Risk, Contractualism, and Rose's "Prevention Paradox"

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Abstract: Geoffrey Rose's prevention paradox points to a tension between two prima facie plausible moral principles: that we should save the greater number and that we should save the most at risk. This paper argues that a novel moral theory, ex-ante contractualism, captures our intuitions in many prevention paradox cases, regardless of our interpretation of probability claims. However, it goes on to show that it might be impossible to square ex-ante contractualism with all of our moral intuitions. It concludes that even if ex-ante contractualism cannot furnish an entire ethics of risk, it does identify important considerations for any such theory.

Keywords: risk; public health ethics; contractualism; prevention paradox; probability; numbers cases

In his classic textbook of public health policy, Geoffrey Rose proposes as a "fundamental axiom in preventive medicine" that "a large number of people exposed to a small risk may generate many more cases [of disease] than a small number of people exposed to a high risk."[1] This gives rise to Rose's "prevention paradox": "population strategies" that reduce the (relatively) low risk of many can be more effective at improving overall population health than "high risk strategies" that reduce the (relatively) high risk of smaller subpopulations.[2] Consider a simplified example:

Case 1: There are 100,000 people at a 0.5 ten-year risk ("the high risk group") and 10 million different people at a 0.01 ten-year risk ("the low risk group") of a fatal heart attack. We could either follow the "high risk strategy": ensure that each of the 100,000 takes a daily pill that will eliminate her risk but cause momentary nausea; or the "population strategy": ensure that each of the 10 million takes a daily pill that will eliminate her risk but cause momentary nausea; both policies are cost-neutral, but are incompatible.[3]

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[1]Geoffrey Rose, *The Strategy of Preventive Medicine* (Oxford: Oxford University Press, 2008), p. 59.

[2]Ibid., chap. 3.

[3]I will discuss the risk estimates used in my examples in section 3.

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It seems that each person in the high risk group would gain more from the high risk strategy than each person in the low risk group would from the population strategy, but the latter would save 50,000 more lives than the former.

Although they point to an important consideration in policy-making, why think these results are paradoxical? [4] Perhaps because Rose was not a philosopher, he was not clear on this, but there are two ways of understanding his concerns: in "absolute" and "relative" terms. First, Rose sometimes seems concerned with an apparent "paradox" concerning the relationship between individual and population benefit that can arise in population strategies but not (or less often) in high risk strategies. Imagine that each "low risk" individual reasonably prefers not to suffer daily nausea over a risk reduction of 0.01. From this "individual-level perspective," it seems that even if we could ensure in a rights-respecting manner that each person takes her pill, the population strategy does more harm than good, and should not be implemented (regardless of how it compares to the high risk strategy). However, from a "population-level perspective," it may seem that the policy is worth pursuing: the aggregate expected benefit of saving 100,000 lives seems worth nausea! Even if this tension is not strictly paradoxical, it certainly seems puzzling.

The second, "relative," problem raised by prevention paradox cases is that they involve a tension between two prima facie plausible normative principles. Assume that each of the 10 million would prefer to take a daily pill in spite of nausea; that is, the "absolute" problem does not arise. If so, the plausible normative principle that, all else being equal, we should choose policies that save as many lives as possible seems to support the population strategy. However, a second plausible principle, that, all else being equal, we should help those at greater risk of serious harm rather than those at lower risk of equivalent harm, supports the high risk strategy. Again, it is unclear that this result is strictly "paradoxical," but it poses an important challenge to policy-makers.

This papers sketches one way in which policy-makers might decide what to do in scenarios such as Case 1, which I call "ex-ante contractualism." In section 1, I articulate desiderata for any normative account of prevention paradox cases, and motivate my focus on contractualism. In section 2, I then defend ex-ante contractualism over "expected harm" contractualism. Ex-ante contractualism faces two challenges: first, that given the nature of risk estimates, it is theoretically inconsistent; second, that it leads to the "wrong" conclusion in some cases. In

[4]For discussion, see Stephen John, "Why the Prevention Paradox is a Paradox, and Why We Should Solve It: A Philosophical View," *Preventive Medicine* 53 (2011): 250-52.

section 3, I resolve the first of these challenges, and in section 4 conclude that the second challenge is insuperable. To pre-empt my conclusions: ex-ante contractualism cannot be the right account of how policy-makers should decide in all prevention paradox cases, because it can lead to deeply counterintuitive results. Why, then, do I argue for it in the rest of this paper? Other plausible, simple accounts of how policy-makers should decide in prevention paradox cases *also* have counterintuitive implications. So, as I discuss in section 5, drawing on Rose's more empirical work, either there is no account of prevention paradox cases that captures all of our intuitions, or we should adopt a messy "mixed" theory, of which ex-ante contractualism is one element. Furthermore, exploring ex-ante contractualism has important implications for other debates in the ethics of risk and over "saving the greater number" in general.

Before going any further, a brief clarification is necessary. Recent writing on justice and health has focused on two issues: personal responsibility, and the relationship between relative wealth and relative health inequalities.[5] Although the scenario sketched above could relate to either issue, for the sake of clarity I stipulate that in Case 1 (and later examples), relative risk differentials are not the result of unjust social institutions or unwise personal choices.

1. Why Are Prevention Paradox Cases So Hard?

In what follows, I shall assume the following three desiderata for any normative account of how policy-makers should choose in prevention paradox cases. First, it should not imply that *all* public health policies are always morally or politically objectionable. Some libertarians might disagree, but this desideratum seems natural given the aims of this paper. Second, in what I called "absolute" versions of the paradox—where each individual affected by some policy would reasonably prefer forgoing the policy's benefits on account of its harms—it recommends against implementing such a policy. Third, a decent normative account of prevention paradox cases should, when applied to relative versions of the paradox, at least sometimes recommend saving the most at risk rather than saving the greater number.

