

Moral Enhancement and Climate Change: Might it Work?

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Abstract

Climate change is one of the most urgent global problems that we face today. The causes are well understood and many solutions have been proposed; however, so far none have been successful. Ingmar Persson and Julian Savulescu have argued that this is because our moral psychology is ill-equipped to deal with global problems such as this. They propose that in order to successfully mitigate climate change we should morally enhance ourselves. In this chapter we look at their proposal to see whether moral enhancement is indeed a viable solution to the climate crisis, and conclude that due to various theoretical and practical problems it most likely is not.

1. Introduction

Climate change is one of the most urgent problems that humanity has to face in the 21st century. The threat of altering the atmospheric composition of our climate beyond safe levels necessary for maintaining life on Earth is real, with impacts of climate change already visible across the world.^{1,2,3,4} Global temperatures are rising in an unprecedented way and, if nothing changes, will continue to rise even faster, leading to considerable sea-level rise, biodiversity loss, extreme weather, and increased mortality later in this century.⁵ In order to

¹ Gian-Reto Walther, et al., 'Ecological Responses to Recent Climate Change', *Nature* **416**: 6879 (2002), 389–395.

² Camille Parmesan and Gary Yohe, 'A Globally Coherent Fingerprint of Climate Change Impacts Across Natural Systems', *Nature* **421**:6918 (2003), 37–42.

³ Jonathan Patz, et al., 'Impact of Regional Climate Change on Human Health', *Nature* **438**:7066 (2005), 310–317.

⁴ IPCC, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2014).

⁵ IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the*

mitigate the worst consequences that climate change can impose on us, we desperately need to act now.⁶

This, however, is not an easy task. The first major scientific report on climate change was published by the Intergovernmental Panel on Climate Change (IPCC) in 1990, establishing that 'there is a natural greenhouse effect which already keeps the Earth warmer than it otherwise would be', and that 'emissions resulting from human activities are substantially increasing the atmospheric concentrations of greenhouse gases'.⁷ The resulting international conferences in Rio de Janeiro in 1992, Kyoto in 1997, and, more recently, Paris in 2015, as well as the multiple newly established research institutes, environmental charities, and governmental organisations took climate change mitigation as their priority. Many reports on climate change have been published,^{8,9,10,11} and novel solutions to the problem have been

Intergovernmental Panel on Climate Change (Cambridge: Cambridge University Press, 2013).

⁶ Robert Henson, *The Rough Guide to Climate Change* (London: Rough Guides, 2008).

⁷ J. T. Houghton, et al., *Climate Change: The IPCC Scientific Assessment. Report Prepared for Intergovernmental Panel on Climate Change by Working Group I* (Cambridge: Cambridge University Press, 1990), xi.

⁸ IPCC, *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007).

⁹ IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2013).

¹⁰ William Chander, et al., *Climate Change Mitigation in Developing Countries: Brazil, China, India, Mexico, South Africa, and Turkey* (Arlington: Pew Center on Global Climate Change, 2002).

¹¹ EEA, *Climate Change, Impacts and Vulnerability in Europe 2016* (Luxembourg: European Environmental Agency, 2016).

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widely researched.^{12,13,14} Moreover, the knowledge of climate change amongst the public has risen,¹⁵ with popular newspapers, television programmes, and even famous actors describing the dangers of climate change and the urgent need to mitigate from its worst consequences. And yet, amongst all this striving and publicity, the emissions of greenhouse gases (GHGs) from 2000 to 2010 were the highest so far in history.¹⁶ Moreover, the average global temperature relative to 1884 rose from 0.44°C in 1990 to 0.99°C in 2016.¹⁷ It seems, then, that the problem is much more complex than we previously thought and that the solution is not easily achievable by producing and publicising new knowledge. There is, then, an increased need to determine the causes of our inaction, and the possible ways in which we could change the situation, so that we can successfully mitigate climate change.

