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Climate Harms

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According to climate scientists, anthropogenic climate change is currently causing harm, will continue to do so for years even if we succeed in controlling our carbon-emitting activity, and will cause greater harm if we do not.[1] As average temperatures increase, so do the frequency and severity of dangerous weather events—storms, fires, floods, heatwaves, droughts—, the prevalence of serious diseases and malnutrition, and the consequent harm and suffering for those who are vulnerable to such threats.[2] I assume we ought to accept these judgements. Harming others is a morally serious matter; taking due care to avoid doing so is one of the most fundamental forms of moral consideration that we demand of each other. How, then, should we think of the relationship between the climate harms that others will suffer in the future and our current emissions activity? Who does the harming, and what are the moral implications?

The focus in what follows is on two kinds of argument for the conclusion that for most well-off individuals, it is morally wrong not to offset one's own personal carbon emissions. The first appeals to facts about the actual or expected harm associated with one's own individual energy-consuming activity. In the first half of the article, I contend that when we look closely at what needs to be done to make an argument of this kind fully cogent, the strength of its support for

[1] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Impacts, Adaptation and Vulnerability* (New York: Cambridge University Press, 2014), esp. ch. 11–13. Available at: www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1.

[2] For an attempt to quantify the current levels of climate harm, see the Global Humanitarian Forum, *Human Impact Report: Climate Change—The Anatomy of a Silent Crisis* (Geneva: Global Humanitarian Forum, 2009), available at: www.ghf-ge.org/human-impact-report.pdf.

this conclusion is unclear. However, the contention in the second half will be that a different kind of argument is stronger. This focuses on the harms that are attributable to carbon-emitters considered collectively, and the relevance this has to assessing the actions each of us takes as a participant in what we do together.

I: Expected Harm

A first view to consider is that the energy-consumption actions of an individual are themselves harmless. John Broome calls this view 'individual denialism'.[3] This holds that any anthropogenic climate harms are caused by humanity collectively, not by me. Atmospheric CO_2 concentrations have risen by about 120ppm since the onset of the industrial era; 2ppm are being added each year; my annual contribution is about one two-billionth of that amount.[4] The harm is done by the overall 120ppm increase, not my yearly one part per 10^{15}.[5]

Individual denialism may seem tempting if one thinks of the relationship between emissions and the production of harm as smoothly continuous. With every extra CO_2 molecule that is added to the earth's greenhouse gas blanket, there is a tiny temperature rise; with every tiny temperature rise, there is a proportionally small impact on people; and when the impact is so

[3] John Broome, "Against Denialism", *The Monist* [this issue].

[4] Source: Carbon Dioxide Information Analysis Center (http://cdiac.ess-dive.lbl.gov). Together, we put 36Gt of CO_2 into the atmosphere annually; 16–17t is the per capita average in the most energy-hungry countries—about one two-billionth of the total. (CO_2, of course, is only one greenhouse gas; but I follow the practice of using the available CO_2 figures as a fair indication of the overall greenhouse gas impact of human activity.)

[5] See Walter Sinnott-Armstrong, '"It's Not *My* Fault": Global Warming and Individual Moral Obligations', in Walter Sinnott-Armstrong and Richard B. Howarth (eds), *Perspectives on Climate Change: Science, Economics, Politics, Ethics* (Bingley: Emerald, 2005), pp.285–307; Baylor Johnson, "Ethical Obligations in a Tragedy of the Commons", *Environmental Values* 12 (2003), pp.271–87; David Killoren and Bekka Williams, "Group Agency and Overdetermination", *Ethical Theory and Moral Practice* 16 (2013), pp.295–307; Joaquim Sandberg, "My Emissions Make No Difference: Climate Change and the Argument from Inconsequentialism", *Environmental Ethics* 33 (2011), pp.229–48; James Garvey, "Climate Change and Causal Inefficacy: Why Go Green When It Makes No Difference?", *Royal Institute of Philosophy Supplement* 69 (2011), pp. 157–74.

small as to be imperceptible, it is harmless.[6] However, the assumption of smooth continuity is clearly false.[7] Some of the harms, after all, are deaths: about 300,000 global warming deaths per year, according to one estimate.[8] But deaths are discrete: the correlation between them and emissions cannot be continuous. And some of those deaths occur because a warmer world contains extra storms and epidemics—not just the same ones increasing continuously in intensity as greenhouse gas concentrations rise.[9]

If that is the wrong way to think of the relationship between emissions and climate harms, what should we say instead? There are two main possibilities.

One is that the graph correlating increasing greenhouse gas concentrations with extra harm is step-shaped. Drawing that graph accurately, to be sure, is something we will never be able to do. That requires being able to determine, for each of our emissions, what the course of events would have been if that emission had not occurred, while everything else stayed the same. However, there is some fact of the matter about that. Provided we accept that there *is* extra harm in a warmer world, then some of the harms are harms that would not have occurred without the emissions that made it warmer. So I can ask: if I compare the course of events as it is when I add one part per 10^{15} to the atmosphere and as it would be if I did not, is there any extra harm? If not, we can repeat the question for the next one part per 10^{15} that is added. As

[6] If the assumption of smooth continuity were defensible, it would then be worth having a debate about whether imperceptible contributions to harming many people add up to something morally significant. But it is not.

[7] Long-term warming and total emissions of CO_2 are "approximately linearly related", according to in IPCC, *Climate Change 2013: The Physical Science Basis* (New York: Cambridge University Press, 2013), p. 1033—but only approximately; and the relationship between average warming and harm is less linear still.

[8] Global Humanitarian Forum, *Human Impact Report*, p. 1.

[9] As John Broome points out, not all of the harm caused by climate change is through events like storms and epidemics: some is caused through more continuous processes, like the depletion of supplies of drinking water, which people must work harder to fetch. However, although those processes are more continuous, the continuity is not completely smooth. It is not the case that your annual emissions cause people around the world to have to extend the distance they walk to fetch water by an extra two-billionth.

we keep on doing so, the answer might usually be No. But it cannot always be No, if there is ever any climate harm. Sometimes, it must be Yes.

If that is the right picture, individual denialism is usually correct. The emissions produced by your individual actions probably land on a flat part of the graph. But for some actions, it is incorrect. Some emissions trigger the steps: they trigger an extra storm or disease epidemic. Although most emissions make no difference to anyone's being harmed, some make a significant difference.[10] Given this, pointing to the fact that my actions probably do not harm is not enough to establish that they are morally unproblematic. Suppose I dump toxic waste near a populated area, knowing that it is very unlikely to enter the water supply, but that many people will be harmed if it does.[11] Even if, as is likely, no one is actually harmed, it could still be wrong to do this because of its negligence or recklessness, in failing to take seriously enough the interests of those whom it exposes to the risk of harm. How great this failure is can be quantified with a simple calculation, which assesses the badness of the possible effects of my actions, and multiplies this by the probability of producing them, to arrive at the expected value of those actions.[12] The greater the expected harm associated with my risky action, the harder it is to justify it to those exposed to the risk.[13]

The other possibility to consider is that the graph correlating emissions with harm is neither smoothly continuous nor step-shaped. It jumps unpredictably up, down or sideways. Weather-systems are so chaotic that my individual actions can themselves make very large-scale

[10] "But for any emission that triggers a step, another one would have come along a moment later to do so. Therefore no individual emission makes a difference." For discussion of this objection, see the Appendix.