Some readers might find both the second and third desiderata puzzling: surely the second simply denies a compelling intuition about population benefit, and the third denies a compelling intuition that we should

[5]On the first topic, see Daniel Wikler,"Personal and Social Responsibility for Health," in Sudhir Anand, Fabienne Peter, and Amartya Sen (eds.), *Public Health, Ethics, and Equity* (Oxford: Oxford University Press, 2004), chap. 6; on the second, see Fabienne Peter, "Health Equity and Social Justice," in ibid., chap. 5.

save the greater number. I will return to these concerns below. For now, note that these desiderata can be justified on the grounds that they capture common intuitions of both the public and policy-makers, who do often seem to find population strategies problematic. For example, it was recently proposed that regardless of individual risk, each British citizen over 55 should be prescribed a daily "polypill," a combination of common drugs that reduce cardiovascular risk with minimal side effects.[6] Although this paradigm population strategy could reduce heart disease rates by an estimated 80%, it has been extremely contentious.[7] Current policy, where only the "high risk" receive preventive cardiovascular drugs, is comparatively uncontroversial. The second desideratum above is intended to capture the kinds of concerns that motivate such opposition.[8] Furthermore, consider the distribution of influenza vaccines, where priority is often given to high-risk groups, such as the elderly, despite evidence that this is unlikely to have the greatest effect on overall mortality.[9] In such cases, we seem to prioritize risk reduction over population benefit, as the third desideratum suggests. Of course, these public and policy preferences might be irrational, but I assume that "explaining away" such commitments is only fair if we have investigated whether they are justifiable, hence my desiderata.

I now suggest that consequentialist accounts of how to resolve prevention paradox cases might be able to meet these desiderata, but only at the cost of failing to capture the intuitions behind them. This is important because, of course, many seem to think assessment of public health policy should be guided primarily by consequentialist considerations. Where two states of affairs differ only in terms of the number of lives saved, then any plausible consequentialist axiology will rank the state where more lives are saved as better. Given this, a consequentialist moral theory will tell us not to choose the population policy in either absolute or rela-

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[6]M.R. Law and N.J. Wald, "A Strategy to Reduce Cardiovascular Disease by More Than 80%," *British Medical Journal* 326.7404 (June 28, 2003), p. 1419.

[7]See the correspondence in the *British Medical Journal* subsequent to Law and Wald's paper. Useful overviews are L.W. Green, "Prospects and Possible Pitfalls of a Preventive Polypill: Confessions of a Health Promotion Convert," *European Journal of Clinical Nutrition* 59, Suppl. 1 (2005): S4-S9; and Geoff Watts, "What Happened to the Polypill?" *British Medical Journal* 337.7673 (October 4, 2008), p. 786.

[8]John Worrall has stressed a similar point with regard to statins: see his "Do We Need Some Large, Simple Randomized Trials in Medicine?" in Mauricio Suárez, Mauro Dorato, and Miklós Rédei (eds.), *EPSA Philosophical Issues in the Sciences* (Dordrecht: Springer, 2010), chap. 27.

[9]See, for example, A.P. Galvani, T.C. Reluga, and GB. Chapman,"Long-Standing Influenza Vaccination Policy is in Accord with Individual Self-Interest but not with the Utilitarian Optimum," *Proceedings of the National Academy of Sciences* 104 (2007): 5692-97.

tive versions of Case 1 only if it also includes aggregate nausea as a morally relevant feature of states of affairs. Such a consequentialist theory might tell us that in an absolute version of Case 1 (where moderate risk individuals do not want to take a pill), we should not pursue the population policy because the expected costs (aggregate daily nausea for 10 million people) outweighs the expected benefits (100,000 lives saved). Similarly, such a theory would sometimes lead us to prefer high risk policies in relative versions of Case 1, at least when the difference between the "costs" of the two policies (in terms of aggregate nausea) is greater than the "benefits" (in terms of number of lives saved).

However, while including nausea in our consequentialist calculus might get the "right answers," it seems only to do this at the cost of misrepresenting our moral concerns. The underlying intuition behind desideratum 2 is, I suggest, that each individual has reason to reject the policy, not that the aggregate costs of the policy (lots of nausea) outweigh the aggregate gains (saving 100,000 lives). The consequentialist justification misrepresents a concern about individuals as a concern about populations. Second, I suggest that the underlying intuition behind desideratum 3 is best understood in prioritarian terms: even if each of the 10 million *is* benefited more than burdened by the population strategy, each of them has a weaker claim to help than each of the 100,000, given that each in the latter group stands to gain more than each of the 10 million.[10] Again, framing opposition to the population strategy in terms of differences in aggregate costs and benefits misrepresents this concern.

Assuming, then, that we want to retain the desiderata, and that I am correct about their intuitive backing, we need either a more sophisticated consequentialism or an alternative normative approach. For the rest of this paper, I will examine the second option, a version of Thomas Scanlon's broadly Kantian moral theory of contractualism. According to contractualism, "actions are right only if there is a principle permitting them that no one could reasonably reject."[11] An individual can reasonably reject a principle (or set of principles) if and only if she can give some reason against their adoption and propose an alternative (set of) principle(s), such that no one else has a stronger objection against her proposal than she has against the original. In Rahul Kumar's crisper formulation, "a

[10]This is not to endorse prioritarianism as a basic principle, but to say that prioritarian considerations, which might ultimately be grounded in other concerns, seem relevant here. See Michael Otsuka and Alex Voorhoeve, "Why It Matters That Some Are Worse Off Than Others: An Argument against the Priority View," *Philosophy & Public Affairs* 37 (2009): 171-99.

[11]T.M. Scanlon, *Moral Dimensions* (Cambridge, Mass.: Harvard University Press, 2008), p. 98. See also his *What We Owe to Each Other* (Cambridge, Mass. : Harvard University Press, 1998).

valid principle is one that is most acceptable to the person for whom it is least acceptable."[12]

I have suggested that both absolute and relative prevention paradoxes arise from a worry about aggregation of costs and benefits, such that consequentialist theorizing—committed to aggregation—cannot really capture why such cases are so puzzling. Contractualism can explain why certain sorts of aggregation are impermissible. For example, imagine that a technician has trapped his arm inside machinery broadcasting the World Cup final. Contractualism implies that because his complaint against not releasing his arm is stronger than that of any of the viewers against missing the final, we should halt the transmission, even if resulting aggregate annoyance outweighs benefit to the technician.[13] Although an account of interpersonal morality, given contractualism's roots in political thought, it seems plausible to apply such reasoning to social policy.

Unfortunately, although contractualism might seem well suited to capturing concerns about aggregation, there is an obvious problem with applying it to the cases above. There is a mini-industry concerning how contractualists should think about risk imposition.[14] Most of this discussion revolves around Scanlon's claim that "the grounds for rejecting a principle are based simply on the burdens it involves, for those who experience them, without discounting them by the probability that there will be anyone who actually does so."[15] My concern is not with risk *imposition*, but risk *reduction*, that is, choosing between courses of action all of which will avoidably leave some agents at different risks. I will return to this distinction below. For now, note that, applied to such cases, Scanlon's claim seems best interpreted as: we should assess courses of action in terms of the harms they *do* involve, and therefore should choose principles in accordance with the objections that agents *will* have as a result of our (in)action.[16] Unfortunately, this "actual harm contractual-

[12]Rahul Kumar, "Reasonable Reasons in Contractualist Moral Argument," *Ethics* 114 (2003): 6-37, p. 33.

