<http://www.diva-portal.org>

Postprint

This is the accepted version of a paper published in *Philosophical Studies*. This paper has been peer-reviewed but does not include the final publisher proof-corrections or journal pagination.

Citation for the original published paper (version of record):

Berndt Rasmussen, K. (2012)

Should the probabilities count?.

Philosophical Studies, 159(2): 205-218

<http://dx.doi.org/10.1007/s11098-011-9698-1>

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-79916>

SHOULD THE PROBABILITIES COUNT?

Katharina Berndt Rasmussen

Department of Philosophy, Stockholm University, 106 91 Stockholm, Sweden
katharina.berndt@philosophy.su.se

Philosophical Studies

Published online: 14 January 2011

<http://www.springerlink.com/content/d1846g511hr01443/>

DOI 10.1007/s11098-011-9698-1

Abstract When facing a choice between saving one person and saving many, some people have argued that fairness requires us to decide without aggregating numbers; rather we should decide by *coin toss* or some form of *lottery*, or alternatively we should straightforwardly *save the greater number* but justify this in a non-aggregating contractualist way. This paper expands the debate beyond well-known number cases to previously under-considered probability cases, in which not (only) the numbers of people, but (also) the probabilities of success for saving people vary. It is shown that, in these latter cases, both the coin toss and the lottery lead to what is called an awkward conclusion, which makes probabilities count in a problematic way. Attempts to avoid this conclusion are shown to lead into difficulties as well. Finally, it is shown that while the greater number method cannot be justified on contractualist grounds for probability cases, it may be replaced by another decision method which is so justified. This decision method is extensionally equivalent to *maximising expected value* and seems to be the least problematic way of dealing with probability cases in a non-aggregating manner.

Keywords Aggregation – Coin toss – Fairness – Lottery – Number cases – Probability cases

1 Introduction

Imagine that you're out at sea in your boat. All of a sudden you spot two larger rocks in the water, at an equal distance from your boat, but at a large distance from each other. You realise that there are people trapped on these rocks: one person on rock A and five persons on rock B. The tide is rising fast and it is obvious to you that these people will drown within minutes if you don't come to their rescue. However, there is no way you can make it to both locations before it's too late. The urgent question is: What should you do?

To bring out the relevant features of the case, let's suppose that all these people are complete strangers to you; there are no pre-existing duties, contracts, promises, or any such things involved. Let's also suppose that the rescue will not cost you anything (of significance) and that your boat is large enough to hold an additional five people. Most of us would then agree that you should save some of these people rather than stand by and watch them drown or simply turn your back. But which of the two alternatives at hand should you choose (a) going to rock A and rescuing one person or (b) going to rock B and saving five?

Intuitively most people would advocate saving the greater number. However, John

Taurek (1977) and many others have attempted to answer this question without any reference to counting the numbers, that is, to aggregating people's lives, their wellbeing, their claims to such things, or the like. Their basic ideas are that numbers are a morally irrelevant feature, that both options therefore are morally equivalent and hence either one is morally permitted, and that a decision in this situation should treat each of the involved people fairly, in terms of equal concern and respect, by giving them an equal chance to survive.

Such non-aggregationist answers have been widely discussed and criticised. This article seeks to expand the debate by introducing a further problem, which has not been paid due attention in the literature, concerning not numbers (of those to be rescued) but probabilities (of such a rescue's success) in cases such as the above. Section 2 will introduce probability cases and show that they lead to an awkward conclusion for common non-aggregationist decision methods: the coin toss and the proportional lottery. Two attempts to avoid the awkward conclusion are shown to lead to further difficulties. Section 3 will develop a Scanlonian account of contractualist non-aggregationism. This account forms the basis for the argument in Sect. 4, which justifies a novel and less counter-intuitive decision method for probability cases: the highest product method. Section 5 will conclude.

2 The awkward conclusion

The rationale for non-aggregationists goes something like this: Survival is a good (or at least something which is good for people) to which, *ceteris paribus*, every person has an equal claim. In situations such as the above, where the good is to be distributed, there is thus a *prima facie* reason from fairness—which requires equal treatment of equal claims—to treat these claims equally.¹ In a substantial sense of fairness, this means that these equal claims should be *equally satisfied*. Yet in the above situation, as it happens, the good is indivisible and equal satisfaction thus impossible.² So instead we should opt for procedural fairness which requires that equal claims should be weighed equally in the decision which claims to satisfy, thus giving each person an *equal chance* to the good, that is, survival.³ One way of doing this is to *toss a coin*, which would give both the A-

¹ It may of course be argued that there are reasons other than from fairness which should affect the decision. While this article considers (some) reasons from fairness in isolation, its results are of relevance for any account of reasons which, possibly *inter alia*, refers to fairness in the given sense.

² It has been suggested that substantial fairness may still be achieved by equal *non-satisfaction* of equal claims, that is, by saving no one at all; see e.g. Broome (1990–1991, p. 95). However, I shall focus on the more promising idea of procedural fairness.

