempting to try to apply similar reasoning to the ethics of risk. Deontology is also far less subject to the problem that precise numbers are needed in order to select between options. The challenge, however, is that it seems impossible to argue that there is an absolute right not to be subject to any risk to which one has not consented, for this would seem to rule out virtually all action: what we called the problem of paralysis (see e.g. Teuber 1990, Hansson 2003b, McCarthy 1997 for similar points). Consequently it seems necessary to make a distinction between 'rights-violating' risk imposition and 'non-rights-violating' risk imposition.

One way of approaching this issue is via means of compensation. Perhaps the problem of paralysis can be overcome is by compensating those whose rights are violated (Nozick 1974: 54-86). In one way, however, this is a curious suggestion. Often the function of compensation is primarily restorative, and partly succeeds in this by being a material acknowledgement of harm done, and a type of commitment not to continue the same course of action: a commitment that is impossible where compensation is paid for risk imposition (see Hayenhjelm, forthcoming).

Nevertheless, compensation has been central to the rights approach to risk. Robert Nozick, in *Anarchy, State, and Utopia,* recognizes the difficulties natural rights theories face in accounting for our common-sense practices regarding risk, which, for example, allow driving of cars, despite the clear risks it imposes to third parties, but does not allow individuals to play Russian Roulette on unwilling strangers, however large the number of chambers on the gun. Nozick frames his discussion by posing two questions: first, why not permit all risky action, provided victims are compensated for any (unjustified) harms suffered; and second, why not prohibit all risky behaviour? (Nozick 1974: 65). In implicit recognition of the problem of paralysis Nozick does not treat the second as a serious question. Rather, the question is why not allow 'act first, compensate later, if necessary' in all cases. (See Railton 1985 for critical discussion).

For some harms, such as death, no compensation is possible, and such cases will continue to be problematic (Nozick 1974: 66). However, Nozick points out that even when someone can be fully compensated for a smaller loss, they may still fear the event in prospect. As he points out one can still fear, say, having one's arm broken

even if one knows that lavish compensation will follow. But, even worse, if we live in a society where we know others can harm us provided they pay compensation later, then we might all live in what Nozick calls 'free-floating' fear. Not all those who live in fear will ultimately be harmed, and therefore if compensation is to be paid only for harm, then non-victims who live in fear will never receive compensation. Hence, it appears, compensation should be 'ex ante': all those who are exposed should be compensated. But this would generate insuperable practical difficulties. Therefore there is also good reason to prohibit actions that will cause free floating fear, and these are likely to include acts of violence (Nozick 1974: 66-69).

Although Nozick is able to present cases where prohibition should be the right policy even if compensation is possible, the natural rights approach is still in difficulty in dealing with risks of death. In particular it seems to be in difficulties in distinguishing cases such as driving, where risks of death to third parties are considered permissible, and the Russian roulette cases, where this is not so. Indeed, it seems hard to make such a distinction without bringing in a further aspect: the benefit of the activity, and therefore the (opportunity) cost of banning it. Such issues are more easily accommodated in a consequentialist framework, or, perhaps, a contractualist framework, which Nozick himself hints at, and we will explore shortly. It does not follow that one ought to give up the notion of individual natural rights as the basis of morality and adopt utilitarianism. But the difficulties in dealing with risk suggest that a plausible morality will involve at base more than a scheme of pre-social, territorial individual rights and will make room for a number of notions – balancing,

aggregation, and the like – more commonly associated with utilitarian than natural-rights theories (Railton 1985: 119, McCarthy 1997).

8. Consent

Compensation can also function as part of a more-or-less explicit agreement making an otherwise unattractive option more appealing (Railton 1985, Hayenhjelm, forthcoming). But then it is consent not compensation that makes the action permissible. On the face of it, if it can be shown that everyone who faces a risk of harm consents to that risk, then the moral problem of risk imposition disappears. However, consent is not so straightforward. Do workers who knowingly work in polluted factories consent to the risk of harm, or, at least, do so in a way that legitimates such a risk imposition? This was a major concern of the Mary Gibson edited volume *To Breathe Freely* (Gibson 1985). One particular puzzle was identified by Judith Jarvis Thomson, in her example of 'Unpleasant Way':