[13]Scanlon, *What We Owe to Each Other*, p. 235.

[14]Elizabeth Ashford, "The Demandingness of Scanlon's Contractualism," *Ethics* 113 (2003): 273-302; James Lenman, "Contractualism and Risk Imposition," *Politics, Philosophy & Economics* 7 (2008): 99-122; Alistair Norcross, "Comparing Harms: Headaches and Human Lives," *Philosophy & Public Affairs* 26 (1997): 135-67. For the ethics of risk imposition in general, see Sven Ove Hansson, "Ethical Criteria of Risk Acceptance," *Erkenntnis* 59 (2003): 291-309.

[15]Scanlon, *What We Owe to Each Other*, p. 208.

[16]Scanlon's comments seem open to a second interpretation: that we should assess courses of action in terms of the worst harms they *might* involve, such that we should choose principles in accordance with the strongest objections those *possibly* affected *could* have. If so, in Case 1, we should choose as if everyone will die without intervention. This seems very strange, which is why I adopt the "actual harm" interpretation (fol-

ism" fails to capture our concerns in prevention paradox cases.

Applied to Case 1, actual harm contractualism implies that if our choice were between the population strategy and doing nothing, then, even if we face an absolute prevention paradox (that is, ex-ante no one wants the pills), the strategy would still be morally preferable to doing nothing (albeit hard to implement in a morally acceptable way). This is because the complaints of each of those (as yet unidentifiable) 100,000 individuals who will die if we do nothing against doing nothing are stronger than the complaints against the population strategy of each of those 9,900,000 who will survive but be unnecessarily nauseated. Therefore, actual harm contractualism cannot meet the second desideratum; indeed, it seems to provide a stronger justification for disregarding individual concerns in favor of population benefit than do the consequentialist theories often claimed to underlie public health policy!

What does it say about the relative case? Clearly, in such a case, actual harm contractualism would, for reasons just outlined, lead us to choose the population strategy over doing nothing. Similarly, if our choice were between the high risk strategy and doing nothing, we should prefer the high risk strategy, even if the aggregate costs of 9,950,000 needless nausea cases outweighs the benefits of 50,000 lives saved. Unlike on the consequentialist perspective, we can disregard the side effect of nausea, such that Case 1 is a choice between saving 100,000 lives (via the population strategy) and 50,000 lives (via the high risk strategy). Scanlon has justified a SGN principle in cases involving certainties of harm using the "tie-break" argument. For example, imagine we must choose between saving Alex and saving 100 lives: Alex's complaint against saving the many is tied with the complaint of any of the 100 against saving Alex; the complaints of each of the remaining 99 against saving Alex then break this tie.[17] From the "actual harm" perspective, Case 1 is such a case; therefore, the population strategy is preferable to the high risk strategy. The tie-break argument is controversial,[18] but my point is that if we treat differences between individuals' ex-ante probability of suffering harm as morally irrelevant in risk reduction cases, then contractualism does not capture concerns about aggregation.

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lowing Otsuka and Voorhoeve ("Why It Matters," p. 183). The worry about the "actual harms" interpretation would also apply to the "worst case" interpretation.

[17]Scanlon, *What We Owe to Each Other*, pp. 229-41.

[18]For critical discussion, see Michael Otsuka, "Saving Lives, Moral Theory, and the Claims of Individuals," *Philosophy & Public Affairs* 34 (2006): 109-35.

2. Ex-Ante Contractualism

One possible way for the actual harm contractualist to respond to this problem would be by claiming that ex-ante risks generate other, actual harms that must be taken into account: say, subjective harms of fear or worry or objective harms following from perceived insecurity. However, although concerns about the effects of insecurity are surely relevant to public policy, it seems, at least in relative prevention paradox cases, that it is the risk, not the effects of knowing you are at risk, that is morally relevant. We cannot dissolve the paradox by handing out "happy pills."

In this section, then, I will suggest an alternative response: adopting ex-ante contractualism as an account of cases of risk reduction. (Note that if contractualists wish to maintain some version of a doing/allowing distinction, this may be less of a deviation from Scanlon's own remarks than it first appears.) According to this view, in risk reduction cases, agents' complaints against principles are proportional to the risks of harm that acting on those principles would avoidably fail to reduce. Given this, principles' permissibility should be assessed in terms that treat agents' complaints as proportional to the avoidable risks they suffer. So, for example, if we were to choose between acting in a way that would reduce Alex's risk of death from 0.5 to zero and acting in a way that would reduce Betty's risk of death from 0.1 to zero, Alex would have a stronger complaint against helping Betty than Betty would against helping Alex. Of course, a full account of ex-ante contractualism would have to provide an account of how to weigh different risks of different harms, but my aim here is simply to sketch the appeal of this theory in cases in which we are dealing with individuals at different risks of the same harm (death), so I place these issues to one side.

Consider, now, an absolute version of the prevention paradox, where—not implausibly—each of the 10 million would reasonably prefer an avoidable 0.01 risk of heart attack over daily nausea. Imagine our choice were between the population strategy and doing nothing. If so, each of the 10 million has an objection against that policy (it would burden more than benefit her), and, from the ex ante perspective, no one has an objection against inaction. The population strategy would be "reasonably rejectable" in favor of inaction. Therefore, ex-ante contractualism meets the second desideratum by refusing to over-rule individuals' concerns for population benefit. At the same time, assuming that each of the 100,000 would prefer taking a pill and having her risk reduced, the high risk policy would not be reasonably rejectable in favor of doing nothing. Therefore, the approach also captures the first desideratum—that is, it does not rule out all public health policies.

What, though, should we say in a relative case, in which each of the

10 million, at ex-ante low risk, is willing to suffer nausea for risk reduction? If so, as well as each of the 100,000 at ex-ante high risk being able reasonably to reject doing nothing in favor of the high risk strategy, each of the 10 million could reasonably reject doing nothing in favor of the population strategy. How should we choose between high risk and population strategies in this case? From the ex-ante perspective, each of the 100,000 has a stronger objection against the population strategy (it would avoidably leave her at a 0.5 risk of harm) than each of the 10 million has against the high risk strategy (it would avoidably leave her at 0.01 risk). Of course, many more people would have a complaint against the high risk policy than against the population policy. However, the complaint of each of the larger group against the high risk strategy is weaker than that of each of the smaller group against the population strategy. According to ex-ante contractualism, policy-makers should prefer the high risk strategy despite the fact that it would save fewer lives, much as standard contractualism justifies halting the World Cup transmission in my earlier example. Ex-ante contractualism can capture the third desideratum, in a way that makes clear how this desideratum relates to concerns about aggregation.