³ It can easily be seen that many non-aggregationists subscribe to some such procedural fairness requirement in terms of chances to *survive*: Taurek (1977, p. 307) talks about each person's "equal chance to be spared his loss"; Kamm (1993, p. 128, 130) examines people's chances "to be saved"; Timmermann and Saunders discuss chances for "being saved" (Timmermann 2004, p. 110; Saunders 2009, p. 286). Even critics of non-aggregationism accept this: Kavka and Hirose discuss chances for "being saved" (Kavka 1979, p. 293; Hirose 2007, p. 48); Rivera-López (2008, p. 329) brings up the "chance of survival". This is

person and each of the five B-people a 50 per cent chance to survive. This is what Taurek (1977, p. 303) suggests.⁴

It might be worthwhile to see whether this idea of procedural fairness, requiring giving each person an equal chance to survive, is plausible for a range of similar cases which have not been considered in detail. These are what might be called *probability cases* rather than number cases.⁵ In the following, such a case shall be tested for the coin toss decision method.

Imagine then that on a second boat trip you find yourself again in the situation of having to choose between saving either the A-person or the B-people.⁶ However, imagine in addition that rock A is surrounded by a vicious current, strong enough to carry off your boat towards a different location C if you attempt to come close to A. The current is vicious in the sense of striking at random: Let's suppose that anyone approaching A has a 0.5 probability of getting there, and a 0.5 probability of being carried off to C. Location C, we assume, is far off, so we can't make it back to either A or B in time; but it's a safe spot so you are not in any danger. Thus the two alternatives at hand are (a') setting off for rock A and either rescuing the A-person, with the probability of 0.5, or rescuing nobody at all, with the same probability, and (b') going to rock B and rescuing the B-people with the probability of 1.

Now, how does this revision affect the answer to the question of how you should choose between (a') and (b')? Flipping a coin between (a') and (b') assigns each of the alternatives—and thus each of the people involved—an equal chance; let's call this the *baseline chance*. But effectively it assigns the A-person only a $\frac{1}{4}$ chance to survive, whereas the people on B still have $\frac{1}{2}$ chance. Thus *survival chances* are no longer equal; the coin toss does not do its job in such a scenario. Hence we need another decision method which is procedurally fair here.

Conveniently, the coin toss can be replaced by some other random decision procedure or lottery if we only assign the baseline chances differently. Suppose we assign a $\frac{2}{3}$ chance to (a') and a $\frac{1}{3}$ chance to (b'). This effectively gives the A-person and each of the B-people the same survival chance, namely $\frac{1}{3}$. So the question of how you should decide in these circumstances is answered with reference to an *equalising lottery* which assigns chances to the alternatives such that each person's chance to survive is equalised, and

hardly surprising, given that the debate has predominantly dealt not with probability cases, but with number cases where such a procedural fairness requirement in terms of *survival* doesn't imply the awkward conclusion (see below).

⁴ See also Hirose (2007), Huseby (forthcoming). Other suggestions for dealing with these number cases will be discussed below.

⁵ To my knowledge, probability cases have only been discussed in two recent articles (Rivera-López 2008; Lawlor 2006), none of which deal with the core problem which is here called the *awkward conclusion* (for a description of the problem, see below; for a defence of this latter claim, see footnote 11).

⁶ Since numbers aren't an issue at this point, the numbers in this scenario may be changed.

selects one winner (a') or (b').⁷ However, the equalising lottery will lead to the following awkward conclusion.

Imagine that on a third boat trip you once again find yourself in the situation of having to choose between saving the A-person, which is surrounded by a vicious current, and the people on rock B. Now imagine that the current in fact is *extremely* vicious, in the sense that anyone setting off for A has a probability of getting there which approaches 0, and a probability of being carried off to C which approaches 1. Thus the two alternatives at hand are (a'') setting off for rock A and either rescuing the A-person, with a probability approaching 0, or rescuing nobody at all, with a probability approaching 1, and (b'') going to rock B and rescuing the B-people with the probability of 1. Then the equalising lottery assigns a baseline chance which approaches certainty to (a'') and a baseline chance which approaches impossibility to (b'').

But this seems extremely awkward: The upshot is that the *less* probable it is for an alternative to lead to a successful outcome, the *greater* chance you ought to assign it in the decision lottery. So, for such a decision procedure the probabilities do count—and they do so in an awkwardly inverse manner.⁸

It should be noted that the problem is not so much the specific form of the lottery procedure, but rather its core feature of satisfying the procedural fairness requirement that each person is due an equal chance to the good, that is, survival. In other words, it is the procedural fairness requirement which drives the awkward conclusion for probability cases.

This also means that the awkward conclusion will affect other lottery solutions developed for number cases, when applied to probability cases, whenever these lotteries aim at satisfying the requirement. To see this, consider one such commonly suggested lottery, the *proportional lottery*. In the original number case, it would assign the same $\frac{1}{6}$ baseline chance to each of the six persons on rocks A and B to "win" and thus survive. The B-people would then be allowed to "pool" their chances: If any one person on B is selected as winner, then all on B are rescued, giving them effectively a $\frac{5}{6}$ chance each to survive, while the A-person only has a $\frac{1}{6}$ chance.⁹

If the proportional lottery is justified by the procedural fairness requirement, it must

⁷ Such a lottery is of course just a generalisation of the coin toss which even covers probability cases; it is extensionally equivalent with the latter in number cases.