2. Persson and Savulescu's Proposal

So why have we not done so already? According to Ingmar Persson and Julian Savulescu, the reason we have so far been unable to tackle the problem is our ill-equipped moral psychology, which has not adapted to deal with complex, global problems. Supposedly our concerns are biologically limited to those around us and our immediate future. Climate change, however, is likely to have the biggest effect on the poorest people in distant countries, and perhaps not for some time. To successfully tackle climate change we would need to be able to entertain more far-reaching concerns, extending towards

¹² Stephen Pacala and Robert Socolow, 'Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies', *Science* **305**:5686 (2004), 968–972.

¹³ Rattan Lal, 'Soil Carbon Sequestration to Mitigate Climate Change', *Geoderma* **123**:1 (2004), 1–22.

¹⁴ R. E. H. Sims, 'Renewable Energy: A Response to Climate Change', *Solar Energy* **76**:1 (2004), 9–17.

¹⁵ Anthony Leiserowitz, 'International Public Opinion, Perception, and Understanding of Global Climate Change', *Human Development Report* (Human Development Report Office Occasional Paper, 2007).

¹⁶ IPCC, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2014).

¹⁷ NASA, *Vital Signs*: <https://climate.nasa.gov/>.

future generations and those living in other parts of the globe. The key to mitigating climate change is, then, to change our moral psychology accordingly, i.e., to morally enhance ourselves. The moral enhancement that Persson and Savulescu have in mind is an intervention which aims to improve human moral capacities or dispositions beyond those occurring normally in human beings.^{18,19} This does of course not necessarily mean that moral enhancement has to be radical, in that it would turn us into moral saints, unable to do the wrong thing. Rather, we could perhaps simply lift those with normal levels of moral capacities to the standard of those of us who by nature possess high levels.²⁰

How could we achieve this? Persson and Savulescu propose that we enhance two features of our moral psychology: altruism and a sense of justice, both of which, they argue, have a biological basis and hence can be improved through biomedical means. Enhancing altruism would presumably help us to become more motivated to alleviate the suffering of those whose lives will be severely disrupted by climate change, as well as provide a motivation to co-operate with others in joint efforts to fight climate change. Enhancing our sense of justice would presumably help us to include future generations in our moral considerations by making us recognise that our inaction is not morally neutral, but, rather, morally wrong and unjust towards those in the distant future. That could perhaps also provide the necessary motivation to act against climate change. The proposed enhancement could be achieved through the administration of drugs that have morally-enhancing properties or through genetic engineering. Persson and Savulescu point to oxytocin and serotonin as the best candidates for moral enhancement. Oxytocin has been found to increase trust and sympathy towards others,^{21,22} while serotonin has been shown to 'make subjects more fair-minded and willing to cooperate'.²³ Persson and Savulescu admit that there are some problems with the administration of some of

¹⁸ Ingmar Persson and Julian Savulescu, *Unfit for the Future: The Need for Moral Enhancement* (Oxford: Oxford University Press, 2012).

¹⁹ T. L. Beauchamp, 'Are We Unfit for the Future?', *Journal of Medical Ethics* **41**:4 (2015), 346–348.

²⁰ Ingmar Persson and Julian Savulescu, 'Reply to Commentators on "Unfit for the Future"', *Journal of Medical Ethics* **41**:4 (2015), 348–352.

²¹ Michael Kosfeld, et al., 'Oxytocin Increases Trust in Humans', *Nature* **435**:7042 (2005), 673–676.

²² P. J. Zak, et al., 'Oxytocin Increases Generosity in Humans', *PloS ONE* **2**:11 (2007), e1128.

²³ Persson and Savulescu, *Unfit for the Future*, 120.

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these drugs, yet they are optimistic that fine-tuning the dosages and combinations of these chemicals could, after careful research and experimentation, lead us to achieve the desired moral states. Another option (although less likely) is genetic engineering, which could be used to overcome problems around the administration of these drugs to everyone on the globe and ensure that everyone is enhanced.