I have outlined a normative theory, ex-ante contractualism, that implies that policy-makers should sometimes prefer high risk strategies to population strategies, even when choosing the latter would save more lives. This normative perspective articulates two intuitive concerns about prevention paradox cases. Furthermore, it might explain public resistance to population strategies without accusing the public of irrationality. It is one thing, however, to say that ex-ante contractualism allows us to articulate intuitive concerns or justify (apparent) public opinion, but another to show that the position is coherent, and yet another to show that we should, all things considered, hold it, particularly because it sometimes has very counterintuitive implications. The next section takes up the first challenge; section 4 takes up the second.

3. The Perspectivalism Problem

In its response to relative versions of the prevention paradox, ex-ante contractualism captures a very general, intuitively appealing thought: the more vulnerable some agents are, then, ceteris paribus, the stronger the demand for others to help them.[19] In turn, this claim might be motivated on multiple grounds: for example, that human agents are typically highly

[19]See Jonathan Wolff and Avner de-Shalit, *Disadvantage* (Oxford: Oxford University Press, 2007), for this claim.

risk-averse, or that security is an aspect or condition of "flourishing." However, the claim that agents' complaints against principles are proportional to risks of harm might seem problematic. As I noted above, it seems that what worries us in prevention paradox and related cases is not that people believe that they are at risk, but that they *are* at risk (which is, of course, compatible with justifying the importance of risk by appeal to what humans generally want). Indeed, to think otherwise rewards conspiracy theorists or hypochondriacs at the expense of the deluded or over-optimistic.[20] Unfortunately, this "objectivism" condition gives rise to a "perspectivalism problem" for ex-ante contractualism, indeed, for any ethics of risk that focuses on ex-ante concerns.

Most epidemiological claims concern subpopulations: for example, "50% of the group of 100,000 people with gene A will suffer a heart attack within ten years." From the ex-ante perspective, such claims are interpreted as each person with gene A has a 0.5 risk of heart attack, which grounds a complaint against principles. However, the claim that there are objective chances is highly controversial.[21] How, then, should we understand statements about individual risks? We can distinguish two answers to this question. On "epistemic" accounts, claims about individuals' chances of suffering harm are strictly claims about the probability of the proposition that they will suffer harm, conditional on our evidence. For example, the claim that Alex is at a 0.5 ten-year risk of heart attack should be understood as "relative to our evidence (about Alex and others with gene A), the probability that Alex will suffer a heart attack within ten years is 0.5." Were we to discover more evidence—for example, that Alex's vegetarianism inhibits heart attacks—then a different probability judgment would be warranted. According to the alternative "frequentist" interpretation, claims about individuals' risks are claims about those individuals considered qua some "reference class"; for example, "considered qua member of the class of gene A people, Alex's risk is 0.5." Although frequentists think that probability claims report about the world, rather than about evidential relations, their claims are still *conditional*, such that different estimates of an individual's risk could all be "correct," depending on the reference class we use.[22] Qua vegetarian, Alex's risk

[20]For further discussion of how to draw this distinction, see Stephen John, "Security, Knowledge, and Well-Being," *Journal of Moral Philosophy* 8 (2011): 68-91.

[21]In what follows, particularly the distinction I draw between "epistemic" and "frequentist" interpretations of probability, I am deliberately simplifying a vast literature to identify topics specific to the political problem. For fuller discussion, see Hugh Mellor, *Probability: A Philosophical Introduction* (London: Routledge, 2005), and Donald Gillies, *Philosophical Theories of Probability* (London: Routledge, 2000).

[22]For discussion, see Alan Hájek, "The Reference Class Problem is Your Problem Too," *Synthese* 156 (2006): 563-85.

might be lower than qua gene A-carrier.

One of these interpretations must be correct, the other incorrect. Unfortunately, however, even if it were so easy to resolve this long-standing dispute, ex-ante contractualism faces a perspectivalism problem on either interpretation: any risk-based complaint must be conditional on a particular perspective (some evidence or some reference class), but can complaints be perspectival, and, if so, what is the proper perspective?[23] Worse, this problem arises for ex-ante contractualism but not for other normative theories. Consider, for example, actual harm contractualism. Imagine we know that (an unidentifiable) 50% of 100,000 people will avoidably die if we adopt policy B; if so, we can assume that 50,000 people will have a complaint if we follow policy B, and reason accordingly. Further evidence, conditional on which half of those 100,000 are at 0.25 risk and half at 0.75 risk, would not alter the (im)permissibility of B. Actual harm contractualists (and other theorists) face serious problems in deciding when population-level claims are well formulated.[24] However, ex-ante contractualists face both this problem and a problem of relating well-formulated population claims to individuals' complaints.

Assuming the epistemic interpretation, if individuals' complaints must be indexed directly to facts about the world, then ex-ante contractualism would be incoherent. However, there are independent reasons to index complaints to facts about what reasonable agents would believe rather than the world. Imagine that, in the course of an army training exercise, I must decide whether to pull the trigger of a gun aimed at Alex, who is unaware of my presence. The gun is in fact loaded, but I am certain it is unloaded. Should we assess Alex's complaint against my pulling the trigger by reference to what will or to what I believe will happen? Imagine that given the evidence I could reasonably have collected, my certainty is warranted; although the gun *is* loaded, this was due to a freak "miracle" that no reasonable agent would ever have considered. If we wish to retain a link between our accounts of permissibility and action guidance,

[23]The problems are inspired by Stephen Perry's discussion in "Risk, Harm, Interests, and Rights," in Tim Lewens (ed.), *Risk: Philosophical Perspectives* (London: Routledge, 2007), chap. 11. However, Perry focuses only on the "reference class problem" for frequentism (i.e., the problem of justifying use of a particular reference class for the generation of risk estimates), as it relates to the claim that imposing risks of harm is to harm. Hájek argues in the "The Reference Class Problem" for the very general result that a version of the reference class problem arises for other interpretations of probability. As far as I know, there is no literature on the problem raised above: that if the reference class problem generalizes to other accounts of probability, then so too do the problems for claiming that risks of harm are normatively relevant.