[11] This adapts the example in Christian Barry and Gerhard Øverland, "Individual Responsibility for Carbon Emissions: Is There Anything Wrong with Overdetermining Harm?", in Jeremy Moss (ed.), *Climate Change and Justice* (Cambridge: Cambridge University Press, 2015), pp. 165–84.

[12] A distinction can be made between two different kinds of expected value: see the Appendix.

[13] Compare Avram Hiller, "Climate Change and Individual Responsibility", *The Monist* 94 (2011), Section III. Christopher Morgan-Knapp and Charles Goodman, "Consequentialism, Climate Harm and Individual Obligations", *Ethical Theory and Moral Practice* 18 (2015), pp.177–90; and John Broome, "The Public and Private Morality of Climate Change", *Tanner Lecture* (The University of Michigan, 16 March 2012).

differences to the weather, through the 'butterfly effect'.[14] Some of my carbon-emitting actions trigger atmospheric processes that cause dangerous storms or droughts, others prevent them, and some do neither. But although, on that picture, my actions' effects are unpredictable, they still have an expected value. The global climate data tell us that the incidence and severity of dangerous weather events increases overall as humans add carbon to the atmosphere; so the first, adverse, kind of effect is more common than the second. The probability that my actions will have bad effects is higher than the probability that they will have good ones, and the expected value of those actions is negative.

This gives us three pictures of the relationship between emissions and climate harms. The first (a smoothly continuous relationship) can be ruled out. Of the other two (a step-shaped correlation, with thresholds, or a chaotic one), we do not currently know which of them (or which combination of them) is right. It is not known whether individual actions really do have effects on the atmosphere that propagate upwards to the scale of harmful storms. According to some experts, the current evidence supports the view that this normally does not happen, but can do so sometimes.[15] However, resolving this uncertainty does not seem to matter morally. If the relationship is step-shaped, the moral status of my action depends on the expected harm associated with it. If the relationship is chaotic, it still depends on the expected harm.

So let us try to calculate this expected harm.[16] Since my emissions are no more or less likely to trigger a harmful process than anyone else's, the expected harm associated with my lifetime

[14] See Leonard A. Smith, *Chaos: A Very Short Introduction* (Oxford: Oxford University Press, 2007), ch. 1.

[15] T. N. Palmer et al., "The Real Butterfly Effect", *Nonlinearity* 27: R123–R141. That would give us a graph which, when magnified to the level of individual contributions, mostly contains flat sections, punctuated by jumps, but more upward jumps (in the direction of greater harm) than downward.

[16] Many philosophers cite the figure produced by John Nolt—2 people suffering serious harm or death—in 'How Harmful Are the Average American's Greenhouse Gas Emissions?' *Ethics, Policy and Environment* 14 (2011): 3-10. But this relies on an unargued assumption that 4% of the world's population will suffer serious harm or death as a result of the emissions of those now living. What follows is an attempt to provide a better basis for H than that.

emissions is equivalent to the total harm produced (ever) by the global emissions during my lifetime (H), multiplied by the proportion of those emissions contributed by me (P):

$$E = H \times P$$

A figure for P can be calculated by using available emissions data: someone in a high-emitting country contributes on average about one two-billionth of the total.[17] However, an estimate of H requires us to speculate about the future. One way to proceed is to draw on the systematic work that has been done to estimate the current incidence of climate harms, and extrapolate from there. The WHO's estimate for 2000 was 150,000 deaths and 5.5m lost disability-adjusted life years.[18] Using the same models, the Global Humanitarian Forum's estimate for 2010 was 300,000 deaths and 325m people seriously affected (meaning that they needed emergency assistance or their livelihood was significantly compromised).[19]

Here is a conservative method for projecting from those figures to give a value for H. Suppose I live for another 35 years. At a rate of increase of 2ppm per year, by the time of my death atmospheric CO_2 will have reached 470ppm.[20] Now assume that atmospheric CO_2 stabilizes at that level. That currently seems unlikely; but we are trying to calculate the harm done by emissions that happen in my lifetime, not by ones that are added later. Next, ask where global temperatures are likely to stabilize eventually, if the atmospheric CO_2 concentration is

[17] See note [4]. Some care is needed on this point, since the per capita emissions average for my country pertains to the emissions produced here, but my emissions include those produced elsewhere to feed my consumption. However, as it happens, Australia has fluctuated during my lifetime between being a net exporter and a net importer of emissions; so the per capita figures are a good rough guide. For the details, see the Deloitte Access Economics Report, *Consumption-Based Carbon Emissions*, p. 26 (available at www2.deloitte.com).

[18] See World Health Organization (WHO), *Climate Change and Human Health: Risks and Responses* (Geneva, World Health Organization, 2003), ch. 7, available at: http://www.who.int/globalchange/summary/en/. These were 0.3% and 0.4% of the global totals, respectively.

[19] Global Humanitarian Forum, *Human Impact Report*, pp. 1, 9.

[20] Source: Carbon Dioxide Information Analysis Center (http://cdiac.ess-dive.lbl.gov).

470ppm. A conservative estimate for this is around 1.8° above pre-industrial levels.[21] Finally, take the relationship between temperature and climate harm so far, and extrapolate this out to 1.8°. Between 2000 and 2010, average temperatures have risen about 0.5°, taking us to 1° above preindustrial levels. So if we assume that climate deaths will increase at the same rate during the next 0.8° of temperature increase, this gives us an annual figure of 540,000 deaths. And if the proportion of serious effects to deaths remains constant, then the figure for these is 585m per year.

How long will these effects last? According to the IPCC, the effects of current emissions on global warming will continue for more than a millennium.[22] It is tempting to discount this, given the possibility that future generations will find a way to remove our greenhouse gases from the atmosphere, preventing the harm they would have done. But if we are trying to assess the moral status of my action, we should not do this discounting. When I create a threat, the moral case against my action comes from the magnitude of the threat I have imposed: it is not answered by pointing out that others who are exposed to that threat may act to avert it. So we should calculate H over a 1,000 year time frame—giving us 540m deaths and 585b serious effects.[23] Multiplying this by P (one two-billionth), we arrive at a figure for E, the expected harm associated with my liftetime emissions, of a quarter of a death and 290 serious effects.