Moral enhancement is seen by Persson and Savulescu as a possible way out of the climate crisis. They are very much aware that the moral enhancement necessary to mitigate climate change is currently not possible and will perhaps not be possible in time to alleviate the problem. However, they claim that our current situation is so serious that we should at least consider their proposal seriously and put money into research and development of moral enhancement as soon as possible. Are they right?

3. Can Moral Enhancement Really Help?

Let us first look at the causes of climate change as we know them today. Our climate changes because of the greenhouse effect, which is a natural phenomenon responsible for keeping the planet warm. Energy comes from the Sun in the form of light, and is reflected by the Earth's surface. The so-called "greenhouse gases" (such as carbon dioxide or methane) act like a blanket, trapping some of the heat and keeping the planet warm. By increasing the concentrations of these gases in our atmosphere, we are artificially increasing the Earth's temperature.

How did we manage to do this? Over the last 150 years we have been adding enormous quantities of greenhouse gases into the atmosphere,²⁴ primarily through the burning of fossil fuels, such as coal, gas, and oil. It is estimated that we add around 30 billion metric tonnes of carbon dioxide alone into the atmosphere each year.²⁵ The more we add, the more dangerous the situation becomes, which means that our top priority right now should be trying to stabilise and reduce our emissions as soon as possible. Indeed, as Archer, et al. point out, 'avoiding climate change means limiting the emission of CO₂'.²⁶ This, of course, is not an easy task in a world that largely

²⁴ Henson, *The Rough Guide to Climate Change*.

²⁵ Henson, *The Rough Guide to Climate Change*.

²⁶ David Archer and Stefan Rahmstorf, *The Climate Crisis* (New York: Cambridge University Press, 2012), 22.

depends on burning fossil fuels to meet its needs. However, it is not an impossible task, as the strategies needed to stabilise our emissions already exist and have been widely researched.^{27,28,29,30} The problem, then, is not that we do not know what to do, but, rather that we do not do it. The question is why.

Persson and Savulescu think our inability to deal effectively with climate change has something to do with our moral psychology, and they may well be right. A number of studies have concluded that our moral psychology is still at the level of the “tribe”, which means that we are not well-equipped to cope with complex, global problems.^{31,32} We are disposed to care more for our kin and prioritise their needs over the needs of distant others.^{33,34} We also have a bias towards the near future and it is easy for us to ignore threats that are remote in time.³⁵ It seems, then, that correcting these biases, and hence improving our moral psychology, would make us better able to engage in co-operative action against climate change.

Persson and Savulescu also seem to be right to focus on the enhancement of altruism and a sense of justice because these have been found to be strong predictors of an individual’s willingness to act on climate change.^{36,37,38} Those individuals who rated ‘high’ on

²⁷ Pacala and Socolow, ‘Stabilization Wedges’.

²⁸ Lal, ‘Soil Carbon Sequestration to Mitigate Climate Change’.

²⁹ Sims, ‘Renewable Energy’.

³⁰ T. M. Wigley, ‘A Combined Mitigation/Geoengineering Approach to Climate Stabilization’, *Science* **314**:5798 (2006), 452–454.

³¹ Robert Gifford, ‘The Dragons of Inaction: Psychological Barriers that Limit Climate Change Mitigation and Adaptation’, *American Psychologist* **66**:4 (2011), 290–302.

³² E. M. Markowitz and A. F. Shariff, ‘Climate Change and Moral Judgement’, *Nature Climate Change* **2**:4 (2012), 243–247.

³³ Markowitz and Shariff, ‘Climate Change and Moral Judgement’.

³⁴ Helen Bernhard, et al., ‘Parochial Altruism in Humans’, *Nature* **442**:7105 (2006), 912–915.

³⁵ George Loewenstein and Jon Elster, *Choice Over Time* (New York: Russell Sage Foundation, 1992).

³⁶ J. L. Dickinson, et al., ‘Which Moral Foundations Predict Willingness to Make Lifestyle Changes to Avert Climate Change in the USA?’, *PloS ONE* **11**:10 (2016), e0163852.