[24]For such problems, see John Worrall, "Evidence in Medicine and Evidence-Based Medicine," *Philosophy Compass* 2 (2007): 981-1022.

then it seems Alex has no complaint against my pulling the trigger. Pulling the trigger would be tragic, rather than impermissible.

These remarks suggest that agents' objections against principles should be indexed to those claims that are warranted on the basis of the evidence that reasonable agents could be expected to collect.[25] If so, the fact that, on an epistemic interpretation, risk estimates are indexed to a particular body of evidence is compatible with understanding individuals' complaints against principles in terms of such estimates, as long as we can identify which body of evidence is proper for risk estimations. Clearly, this cannot be all the evidence ever collectable (that would be too demanding), but nor can it be all the evidence that has actually been collected (that would be too lax).

I suggest that a proper risk estimate for normative purposes is one relative to the body of evidence it is *reasonable* to expect those whose actions should be guided by such evidence to collect. More formally: for ex-ante contractualist assessment, acting on some principle avoidably leaves some patient of justice at risk of harm in a way that grounds a complaint when, relative to the evidence it is reasonable to expect the agent of justice to collect, different probabilities should be assigned to the claims that the patient will survive if we do and if we do not act on that principle. This notion of "reasonableness" might seem frustratingly indeterminate, but can itself be cashed out in contractualist terms: that is, of some body of evidence we can ask whether a principle demanding collection of more evidence is reasonably rejectable. For example, if agents would reasonably reject a principle mandating state collection of genetic data, then such information would not be relevant to public health policy-making.

This account of proper risk estimates is complicated in three ways. First, there might be a gap between the actual probability of some hypothesis relative to the evidence and what we believe it to be; the former is what matters normatively. Second, there could be a difference between the bodies of evidence that agencies do and should use, such that we should be careful about moving from (even well-founded) generalizations to specific claims about agents. Third, a proper risk estimate may differ according to who is assessing the risk. For example, if we can reasonably make different demands upon them, then maybe public policymakers and physicians ought to collect different kinds of data, such that Alex's risk-based complaints about how the state and how his physician distributes a drug differ. For thinking about the prevention paradox, what matters is the evidence that state agencies should collect, although this is

[25]These comments gloss a large debate, but the conclusions match those suggested by Scanlon (*Moral Dimensions*, pp. 47-49).

an intriguing problem.

Why should individuals endorse proper risk estimates as relevant to assessing their complaints against principles, particularly when they have access to more detailed evidence, conditional on which they suffer a different, higher risk? For example, imagine Alex discovers new evidence, which it is unreasonable to expect the State to collect, and that conditional on this evidence, his risk of heart disease is 0.9, rather than the State's 0.5. I suggest that although such cases will arise, policy-relevant and individual-relevant bodies of evidence will typically co-vary. This may be too sanguine an assumption. However, even if it is false, ultimately, such disjunctions are a phenomenon that reasonable agents should accept, much as they should accept that official estimates of wealth may not reflect the fact that they have written IOU notes.

What if we adopt the frequentist interpretation? If so, and if individuals' complaints against principles cannot rest on facts about their group membership, then ex-ante contractualism would be incoherent. However, although contractualism places an "individualist restriction" on the reasons that can be offered against principles, denying the salience of numbers of complainants, it also holds that complainants' reasons must be "generic." Justification does not concern whether a principle is justifiable to *this particular individual*, but, whether it is justifiable to an individual viewed *under a generic description*.[26] Scanlon argues for such a restriction as arising from the need to assess principles as grounds for "general regulation."[27] We might add that the demand that reasons must be generic reflects a deeper fact about practical reasoning, central to Kantian nonconsequentialism: that justification must always abstract from particulars, and, hence, always involves thinking about individuals under abstract descriptions.[28] Therefore, that, on a frequentist interpretation, risk claims are claims about individuals viewed in some generic way—say, as people who possess gene A—does not in and of itself disqualify using those claims to assess individuals' objections. The real challenge is in identifying normatively apt generic descriptions; that is, which reference classes are proper ways of grouping for policy.

An apparently plausible answer might be that we should use the most fine-grained reference classes available (given our evidence), because doing so seems to get us closer to the ideal reference class, of which the

[26]Scanlon, *What We Owe to Each Other*, pp. 204-5.

[27]Ibid.

[28]See Onora Nell (O'Neill), *Acting on Principle: An Essay on Kantian Ethics* (New York: Columbia University Press, 1975); see also Onora O'Neill, *Towards Justice and Virtue: A Constructive Account of Practical Reasoning* (Cambridge: Cambridge University Press, 1996), chap. 2.

individual in question is the only member.[29] However, this response is problematic: the same individual can be a member of two equally narrow reference classes (say, men born at noon on 1 March 1979 and men who like Brussels sprouts for breakfast), but qua member of the different classes be at different risks.[30] Furthermore, the narrower the reference classes, typically, the less useful they will be for policy-making: white men are far easier to identify than men born at noon on 1 March 1979. A second option might be to say that we should employ those reference classes used in our best science.[31] Unfortunately, different sciences (say, social epidemiology and genetic epidemiology) employ different classification schemes.[32] Furthermore, even if the reference classes used in some sciences correspond to "natural kinds," those kinds may not be narrow (or general) enough to play a useful role in policy-making.

I suggest, then, that normative, specifically contractualist, arguments should be used to identify proper reference classes. More formally: acting on some principle avoidably leaves some patient of justice at risk of harm in a way that grounds a possible complaint when, relative to the reference classes it is reasonable to expect the agent of justice to employ, we would assign different probabilities to the claims that the patient will survive if we do and if we do not act on that principle. It is reasonable to expect an agent of justice to use a reference class when some individual has a complaint against not using that class, and where no other individual has a stronger complaint against using that class.

Although unfamiliar, the claim that normative considerations can provide objective grounds to favor certain ways of categorizing people is plausible. For example, in France, official statistics are not collected on religious group membership because, it is claimed, a secular state should not endorse such categories; in the U.S., for many years political ideology led to a refusal to categorize mortality data by social class.[33] My claim is not that the French are right and the Americans wrong (or vice

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[29]See, for example, Kasper Lippert-Rasmussen, "Nothing Personal," *Journal of Political Philosophy* 15 (2007): 385-403, which suggests that "fine-grained" classes are always, ceteris paribus, preferable for policy-making (p. 390).

[30]See Hájek, "The Reference Class Problem."

[31]Following Norman Daniels's attempt in *Just Health* (Cambridge: Cambridge University Press, 2008), chap. 2, to avoid a similar problem about defining health.

