

**[*Forthcoming in Thought*]**

Introduction

Defenders of the Everettian version of quantum mechanics generally hold that it makes no difference to what we ought to do. This paper will argue against this stance, by considering the use of lotteries to select the recipients of indivisible goods. On orthodox non-Everettian metaphysics this practice faces the objection that only actual and not probable goods matter to distributive justice. However, this objection loses all force within Everettianism. This result should be of interest to both philosophers of physics and to ethicists.

Everettian Quantum Mechanics and Rational Choices

On the Everettian version of quantum mechanics, all possible outcomes will actually occur after any chancy quantum event. For example, when an electron in a superposition of spin ‘up’ and spin ‘down’ in the z-direction has its spin measured along that axis, the part of reality that is affected by the result, including any human observers, will branch into two futures, one where ‘up’ is seen, and another where ‘down’ is.

This is of course an unorthodox metaphysical view, but defenders of Everettianism generally argue that it would make no difference to the choices we make under risky conditions. They maintain that Everettian agents are able to attach just the same decision-relevant weights as orthodoxy to the different outcomes that emerge from chancy quantum situations, and so can simply follow orthodoxy in favouring choices that maximize probabilistically expected utility. True, where orthodoxy thinks of the best choices as those that maximally spread utility over all *possible* futures weighted by their probabilities, Everettian agents think of them as maximally spreading utility over all *actual* futures similarly weighted. But given that both will weigh the same futures in the same way, they will end up with the same choices (Greaves, 2004; Wallace, 2012: ch. 4-5).

Some Everettians argue that general principles of rationality constrain Everettian agents to attach the same decision-relevant weights as orthodoxy to chancy quantum outcomes (Deutsch, 1999; Wallace, 2007, 2012: ch. 5). Others object that the relevant principles are by no means mandatory given Everettianism (Albert, 2010; Price, 2010). Fortunately we can bypass this dispute here, since even the critics agree that there is nothing to *prevent* Everettian agents weighing chancy futures in the same way as orthodoxy. What we shall show is that, even after Everettians adopt orthodox decision-relevant weights, their metaphysics makes a different difference to certain specific choices.

Our concern will not be with the weights attached to quantum outcomes, but rather the way we value those outcomes. We shall show that, in certain cases involving distributive justice, a set of quantum outcomes will appear more desirable on the Everettian view than on metaphysical orthodoxy.

## Lotteries and Indivisible Resources

Consider this stylised case.

*Distribution:* Ann and Bill each have a claim on an indivisible good. Let us assume that Bill's claim is two thirds as strong as Ann's, so that Ann's claim is of strength 6 and Bill's is 4. Aside from the difference in strength of their claims, their predicaments are exactly alike.<sup>1</sup>

Should the good be given directly to Ann, or should it be allocated by a lottery in which Ann and Bill have chances in proportion to their claims? Both answers are defended in the literature.

Some hold that fairness demands the use of a lottery. Simply giving the good to Ann gives no due weight to Bill's genuine claim. Since we can't divide the good itself, the fairest procedure is to proportionately divide the chances of the good (Broome, 1990, 1984; Piller, 2017).

Against this, Hugh Lazenby (2014) has argued that the lottery's fairness in assigning chances cannot override Ann's greater claim.<sup>2</sup> Lazenby appeals to what he calls the "uniqueness of experience". Individuals only experience the life that they actually lead, and not the possible lives that they could have led. So there is no value in a mere chance of a good, if that chance is not realised in actuality. If the less-entitled Bill were to get the good after a lottery, the harm in this would in no way be compensated by Ann's having had a greater chance of the good. Chances as such butter no parsnips.

In effect, Lazenby's point is that there is nothing worthwhile about achieving fairness across merely possible individuals. Merely possible individuals do not experience anything. Our concern should solely be with the actual Ann and Bill—in which case argues Lazenby, the better result is clearly that Ann gets the good (Lazenby, 2014: 335).

## Everettianism and Lotteries

That debate remains open. The use of lotteries to allocate indivisible goods strikes many as intuitively fair. But Lazenby's argument that there's no virtue in fairness to merely possible individuals is also persuasive.