³⁷ Ignor Knez, ‘How Concerned, Afraid and Hopeful Are We? Effects of Egoism and Altruism on Climate Change Related Issues’, *Psychology* **4**:10 (2013), 744–752.

³⁸ Igor Knez, ‘Is Climate Change a Moral Issue? Effects of Egoism and Altruism on Pro-Environmental Behavior’, *Current Urban Studies* **4**:2, 157–174.

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altruism were willing to make bigger sacrifices and were more afraid of climate change.³⁹ Since altruism and a sense of justice seem to make us more willing to adopt climate-friendly behaviours, it seems that morally enhancing people in that way could have enormous benefits. Firstly, morally enhanced people would presumably be more motivated to adopt climate-friendly actions in their daily lives. These actions, such as e.g. driving a bike to work, purchasing solar panels, or refraining from eating meat would reduce individual household GHG emissions. Morally enhanced people would also presumably vote for politicians that promise climate action or create their own political parties with a strong agenda for mitigating climate change. This would undoubtedly lead to many social, political, and economic changes that could help lower our national and international GHG emissions. Moreover, morally enhanced people could also be more likely to agree to pay taxes for developing climate technologies. These technologies could play a key role in reducing the concentrations of GHG in the atmosphere.⁴⁰

4. Problems with Persson and Savulescu's Proposal

There are, however, some problems with the proposal, the most serious of which is perhaps the fact that climate change is not entirely a moral problem. It is true that our moral psychology is not well-equipped to deal with global problems such as climate change, and it is also true that altruism and a sense of justice are strong predictors of willingness to act on climate change. However, there are other, non-moral factors that play an important part. For one thing, climate change is also a significant cognitive problem. It seems that understanding the causes of climate change is a powerful predictor of behavioural response to the problem.⁴¹ Greater knowledge of climate change is correlated with greater concern over its impacts, which in turn is associated with higher willingness to take action.⁴²

³⁹ Knez, 'How Concerned, Afraid and Hopeful are We?'.
⁴⁰ Henson, *The Rough Guide to Climate Change*.

⁴¹ R. E. O'Connor, et al., 'Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change', *Risk Analysis* **19**:3 (1999), 461–471.

⁴² T. L. Milfont, 'The Interplay Between Knowledge, Perceived Efficacy, and Concern About Global Warming and Climate Change: A One-Year Longitudinal Study', *Risk Analysis* **32**:6 (2012), 1003–1020.

Moreover, those who perceive climate change as temporally and spatially distant as well as less serious than it is generally considered to be, are less willing to take action.^{43,44} It becomes clear, then, that the understanding of the causes and risks of climate change significantly determines our willingness to act on climate change. However, there are also other cognitive factors that come into play. For example, a first-hand experience of a natural disaster, such as flooding, tends to increase concern over climate change and the willingness to adopt climate-friendly behaviours.⁴⁵ Those who have had a first-hand experience of a flood generally believed that their actions have more effect on climate change, and were observed to be significantly more motivated to save energy with the aim of climate change mitigation.⁴⁶

Climate change is also a problem that concerns our values and beliefs. Different belief systems and personal values lead to different attitudes towards climate change, and, hence, different levels of motivation to engage in climate-friendly behaviour. For example, those of us who believe that humans are a part of nature and understand our position as interdependent on others and the natural world, are more concerned about environmental issues and more willing to engage in environmentally-friendly behaviour.^{47,48} Those cultural groups that express biospheric values are more likely to behave pro-environmentally.⁴⁹ Interestingly, it has also been speculated that those who

⁴³ Anthony Leiserowitz, et al., *Climate Change in the American Mind: Americans' Global Warming Beliefs and Attitudes in November, 2013* (Yale University and George Mason University, New Haven: Yale Project on Climate Change Communication, 2014).

⁴⁴ A. S. Singh, et al., 'The Perceived Psychological Distance of Climate Change Impacts and its Influence on Support for Adaptation Policy', *Environmental Science and Policy* **73** (2017), 93–99.

⁴⁵ Alexa Spence, et al., 'Perceptions of Climate Change and Willingness to Save Energy Related to Flood Experience', *Nature Climate Change* **1:1** (2011), 46–49.