There is much to question in this calculation. The WHO-derived annual death figures on which it is based come from counterfactual speculation concerning how many fewer deaths there would have been without anthropogenic climate change. However, those figures are

[21] A scenario in which we stablized at 470 ppm would lie between IPCC's RCP 2.6 and RCP 4.5 scenarios, for which atmospheric CO_2 and long-term temperature predictions are provided in *Climate Change 2013: The Physical Science Basis*, Section 12.5. See also www.climateinteractive.org.

[22] IPCC, *Climate Change 2007: Synthesis Report* (New York: Cambridge University Press, 2007), p. 47.

[23] I say 'serious effects' here, rather than 'people seriously affected', to take account of the point that the figures for whether someone is seriously affected may count the same individuals twice. They must do, if there are 585b serious effects: even over 1,000 years, the number of people who live will probably be smaller than that. Allowing for this, two serious effects are still obviously worse than one.

likely to err in the direction of being too low, since they leave out many potential sources of climate harm.[24] There are also good reasons for thinking that the method of projection I just used to arrive at H produces a figure that is too low. According to the IPCC, the human impacts of the second degree of global warming are likely to be greater than the first.[25] And in the WHO-derived figures, 90% of the deaths and other serious effects are produced by gradual environment degradation (leading to malnutrition and disease), rather than episodic weather-related disasters: that degradation can be expected to keep on getting progressively worse, well after temperatures have stabilized.

What this suggests is that our figure for expected harm is only a lower bound. But it already seems like a serious figure. An action of dumping toxic waste with an expected harm of a quarter of a death and 290 serious effects on people would be very difficult to justify. And if, having exposed people to that risk, I could then act to reduce it, it would be difficult to justify not doing that. But in the case of my emissions activity, there is a way for me to reduce the risk of climate harm that people are exposed to. Assuming that some carbon offsetting schemes do indeed reduce the amount of CO_2 that would otherwise have been in the atmosphere, I can do so by buying carbon offsets.[26] At current prices, the cost of offsetting the equivalent quantity of CO_2 to the amount I emit will be about $500 per year for me from now on.[27] So this provokes the question: Can I defend acting in a way that leaves others exposed to a risk of magnitude E by citing the $500 a year I save by not reducing it? Apparently not. Unless there is some

[24] For eight prominent exclusions from the WHO figures, see http://www.who.int/globalchange/summary/en/index6.html. And of course, they do not cover harm to non-humans.

[25] See IPCC, *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, p. 12. Assuming that stabilizing atmospheric CO_2 will stabilize temperatures also ignores the prospect of "climate change commitment" described in IPCC, *Climate Change 2013: The Physical Science*, Section 12.5.2.

[26] For objections to offsetting, see the concluding discussion in Section VII.

[27] Using the figures at www.carbonfootprint.com/offset, the cost will be $10–15/tonne. I need to double this if I am halfway through my life, and now have to pay for the first half as well as the second.

relevant difference between my emissions activity and dumping the waste, we should conclude that failing to offset my own carbon emissions is morally wrong.

Notice that this argument does not claim that emitting-and-then-offsetting is morally equivalent to not emitting.[28] That would require showing that dumping my waste and then cleaning up someone else's can be morally equivalent to not dumping at all. The questions this raises deserve separate discussion: I do not tackle them here. Instead, the claim is that, having emitted, it is morally wrong not to offset.

II: Two Complications

That gives us a first way to think about the relationship of our carbon-emitting actions to climate harms. It will help to have a label for this approach: call it the Individual Two Factor Approach. It tells us to assess the justifiability of each individual's actions by comparing the magnitudes of two factors: the expected harm associated with that individual's actions, and the cost of reducing that expected harm.[29]

However, this oversimplifies. It ignores two ways in which the situation of carbon emitters differs from that of the person who dumps toxic waste. Both seem morally significant.

First, I am one of many carbon emitters. When I cause some CO_2 to be added to the atmosphere, there is only a problem associated with my action because I am doing what many other people have also been doing. The Individual Two Factor Approach ignores this. It concentrates on the expected value of my individual actions, and since the effects of my actions

[28] For that stronger claim, see John Broome, *Climate Matters: Ethics in a Warming World* (New York: W.W. Norton, 2012), p. 85.

[29] For examples of this approach, see the authors cited in note [12]; also Broome, "Against Denialism".

depend on the physical atmospheric conditions in which I am acting but not on what has produced those conditions, it treats my decision as being no different from the one I would face if global warming were being produced independently of human activity—by volcanoes, say—and I was the only person whose activity added any emissions.[30]

In this way, the Individual Two Factor Approach treats the behaviour of others as parametric.[31] What is done by others who act before or at the same time as me is treated in the same way as any other part of the environment in which I act. Does this overlook morally significant relationships between my own actions and those of other emitters? I turn to that question from Section IV onwards.

But first, there is another way in which the Individual Two Factor Approach treats others' behaviour as parametric. To assess the expected harm associated with my action, it treats as fixed the behavioural dispositions of those who will act after I do, treating these also like other parts of the future environment whose influence on the effects of my action I need to predict. This ignores another important set of issues.

To see this, consider another example. Research in social psychology unsurprisingly supports the prediction that increases in ambient noise levels cause a greater incidence of violent behaviour in those with aggressive dispositions.[32] Suppose I applied the Individual Two Factor Approach here. Then, treating other people's behavioural dispositions as fixed, I would need to ask the corresponding question about the expected harm associated with my behaviour. What is the probability that my contribution to the overall level of ambient noise will trigger a

[30] Compare Parfit's Single Torturer: *Reasons and Persons* (Oxford: Clarendon Press, 1984), p.81.

[31] For the distinction between treating others as parametric and treating them as potential interlocutors, see Philip Pettit, "The Consequentialist Perspective", in Marcia W. Baron, Philip Pettit and Michael Slote, *Three Methods of Ethics: A Debate* (Oxford: Blackwell, 1997), p.165.

[32] See Sheldon Cohen and Shirlynn Spacapan, "The Social Psychology of Noise", in D.M. Jones and A.J. Chapman (eds), *Noise and Society* (Chichester: John Wiley, 1984), pp.221–45, at 227–31.

violent incident? Presumably, it is small; but there is some probability of doing so. Multiplying that probability by the magnitude of the possible harm, we could calculate the expected harm associated with my noise-making. I could reduce that probability by being quieter. Or I could offset it by quietening some other significant source of noise. The Individual Two Factor View tells me, again, to assess the justifiability of my actions by comparing their expected harm with the cost of acting otherwise.