⁸ Luckily, in the extreme case which assigns a 0 probability to getting to A, the "ought implies can" principle comes to your rescue: Since getting to A is no longer anything you can do, it disappears from the list of alternatives one of which you ought to do. Note that, on that principle, we could even raise the probability boundary for what you can do (for instance to appease those who are reluctant to say that winning the national lottery is something that you can and also, arguably, ought to do). My argument only hinges on the assumption that one can do something even if the probability of success is lower than 1.

⁹ For pooling lotteries, see Kamm (1993, pp. 128–134), Timmermann (2004), Saunders (2009). It is hard to conceive how a non-pooling lottery could be made plausible; yet, for a defence (though not an endorsement) of non-pooling lotteries, see Hirose (2007). On the fairness of lotteries when "claims are equal or roughly equal", see Broome (1990–1991, p. 99).

give each an equal chance to survive.¹⁰ When probabilities are introduced in the above number case—for instance when the probability of rescuing the A-person, given that one sets off for rock A, is 0.5—the A-person's baseline chance of $\frac{1}{6}$ would give her only a $\frac{1}{12}$ chance to survive. Thus baseline chances should be adjusted, that is, an *equalising lottery* is once more introduced. We will then have to assign a $\frac{2}{7}$ baseline chance to the A-person (giving her a $\frac{1}{7}$ chance to survive), and a $\frac{1}{7}$ baseline chance to each B-person (which they then can pool, giving them a $\frac{5}{7}$ chance to survive). And again, if the probability of rescuing the A-person approaches 0, her baseline chance will have to be increased enormously, thus assigning her rescue attempt a *greater* chance, the *less* probable it is for the rescue attempt to succeed. Thus again, and awkwardly, probabilities count in an awkwardly inverse manner.¹¹

Now, although proponents of the procedural fairness requirement could choose to accept the awkward conclusion and say that this is simply what fairness demands, many would presumably not be prepared to do so. So let's see how they might be let off the awkward hook.

One way to avoid the awkward conclusion would be to rephrase the procedural fairness requirement and to restate it, not in terms of *actual survival*, but in terms of attempted rescue, that is, of *receiving the best effort to be rescued*.¹² Given this

¹⁰ It could be objected that once we allow pooling, we must allow unequal survival chances. However, while pooling implies the possibility of unequal *group* survival chances (which are assigned to individuals in virtue of their being group members), it is consistent with everyone having an equal *individual* survival chance. Note that individual survival chances and (individual) baseline chances are not the same; they may come apart in probability cases.

¹¹ A similar complaint against the equalising lottery has been made by Eduardo Rivera-López (2008), who notes that the *equalising lottery* increases the risk of saving no one at all and who states that such a lottery "is vulnerable to a strong 'leveling down' objection: we obtain equality only at the expense of the overall probability of saving anyone at all" (2008, p. 329). So for a probability case which resembles the above third boat trip, with the options of a 2% chance of success for rescuing the (single) A-person or a certain rescue for the five on B, the complaint is that "you will have a slightly more than 96% chance of saving no one at all!" (2008, p. 330). Thus, Rivera-López faults the equalising lottery for its wastefulness. In fact, he directs the same criticism towards the *coin toss* in probability cases, noting that with the options of a 2% chance of success for rescuing the A-person or a certain rescue for the B-people, it would be "extremely counterintuitive to hold that you have to flip a coin in this case, since this would give you a 49% chance of saving nobody at all" (2008, p. 327).

However, in considering that both decision methods are similarly wasteful, Rivera-López does not pay attention to the fact that the equalising lottery is *dissimilar* to the coin toss, because of its core feature of aiming to equalise chances of survival, which leads to the awkwardly inverse relevance of probabilities. Of course, the upshot of both his and my objection is that the decision methods lead to counterintuitive—or awkward—conclusions for nonaggregationists. Yet the equalising lottery's sensitivity to probabilities, regarding the assignment of baseline chances—a feature it does not share with the coin toss—is quite a different and presumably more significant problem still. (Also note that the objection is *not* a levelling down objection, since the move from the coin toss to the equalising lottery in the second boat trip case, while decreasing the B-people's chances to survive from $\frac{1}{2}$ to $\frac{1}{3}$, actually *increases* the A-person's chances from $\frac{1}{4}$ to $\frac{1}{3}$. For a proper levelling down objection, see Rob Lawlor (2006, pp. 162–163). However, Lawlor discusses neither the equalising lottery nor the awkward conclusion.)

¹² Lawlor (2006) also discusses this revision: "As we have seen [from the levelling down objection] we clearly do not want to conclude that I should give each person an equal chance of survival. We could, however, still conclude that I should toss a coin to decide who we will *try* to save" (2006, p. 164). (The

restatement, probabilities of success do not matter since we are no longer dealing with actual survival, which might be beyond the rescuer's control, but instead focus on rescuer's doing the best she can. Then, proponents of the coin toss or the proportional lottery could simply restate their arguments on this assumption. However, they now face a new challenge.

Imagine that on your fourth boat trip it is obvious to you that, while the probability of reaching B is 1, a *dreadfully* vicious current will actually make it impossible for you to ever reach A, and thus that survival for the A-person is impossible. If survival were what people had an equal claim to, one could now compellingly argue that setting off for A would drop out of your list of alternatives and that hence you should go to B straight away without any coin toss or lottery. But here we assume that what people have an equal claim to is your best effort to rescue them. Even in the dreadfully vicious current case, giving it your best effort is not impossible—to compare: Surely, even though (I know that) it's impossible for me to draw a square circle, this doesn't mean I can't give this task my best effort. Hence there is no longer a straightforward argument from impossibility that you should set out for B right away, and so the coin toss or lottery is still on, even though one of the two options is impossible.