⁴⁶ Alexa Spence, et al., 'Perceptions of Climate Change'.

⁴⁷ P. W. Schultz, et al., 'Implicit Connections With Nature', *Journal of Environmental Psychology* **24:1** (2004), 31–42.

⁴⁸ Steven Arnocky, et al., 'Self-Construal Predicts Environmental Concern, Cooperation, and Conservation', *Journal of Environmental Psychology* **27:4** (2007), 255–264.

⁴⁹ T. L. Milfont, et al., 'A Cross-Cultural Study of Environmental Motive Concerns and Their Implications for Proenvironmental Behavior', *Environment and Behavior* **38:6** (2006), 745–767.

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believe that the world is stable, orderly, and just are more likely to deny the existence of climate change or the extent of risks that it can impose on us, effectively lowering their willingness to act.⁵⁰ The differences can also be seen in terms of political values. Those who align their values and beliefs with right-wing parties are less likely to adopt high-cost climate-friendly behaviours and support policies which aim to mitigate climate change than those with other political beliefs.⁵¹

Last, but not least, climate change is also a social problem. This means that it is a problem that arises due to the ways in which our societies function; our social norms and habits, the infrastructure of our cities, the local economies and governments, as well as existing policies. For example, the infrastructure of our cities has an enormous effect on our work and travel habits, which, in turn, determine the amount of GHGs that a city will emit each year.⁵² Those cities that have a well-developed public transport system allow citizens to reduce their individual GHG emissions by forgoing their car, and using public transport to commute to work each day. Those cities that cannot provide a well-developed transport system, for example because they are very spread-out, tacitly encourage their citizens to use cars each day in order to earn their living, effectively increasing GHG emissions. This means that our desire to adopt climate-friendly behaviours is often restricted by the type of society we live in, and the opportunities that such society can provide, given its geographical location, political and economic status, available finances, and so on.

This is of course not an exhaustive presentation of the aspects and causes of climate change inaction. For example, climate change can also be understood as an existential problem,⁵³ a problem that arises

⁵⁰ Matthew Feinberg and Robb Willer, 'Apocalypse Soon? Dire Messages Reduce Belief in Global Warming by Contradicting Just-World Beliefs', *Psychological Science* 22:1 (2011), 34–38.

⁵¹ Christina Tobler, et al., 'Addressing Climate Change: Determinants of Consumers' Willingness to Act and to Support Policy Measures', *Journal of Environmental Psychology* 32:3 (2012), 197–207.

⁵² Dimitri Zenghelis and Nicholas Stern, 'Climate Change and Cities: a Prime Source of Problems, Yet Key to Solution', *The Guardian*, 17th November 2015: <https://www.theguardian.com/cities/2015/nov/17/cities-climate-change-problems-solution>.

⁵³ J. L. Dickinson, 'The People Paradox: Self-Esteem Striving, Immortality Ideologies, and Human Response to Climate Change', *Ecology and Society* 14:1 (2009): <http://www.ecologyandsociety.org/vol14/iss1/art34/>.

due to our differing personalities,^{54,55} or an economic problem.⁵⁶ The important point here, however, is that our ill-equipped moral psychology is not the only, or perhaps even the most important, cause of our inaction in the face of climate change. There are many other factors that come into play, which means that it is unlikely that moral enhancement alone could mitigate climate change.

5. The Unpredictability of Outcomes

However, even if moral enhancement were the sole factor in determining behavioural responses to climate change, it is unlikely that we could predict whether its outcome would be satisfactory. Persson and Savulescu are optimistic that research and experimentation in the field of moral enhancement can lead us to achieving moral states necessary for climate change mitigation. They acknowledge that developing such moral enhancement could take a long time, and that it would certainly be a complicated and costly endeavour, yet they are confident that such technology could eventually be realised. However, it is doubtful that moral enhancement could ever be fine-tuned in such a way that it leads to climate change mitigation, no matter how much money or effort we put into the research. Upon closer examination it becomes clear that there are many theoretical and practical difficulties with Persson's and Savulescu's claim, which ultimately render the outcome of moral enhancement uncertain.