It is striking, however, that Lazenby's argument loses all force if we embrace Everettianism. This is because Lazenby's argument assumes that lotteries only have one actual outcome. According to Everettianism, however, a suitable quantum lottery held to decide between Ann and Bill will lead to two futures, a 60% weighted future in which Ann gets the good, and a 40% one in which Bill gets it. We no longer have only one actual recipient. Successors of both Ann and Bill receive the good, albeit in different futures with different weights. So now we are no longer forced into an all-or-nothing outcome. We can spread the good across Ann's and Bill's successors, in proportion to their claims. And now we are being fair to actual successors, not merely possible ones.

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<sup>1</sup> This case is modelled on one provided by Hugh Lazenby (2014: 335).

<sup>2</sup> Others who have argued that one ought to give the good to the person with the stronger claim in such cases include Hooker (2005: 349) and Hyams (2017).

Here is an analogy. Suppose we have the *Distribution* case just as before, except it arises newly every week of the year. Each Monday there is a new indivisible good, with Ann and Bill again having claims in the proportion 6:4. Now, even without Everettianism, it seems natural to arrange for Ann to benefit on 60% of the weeks and Bill on 40%. Here too Lazenby's objection has no grip. We aren't achieving fairness across merely possible individuals, but rather across the actual week-by-week experiences of Ann and Bill.

We should note that it will not be automatic, in either this temporal case or in an Everettian branching scenario, that fairness should trump the greater aggregate benefit of allowing Ann to monopolise the good. If Ann were to get the good every week, or in every future, then the overall pay-off would no doubt be higher than if we sometimes gave it to the less entitled Bill. Still, it is widely agreed that in such cases equity matters as well as aggregate utility.<sup>3</sup> Once a good is divisible, the unfairness of one person getting it all needs to be taken into account too.<sup>4</sup>

When a new indivisible good is available each week, it in effect becomes divisible over a year, and so considerations of equity argue against Ann getting it every time. Given Everettianism, exactly the same applies to allocation by quantum lottery. It renders the indivisible good divisible, with Ann's successor getting it in 60% of the future, and Bill's in 40% of it. So again equity clearly argues for a lottery and against simply giving the good to Ann.<sup>5</sup>

Some readers might be wondering whether the original worry about lotteries does not remain. Consider the future version of Ann on the 40%-weighted branch in which Bill gets the good and she does not. Could she not complain, just as before, that her greater claim to the good has been overridden in favour of the less deserving Bill, without anything to compensate this? After all, the experience of this Ann is unique too, and any benefits to other versions of Ann on other branches of reality contribute nothing to her experience.

This would be a good objection if the decision at issue were how to arrange matters *within* this 40%-weighted branch. If that were the question, then indeed the 40%-weighted future Ann could object to the good being given outright to Bill. However, the decision we have been discussing is a different one, a choice that arises before any quantum splitting has taken place. Should we give all the good to Ann, or should we create two futures, with Ann getting the good in the 60%-weighted one and Bill getting it in the 40%-weighted one? We have argued that, given Everettianism, equity favours the latter choice. And from the perspective of this choice, there is no further issue of whether it is right that the 40%-weighted Ann

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<sup>3</sup> See, for example, Nagel (1979: 123-5) and Parfit (1997).

<sup>4</sup> It should be noted that this unfairness will obtain even if Ann and Bill have equal claims. In the week-by-week case, it would clearly be unfair if Ann were to get the good every week, compared to Ann and Bill each receiving the good half of the time. Correspondingly, Everettianism will favour of a lottery in cases of equal claims instead of giving the good directly to one of the candidates.