But what this example makes clear is that a third factor is also significant. There is also a question to be asked about the degree to which I am responsible for any harm that does occur. Suppose that, as seems possible, there is an assault that would not have happened had I not contributed to the level of ambient noise (holding all the other causal influences on the action fixed). How much responsibility for the resulting harm could be attributed to me? The responsibility for the assault lies primarily with the assailant, perhaps to others who have interacted with him directly, and no more to my action than to the many other actions that contribute to the stresses that help to trigger his aggressive dispositions. Surely, this also has a bearing on how reasonable it is to require me to reduce the expected harm associated with my noise-making.

III: The Third Factor

This gives us two potentially significant differences between the actions of energy users and simpler actions of negligence or recklessness like the dumping of toxic waste. The Individual Two Factor Approach ignores these: its Individual part ignores the fact that I am one of many emitters; its Two Factor part ignores the way in which the effects of my action depend on what is done by others after I have acted.

It will be clearest if we investigate the significance of these two differences separately. So let us start by removing the second limitation. Doing that gives us an Individual *Three* Factor Approach—one that still assesses the justifiability of my action by reference to the expected harm associated with it, but now treats that as having to be assessed in relation not just to the cost of acting otherwise, but also to the degree to which I am responsible for any harm that does occur. Comparing these three magnitudes, we need to ask:

> When my action carries an expectation of harm *E*, my degree of responsibility for any harm is *R*, and the cost of acting otherwise is *C*, is this cost great enough to justify me in performing the action?

How do we go about answering this question?

When we ask whether my action has an adequate *justification*, this may express various different concerns. But one prominent concern is with whether my action is justifiable to those potentially affected by it—those who have standing to demand of me that I take adequate account of them in acting as I do. And one central way of using the phrase 'morally wrong' is to mark out the actions that fail to meet that demand. Saying this leaves scope for a range of different ways of developing a more particular account of what it is for my action to take 'adequate account' of others and thus to be justifiable to them: the possibilities here include attempts to explain this by appealing simply to the relative strengths of the reasons for and against the action;[33] to whether the action calls for reactive attitudes such as resentment, indignation and blame;[34] to a publicity condition, which appeals to the standards that have to prevail in order for our treatment of each other to be governed by the exchange of reasons

[33] W.D. Ross's view of wrongness is standardly read this way: see, e.g., Philip Stratton-Lake, "Introduction" to W.D. Ross, *The Right and the Good* (Oxford: Clarendon Press, 2002), pp.ix–lviii.

[34] See, e.g., Gary Watson, *Agency and Answerability* (Oxford: Clarendon Press, 2004), esp. ch. 8.

rather than coercion;[35] or to whether the action meets demands of second-person accountability.[36] However, pursuing that further debate is not necessary here. Plausible versions of these different accounts of what it is for an action to be justifiable to others converge in the most obvious cases (that is part of what it is for them to be plausible). They share a common justificational challenge which my actions should be able to meet. Do my actions meet the standards it is reasonable for us to demand of each other in taking care to avoid harming others?

This does not equip us with a simple rule for comparing the three magnitudes that the Individual Three Factor Approach asks us to consider. However, it gives us a way of thinking about the relevance of the third factor, *R*, in assessing the adequacy of my justification for acting with an expected harm. In the ambient noise case, the fact that my responsibility for any harm that comes to victims of violence is minor makes a difference to how reasonable it is to address a complaint against me on the victims' behalf. The point is not that there is a fixed amount of responsibility to share around, so that if enough responsibility for a harm is assigned to others, there is none left to assign to me. If a hostage-taker threatens to hurt his hostage if I speak and I insist on doing so, I can be answerable for endangering the victim, although the hostage-taker remains fully responsible for what he does.[37] Instead, the point is that when my responsibility is comparatively small, that can bear on how much cost it is reasonable to ask me to bear in order to reduce an expected harm.

With this in mind, we can apply the Individual Three Factor Approach to my carbon emissions. When Section I compared this to the dumping of toxic waste, only two factors were

[35] T.M. Scanlon's view, in *What We Owe to Each Other* (Cambridge, Mass.: Harvard University Press, 1998), ch. 5, belongs to this type.

[36] See, e.g., Stephen L. Darwall, *The Second-Person Standpoint: Morality, Respect, and Accountability* (Cambridge, Mass.: Harvard University Press, 2006), esp. ch. 5.

[37] I need to answer the hostage's question: "Why are you not prepared just to restrain yourself from speaking, in order to protect me from this threat?" My lacking a good reply is what makes my action wrong.

considered: the magnitude of the expected harm and the cost of avoiding it. What difference does the third factor make?

There are four differences we can point to. First, my emissions are adding a tiny amount to a large and growing threat that already exists: one two-billionth of the annual total. I am contributing a tiny elevation of a large existing threat, rather than creating a new one. Secondly, the threat is known. The people who face this threat already (whatever I do) face the question what adaptation actions to take—how seriously to take this threat, and what to do about it—and if they do act to reduce their exposure to the prior threat, the small risk I impose on them will become much smaller. Thirdly, governments could act to remove the overall threat but have not. They will have to keep failing to address it for another 1,000 years in order for the expected harm associated with my action to reach the magnitude we calculated earlier. And fourthly, people's exposure to the threat of climate harms depends on many other much more influential factors. It is the poorest people—those lacking political and economic power—who are most vulnerable to disease, hunger and natural disasters; and the sources of this disempowerment lie in broader structural injustice and social dysfunction.[38]

How strong are these four points? They do not show that no responsibility for future harms can be assigned to me. As we have seen, from the fact that others are responsible for a harm it does not follow that I am not. However, the attribution of responsibility to others can help to show that I am comparatively less responsible. In this case, four other classes of responsible agents can be identified: governments that could adopt policies to mitigate the threat; citizens who fail to support the necessary political decisions; future individuals and groups who could take action to adapt; and those who could address the issues of structural injustice that render poor people more vulnerable to climate harms.

[38] For a survey of relevant literature, see my *The Moral Demands of Affluence* (Oxford: Clarendon Press, 2004), ch. 3.

In these ways, the case of individual contributions to climate change differs from a simple case of dumping toxic waste. The degree of responsibility of an agent for any harm that results from her action is lower. What does this show about the question posed by the Individual Three Factor Approach? —

> When my action carries an expectation of harm *E*, my degree of responsibility for any harm is *R*, and the cost of acting otherwise is *C*, is this cost great enough to justify me in performing the action?

It does not show that the answer is obviously Yes. But it is not obvious that the answer is No. Given the other agents with responsibility for any harm to which my emissions make a difference, it is not obvious that the future inhabitants of a warmer world can reasonably demand that I reduce the expectation of harm associated with my action to zero.

Having said this, a caveat is needed. I admitted earlier that the figure I gave for *E* is only a lower bound. If the correct figure is much higher, the following possibility needs to be noticed. When the expected value of an action is high enough, the value of *R* ceases to matter. Even if I bear *no* responsibility for the infliction of a harm, I could still be morally required to act to prevent it: if the harm is large enough and the cost of preventing it relatively small, this can be morally required of me as an action of beneficence.[39]

Given this, one might want to go back and recalculate, asking how far above my lower bound the real figure for *E* might credibly be. However, I am going to argue that that is unnecessary. It will turn out in Section VI that there is another argument that delivers the conclusion that, for most of us, it is wrong not to offset our emissions, even on the figures that were given above.