[32]This is a specific example of the more general "pluralist" philosophy of science defended by John Dupré in *The Disunity of Science* (Cambridge, Mass.: Harvard University Press, 1993).

[33]On France, see Cécile Laborde, *Critical Republicanism: The Hijab Controversy and Political Philosophy* (Oxford: Oxford University Press, 2008); on the U.S. case, see Vicente Navarro, "Race or Class Versus Race and Class: Mortality Differentials in the United States," in Dan E. Beauchamp and Bonnie Steinbock (eds.) *New Ethics for the Public's Health* (Oxford: Oxford University Press, 1999), pp. 39-44.

versa), but that such decisions are intelligible in light of the values of those nations, and contractualism can provide a mechanism for either challenging or incorporating such values in policy. Once we allow that use of certain general reference classes (such as ethnicity or social class) may be improper on contractualist grounds, further choices within the set of permissible reference classes can also be assessed through normative reasoning. Such debate will include epistemic questions about the accuracy of the predictions we can make relative to some reference class, but will also include nonepistemic considerations about, for example, the costs or possible secondary effects of using classes. Again, contractualist considerations of reasonable rejectability can be used in this task.[34] It is, unfortunately, impossible to specify in advance of a particular debate what might count as a valid reason, but to give an example, imagine that there are good contractualist arguments against allowing the State to collect data on dietary habits. If so, it would simply be improper to assess Alex's complaint against some policy in terms that treated him as a member of that reference class.

Again, these remarks raise problems about what to do when actual estimates are not based on apt categories, whether different social actors might use different categories, and so on. However, these problems relate to the core contractualist commitment that complaints should be conceptualized generically. In turn, the contractualist must either rely on an independent quasi-naturalistic account of how best to group individuals, or, more plausibly, hold that the contractualist machinery can be used recursively to justify ways of grouping. A similar result holds, I suggest, for any broadly Kantian nonconsequentialist theory. Therefore, the normative solution to the reference class problem is inherent in nonconsequentialist thought.[35]

That the reference classes that policy-makers ought to use are not necessarily the classes that individuals themselves use to assess their own risk may seem problematic. However, if the system of developing categorizations is working well, then the categorizations that public agencies use will reflect how reasonable agents are willing to, and sometimes do, think about themselves, at least for political purposes. Therefore, reasonable agents should be willing to endorse use of those risk estimates as

[34]For a more fully developed account of this process, see Stephen D. John, "Cancer Screening, Risk Stratification and the Ethics of Apt Categorisation: A Case Study," in Daniel Strech, Irene Hirschberg, and Georg Marckmann (eds.), *Ethics in Public Health and Health Policy* (Dordrecht: Springer, 2012), chap. 10.

[35]I take this to be an extension of Rahul Kumar's claim (in "Reasonable Reasons") that whether some putative complaint against principles is, in fact, reasonable is to be decided recursively.

capturing (at least some of) their own concerns.[36] Again, this may be overly optimistic, but a certain amount of misrepresentation of our concerns may be a reasonable price for living together.

The thought that the greater the risk of physical harm individuals suffer, then the stronger the demand that the State aids them seems central to our response to prevention paradox cases: intuitively, choosing population over high risk strategies is problematic because they benefit each individual less. However, an objectivist interpretation of the badness of being at risk faces the perspectivalism problem. In this section, I have shown how contractualism can respond to this problem. I hope not only to have defended ex-ante contractualism against the perspectivalism problem, but also to have suggested that if we are tempted by the thought that risks of harm are themselves politically salient, then we have good reason to frame our concerns in ex-ante contractualist terms.

4. Must We Save the Greater Number?

Ex-ante contractualism captures some of our intuitions, and can be rendered theoretically coherent, but is it morally appealing? The third desideratum I listed for any decent account of relative prevention paradox cases is that it sometimes tells us to save the most at risk, rather than to save the greater number. What, though, is the precise relationship between ex-ante contractualism and the demand that we save the greater number?

Imagine: On island A, there are 50 people, all of whom will die without help; on island B, there are 100 people, all of whom will die without help. You could save those on A or those on B, but not both groups. You have no special obligations towards either group, neither group is responsible for its plight, and neither differs in any other possibly morally relevant respect.[37] Many philosophers assume that in such a case, you should save those on island B, and that a decent moral theory should justify the underlying SGN principle: if you must choose between saving more or fewer lives and all other morally relevant factors are equal, you should save the greater number. As I noted in section 2, Scanlon thinks that contractualism can justify this principle. Other philosophers deny the intuition or that a decent moral theory must justify the SGN principle.[38]

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[36]That is to say, such measures meet the "endorsement constraint" on any objective measure to be used for assessing how well off individuals are for political purposes.

[37]This example is adapted from John M. Taurek, "Should the Numbers Count?" *Philosophy & Public Affairs* 6 (1977): 293-316.

[38]Taurek himself denies that we must justify the SGN principle. See also Véronique Munoz-Dardé, "The Distribution of Numbers and the Comprehensiveness of Reasons," *Proceedings of the Aristotelian Society* 105 (2005): 191-217, for the claim that a decent

However, even when the SGN principle is challenged as part of interpersonal morality, it seems compelling when thinking about social policy.[39] I agree with the consensus: a decent normative theory of public policy should justify the SGN principle.

As I have already noted, ex-ante contractualism tells us that in some prevention paradox cases, we should choose policies that will not save the greater number. This is compatible with the SGN principle, because ex-ante contractualism holds that when choices involve individuals at different risks of harm, then all other moral factors are not equal. When all individuals are at an equal risk of harm, including the limiting case above, where the risk is "1," ex-ante contractualists can appeal to the same tie-break argument used by its "actual harm" cousin to justify an SGN principle. Furthermore, I have suggested that it is not obviously counterintuitive in scenarios such as Case 1 to think that we should fail to save the greater number. Therefore, in some sense, there is no clash between ex-ante contractualism and SGN. However, ex-ante contractualism may still seem problematic. Most decisions faced by state agencies are not as stark as choosing which islanders to help, but involve deciding between helping different at-risk groups. In many such cases, it may seem intuitively plausible that state agencies should save the greatest number. Indeed, although to the best of my knowledge there is no philosophical discussion of numbers cases in which all of our options are probabilistic, we might have thought that the interest of those discussions was to illuminate public policy, where options are typically probabilistic.