<sup>5</sup> Huw Price (2010 379-80) and Sean Carroll (2019 113-4) have suggested that Everettian metaphysics plus considerations of fairness might incline an agent against choices that will favour his or her successors on some branches over those on others. This is not inconsistent with Everettianism (cf Wallace 2012 192) but strikes us as somewhat fanciful. In any case, this is a different issue from ours. We are concerned with fairness between distinct individuals who initially inhabit the same branch of reality, not fairness between the different successors of a single individual who come to inhabit different branches. In line with this, we have simply appealed to our pre-theoretical concern to treat different individuals as equitably as possible, and not to some Everett-inspired concern for equity across branches. Our argument is that this pre-theoretical concern on its own should definitely make us favour lotteries, once we hold with Everett that all quantum outcomes occur, when we wouldn't favour them otherwise.

should fail to get the good despite her greater claim. That this should be so was fixed by the pre-split choice, and arguably justified by considerations of fairness.

The 40%-weighted Ann can reasonably feel disappointed that she has drawn the short quantum straw, so to speak. The life of the 60%-weighted Ann is superior to hers. But the 40%-weighted Ann cannot reasonably complain that she has been unfairly treated. That would be like Ann in the temporal analogy complaining, in a week that Bill receives the good, that it is unfair he is being given it. While Bill's so receiving the good would have been unfair if it resulted from a decision solely focused on what to do that week, that doesn't mean that there is anything unfair about the prior decision not to give the good to Ann every week, but to Ann on 60% of the weeks and to Bill on 40%. Similarly there would be nothing unfair about a prior decision that arranges for the good not to go to Ann in all of the future, but to Ann's successor in the 60%-weighted future branch and Bill's in the 40%-weighted branch.

### Conclusion

The Everettian account is generally supposed to have no implications for what we ought to do. But we have shown that it affects the rationality of using lotteries to allocate indivisible goods in the face of unequal claims. On orthodox metaphysics, it is doubtful that such lotteries add anything to fairness. But on Everettianism they certainly do.

Everettianism does not leave everything as it is after all. Rather it has definite implications for many real-life decisions.

### References

Albert, D. (2010). Probability in the Everett Picture. in Saunders, Simon, Barrett, Jonathan, Kent, Adrian and Wallace, David, (Eds.), *Many Worlds?: Everett, Quantum Theory, and Reality* (pp. 355-69). Oxford: Oxford University Press.

Broome, J. (1990). Fairness, *Proceedings of the Aristotelian Society*, 91, 87-101.

Broome, J. (1984). Selecting People Randomly, *Ethics*, 95, 38-55.

Carroll, S. (2019). *Something Deeply Hidden: Quantum Worlds and the Emergence of Spacetime*, Oneworld Publications.

Deutsch, D. (1999). Quantum theory of probability and decisions, *Proceedings of the Royal Society of London*, A455, 3129-37.

Greaves, H. (2004). Understanding Deutsch's Probability in a Deterministic Multiverse, *Studies in the History and Philosophy of Modern Physics*, 35, 423-56.

Hooker, B. (2005). Fairness, *Ethical Theory and Moral Practice*, 8, 329-352.

Hyams, K. (2017). On the contribution of ex ante equality to ex post fairness, In Sobel, David et al. (Eds.), *Oxford Studies in Political Philosophy*, 3, Oxford: Oxford University Press.

Lazenby, H. (2014). Broome on Fairness and Lotteries, *Utilitas*, 26, 335.

- Nagel, T. (1979). *Mortal Questions*, Cambridge: Cambridge University Press.
- Parfit, D. (1997). Equality or Priority?, *Ratio*, 10, 202-221.
- Piller, C. (2017). Treating Broome Fairly, *Utilitas*, 29, 214-237.
- Price, H. (2010). Decisions, Decisions, Decisions: Can Savage Salvage Everettian Probability? in Saunders, Simon, Barrett, Jonathan, Kent, Adrian and Wallace, David, (Eds.), *Many Worlds?: Everett, Quantum Theory, and Reality* (pp. 370-90). Oxford: Oxford University Press.
- Wallace, D. (2007). Quantum Probability from Subjective Likelihood: Improving on Deutsch's Probability in a Deterministic Multiverse, *Studies in the History and Philosophy of Modern Physics*, 38, 311-32.
- Wallace, D. (2012). *The Emergent Multiverse*, Oxford: Oxford University Press.
- Wasserman, D. (1996). Let Them Eat Chances: Probability and Distributive Justice, *Economics and Philosophy*, 12, 29-49.