[39] Notice that what would follow from this is that I should keep offsetting emissions, whether my own or anyone else's, until I have reached the limit of what beneficence can demand of me.

IV: The Deflection Argument

The story so far is this. Individual energy-users who do not offset their emissions probably cause no harm. It cannot be inferred from this that their actions are not wrong: they could be wrong because of the expected harm. However, the Individual Two Factor Approach is not the right way to assess this: it ignores two morally significant issues. So far, we have been examining one of them: the degree to which I am responsible for any harm. When we take account of this, moving to an Individual Three Factor Approach, the case for the wrongness of individual carbon-emitting actions is inconclusive.

Now we should turn to the other issue. The problem to which I am contributing is the result of many other people doing the same thing as me. How does this matter?

A commonly encountered answer to that question runs as follows. The problem of anthropogenic global warming is a coordination problem. Its solution does not lie in individual decisions to reduce personal carbon footprints, or buy offsets. Rather, it needs to be solved by political decisions to regulate our economic incentives. This is a problem *we* must address together, and we cannot do so by treating each other as parametric, as Individual Approaches do. Instead, the right question for each of us to ask is: How can I contribute to the processes that can lead us, together, to a regulatory solution? Voting in favour of climate action is a way of doing that; buying carbon offsets is not. I am making a mistake if I think of my relationship to the problem of climate harms by calculating the expected harm associated with my own

individual actions. I should instead think of myself as a potential contributor to the collective action that constitutes a solution to the problem.[40]

On this line of thought, a better analogy for our current climate predicament than the ones used so far comes from the residents of 19th and 20th century London, burning the coal that created polluting smogs.[41] It is now estimated that the 'Great Smog' of 1952 caused 12,000 extra deaths.[42] But the complaint that could reasonably have been made on behalf of the people who died was not a complaint directed against the individual householders whose fireplaces emitted the particles that ended up in their lungs. It was a complaint against legislators with responsibility for public health regulation: the complaint addressed by the Clean Air Act of 1956. Prior to 1956, in the interim period between the recognition of the health effects of coal smoke and the enactment of effective regulation, what could reasonably have been demanded of a London householder with a coal fire? Suppose we ask, on behalf of those who were to be affected, "Why are you not prepared to meet the cost of protecting me from harm?" They could answer as follows. The cost of doing this is supporting the enactment of appropriate legislation, not changing one's own domestic behaviour. As long as one does support the enactment of appropriate legislation, one is justified in acting as a law-abiding consumer. The same can be said now, concerning current day contributions to global warming.

I shall call this the Deflection Argument. It deflects the challenge to change one's own personal behaviour by locating the problem at the regulatory level, and inferring that the appropriate personal action in the interim is to give one's support to regulatory change, rather than to change the behaviour that needs to be regulated.

[40] Compare Johnson, "Ethical Obligations in a Tragedy of the Commons"; also Aaron Maltais, "Radically Non-Ideal Climate Politics and the Obligation to at Least Vote Green", *Environmental Values* 22 (2013), pp. 589–608.

[41] See Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Athens, Oh.: Ohio University Press, 2006), ch. 1, "Coal, Smoke, and History".

[42] http://news.bbc.co.uk/2/hi/health/2545747.stm

V: Joining In

I think the Deflection Argument is unsuccessful. But before we come to the two mistakes it makes, we should first notice that it gets something importantly right. It points to an important source of morally relevant reasons for your actions that are independent of their expected value. These are reasons of *participation*.

Suppose an effective regulatory solution to the global emissions problem is implemented. Let's say it involves taxing energy consumers. Suppose this succeeds in reducing the concentration of greenhouse gases in the atmosphere below the level at which individual emissions have any expectation of harm. If I continue to emit without paying the tax, there is an objection to what I am doing. But now it cannot come from any associated expectation of harm. It is instead an objection of unfairness. Our success in achieving something important together comes from others' willingness to accept a common constraint. I am arrogating to myself the privilege of avoiding that constraint. The reason I have not to do that is a reason to join in a worthwhile collective action, on the same terms as the other participants.

What the Deflection Argument gets right, then, is its recognition that we have participatory reasons that are not reasons of difference-making. It appeals to these reasons when it argues that, in the absence of effective greenhouse gas regulation, I ought to support the efforts that are being made to establish it. Participatory reasons are generated whenever a group of which I am potentially a member is doing something worthwhile.[43] The groups whose worthwhile actions generate these reasons can range in size from a handful of friends to the world

[43] For fuller discussion of this topic, see my *Concern, Respect, and Cooperation* (Oxford: Oxford University Press, 2018), ch. 3 and 11.

population. Suppose one of my friends points out, “We ought to put the tables together”, so that we can all sit together at the café: if I failed to see this as having a bearing on what *I* do, that would be a basic moral failure—the failure to appreciate a participatory reason.

At the other end of the scale, reasons for participating in worthwhile collective action—and the associated challenge to justify not participating—can apply when a group is very large. This challenge is not met by pointing out that my non-contribution makes no significant difference to anyone. It may be true that when I ride on public transport without paying I do not harm anyone else, and when I cheat on my taxes this does not itself cause any public services to be cut. The complaint against me is not that I am harming anyone. It is that I am behaving unfairly, in failing to contribute on the same terms as everyone else to an important collective enterprise.[44] A large group may be achieving something important, and only doing so because of the willingness of individuals to contribute, despite the fact that their individual action makes no significant difference. My failure is a failure to join in on the same terms.

In cases like the ones just described, non-participants are free riders: their unfairness is a failure to contribute towards the cost of the benefits created for them by others’ cooperation. But cases of free riding are themselves only one subset of the broader class of cases in which a worthwhile collective action generates participatory reasons. The cases in that subset are ones where we ought to be acting for reasons of collective prudence: we ought to produce a benefit for ourselves. (*We* ought to do this for reasons of collective prudence; morality then gives *me* a reason of fairness to join in.) But there are also cases in which our action is worthwhile because we morally ought to perform it. If there is an accident outside the café in which several people are injured, and one of my friends points out, “We ought to go and help them”, then here, too, my failure to see this judgement as having any bearing on my own reasons to act

[44] See my ‘Moral Free Riding’. *Philosophy and Public Affairs* 24 (1995), pp. 6, 22.

would be a moral failure. It would be another version of the same basic moral failure as before: a failure to see the relevance of what *we* ought to do to my own reasons for action.