This seems unacceptable, so it could now be suggested that a moral imperative should never tell us that we should attempt to do what we cannot succeed to do—an extended "ought implies can" one might say. But consider the following example: Suppose that it is true that you ought to maximise happiness, and further, that at some point during a geometry-convention, the thing that would, *ceteris paribus*, make all these geometers the happiest is for you to simply attempt to draw a square circle. They would be enormously entertained if you gave it a go on the blackboard. It would then be unreasonable to object that you still shouldn't *attempt* to draw a square circle on the grounds that you cannot *successfully* draw a square circle; after all, only the attempt is required by the moral imperative.

Alternatively, non-aggregationists could just claim that one cannot give (equal) concern and respect to another by attempting to do the impossible (this would be an empty gesture at best and a patronising treatment at worst). Then, on the fourth boat trip, there is only one option, namely making one's best effort to go to B and rescue five.

Yet this move leads to, if not an awkward, so a puzzling conclusion: From the starting point that probabilities should not matter, which underlies the nonaggregationist strategy of identifying the good with the rescuer's best effort, it eventually turns out that probabilities do matter after all. This is because the scope of the procedural fairness requirement is limited, since it now requires equal weighing of equal claims to the rescuer's best effort *only if* actual rescue or survival is possible. Probabilities moreover matter in a rather discontinuous or unbalanced way. Thus, while a huge difference in

upshot of Lawlor's argument is that, given Taurek's reasoning, "Taurek—it seems—should be committed to tossing a coin" even in probability cases. 2006, p. 165)

probabilities may justify the assignment of equal baseline chances (in cases where there is an extremely low probability of success for one option vs. a probability of 1 for the other), minute differences in probabilities may justify an enormous difference in the assignment of baseline chances (in cases where there is an extremely low probability of success vs. a probability of 0).¹³

A second way of avoiding the awkward conclusion is to state that people's claims in probability cases are really not equal, since the good at stake is unequal for the A- and B-people respectively. This could be claimed if the good was identified not with *actual* survival, but with *expected* survival. To be sure, for each person on any of the rocks, the possible outcomes are to either be rescued or left to die. But we must also concede that the "gain" for the A-person is to be rescued with probability p_A ; and the "gain" for each of the B-people is to be rescued with probability p_B ; and $p_A < p_B$. Thus the expected gain is lower for the A-person than for the B-people; and this inequality is relevant, that is, it should be reflected in the relative strength of their claims to survival. Hence the procedural fairness requirement (requiring the equal weighing only of equal claims) is suspended in probability cases.

If this revision of the original assumption is accepted, it is clearly conceivable that again probabilities are allowed to count, since any decision method now must be sensitive (in some way) to *expected* gains. However, this move is not open for Taurek and his followers, precisely because it depends on the equation of 'good' and 'expected good'. To see this, we should briefly consider one of Taurek's arguments behind the claim that the two options of saving one or saving five are equally permissible.¹⁴

Taurek clearly states a conviction that neither of these two options is worse *simpliciter*. He asks us to imagine that it were the A-person who had to choose between saving herself and saving the five B-people. Then we couldn't plausibly say to her that it would be a "worse thing, period" (1977, p. 304), if five died than if only she died. Sure, for each of the five it would be worse to have to die instead of the A-person. But there is no entity for which these five losses would add up to a loss five times as bad as a single

¹³ One might be tempted to argue that this conclusion isn't really that puzzling, and that an analogous conclusion and discontinuity uncontroversially holds for numbers: Taurek assigns the same equal chance to be rescued to all, regardless if their numbers are great or small; yet as soon as we consider options with the numbers 0 and 1, assigned chances differ radically. However, these conclusions are not analogous: Whereas a "0-number option" implies that there is no life at stake and hence no claim to survival (or the best rescue effort), a "0-probability option" may still contain some number of lives at stake and hence some number of such morally relevant claims.

¹⁴ One of Taurek's central claims is that if it would be permissible for the A-person to choose either option, then, by a strong principle of impartiality, the same would hold for any third party. Taurek's (1977, p. 301) principle of impartiality states: "If it would be morally permissible for B to choose to spare himself a certain loss, H, instead of sparing another person, C, a loss, H', in a situation where he cannot spare C and himself as well, then it must be permissible for someone else, not under any relevant special obligations to the contrary, to take B's perspective, that is, to choose to secure the outcome most favorable to B instead of the outcome most favorable to C, if he cannot secure what would be best for each". This principle is of course highly contentious; its intuitive plausibility might rely on a failure to distinguish between the claim that B isn't *blameworthy* and the—arguably independent—claim that B's action is *permissible*.

one. And on the other hand, surely for the A-person it would be worse were she to die instead of the others. This implies that numbers are not axiologically relevant, and so there is no value difference which could be evoked against the claim that both options are equally permissible.

