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Comment on ‘The climate mitigation gap: education and government recommendations miss the most effective individual actions’

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Introduction

In a recently published and widely disseminated article, Seth Wynes and Kimberly Nicholas (2017) identify lifestyle choices that reduce individual greenhouse gas (GHG) emissions and quantify the GHG reductions of each such choice for high-carbon individuals in developed countries. They also show that policy makers and educators fail to recommend high-impact actions over lower-impact actions. The most striking example of a high-impact action that is largely neglected in recommendations, according to the study, is having one fewer child.

Wynes and Nicholas argue that this choice is vastly more significant than any other choice that an individual could make. For example, ‘a US family who chooses to have one fewer child would provide the same level of emissions reductions as 684 teenagers who choose to adopt comprehensive recycling for the rest of their lives’ (Wynes and Nicholas 2017). Although we do not dispute the potentially high impact on GHG emissions of a decision to have a child, we shall raise a methodological concern about attributing responsibility for its consequences in the way that the authors do.

From ‘carbon legacy’ to action recommendations: the problem of double counting

The decision to have a child sets in motion a causal chain that is likely to create additional GHG emissions. But this is not to say that the individual that makes the decision is thereby responsible, in the relevant way, for all emissions that follow from it. It is important to point out the obvious here: GHG emissions are mainly and directly caused by burning of fossil

fuels, everything else just makes that more or less likely. If one is attributing responsibility—as one is when making normative recommendations in government documents and textbooks—the focus should be on actions that are under the control of the individual agent and which, with a significant probability, contribute to the undesired outcome. It is not clear that the decision to have a child falls under this category of actions.

Consider the example of air travel. Emissions from air travel could be thought of as the result of an individual deciding to travel by airplane *but also* as a result of that individual’s parents deciding to have her at some prior point in time. Who, then, is responsible and who should be held accountable for the unwanted consequences? The individual, the parents, or both? The latter answer gives rise to a problem of multiple counting which is in tension with the objectives of Wynes’s and Nicholas’ study.

Wynes and Nicholas draw on an article by Murtaugh and Schlax (2009), who seek to quantify the ‘carbon legacy’ of individuals in the world’s most populated countries, that is, the contribution that individual reproductive choices make to climate change. Their basic assumption is that an individual is responsible for her own emissions as well as for the emissions of her descendants in proportion to their relatedness to her. The relatedness is weighted by a fraction of ‘genetic units’—the proportion of an individual’s genes that she shares with the descendant in question. For a given individual, the fraction of genetic units that she shares with her offspring is 1/2, the fraction of genetic units she shares with her offspring’s offspring, 1/4, and so on. Thus, in general, the weighted relatedness of an individual to a given ancestor is $(1/2)^n$, where n is the number of generations the individual in question is removed from the ancestor.

Within this framework of genetic relatedness, Murtaugh and Schlax define the *carbon legacy* of an individual. An individual's carbon legacy is the sum of the carbon emitted by that individual and by each of her descendants weighted by the fraction of genetic units that they share with her. Calculating the carbon legacy of a contemporary individual thus requires estimating future average fertility rates, and projected carbon emissions of individuals in different countries, which of course is subject to considerable uncertainty. We will come back to this difficulty below; leaving it aside for now. The problem is that Murtaugh and Schlax identify a person's *responsibility* for carbon emissions with her carbon legacy.

This identification has an undesirable consequence for attributing responsibility for carbon emissions. From the identification and the formula for calculating carbon legacies it follows that, if we pick an individual, x , she is fully responsible for her own carbon emissions (responsibility $(1/2)^0 = 1$); half responsible for the carbon emissions of her children $((1/2)^1 = 1/2)$; a quarter responsible for her grandchildren $((1/2)^2 = 1/4)$, and so on. What about the responsibility of x 's descendants? Under the plausible assumption that there is nothing special about x , or x 's generation, the same calculation applies. So, if we fix one of x 's children, y , this individual is fully responsible for his own carbon emissions, half responsible for those of his children, and so on.

This shows that the total share of responsibility is overdetermined. Although y is fully responsible for his emissions, x is also partly responsible for y 's emissions, and y 's parents taken together are fully responsible for his emissions. Generalising the analysis, the members of a generation X are fully responsible for the emissions of their successive generation, Y (and in fact, of all successive generations), though the members of Y are also fully responsible for their own emissions. Hence, the analysis invokes multiple counting of shares of responsibility for emissions: for a given generation, every preceding generation is fully responsible for that generation's emissions.