> Suppose there are two ways in which I can get home from the station at the end of the day. The first is pleasant, passes through a brightly lit middle-class shopping area, is quite safe, but is long. The second way is unpleasant, passes through an ill-lit area of warehouses, is unsafe, but is short. Nobody has ever been mugged while walking along Pleasant Way; people have from time to time been mugged on Unpleasant Way. Here I am at the station; I'm tired; I think 'The Hell, I'll chance it, I'll take Unpleasant Way.' I then promptly get mugged. (Thomson 1985: 139)

Thomson plausibly argues that although she knowingly ran the risk of being mugged, and therefore should not be surprised that it happened, nevertheless she has still been wronged. The fact that she consented to walk down Unpleasant Way, and knew that a mugging was a practical possibility, is not enough to make it the case that she has consented to the mugging. On the other hand, if one consents to a gamble, and loses, one doesn't consent to the loss, but nevertheless often the loser has no legitimate complaint. Thomson does not attempt to show why and when it is that consent also renders foreseen consequences fair, and it still remains, as Thomson says 'a nice problem' (Thomson 1985: 139). What it shows, however, is that it is not always easy to decide what someone has consented to, and if they have consented, what their consent entails, and this applies with particular force to those who work in what they know to be hazardous jobs.

In what may, at first, appear to be a further complication of the issue of consent, Samuel Scheffler provides an illuminating distinction between three reasons for taking consent seriously. The first is purely instrumental. Insisting on consent is likely to provide a barrier to morally unacceptable outcomes, and will improve inter-personal relations, as, for example, in medical ethics (see e.g. Manson and O'Neill 2007). Second, consent may be thought to be an important aspect of a good life. The mere fact of being able to make choices is important, independently of the results achieved. Third, it might be argued that we have strong individual rights that bar others doing anything to us without our consent. (Scheffler 1985: 75-6)

Although these arguments are often used together, perhaps even run together, they are importantly distinct. Only on the third view is it automatically wrong to do things to people without their consent. The first two views accept that consent is very important, yet make room for the possibility that consent is not always necessary to legitimize action. By contrast, on the third view it is of paramount importance, perhaps the only thing of importance. This view is associated, of course, with natural rights or libertarian writing. But we remain with the main problem. Unless we are prepared to accept the problem of paralysis, we cannot accept the claim that actual consent is a necessary condition of legitimate risk imposition.

9. Contractualism

Contractualism may appear to retain many of the attractions of the actual consent approach, yet avoid many of the difficulties. On this approach risk impositions are morally permissible if and only if they are such that everyone concerned could or would, at least in theory, agree to them, or to principles regulating them, from a suitable defined standpoint. This would exclude morally unattractive utilitarian or consequentialist cases of asymmetric imposition of risks to one person for the benefit of another since this is, presumably, is not something everyone would agree to. We might say, in this case, one's compensation for being exposed to risk is the opportunity to expose others, and indeed, this appears to be the view that Nozick leans towards (Nozick 1974: 66-67).

Lenman turns to contractualism precisely to avoid the unfairness associated with pure aggregation where the risks to one person can be outweighed by the benefits to the many. The contractarian approach that he takes as his starting point, based on Scanlon, is characterised by '…the thought that the right normative ethical claims are

those we are best able to justify to others where, crucially, this justifiability is understood as justifiability to *each other person*…' (Lenman 2008: 100) The voice of every single person exposed to a risk matters, and cannot be overlooked by the number of people benefiting from so exposing that person. This means that we avoid the simple version of the problem of paralysis; it is not an absolute restriction against harm that marks the line of permissibility. We can impose risks on others as long as this is done in a way that is justifiable to each, involving an equitable distribution of risk.

Contractualism thus provides a plausible moral standpoint when people equally benefit, at least *ex ante*, from mutual imposition of risk. However, matters are more troublesome when some will benefit much more than others. Whereas some such cases are obviously morally problematic such as painful medical experiments on selected victims, other cases we seem to accept rather un-problematically such as the risks to those on the ground of planes falling falling from the sky (Scanlon 2000: 209). But how is the contractualist to account for the intuition that the risk from falling planes does not make air traffic impermissible? Munoz-Dardé addresses this question, developing the example into a case of an Amish farmer running a very small risk of becoming a victim of falling planes due to air traffic, an activity from which he gains no or little benefit (Munoz-Dardé, forthcoming). The case is problematic for Scanlon as he neither allows for interpersonal aggregation nor the degree of probability of harm to determine the moral permissibility of risk impositions.[1]

[1] He does allow for numbers to be taken into account but merely as a "tie-breaker" between equal moral claims. (Scanlon 2000: 232f). For discussion on Scanlon and the problem of aggregation see Scanlon 2000: 229ff, Ashford 2003, Otsuka 2006,

As soon as aggregation and probability adjustments are introduced it can be hard to resist accepting the imposition of risk on some for the benefit of others. Scanlon tries to step around this problem by making risk impositions conditional on due precaution on the one hand and the degree of burden such precautionary restrictions would entail. However, if the concern of the farmer is to be counted for the same as that of everyone else, then we may have evaded the problem of paralysis by replacing it with one of equally valid conflicting moral claims. (Scanlon 2000: 235-237).