Against this background, it cannot be maintained that the good at stake for the A- and B-people is unequal simply because their rescue probabilities are unequal. After all, even though the probabilities of success might differ immensely, what is at stake for each of the stranded persons on the rocks is the loss of their life; and there is no entity for which a greater probability of this loss would add up to a greater loss. Hence, it cannot be claimed that one of the options is worse *simpliciter*, just in virtue of a lower probability of success. Just as numbers, probabilities are not axiologically relevant, and so they cannot be a constitutive part of the good.

3 A Scanlonian contractualist approach

Up to this point, we have considered non-aggregationist randomising proposals— coin toss and lotteries—for dealing with probability cases. Regarding number cases, there has been another strand of non-aggregationist proposals which aim to justify a distinct kind of decision method as being procedurally fair: *saving the greater number simpliciter*. One influential proposal to this effect is based on the nonaggregationist, contractualist idea that no one could reasonably reject this method, as advocated by Thomas Scanlon (2000).¹⁵

Scanlon (2000, p. 233) states two requirements which a principle for deciding what to do in number cases must satisfy, in order to steer clear of reasonable rejection: It must "give positive weight to each person's life" and "give each person's life the same importance". Scanlon then claims that the greater number method satisfies these, while the coin toss does not, since the additional B-people make no difference in the decision procedure. The idea is that if you are justified to toss a coin in a case where there is only *one* person on each rock, which clearly seems fair, the additional four people on B in the original number case could reasonably complain that you gave no importance to their lives if you still insisted on tossing a coin between rescuing the person on A and *five* B-people.

The proportional lottery solution for number cases, on the other hand, does satisfy the two requirements, since adding more B-people changes baseline chances, and each addition changes them "in the same way" (2000, p. 233). Moreover, says Scanlon, the A-person (qua member of the smaller group) has reason to prefer the proportional lottery to the greater number method, since the former at least gives her some chance to survive. Yet Scanlon maintains that this doesn't give the A-person grounds to reasonably reject the

¹⁵ Whether the answer really can be justified in a non-aggregating manner is a controversial issue though (see Otsuka 2000; Kumar 2001; Hirose 2001; Timmermann 2004).

greater number method, "since the importance of saving [the A-person] has been fully taken into account" in the decision. Any group which turns out to bear the greater burden of the application of some principle has a reason to prefer some less burdensome principle, but this in itself doesn't make any such principle prone to reasonable rejection. Thus Scanlon shows that it wouldn't be reasonable to reject the greater number method in favour of the proportional lottery. Yet he doesn't show that it would be reasonable to reject the proportional lottery on the grounds of the abovementioned two requirements. Still subsequently he disregards the latter as an equally justified alternative to the former. What could be the reason for this asymmetrical treatment?

A plausible suggestion is that this is due to an underlying appeal to a third requirement, namely, to give to each person's life not only a positive and equal weight, but also the greatest possible weight. As we shall see, while the greater number method satisfies this requirement, the proportional lottery fails and can thus be reasonably rejected after all.

To see how this third requirement is appealed to by Scanlon and how it relates to the two methods, let's consider the concluding sentence of Scanlon's argument against the reasonable rejectability of the greater number method—and, we may suspect, for the reasonable rejectability of the proportional lottery. Scanlon (2000, p. 234) claims: "There is no reason, at this point, to reshuffle the moral deck, by holding a weighted lottery, or an unweighted one". This remark gives rise to a recent interpretation by Saunders (2009).

Saunders (2009, p. 282) claims that the reference to "*re-shuffling*" uncovers "that Scanlon prefers saving the greater number because he implicitly assumes that it is already a matter of chance who is in which group, making such a policy fair to everyone". Thus Saunders assumes that Scanlon invokes a notion we may call *probability of location*, which differs for the different persons in number cases and which is of relevance for Scanlon's advocating the greater number method.

In order to see how this idea might work, let's start from the assumption that for each of the stranded people it is a genuinely random outcome or "shuffle" on which rock they will end up. Since there is one available "slot" on A and five "slots" on B, this means that each of them has a probability of $\frac{1}{6}$ of ending up on A, and a probability of $\frac{5}{6}$ of ending up on B. The greater number method, which picks the option of saving the B-people, thus gives everyone a survival chance (prior to the shuffle) of $\frac{5}{6}$. In comparison, the proportional lottery gives each a lower survival chance (prior to the shuffle): It adds the baseline chance of $\frac{1}{6}$, given that one ends up on A with location probability $\frac{1}{6}$ (that makes $\frac{1}{36}$), and the pooled baseline chance of $\frac{5}{6}$, given that one ends up on B with location probability $\frac{5}{6}$ (that makes $\frac{25}{36}$) – and thus gives each a survival chance of only $\frac{13}{18}$. In assigning a lower survival chance to each, the proportional lottery thus gives to each person's life a smaller weight in the decision than the greater number method. This means that it can be reasonably rejected on grounds of the third requirement. Hence, just as Scanlon implies, saving the greater number is the justified decision method in number

cases.¹⁶

4 Introducing a novel decision method

If this interpretation and the thus supported third requirement are accepted, where do they lead us in probability cases? So far we have discussed three decision methods: *tossing a coin*, employing a *proportional lottery*, or *saving the greater number*. However, for probability cases it might be interesting to consider a further non-randomising method: the *greatest probability of success method*. This simply picks the alternative which is more likely to succeed, that is, the alternative with the higher success probability. Could any one of these contenders be justified on the above Scanlonian account? Which one would give each life the greatest possible weight in probability cases?¹⁷