When I say that there are participatory reasons to join in a collective action that is 'worthwhile', this does not mean that the collective action must be obligatory, or optimal. Actions of collective prudence are not themselves obligatory. And if we have launched a mission to rescue 10 people when we could have rescued 20, then our decision to act sub-optimally should no doubt be criticized, but there is still a reason to join the rescue mission that is taking place, given the importance of what it is achieving. Moreover, the 'collective actions' to which participatory reasons apply need only be actions *we* are performing, for which there can be reasons that make them worthwhile, and which it is possible for me to join in, giving rise to the question, "Why are you not participating?". They do not require the elaborate structure of interlocking intentions, common knowledge, or agreement that characterize full-fledged forms of collective agency.[45] If someone launches an internet appeal for donations to fund an operation for a sick child, none of those further conditions might be met. But if what the donors are doing is worthwhile, there is a participatory reason for me to contribute.

So participatory reasons arise in a very broad range of cases. When a group of which I am potentially a member is doing something worthwhile, there is a morally significant reason for me to join in. However, two restrictions on the scope of this claim should be noted. First, it is not a claim about unilateral action. A reason *to participate* in a worthwhile collective action is not a reason for me to contribute my share of the collective action we ought to be performing together, when we are not. Perhaps my friends and I ought to be making the movie we have often talked about; but if we are not doing so, I have no reason to take my camera to the studio where we would have made it and start filming. Thus, the Deflection Argument is also right to

[45] For detailed explorations of this interlocking structure, see Michael E. Bratman, *Shared Agency: A Planning Theory of Acting Together* (Oxford: Oxford University Press, 2014); and Margaret Gilbert, *Living Together: Rationality, Sociality, and Obligation* (Lanham: Rowman and Littlefield, 1996).

imply that my participatory reasons in connection with climate change are not reasons to contribute my share of the global action that is not yet being performed; they are reasons to contribute to the worthwhile current actions that *are* being performed, as steps towards an eventual solution.[46]

But secondly, it is a claim about the existence of a morally significant reason, not about wrongness. The wrongness of my action (as Section III understood it) is a matter of whether it is justifiable to those to whom I am answerable. The reasons for joining in give me a case to answer if I am not; whether I am acting wrongly depends on whether I can answer that case. The accusation I need to meet when I am challenged to justify my non-participation in a worthwhile action is to show that I am not unfairly making a special case of myself. There must sometimes be good answers to that challenge: after all, there are many more worthwhile collective actions than I could possibly contribute to, so I cannot reasonably be required to join them all. If so, the requirements endorsed by a Deflection Argument may be quite modest. Given the costs involved, I may only be required to vote green; not to devote my time and money to climate activism.[47]

VI: Participating in Collective Climate Action

The Deflection Argument does get something importantly right. There are significant moral reasons for me to join in the worthwhile collective action that is being taken to support the

[46] That is not to say that there could never be reasons for unilateral action; but that they would need a different source. See the discussion of "mimicking actions" in Elizabeth Cripps, *Climate Change and the Moral Agent: Individual Duties in an Interdependent World* (Oxford: Oxford University Press, 2013), ch. 6.

[47] See Maltais, "Radically Non-Ideal Climate Politics and the Obligation to at Least Vote Green", Section IV. For the contrary view, see Cripps, *Climate Change and the Moral Agent*, ch. 6.

implementation of effective regulation to address global climate change. These reasons do not require that my own contributory action makes a significant difference to anyone. They have a different source, in the considerations of fairness governing our participation in collective action.

However, it also gets two things importantly wrong. First, our participatory reasons are *additional* to reasons of difference-making, not alternatives to them. So it is a mistake to think that the case for participating in collective action *deflects* the challenge of the Individual Three Factor Approach to justify acting with the expected harm you do. That challenge cannot be avoided by pointing out that morality gives us participatory reasons as well. But secondly, the Deflection Argument also takes too narrow a view of the collective climate actions to which we can be required to contribute. It restricts these to actions aimed at implementing future regulation; but in doing so, it neglects the other collective actions that are being taken to mitigate the problem we are causing, while we work towards a global solution.[48]

In particular, we need to consider what is being done by the group of all those energy consumers worldwide who offset some or all of their personal carbon emissions in order to reduce the climate burden on future generations. This, too, qualifies as a collective action of the kind that generates participatory reasons, provided a group is doing this, there are reasons that make it worthwhile, and I can join in, so that the question, "Why are you not participating?" arises. This collective action may not be a solution to the global problem, but it has a positive expected value. To assess whether this group's action is worthwhile, we can compare its expected value with two other factors: the cost to the group, and the group's degree of responsibility for any harm that would otherwise occur. If, according to this assessment, the

[48] See Andrew Szasz, "Is Green Consumption Part of the Solution?", in John S. Dryzek, Richard B. Norgaard and David Schlosberg (eds), *The Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011), pp.594–608.

collective action is worthwhile, there is a participatory reason for me to join in, and it is an action for which the question can be raised: Have I a sufficient justification for not joining in?

This now gives us a *Collective* Three Factor Approach to assessing our participation in the collective action of offsetting. The assessment has two stages, asking:

> When the expected value of our collective action is *E*, our degree of responsibility for any harm if we did not act would be *R*, and the cost to each of us of joining in is *C*, (i) is the collective action worthwhile, and (ii) is *C* great enough to justify me in not joining in?

It may seem that the uncertainty that we had when making the earlier three-factor comparison for individuals must carry over to this new comparison for groups. It is true that the figure for *E* is now much higher: if as few as 400,000 people around the world voluntarily offset their personal carbon emissions, then our lower bound for the expected value of what they do together is the prevention of 100,000 deaths and more than 100 million serious effects on future people. But the cost is also correspondingly higher: $500 per year for each of the offsetters ($8b in total).[49] And the earlier reservations about *R* still apply. So don't we arrive at the same indeterminate conclusion?

The answer to this is No, for two reasons. First, what we are assessing at stage (i) is whether the collective action is worthwhile, not whether it is obligatory or optimal. That is a much lower bar to get over than the one we were trying to clear in Section III. Indeed, suppose we make an exaggerated assumption. Section III gave some reasons for thinking that individual emitters are comparatively less responsible than other agents for climate-related harms: suppose, implausibly, we treat those reasons as being so strong that *R* is zero. Suppose, that is, we treat

[49] Remember that $500 assumes someone who is halfway through their life, and paying for both halves. So supposing an 80-year lifespan, the total is $500 x 40 x 400,000 = $8b.

this as a case in which we can together act with the expectation of averting threats to life and welfare that we have *no* responsibility for producing—that is, as a case of simple group beneficence. If the members of a large group each spend $500 per year to do something with an expectation of preventing 100,000 deaths and 100 million serious effects, are they doing something worthwhile? Unless, in doing this, they are doing something else very bad, the answer has to be Yes.