Is it desirable and possible to avoid double counting?

Is it a problem to say that responsibility for emissions is overdetermined through individual's decisions to, say, have a child and that child's decision to take a long-distance flight? This depends on what the purpose of the exercise is. Double counting is, for instance, perfectly fine when it comes to counting genes: the fact that an individual's genes are also a mix of her parents' genes is apparently without problem. Perhaps it is a different matter with responsibility, but again, it depends on the objective of the calculation.

If the objective is to distribute compensation to future victims of climate change, it is certainly

problematic to double count: there is a fixed amount that is owed and it should only be paid once, by the one/s responsible for the wrong. (Note that the responsibility could be shared by several individuals without double counting, as when a car is shared.) But responsibility can also be used in a different sense, when one is interested in picking out the agents whose actions are suitably related in the causal chain likely to produce the unwanted event. This then specifies a reason for them to stop acting in those ways. But which actions in current fossil fuel societies *are not* involved in such causal chains, and how should their relative importance be determined? The purpose of making recommendations to individuals as to what actions they should take in relation to climate change is not clear.

Consider some ways of avoiding double counting of responsibilities for emissions. One possibility is to let the current generation bear full responsibility for their carbon legacy. Any carbon emissions that occur in the future would then fall back on this generation. But while this solves the problem of double counting, it is an undesirable solution. It would require an argument as to why it is that the current generation is the special one that shoulders the main share of responsibility and it would free future generations from responsibility for their emissions. But surely future lifestyle choices, for example, the choice to eat meat or take long distance flights etc., must be attributable to the individuals making those decisions and not to their far-off ancestors.

Another possibility is a kind of compromise. Parents could be counted responsible for the emissions caused by their children up to their legal age, after which they themselves would be responsible. Once an individual reaches the age at which she is entitled to vote, and of criminal responsibility, she is also fully responsible for her emissions. As for grandchildren, their emissions will be the responsibility of their parents, not of their grandparents, unless their parents have themselves not reached legal age when they have the children.

This is an improvement, but perhaps it comes at the cost of effectively nullifying the idea of responsibility for reproductive choices. This is because, while an individual would be responsible for their children's emissions up to the age of 18, one would also have to discount that individual's emissions up until they were 18. The effect is that a couple with two children is responsible for the same number of emission-producing years as before, with the difference being that those years do not begin when they are born, but when they are of legal age, and, furthermore, include 18 years of their children's emission-producing years. Note though that more children do mean more emissions attributed under this proposal. But it is an open question whether 'having one fewer child' would count as a high-impact action. This in turn depends on what other lifestyle choices you make for your children,

for example, whether or how often they embark on transatlantic flights.

Responsibility is sensitive to emission trajectories

The impact of having a child on GHG emissions depends on other lifestyle choices and technologies. This brings us to our final point. Anthropogenic GHG emissions are a function of the global population, as well as consumption and technologies. These variables interact. If the world succeeds in transitioning to a net-zero carbon economy in due time, the population variable will become less relevant. More people will, of course, strain the planet in other ways, such as reducing biodiversity, and perhaps put additional pressure on negative emission technologies. Nevertheless, having fewer children would have a much lower impact on future emissions than in overshoot scenarios. But Wynes and Nicholas implicitly exclude scenarios in which global emission trajectories become net-zero, or negative⁴. Investigating the implications of having children with regards to the full range of different scenarios, including likelihood analyses, calls for further studies.

Conclusion

Wynes and Nicholas's article is an important contribution to the formulation of meaningful individual climate mitigation recommendations. However, we have argued that the attribution of responsibility Wynes and Nicholas invoke involves a kind of multiple counting which runs counter to the objectives of the study. This may distort recommendations from policy makers and educators who rely on their study.

While we have focussed on a methodological issue, the extent to which recommendations are feasible and will be adopted must also be taken into account (cf. Dietz *et al* 2009). The recommendation to have fewer children may be difficult in this respect (Stern and Wolske 2017). The design of feasible policies that are based on sound methodology calls for further research.

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⁴ Thanks to an anonymous referee for pointing this out.