As it turns out, the problem for all these decision methods is that the weight they give to each life, in terms of survival chances, is contingent on three distinct variables: (i) location probability p_{LA} for ending up on rock A (location probability p_{LB} for ending up on rock B equals $1-p_{LA}$); (ii) success probability p_{SA} for the attempt to rescue the A-people; and (iii) success probability p_{SB} for the attempt to rescue the B-people (the latter two are independent). These probabilities can take any value between 0 and 1. As the following argument shows, this prevents a definite ranking in terms of survival chances for all possible cases—and thus none of these decision methods always maximises survival chances in probability cases.

The argument simply propounds a comparison of survival chances. In order to calculate the survival chance for any given individual for any randomising decision method, we need to multiply location probability with success probability and baseline chance for each alternative and add the results. Let's call the survival chance z and the (pooled) baseline chances for each of the alternatives c_A and c_B respectively; then $z = p_{LA} \times p_{SA} \times c_A + p_{LB} \times p_{SB} \times c_B$.

Thus for the *coin toss*, with a 0.5 chance for heads or tails, we calculate: $z = p_{LA} \times p_{SA} \times 0.5 + p_{LB} \times p_{SB} \times 0.5$. This means that on the second boat trip, with one person on A and five on B (which gives us $p_{LA} = 1/6$; $p_{LB} = 5/6$), and a probability of getting to A of 0.5, whereas getting to B is a certain enterprise (which gives us $p_{SA} = 1/2$; $p_{SB} = 1$), survival chances for any given individual would equal $11/24$ ($1/6 \times 1/2 \times 0.5 + 5/6 \times 1 \times 0.5$).

The *proportional lottery*, instead of assigning a 0.5 chance, assigns pooled baseline

¹⁶ Kamm (1993, pp. 119–121) discusses a similar proposal and raises a number of objections to it. The interpretation is similar to Schelling's appeal to rational decision-making under uncertainty as to one's own (or other, valued people's) inclusion in the A- or B-population (see Schelling 2006, pp. 141–142). However, its justification is not given in terms of (rationally) maximising one's own interests, but rather in terms of finding and applying a principle that no one similarly motivated could reasonably reject, because it takes everyone's interest (survival) positively, equally, and maximally into account (giving each an equal and maximal chance to survive).

¹⁷ For a different discussion of probability cases and the "Kamm/Scanlon [contractualist] account", see Rivera-López (2008, pp. 327–328).

chances to the alternatives. The equation is: $z = p_{LA} \times p_{SA} \times c_A + p_{LB} \times p_{SB} \times c_B$. Here we must note that c_A and c_B in fact are equivalent to p_{LA} and p_{LB} respectively – both variables are equivalent to the relative numbers in either location. Then, on the second boat trip, with the above location and success probabilities, survival chances for any given individual would equal $^{51}/_{72}$ ($^{1}/_6 \times ^{1}/_2 \times ^{1}/_6 + ^{5}/_6 \times 1 \times ^{5}/_6$). Note that, since $^{51}/_{72} > ^{11}/_{24}$, we can already establish that the proportional lottery in at least one case does better, in terms of survival chances, than the coin toss.

The non-randomising *greater number method*, which simply picks the outcome with the higher location probability, doesn't seem to give us any baseline chances to calculate with. However, by always picking the greatest number the method effectively assigns the baseline chance of 1 to that option; thus the equation is: $z = p_{LA} \times p_{SA} \times 1 + p_{LB} \times p_{SB} \times 0$, for any $p_{LA} > p_{LB}$. Then, on the second boat trip where $p_{LB} > p_{LA}$, the greater number method would tell us to go to B and survival chances for any given individual would equal $^{5}/_6$ ($^{5}/_6 \times 1 \times 1$). And since $^{5}/_6 > ^{51}/_{72}$, we can establish that the greater number method in at least one case does better, in terms of survival chances, than the proportional lottery.¹⁸

For the *greatest probability of success method*, which picks the alternative with the higher success probability, we can again accommodate baseline chances in this model by setting them to 1 and 0; thus the equation is: $z = p_{LA} \times p_{SA} \times 1 + p_{LB} \times p_{SB} \times 0$, for any $p_{SA} > p_{SB}$. Then, on the second boat trip where $p_{SB} > p_{SA}$, the greatest probability of success method would tell us to go to B and survival chances for any given individual would equal $^{5}/_6$ ($^{5}/_6 \times 1 \times 1$). This shows that in the case under discussion, the greatest probability of success method does just as well as the greater number method.¹⁹

However, none of these two methods maximises survival chances for all cases. To see this, let's consider two more cases. On the fifth boat trip, there is one person on A whom you can save with the probability of 1, and on B there are five whom you can save with the probability of $^{1}/_{10}$. The greatest probability of success method then tells you to go to A, and thus gives a survival chance of $^{1}/_6$ to any given individual ($^{1}/_6 \times 1 \times 1$). The greater number method, on the other hand, tells you to go to B, and gives a survival chance of $^{1}/_{12}$ to any given individual ($^{5}/_6 \times ^{1}/_{10} \times 1$), which means it does worse than the greatest probability of success method.