This brings us to stage (ii). The collective action may be worthwhile; but is the cost of participating great enough to justify me in not joining in? To show that it is, I need to establish that the cost to me is high enough that no one has a reasonable complaint against me for not joining in. But here is where a second point of difference between the assessment of individual and collective actions becomes crucial. When a group of people together act beneficently, the benefit we produce is magnified; but there is a sense in which the cost of producing the benefit is diluted across the members of the group.

Here is an illustration. Suppose someone is trapped in a burning building, and twenty of us are able to act together to save him. How much can be required of each one of us, as a participant in this action? I might try reasoning, "The maximum that could be required of me to save him on my own is to exert myself to the limits of my safe capacity; so the most that can be required here is one twentieth of that effort." Or I might try, "By joining in, I do something one twentieth as good as the saving of a life; so the maximum burden that can be required of me here is the maximum that could be required of me to achieve something that good if I were acting on my own." But these forms of burden-division reasoning are wrong. Plausibly, a single agent is morally required to exert herself to the limit of her safe capacity to save someone's life; but when we can act to save a life together, it is just as plausible that *each* of us is morally required to exert herself to the limit of her safe capacity. In either case, the trapped person can ask, "How much are you willing to do to help me?" When the potential rescuer is an individual,

the ‘you’ in the question is singular; when it is a group, it is plural. In a case like this, an answer that is inadequate when it is offered by an individual acting alone remains inadequate when it is offered by every member of a group. When I am asked how much I am willing to do, the costs borne by others are not relevant to my answer. That is the sense in which participation in a group dilutes the costs of beneficent action.

There are limits to this point. When I could join in an action of group beneficence, I face the beneficiaries’ question: “If cost *C* would not be too much to ask of you to help us when acting by yourself, why is it too much to ask of you as a participant in a group that helps us?” Sometimes, there is a good answer. For example, giving up my life could be required of me to save a million lives, but it could not be required of each of a billion people working together to save a million lives. In that case, the question can be answered by pointing out that a collective action in which so much more is lost than is gained is not worthwhile. So the claim is not that this challenge can never be answered: it is that it cannot be answered by burden-division reasoning.

With this in mind, we can now consider the same challenge as posed by the future beneficiaries of offsetting. Surely, $500 per year would not too much to ask of me to perform an action of my own which itself had an expected value of preventing 100,000 deaths and 100 million serious effects. So the future beneficiaries of offsetting can ask: “Since this cost would not be too much to ask of you acting on your own, why is it too much to ask of you as a participant in a collective action with that expected value?”

If I am to give a satisfactory answer to this question, I will have to show that this is too much to ask of *any* participant in the same situation. That will require doing one of two things. The first is to show that (a) the cost I am being asked to bear is higher than that of other participants, in a way that justifies me in declining to participate in the collective action without any unfairness. The other possibility is that (b) *all* participants in the collective action are meeting

a cost so high that the beneficiaries would have no complaint against us were we all to decline to help them. But neither of these options seems to be available in this case.

The obstacle to (a) is that the cost I am being asked to bear is just to pay for offsets in proportion to the emissions produced by my consumption activity. Described in that way, it is the same cost as is imposed on everyone else. So I need to show that there is some other relevant description under which the burden I face is disproportionately high. I could credibly do that if I were poor and disabled, with high energy-consumption needs. Then the cost of offsetting my emissions might be much higher than it is for others, and my capacity to pay for them much lower. Another possibility would be if I were already spending all of my available resources on other, more important, individual and collective actions; then I might credibly be able to maintain that asking me to give any of those actions up or to push myself even harder would be unreasonable. But for most of us, neither of those things is true. The cost I am being asked to meet in offsetting my own emissions is not more burdensome than the cost being met by other offsetters, in any relevant way. So option (a) is closed.

This leaves option (b). Perhaps the cost of my participation is not relevantly higher than anyone else's, but it is so high for every participant that the beneficiaries would have no complaint against any of us were we all to decline to help them. This is true of the case in which a billion people are sacrificing their lives to save a million: then the collective action is not worthwhile. And it can be true of collective actions that are worthwhile, but supererogatory. If a group of people are each devoting their entire lives to campaigning for disability rights, say, then the collective action is worthwhile, but the costs the participants are bearing may be greater than can reasonably be demanded, on behalf of the beneficiaries, of any participant and therefore of me as a potential participant. The case for (b) in relation to offsetting would have to be of this latter kind. But how can that be supported? I need a good answer to the beneficiaries' question, "Why are you not willing to meet this cost with the others to spare us

from this amount of harm?" The cost of participation is not high in absolute terms: I am not being asked to sacrifice my life, or devote it to a cause. And I cannot show that it is too high, relative to the benefit we produce, by appealing to burden-division reasoning.

If burden-division reasoning fails, this creates the following possibility. When cost *C* is too much to ask of me acting by myself to confer a benefit of magnitude *B*, the same cost *C* may nonetheless *not* too much to ask of me as a participant in an *n*-member group acting together to confer a benefit of magnitude *n* x *B*. It can be the case that when someone facing a certain threat asks me to spend an afternoon to remove one thousandth of the threat, I can justifiably refuse, but when he asks a thousand of us to do the same thing to remove the threat completely, I am now required to give up my afternoon with the others to help him. In the latter case, he can address each of us: "Why aren't you willing to give up an afternoon with the others to prevent this threat?" This is a harder question to answer than the corresponding question in the former case, addressed to me alone: "Why aren't you willing to give up an afternoon to reduce the threat by one thousandth?"

I think that, as a contributor to carbon offsetting, I am in a situation of a similar kind. If I were the world's only offsetter, an Individual Three Factor Approach would be unable to ground a compelling case for offsetting. But as a contributor to an action with a very significant expected value, it is much harder to justify an unwillingness to join in. Neither option (a) nor (b) for justifying my non-participation is available.

Finally, remember the exaggerated assumption under which we have been operating. This is the implausible assumption that *R* is zero, and our offsetting is an action of pure collective beneficence. What we have just found is that, even if we adopt that assumption, treating the justificatory burden I have to meet as only the one that applies to actions of collective beneficence, I would not be able to meet it. But if climate harms are harms which we are (to some degree) responsible for imposing, then acting to offset them is not a case of pure group

beneficence. So the real justificatory burden is higher, and it is therefore more obvious that I cannot meet it.

I conclude that for most well-off individuals, the failure to offset one's own emissions is morally wrong. It is wrong because it is an unjustifiable failure to join in a worthwhile collective action on the same terms as other similarly situated people.