Altham in a much earlier discussion notes the difficulties of applying contractarianism to the ethics of risk. His worry is how the interests of the risk averse and the risk prone could ever meet in some general principle that seems rational in a Rawlsian original position. There seems to be little hope for convergence. (Altham 1983: 22).

Hansson suggests that a risk imposed on an individual should be linked to an 'equitable social system of risk-taking that works to her advantage' (Hansson 2003b: 305, and Hansson 2004: 32), that is to say a system of risk taking from which everyone benefits. But a scheme that made you face the risks of mining, me the risks of infectious diseases in being a doctor, and another the risks from a waste dump, may neither be efficient nor fair, since this may not take special vulnerabilities, interests or concerns of individuals into account. It is possible, however, that the approach can be developed to deal with such problems, although we should also note that, this

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Reibetanz 1998 Low probability of harm is not a reason to discount for that harm but gives rise to precautionary obligations. (Scanlon 2000: 208f)

approach, in itself, says nothing about the acceptable level of risk that we may each face.

Although not explicitly addressed to contractualism, it is worth introducing an important contribution introduced by Hermansson and Hansson (2007), who note that the imposition of risk generally involve three crucial roles: first, being exposed to the risk (and its possible harms); second, benefiting from the risk-imposing activity; and third having thedecision-making powers of decisions over that risk and the risk-imposing activity. They note that the ethics of risk look very different depending on how these roles are distributed. It is, for example, especially troubling if the party that benefits from the risk also has the decisive say as to whether it is imposed, while those who face the possible harms have no say (see also Wolff 2011). The promise of contractualism, perhaps, is to be able to rule out such situations unless they are part of a larger pattern from which everyone benefits. Nevertheless, applying contractualism to risk regulation policy has not been attempted in detail, and here it lags behind consequentialism.

10. Prima Facie Rights

An emerging compromise is to appeal to an individual's *prima facie* right not to be subjected to risky activity, but in certain cases, such as when the benefits of the practice are generally high, and it meets other considerations perhaps about magnitude and distribution of risk, then risky behaviour is acceptable. Now, on a natural rights position such a view may appear entirely ad hoc, but if we return to Scheffler's distinction between different reasons for valuing consent we can recall

that on some views consent is important not because we have natural rights, but either because consent normally indicates better moral outcomes, or because the opportunity to give and withhold consent is one component of the good life. On such views the prima facie right not to be subject to risky behaviour of others without consenting is a natural consequence of the rationale for finding consent important, as is the defeasibility of consent if there are other significant benefits.

The question then arises of what follows if one's prima facie rights are justifiably over-ridden, and one is subjected to risky behaviour. Note that on a pure consequentialist view compensation may not be necessary, for all consequences, including adverse ones, have already been taken into account in approving the risky behaviour in the first place. Thus compensation will only be required if, in advance, the possibility of compensation was one of the factors that led the action to be approved in the consequentialist calculation. On the prima facie rights view the situation is different, and compensation may be thought appropriate for over-riding a prima facie right, even if compensation would not be justified by a pure calculation of consequences. (see Peterson and Hansson 2004, Hansson 2007b)

Indeed, we could see the doctrine of prima facie rights as an output of contractualism, as well as a plausible compromise between consequentialism and deontology. Hence there is much in its favour. However, there are two obvious limitations. First, the approach itself says nothing about the generally acceptable level of risk imposition. Second, while it seems reasonable in ordinary everyday cases, such as driving, ordinary workplace risks and so on, where everyone can benefit from practices of risk-taking, it is unclear that it can help with the cases such as new environmental

threats, climate change or nuclear power, that generated interest in the topic in the first instance.