But on the sixth boat trip, with one person on A and five on B, the success probabilities are 1, for rescuing the A-person, and $^{4}/_5$, for rescuing the B-people. The greatest probability of success method then tells you to go to A, and thus gives a survival chance of $^{1}/_6$ to any given individual ($^{1}/_6 \times 1$). The greater number method, on the other hand, tells you to go to B, and gives a survival chance of $^{2}/_3$ to any given individual ($^{5}/_6 \times ^{4}/_5$), which means it now does better than the greatest probability of success method. To summarise, the argument shows that none of the four decision methods *always*

¹⁸ In order to get definite outcomes even when numbers are equal, we should complement the greater number method with some randomising decision method for such cases, for instance the coin toss.

¹⁹ Even this rule would need to be complemented by some tie breaker, such as the coin toss, for cases in which success probabilities are equal.

maximises survival chances for any given individual.

On the other hand, and on a more constructive note, there is a decision method which does maximise survival chances for any substitution of location and success probability: It tells us to simply pick whatever outcome has the *highest product* of these two variables. This means that we should attempt to go to A whenever the product of location probability and success probability for A is higher than the product of location probability and success probability for B ($p_{LA} \times p_{SA} > p_{LB} \times p_{SB}$). Here's a proof that a decision method which assigns baseline chances in this manner maximises survival chances for any given individual.

Let's start from the above general equation of survival chances for any of the discussed decision method: $z = p_{LA} \times p_{SA} \times c_A + p_{LB} \times p_{SB} \times c_B$. Since the baseline chances c_A and c_B here are assumed to add up to 1, such that $c_B = 1 - c_A$, the equation is $z = p_{LA} \times p_{SA} \times c_A + p_{LB} \times p_{SB} \times (1 - c_A)$.

Now which substitution of c_A maximises z , for any given location and success probabilities? Let's assume that $p_{LA} \times p_{SA} > p_{LB} \times p_{SB}$, and let's start by considering baseline chances of 1 and 0. If we assume that $c_A = 0$, then $z = p_{LB} \times p_{SB}$ (since $z = p_{LA} \times p_{SA} \times 0 + p_{LB} \times p_{SB} \times 1$). But if we instead assume that $c_A = 1$, then $z = p_{LA} \times p_{SA}$ (since $z = p_{LA} \times p_{SA} \times 1 + p_{LB} \times p_{SB} \times 0$), which by hypothesis is higher. This means that, for the assumption that $p_{LA} \times p_{SA} > p_{LB} \times p_{SB}$, setting $c_A = 1$ results in a higher survival chance z than setting $c_A = 0$.

How does this compare to all other possible substitutions of c_A ? Here, c_A can be assumed to take any value strictly between 0 and 1. Since we have assumed that $p_{LA} \times p_{SA} > p_{LB} \times p_{SB}$, and that $c_A \neq 1$ (since $0 < c_A < 1$), we know that $(1 - c_A)p_{LA} \times p_{SA} > (1 - c_A)p_{LB} \times p_{SB}$. Now, by simply adding the term $c_A \times p_{LA} \times p_{SA}$ to each side of this inequality, we get $p_{LA} \times p_{SA} > \{(1 - c_A)p_{LB} \times p_{SB} + c_A \times p_{LA} \times p_{SA}\}$ (since, trivially, $c_A \times p_{LA} \times p_{SA} + (1 - c_A)p_{LA} \times p_{SA} = p_{LA} \times p_{SA}$). Since $(1 - c_A)p_{LB} \times p_{SB} + c_A \times p_{LA} \times p_{SA} = z$, this means that $p_{LA} \times p_{SA} > z$, for $0 < c_A < 1$. But as we have seen above, if instead $c_A = 1$, then $z = p_{LA} \times p_{SA}$, which means that z is higher. Thus setting $c_A = 1$ maximises z whenever, as we assumed, $p_{LA} \times p_{SA} > p_{LB} \times p_{SB}$.

Now consider first that setting the baseline chance to 1 for any outcome in effect means picking this outcome. Consider secondly that the above proof shows that any method which picks whatever outcome has the higher product of location and success probability, maximises survival chances. And consider thirdly that the highest product method simply picks whatever outcome has the highest product of location probability and success probability. Hence what has been proved is that the highest product method maximises survival chances.

It is interesting to note that if $p_{LA} \times p_{SA} = p_{LB} \times p_{SB}$, that is, if numbers and probabilities are equal or if they "cancel each other out", *any* substitution of c_A , for $0 \leq c_A \leq 1$, will maximise z . This can be seen from the following proof. Let's again start from our general equation $z = p_{LA} \times p_{SA} \times c_A + p_{LB} \times p_{SB} \times c_B$. Since now, by hypothesis, $p_{LA} \times p_{SA} = p_{LB} \times p_{SB}$, and since $c_B = 1 - c_A$, we get $z = p_{LA} \times p_{SA} \times c_A + p_{LA} \times p_{SA} \times (1 - c_A)$. Thus, for any $0 \leq c_A \leq 1$, $z =$

$p_{LA} \times p_{SA} (= p_{LB} \times p_{SB})$. Since this also implies that there is no substitution of c_A for which $z > p_{LA} \times p_{SA} (= p_{LB} \times p_{SB})$, this means that any substitution of c_A maximises z . Of course, the highest product method doesn't tell us which alternative to pick in this case. But this result means that it can be complemented with *any* tie breaker and still maximise survival chances.