Before going any further into challenges to ex-ante contractualism, I note a possible complexity here. Some writers have argued that we should choose whom to help by means of a procedure offering each individual an equal chance of survival.[40] I ignore such arguments, because a normative account of social policy that told lifeboat workers to flip a coin, even a weighted coin, when deciding whom to help seems to me deeply implausible.[41] Furthermore, I suggest that proponents of such views may face a challenge in extending their theories to prevention paradox cases, because it is unclear what counts as giving an "equal chance" of survival where initial chances are already unequal. Further investigation of ex-ante contractualism may help to clarify these issues, and thus provide us both with a better understanding of normative ethics and the

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moral theory need not conclude that we *must* save the greatest number.

[39]For example, this is the conclusion reached by Munoz-Dardé ("The Distribution of Numbers").

[40]See Otsuka, "Saving Lives," for discussion.

[41]Although not everyone agrees: see Martin Peterson, "The Moral Importance of Selecting People Randomly," *Bioethics* 22 (2008): 321-27.

place of fairness considerations in policy; however, to establish the value of this project, first it is necessary to ask whether ex-ante contractualism is worth pursuing at all.

Specifically, I suggest that there are two kinds of relative prevention paradox cases—that is, cases in which members of the larger group do not prefer risk over some medical burden—where ex-ante contractualism seems deeply counterintuitive. First, there are cases in which the risk differential between members of different groups is small, but there is a large difference in the number of lives we might save. For example:

Case 2: There are 100,000 people at a 0.5 ten-year risk, and 1 million people at a 0.45 ten-year risk, of a fatal heart attack. We could either ensure that everyone in the first group takes a pill every day, or ensure that everyone in the second group takes a pill every day that will eliminate their risk.

Second, there are cases in which there is a large risk differential, but a large difference in the number of lives we might save. For example:

Case 3: There are 100,000 people at a 0.5 ten-year risk, and 100 million people at a 0.01 ten-year risk, of a fatal heart attack. We could either ensure that everyone in the first group takes a pill every day that will eliminate their risk, or that everyone in the second group takes a pill every day that will eliminate their risk. Both policies are equally costly, but are incompatible.

(I assume these risk estimates meet the conditions in section 3.) I presume that those who find it intuitive that in simple cases involving islanders and lifeboats we ought to save the greater number will also think we should do so in Cases 2 and 3. However, ex-ante contractualism seems to conflict with these intuitions. Even if ex-ante contractualism is compatible with both the SGN principle and the islander/lifeboat intuitions normally used to motivate it, it may still conflict with *other* intuitions that underlie the appeal of the SGN principle.[42] If so, it may seem unappealing as an approach to social policy-making. How serious are these problems? I will now argue that ex-ante contractualism can capture our intuitions in Case 2, and in some versions of Case 3; unfortunately, it cannot capture our intuitions in all versions of Case 3. I then consider the

[42]These are specific versions of problems for any attempt to apply moral reasoning to ex-ante, rather than expected, outcomes perspectives. See, for example, Otsuka and Voorhoeve's discussion of "ex-ante prioritarianism" in "Why It Matters," and the discussion of ex-ante egalitarianism in Marc Fleurbaey, "Assessing Risky Social Situations," *Journal of Political Economy* 118 (2010): 649-80.

implications of this result.

First, consider Case 2. There is an obvious difference between Cases 1 and 2: the gap between the risks suffered by both groups in the first case (0.01 and 0.5) is far greater than in the second (0.45 and 0.5). Scanlon has stressed that contractualist assessment should proceed in a rough-grained rather than fine-grained manner, employing a concept of "roughly comparable harms" to balance complaints.[43] For example, even if losing an arm is in fact slightly worse than losing a leg, we might say that for purposes of normative assessment these harms carry equal weight. Why hold such a claim? Although it seems that if we must choose between saving the technician's arm and the enjoyment of many people watching the World Cup final, we should not sacrifice the former for the latter, it may also seem plausible that if we must choose between one person losing an arm and two people each losing a leg, we should prefer the latter to the former. Combining a concept of "roughly comparable harms" with the tie-break argument allows us to do this. That is to say, the concept of roughly comparable harms captures intuitions that seem related to concerns about aggregation without endorsing aggregation in other cases.

I suggest, then, that an ex-ante contractualist can borrow the maneuver Scanlon uses in cases involving certainties of harm, and claim that although there is a difference between being at 0.45 and 0.5 risk of harm, these levels of risk seem "roughly comparable" in terms of the objections to principles they ground. If so, tie-breaking considerations can be used to justify saving the greater number. By contrast, a 0.5 risk of harm and a 0.01 risk of harm do not seem roughly comparable; someone at 0.5 risk faces a qualitatively different danger from that of someone at 0.01 risk of harm. Of course, this response faces various challenges: for example, that it might be unclear when risks are roughly comparable; or that the arguments might lead to a sorites paradox; or that it depends on the controversial tie-break argument. However, although serious, these are problems for contractualism, perhaps for nonconsequentialist theory, in general, not its ex-ante variant. As such, if contractualist reasoning seems the right way in which to capture our intuitions in prevention paradox cases, we still have reason to prefer the ex-ante formulation.[44]

What about Case 3? Risks of 0.01 and 0.5 are not roughly comparable. Therefore, ex-ante contractualism seems to imply a shocking conclusion: we should knowingly allow 1 million people to die for the sake of saving 50,000 lives. Clearly, this is wrong. Ultimately, I suspect this ob-

[43]Scanlon, *What We Owe to Each Other*, 239-40.

[44]See Derek Parfit, "Justifiability to Each Person," *Ratio* 16 (2003): 368-90, for worries about rough comparability.

jection is insuperable. However, to assess its strength, it is useful first to note that the contractualist need not always claim that even when the risk differentials are large, we should never save the greater number. In cases such as 3, we can often be certain that failing to help the greater number will also create a near-certainty of social catastrophe, whereas allowing 50,000 people to die would not. Nonconsequentialists have often claimed that when we face a catastrophe, normal deontic restrictions no longer apply.[45] The ex-ante contractualist might, then, claim that when doing so would threaten catastrophe, we should not save the most at risk.