11. The Precautionary Principle

In the case of more extreme or exotic risks, it is often assumed that there is a 'precautionary principle' that can guide thinking. In fact what is called the precautionary principle is a response to an argument to the claim that where is no scientific proof of a harm, there should be no regulation. It is generally agreed that an early statement of the precautionary principle was provided in the United Nation's *Rio Declaration* from 1992:

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (UNEP 1992).

While wise advice, it is clear that this falls far short of any sort of principle. Some philosophers have taken the precautionary principle essentially as a way of framing the decision problem, emphasising the importance of scientists facing up to uncertainty, rather than as a contribution to decision theory (Steele 2006). Yet guidance is necessary in such cases.

In the face of potentially catastrophic risks, such as nuclear accidents, it is tempting to suggest that the principle instructs us to take all possible precautions. But of course

one precaution is not building new power stations and returning to candle power (cf. Manson 2002). Accordingly, it seems appropriate to weaken the theory to 'all reasonable' or 'all cost-effective' precautions. Yet this threatens to reintroduce cost-benefit analysis, or in other words only defers the problem. The very idea of precaution is very vague (see e.g. Sandin 2004 and Turner and Hartzell 2004). It appears that we lack any promising formal methodology for approaching extreme or new risks, and hence we need also look at non-formal approaches.

12. Conventionalism

Baier, in an early paper, takes a rather 'anti-theoretical' perspective on risk regulation from, starting from the Humean proposition that 'Morality is the culturally acquired art of selecting which harms to notice and worry about, where the worry takes the form of bad conscience or resentment.' (Baier 1986: 49)

The idea is that in cases of risk we cannot rely on over-arching principles to reach the right kind of conclusions but must weigh all the reasons that bear on the case. Rights are nothing more than 'crude moral guides.' The main worry is that such rights will eventually clash and we need to be able to address such conflicts and determine which rights outweigh other ones.

Baier proposes a list of normative distinctions to take into account when making decisions about risk, suggesting that there are intuitive reasons that contribute to make a particular kind of risk impositions more or less morally problematic. Thus, it is better to exploit an old risk than adding a new one to old ones; it is better to allow risks taken in leisure time than as part of a work environment, etc. It is interesting to note the moral concerns that she raises are very similar to the explanations proposed in the study of public risk perception by Slovic and others (e.g. Slovic et al 1982) as mentioned in section 5 above, and indeed her whole approach has strong affinities with the anthropological approach (Douglas and Wildavsky 1982, Douglas 1992, Thompson 1986, Adams 1999). Taken as intuitive moral indicators some of her normative distinctions have been widely discussed and some have lost some of their initial intuitive plausibility in later discussions. For example, it is not clear why a non-natural risk is more morally problematic than a natural one (cf. Hansson 2003a, 2007). Or, that risk imposed at work are morally more problematic than those in leisurely activities. Risks at work could well be compensated for and extra precautionary measures taken, and far from all risks faced outside the work place are voluntary. However, certain aspects from the risk perception literature do seem to hold a compelling intuitive force such as risks with large catastrophic effects, and risks with irreversible effects.

Baier's worry about basing an ethics of risks on over-arching principles such as rights, comes from the argument that rights presume identifiable victims and imposers, but also the possibility of delivering the requirements of those rights. However, what can be provided in terms of safety depends on contingent matters,

such as the political, social, educational structure in a given society that would enable provision of safety. The kinds of right to be rescued from risks cannot be conceived independently from institutions that can guarantee such rights.

The genuine moral concern for Baier is that of acts out of ill-will towards others. Such moral wrong-doings seem to constitute a much more troubling kind than all others. Thus imposing risks onto others knowingly and intentionally can, according to her, be compared to sending poisoned chocolates to relatives slowly awaiting their death. As a consequence what is permissible and not permissible heavily depends upon what is known and what can be known about the effects of risky activities at a particular time.

There are a number of objections that could be raised against making the permissibility of risks depend so much on intentional harm. It is not entirely clear what intentionally imposing a risk would entail and how that compares to intending bring about actual harm. Whereas it is morally problematic to intentionally harm someone, it is less obvious that the same moral intuition can be directly carried over to that of intentionally imposing a risk on someone, since presumably, at least in most cases, a risk is imposed for some expected gain that it may bring about. In the general case it makes no sense to presume that someone wanted to impose a risk out of ill-will. A person may want to harm someone out of ill-will, but then why aim to merely for a risk rather than a more certain harm? There could be some particularly ill-willed cases when someone intends precisely not to bring about great harm but a greater harm by adding an element of fear as to which harm and when. In any case ruling

those cases out would still leave the bulk of all risk impositions. Another objection stems from the worry about making permissibility relative to information and knowledge. As Thomson puts it:

We do not call out 'it is perfectly alright for you to press that button now, but we have some information that after we have given it to you it will then be the case that you ought not to press that button' We do not suppose that what a man ought or ought not to do turn on what *he* thinks is the case. (Thomson 1986: 184)

The rights and wrongs of risk impositions cannot depend entirely on what is known by the risk imposer. If that were the case a person could simply escape moral wrong doing by neglecting to inform himself or herself about potential risks and safety procedures. It seems that any knowledge-relativism must be complemented with some idea of what a risk imposer ought to have known, but again this is relative to such contingent matters as how much money is spent on which type of research, about duties to inform, rights to know, and dissemination of information. Whereas it may be excusable to impose a risk at a time when those risks are, universally, unknown, it cannot be excusable to merely fail to inform oneself of the risks resulting from actions affecting others.

However, in fairness to Baier's overall project, it is hard to deny that a strong strain of conventionalism must be part of risk ethics and regulation. Even within a contractualist theory of prima facie rights, a threshold between acceptable and unacceptable risks must be drawn, and it is hard to argue that there is a universal,

cross-cultural answer to this question. At the very least, any cost-benefit analysis will depend on the valuation of different harms and benefits, and there is likely to be great variation here, which will, in return, be partly determined by level of wealth and resources. Wealthy societies will tolerate fewer risks than poorer ones, which have higher priorities for the use of their scarce resources.

13. Proceduralism

There is a worry about how much of all morally relevant features can be fitted into formal analysis, and how much must in the end be political decisions and open for a discussion amongst those concerned rather than decided by experts, especially in the cases of those risks that fall outside the 'everyday' category.

There has, for at least the past three decades, been a persistent plea for democratic involvement of the public in decision-making about risk as an alternative to the expert-based cost benefit approach to risk decisions. Consequently many actual initiatives to involve the public in various ways have been introduced into the management of risks. However, the justification for this democratic involvement has been rather un-theoretical, stemming from an acknowledgement of the shortcomings of the scientific experts when it comes to values, rather than from anything more than cursory reference to the deliberative democracy literature within political philosophy.

In particular, this call for democratic decision-making as a way to justify risk impositions is perhaps best understood against a type of scientific arrogance sometimes experienced in earlier days of risk governance. One central approach to the justificatory issues of technological risk impositions, as mentioned previously, was to

find the level of risk – a probability of expected deaths - that was ‘acceptable’ or ‘tolerable.’ One such approach to find the level of risk was to compare with already existing ‘natural’ risks. Hence, the risks from nuclear power would be compared with the naturally occurring background radiation, for instance. A different approach would be to compare risks with those that are already accepted assuming that if a risk is *de facto* accepted it must also be acceptable. Or, as in Starr’s paper from 1969, accepted risks are compared against their benefits and costs (Starr 1969). Katherine Rowan distinguished between two different approaches to decisions about risk, one democratic and the other technocratic (Rowan 1994), and this dichotomy under different names seem to be the general view in most of the risk policy and risk communication literature (see e.g. Gurabardhi et al 2005).

Against this line of thought came the ideas stemming from the empirical findings from risk perception research suggesting that people took many other concerns into account when ranking risks other than their magnitude, and that decisions about risks in the end were about values (cf. Otway and von Winterfeldt 1982). Slovic for example has argued (Slovic 1999) for a ‘lay expertise’ when it comes to values as an argument for participatory decision-making. It is in this line of thought that scholars like Jasanoff and Wynne argue for more public involvement together with an idea of the very understanding of ‘risk’ as socially constructed (see Kusch 2007 for discussion of Jasanoff and Wynne). This view, that since the understanding of risk is constructed it must be negotiated, is a re-occurring one in the sociological literature on risk. Bradbury expresses this view quite clearly: ‘From this viewpoint, acceptance and acceptability of risk cannot be analytically determined but must be negotiated, that is, socially constructed.’ (Bradbury 1989: 391). Beck, one of the key figures in the sociology of risk, expresses the social nature of risk thus:

> By risks I mean above all radioactivity, which completely evades human perceptive abilities, but also toxins and pollutants in the air, the water and foodstuffs, together with the accompanying short- and long-term effects on plants, animals and people. They induce systematic and often *irreversible* harm, generally remain *invisible*, are based on *causal interpretations*, and thus only exist in terms of the (scientific or anti-scientific) *knowledge* about them. They can be changed, magnified, dramatized or minimized within knowledge, and to that extent they are particularly *open to social definition and construction*. (Beck 1992: 22f).