To summarise, the argument shows that the highest product decision method always maximises survival chances for any given individual, and thus gives each life the greatest possible weight. Moreover it also satisfies the other two Scanlonian requirements, since its assignment of location probabilities varies positively and equally with each additional life at stake. Hence it cannot be reasonably rejected according to the Scanlonian contractualist account. It also seems to yield less counter-intuitive conclusions for probability cases than the other non-aggregationist decision methods which have been discussed.²⁰

A corollary of this argument is that this decision method is extensionally equivalent to *maximising expected value*, when value is interpreted in terms of the amount of lives to spare. This is no surprise, since it can be easily seen that location probabilities are equivalent to relative numbers of lives to spare (and thus to relative value), and success probabilities denote the risks for each alternative. What is interesting is simply that the Scanlonian justification of the greater number method, by the third requirement, lends itself to a decision method which is extensionally equivalent to maximising expected value.²¹

5 Conclusions

This article has attempted to expand the debate on number cases by considering probability cases. The latter have been argued to give rise to an awkward conclusion—the less probable the success of an option, the greater the chance that it should be assigned—for the most usual randomising decision methods for number cases, namely the *coin toss* and the *proportional lottery*, whenever these are justified in virtue of giving each an equal chance to survival. So, in order to answer the title question of this paper, probabilities have been revealed to count—in an awkwardly inverse way. Attempts to avoid the awkward conclusion have then been shown to lead to further difficulties, due to making probabilities count in puzzling or, for Taurekians, axiologically unacceptable ways.

²⁰ It may be interesting to note that the greater number method is really just a special instance of this decision method for number cases, where success probabilities are (assumed to be) equal.

²¹ The cautious claim to mere *extensional* equivalence is prompted by the recognition that (i) the notions of relative value (of saving the A- or B-people) and relative numbers may come apart (for instance if there are other values than the saving of lives) and that (ii) the notions of relative numbers and location probability may come apart (for instance if for some people it is determined beforehand on which rock they will, or are more likely to, end up).

Moreover, it has been shown that there may be a non-aggregationist way out, given a Scanlonian contractualist approach. It has been argued that Scanlon's (explicit and implicit) requirements for reasonable non-rejectability support a novel decision method for probability cases: the *highest product method*, which maximises the product of location and success probability. This method, which is extensionally equivalent to *maximising expected value*, makes probabilities count—in what seems to be a less counter-intuitive way.²²

References

- Broome, J. (1990–1991). Fairness. *Proceedings of the Aristotelian Society, New Series* 91:87–101.
- Hirose, I. (2001). Saving the greater number without combining claims. *Analysis*, 61(4), 341–342.
- Hirose, I. (2007). Weighted lotteries in life and death cases. *Ratio*, 20(1), 45–56.
- Huseby, R. (forthcoming). Spinning the wheel or tossing a coin? *Utilitas*.
- Kamm, F. M. (1993). *Morality, mortality volume I: Death and whom to save from it*. Oxford: Oxford University Press.
- Kavka, G. S. (1979). The numbers should count. *Philosophical Studies*, 36, 285–294.
- Kumar, R. (2001). Contractualism on saving the many. *Analysis*, 61(2), 165–170.
- Lawlor, R. (2006). Taurek, numbers and probabilities. *Ethical Theory and Moral Practice*, 9, 149–166.
- Otsuka, M. (2000). Scanlon and the claims of the many versus the one. *Analysis*, 60(3), 288–293.
- Rivera-López, E. (2008). Probabilities in tragic choices. *Utilitas*, 20(3), 323–333.
- Saunders, B. (2009). A defence of weighted lotteries in saving life cases. *Ethical Theory and Moral Practice*, 12, 279–290.
- Scanlon, T. (2000). *What we owe to each other*. Cambridge, MA: Harvard University Press.
- Schelling, T. C. (2006). *Strategies of commitment and other essays*. Cambridge, MA: Harvard University Press.
- Taurek, J. M. (1977). Should the numbers count? *Philosophy and Public Affairs*, 6(4), 293–316.
- Timmermann, J. (2004). The individualist lottery: How people count, but not their numbers. *Analysis*, 64(2), 106–112.

²² Thanks to Emil Andersson, Gustaf Arrhenius, John Broome, Iwao Hirose, Frej Klem Thomsen, Kasper Lippert-Rasmussen, Jonas Olson, Niklas Olsson-Yaouzis, Ben Saunders, Julian Savulescu, Folke Tersman, Gerard Vong, and two anonymous referees, as well as the participants of the James Martin Advanced Research Seminar at University of Oxford, the PhD-seminar in practical philosophy at Stockholm University, the Applied Ethics Graduate Discussion Group at the Uehiro Centre for Practical Ethics, University of Oxford, and the 2009 conference of Nordic Network for Political Theory in Copenhagen, for valuable comments on earlier versions of this paper. The author thankfully acknowledges travel grants, for the latter two meetings, from the Royal Swedish Academy of Sciences and the Knut and Alice Wallenberg Foundation.