VII: Conclusion

I have argued for three main pairs of positive and negative conclusions. First, an Individual Two Factor Approach to assessing the relationship of our actions to climate harms is too simple: a moral evaluation of the consequences of my individual actions should instead adopt an Individual Three Factor Approach. Secondly, the significance of the fact that climate harms are produced by the actions of many emitters does not support a Deflection Argument: instead, it supports a Collective Three Factor Approach to assessing the harm we can collectively avert by offsetting our emissions, and the resulting challenge to each of us to justify not joining the offsetters. So my individual actions can be assessed in two ways: in terms of their own effects, and as contributions to what we do collectively. These two forms of assessment are not rivals: they pertain to two different sources of morally relevant reasons that bear on the justifiability of my action. The third pair of conclusions is this: an assessment of my actions using the Individual Three Factor Approach does not clearly support the judgement that, for most well-off individuals, emitting without offsetting is morally wrong; but an assessment using the Collective Three Factor Approach does support that judgement. It is true that this is not going to solve the problem of global climate change: that requires a different sort of collective action. But before we arrive at that solution, each of us ought to offset our own personal carbon

emissions, as a contribution to a collective action that works in the interim to prevent future harm.

I should close by acknowledging that I have not attempted to address here the various worries that have been raised about the practice of carbon offsetting. These are of three broad kinds. The first is that 'carbon offset' schemes do not actually do what they claim—your buying a 'carbon offset' does not in fact reduce the amount of CO_2 that there would otherwise have been in the atmosphere. I assumed that that is not universally true: there are some schemes through which you can do this. If that assumption is false, my argument obviously fails. The second is that carbon offsetting should not be advocated as the solution to our problem of climate change. That is true but irrelevant here: its truth does not undermine the argument given above for the conclusion that you should offset.[50] The third is that the collective practice of offsetting, overall, has bad consequences: for example, that it contributes to sustaining business-as-usual attitudes that are obstacles to the structural changes we need to make.[51] Worries of this third kind deserve a careful reply;[52] but here, I confine myself to a comment on their relevance to the arguments discussed above. When one adopts an Individual Three Factor Approach, this third kind of point is also irrelevant. That approach tells me to treat others' behaviour as parametric. Offsetting schemes exist as part of the environment in which I act, doing whatever combination of good and harm they do: the question for me to ask is not what difference it makes that these schemes exist, but what difference I make if I participate. The first issue bears on this, but not the third. On a Collective Three Factor Approach, by contrast, the third issue is important: it affects whether the collective practice of offsetting is indeed

[50] There are three different points to consider here: that *advocating* offsetting (but not offsetting itself) has bad effects; that trying to solve the global problem through universal voluntary self-constraint is utopian; and that universal offsetting is not possible. On the latter point, see Kai Spiekermann, "Buying Low, Flying High; Carbon Offsets and Partial Compliance, *Political Studies* 62 (2014), pp. 913–29.

[51] See, e.g., Kevin Anderson, "The inconvenient truth of carbon offsets", *Nature* 484 (2012), p. 7.

[52] See, e.g., Broome, *Climate Matters*, pp. 85–95.

worthwhile, all things considered, and hence whether there is a good reason for me to join in. Since the third issue surely does have a bearing on whether individuals ought to offset, I think that is another reason for adopting a Collective Three Factor Approach.[53]

[53] For very helpful comments, I am grateful to Katie Steele, Christian Barry, Bob Goodin, Max Fedoseev, Ten-Herng Lai, Matt Lindauer, Geoff Brennan, Nic Southwood, Seth Lazar, an anonymous referee for *The Monist* and, especially, John Broome.

Appendix: Causation, Difference-Making, and Pre-Emption

Causation and difference-making are not the same thing. When I throw a brick and you decide not to jump in front of it, your decision makes a difference to whether the window is smashed but does not cause it to be smashed; when you throw a brick and I throw one a moment later, you smash the window without making a difference to whether it is smashed.

Both are morally significant. It can be wrong to cause harm pre-emptively, although someone else will cause it if you do not; it can be wrong not to intervene to prevent harm, although you do not cause it. There are therefore two different kinds of morally significant expected harm: the possible harm I will cause, multiplied by the probability of my causing it; and the possible difference I will make, multiplied by the probability of my making it.

Section I discusses the latter. It asks what would have happened had my emission not occurred, and argues that some individual emissions must be difference-makers. This is not sufficient to establish that they cause harm. More work would be needed to establish that the way in which those emissions make a difference to harm amounts to causing it. But since the kind of expected harm connected to difference-making is morally significant, that further work is unnecessary. If it were not too cumbersome to do so, a more cautious way to phrase the opening sections of the paper would have removed its causal language, and talked only of difference-making instead.

The difference-making argument in Section I is sometimes rejected on the strength of the following line of objection, which appeals to pre-emption reasoning (this is another path to individual denialism).[54] Billions of people are adding their CO_2 to the atmosphere all the time.

[54] See Maltais, “Radically Non-Ideal Climate Politics and the Obligation to at Least Vote Green”, Section I; Cripps, *Climate Change and the Moral Agent*, pp. 119–24; Benjamin Hale, "Nonrenewable Resources and the Inevitability of Outcomes," *The Monist* 94 (2011), pp. 282–3.

So it does not matter whether my emission occurs as a threshold for the production of further harm is being crossed or not. Either way, my emission makes no difference. Even if it does happen to be the emission that occurs as a harm-threshold is crossed, it does not make a difference to whether the threshold is crossed: another emission will come along a moment later to ensure that it is. In the long run, my self-constraint could at best make a difference to reducing the level at which the global temperature peaks by a tiny amount—a billionth of a degree, perhaps; but that could be expected only to delay the harmful outcomes produced by the elevated temperature, not to eliminate any of them.

This objection depends on thinking that the graph correlating emissions with harm is a step-shaped with thresholds, rather than jumping unpredictably with every emission. If there is a pervasive butterfly effect, then my emissions make a difference to the weather, all the time, and are likely to make more bad differences than good ones. But even if the correlation is step-shaped, the objection still fails: an argument of the form given in Section I still applies. Consider how much climate harm there will be annually if global temperatures peak at 2° above pre-industrial levels; contrast this with the larger amount there will be if they peak at 5°. Now go back to the 2° scenario, and increase this number by a billionth of a degree. Is there any extra harm? If not, raise the temperature by another billionth and ask the same question. The answer may often be No, but *sometimes* it will have to be Yes, if there is to be any difference between a 2° and a 5° peak. Some individual emissions must be difference-makers; so there is an expected harm associated with individual emissions, given by the possible differences multiplied by the probability of making them; this is equivalent to the total difference we all make multiplied by my proportion of that difference; so we have the same calculation for E as before.

What if there is no peak? Then ask this: what is the average global temperature, T, over the period 2000–2100; how much total harm, H, is there over the period 2100–2200? Start with T

(optimistically) at 2°; then keep raising it by increments of a billionth of a degree. There must be some increments that make a difference to H, if increased temperature does make a difference to H. Those increments make a difference to the harm suffered by people who would not otherwise have been harmed; and my emissions might be the difference-makers.

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