It is revealing that Martin Kusch in an attempt to construct a political philosophy of risk discusses Jasanoff's and Wynne's empirical work in science and technology studies rather than political philosophy as representatives for this more democratic approach (Kusch 2007).

14. Conclusions

The philosophical area of ethics of risk falls somewhere between probability theory, decision theory, applied ethics, applied political philosophy, action theory, and moral philosophy, with obvious links to all of the above areas. Roughly, ethics of risk can be said to refer to two separate activities. It is in part ethics, decision theory, and epistemology, applied to cases of danger with the aim to inform the normative discussion on distinct issues and problems. But it is also in part a re-shaping of moral

philosophy to reconcile moral theory with circumstances of epistemic uncertainty and high stakes. It is rather telling how little the standard approaches to ethics seem able to satisfactory deal with the uncertainties of life and action, and how little has been done, even within philosophy, to draw separate disciplines together. For example, the current debates in action theory and moral philosophy about reasons and the formal and technical discussion about probabilities and uncertainty in epistemology have had remarkably little contact with each other and with the ethics of risk. 'Risk' as an integrated part of our understanding of moral actions would bring much of moral theory closer to the inherent complexity of moral issues. There are relevant discussions about uncertainty and risk in decision theory and epistemology but these stay within the realm of rational, rather than moral, actions. In moral and political philosophy there have been interesting debates about moral luck and lotteries, but such topics have typically been addressed in terms of reasons for exemptions from moral responsibility, or in any case as special cases rather than as an essential part of moral actions.

The philosophical discussion of ethics of risks can be said to have focused primarily on five central problems. The first is that of the justification of imposing risks, often discussed with the example of hypothetical cases of Russian roulette with unusually many chambers. The second is the so-called problem of paralysis, resulting from moral impermissibility for imposing harm and imposing risk for harm leading to a paralysis of most actions. The third problem is that of a fair distribution of risks. If merely as low risk level as possible is sought this could lead to some being exposed to risks unfairly if this benefitted that total balance of risk exposure. Discussions on

public participation, equal distribution of risks, compensation for those who are more exposed, and deliberative approaches are all ways trying to address this particular problem. The fourth problem is that of assessing risks, or rather working out the right numerical estimate of a risk. Difficulties arise from the attempt to put a numerical value on risk, both from trying to put monetary value on such things as loss of life and limb, as well as problems in assigning probabilities for rare events. The fifth problem which we have not discussed in detail here concerns the scope of moral responsibility for risk impositions, in the face of problems with multiple or aggregate causes, knowledge and awareness of possible outcomes, proximity of causation, small risks distributed over large populations, anonymous deaths, collectively contributed risk impositions, and responsibility towards future generations and problems of discounting value for future gains and losses.

Traditionally moral philosophy has not fully explored the complications that arise with the fact the most of the time when we act towards others we do not know what will happen. Consequentialism has traditionally looked at the actual outcomes of actions and deontological approaches at the intentions of the agent or the rights of individuals. Neither of these approaches provides much guidance when deciding how to act in cases of risky activities in pursuit of some good. Attempts have made to move consequentialism to expected outcomes, relying on assessments of probabilities and expected utility of outcomes compared against costs and benefits of different alternatives. This has probably been the more successful attempt to deal with the ethics of risks, at least in applications to policy, but leaves a lot unanswered. In particular the information needed to make the right kind of decisions on cost-benefit

grounds when dealing with matters of great uncertainty is problematic. Furthermore, the general philosophical worry about aggregations of harms and benefits across individual is not addressed.

Non-consquentialist approaches, in particular, rights-based ones, have had a hard time even getting started on the topics of risk, since in its most conservative reading, imposing risks seen as a harm to others, would simply not be morally permissible without consent. Attempts have been made to work around this problem in terms of exploring hypothetical forms of consent, introducing compensation, and allowing probabilities and aggregation into the rights-based framework, by means of constructivism and, most promisingly, prima facie rights. Although reasonable successful in a range of ordinary cases, such approaches have their limits in dealing with novel, mass risks, such as those of climate change and nuclear power. For these more exotic and extreme cases, the general question on how to reconcile individual rights and risky actions in a convincing way has however yet to be worked out.[2]

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