The ex-ante contractualist can plausibly hold that although the fact that acting on a principle would leave someone at a high risk of death provides that individual with a strong complaint, that complaint can be outweighed when not acting on that principle would lead another to suffer extreme destitution (for example); risks of death need not be a trump card. If so, she can understand Case 3 as follows: against the population strategy, there are 100,000 people each with a complaint proportional to a 0.5 risk of death; against the high risk strategy, there are 100 million people each with a complaint proportional to a 0.01 risk of death and some people each with a complaint proportional to avoidable personal costs of catastrophe (such as extreme destitution); although the risk suffered by any of the 100,000 outweighs that of any of the 100 million, the complaint of those almost certain of destitution outweighs a complaint proportional to a 0.5 risk of death; therefore, contractualism favors the population strategy. To clarify: the claim is not that once catastrophic effects are taken into account, the *aggregate* balance of consequences favors the population strategy—aggregate considerations always favored that strategy—but that once some individuals suffer a known consequence worse than a 0.5 risk, the balance of reasons favors the population strategy.

Unfortunately for ex-ante contractualism, there are clearly variants of Case 3 where it seems that there is no threat of catastrophe. More generally, even if catastrophes are always a possibility in Case 3 scenarios, appeal to this fact might reach the right answer for the wrong reason: it is the balance of aggregate consequences, rather than the threat of destitution, that is driving our moral concerns. Therefore, I cannot claim that ex-ante contractualism has a decisive response to the concerns raised by Case 3. However interesting the relationship between Rose's prevention paradox and standard "numbers cases," ex-ante contractualism seems, ultimately, too counterintuitive to be a plausible guide to policy-making.

This paper started with an account of Rose's prevention paradox and

[45]For discussion, see Tom Sorell, "Morality and Emergency," *Proceedings of the Aristotelian Society* 103 (2003): 21-37.

suggested three desiderata for any action-guiding moral theory to solve such cases: it should not rule out all public health policies; it should tell us not to pursue population policies in absolute paradox cases; it should not always lead us to prefer population over high risk policies in relative versions of the paradox. I argued that consequentialist theories can only meet the second and third desiderata by misrepresenting our moral concerns; what drives resistance to population policies is how they seem to aggregate across individuals, but consequentialist theories seem bound to engage in such aggregation. This motivated a turn to considering contractualism, but, I argued, only its ex-ante variant meets the three desiderata. Unfortunately, ex-ante contractualism is itself deeply counterintuitive in some prevention paradox cases. What, then, should we conclude?

5. Summing Up

Broadly, I suggest, we have two options available to us, which this concluding section will consider. The first is to embrace a counterintuitive account of prevention paradox cases, be it ex-ante contractualist, or actual harm contractualism, or some form of consequentialism, and to deny at least some of our intuitions. The second option is to say that the correct normative theory for prevention paradox cases must combine aspects of different theories. For example, we might hold that ex-ante contractualist reasoning is appropriate only when the differences in terms of numbers of lives saved is below a certain threshold.[46] If we follow the first "revisionary" option, then we have a neat theory, but face a challenge of showing why certain desiderata are, in fact, not desirable. If we follow the second "mixed" option, then we can provide a compelling account of why prevention paradox cases are so difficult—indeed, might seem paradoxical; if the correct moral theory is messy, then it is likely to be difficult to understand when and how to apply that theory. However, we gain descriptive power only at the cost of holding a theory that may seem ad hoc.

I am unclear how we should trade off the virtues and vices of these two options at the level of philosophical theorizing. Therefore, I cannot conclude that this paper has provided a philosophically compelling normative account of prevention paradox cases. Rather, it has suggested that any account of this pressing real-world problem will be either counterintuitive or messy, with interesting implications for thinking about the ethics of risk and numbers problems more generally.

[46]Interestingly, Lenman, in "Contractualism and Risk Imposition," reaches a similar conclusion about the role of similar considerations in cases of risk imposition.

However, in conclusion, I suggest that consideration of a second phenomenon identified by Rose, also sometimes rather confusingly called "the prevention paradox," suggests a surprising reason to adopt a "mixed theory" for practical purposes (even if its philosophical legitimacy is questionable). One of Rose's important insights is the mathematical point that high risk strategies will not necessarily have the greatest impact on population health outcomes. However, Rose also suggests a second, more sociological, problem for justifying high risk strategies.[47] Many behaviors that increase risk of disease are normally distributed across the population; for example, most people who drink alcohol will drink "moderately," with smaller groups of "heavy drinkers" and "light drinkers." Rose suggests that high-risk behaviors often vary with mean behavior, such that the most effective way in which to change high-risk individuals' behavior will be to change the majority's behavior. If so, attempting to reduce heavy drinkers' alcohol consumption while making no change to moderate drinkers' habits is likely to fail; rather, the most effective strategy for changing "high risk" heavy drinking will be by changing "normal" consumption patterns. Although these insights apply most clearly when behavior and risk are strongly related—such as alcohol consumption—they can be generalized: high risk people may, for example, be more likely to take a daily pill if this is considered normal.[48] Regardless of whether our normative concern is with helping the most at risk or maximizing population benefit, the most effective means to our end will often be the same: large-scale population strategies aimed at "moderate risk" population members.

This might seem good news: regardless of philosophical disagreement, we can often agree on which strategies are preferable. However, in practice it is bad news: motivating people to change their behavior when the expected individual benefit seems so tiny is hard. Given this, it is difficult to build political will in favor of the structural changes that would encourage healthier behavior. Policy-makers face a problem: whatever their overarching normative aims, the most effective strategies for achieving their goals are likely to be unpopular. How, then, might we seek to convince the population to acquiesce in population strategies? One response would be to appeal to Rose's mathematical argument that population policies would, predictably, save many more lives than tinkering at the edges of the distribution. A second option would be to appeal to Rose's sociological argument that such policies would benefit those who are most vulnerable. I doubt that either strategy would be particularly successful. However, as Rose acknowledges, the latter seems more likely to

[47]Rose, *The Strategy of Preventive Medicine*, chap. 6.
[48]Ibid., chap. 8.

succeed in virtue of its appeal to a social value, solidarity with the least well off, which is thicker and richer than the thin, technocratic claim that more lives are better than fewer. Furthermore, appeal to solidarity with the least well off seems particularly appropriate in public health policy, given the moral foundations of most nations' healthcare systems.

Therefore, Rose's own sociological arguments not only imply that ex-ante contractualists might sometimes have strategic reasons to prefer population strategies to high risk strategies, but that staunch defenders of population policies as normatively preferable might have good reasons to frame their concerns in terms that mirror ex-ante contractualism's claim that the greater the risk we suffer, the stronger our demands. In short, even those who are unconvinced that we need a mixed strategy at a philosophical level might find that such a strategy is practically very successful. It is, however, unclear whether this counts as a solution to the prevention paradox or simply as more evidence that such cases are, if not paradoxical, at least very strange.[49]

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