Consider the two chemicals that Persson and Savulescu think are likely to play a role in moral enhancement. Oxytocin is a chemical responsible for creating and maintaining social bonds, promoting trust and altruism, and reducing anxiety.⁵⁷ Naturally, it seems that enhancing the levels of oxytocin in a person's brain will lead to more trusting, altruistic behaviours, and hence that oxytocin has "morally enhancing" properties. However, a significant number of studies

⁵⁴ J. B. Hirsh, 'Personality and Environmental Concern', *Journal of Environmental Psychology* **30**:2 (2010), 245–248.

⁵⁵ T. L. Milfont and C. G. Sibley, 'The Big Five Personality Traits and Environmental Engagement: Associations at the Individual and Societal Level', *Journal of Environmental Psychology* **32**:3 (2012), 187–195.

⁵⁶ W. D. Nordhaus, *Managing the Global Commons: The Economics of Climate Change*, Vol. 31 (Cambridge: MIT Press, 1994).

⁵⁷ Markus MacGill, 'Oxytocin: What Is it and What Does it Do?', *Medical News Today*: <http://www.medicalnewstoday.com/articles/275795.php>.

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have found that artificially increasing the levels of oxytocin in a person's brain results in unexpected outcomes. Oxytocin has been found to decrease pro-social behaviour towards out-group individuals,⁵⁸ increase human ethnocentrism,⁵⁹ and promote group-serving dishonesty.⁶⁰ Moreover, participants with increased levels of oxytocin were less likely to adhere to fairness norms when dealing with out-group individuals and were less generous towards them.⁶¹ Oxytocin has also been found to only increase altruism in the social, rather than environmental domain. Those participants who were treated with oxytocin were less willing to donate money to environmental causes.⁶²

Serotonin, on the other hand, is responsible for modulating our emotions and increasing harm aversion. It has been speculated that increasing the levels of serotonin in the brain will lead to increased sense of fairness and decreased willingness to cause harm.⁶³ However, it has been found that individuals with increased levels of serotonin were more likely to tolerate behaviours that were unjust, in order to avoid having to punish others.⁶⁴

These examples show that the outcomes of even such basic moral enhancements of small groups of people in controlled study environments are highly unexpected and uncertain, and, hence, that the situation is much more complex than Persson and Savulescu let on. Of

⁵⁸ C. K. De Dreu, et al., 'The Neuropeptide Oxytocin Regulates Parochial Altruism in Intergroup Conflict Among Humans', *Science* **328**:5984 (2010), 1408–1411.

⁵⁹ C. K. De Dreu, et al., 'Oxytocin Promotes Human Ethnocentrism', *Proceedings of the National Academy of Sciences* **108**:4 (2011), 1262–1266.

⁶⁰ Shaul Shalvi and C. K. De Dreu, 'Oxytocin Promotes Group-Serving Dishonesty', *Proceedings of the National Academy of Sciences* **111**:15 (2014), 5503–5507.

⁶¹ Sina Radke and E. R. De Bruijn, 'The Other Side of Coin: Oxytocin Decreases the Adherence to Fairness Norms', *Frontiers in Human Neuroscience* **6** (2012): <https://www.frontiersin.org/articles/10.3389/fnhum.2012.00193/full>.

⁶² Nina Marsh, et al., 'The Neuropeptide Oxytocin Induces a Social Altruism Bias', *Journal of Neuroscience* **35**:47 (2015), 15696–15701.

⁶³ J. Z. Siegel and M. J. Crockett, 'How Serotonin Shapes Moral Judgement and Behavior', *Annals of the New York Academy of Sciences* **111**:15 (2014), 5503–5507.

⁶⁴ M. J. Crockett, et al., 'Serotonin Selectively Influences Moral Judgement and Behavior Through Effects on Harm Aversion', *Proceedings of the National Academy of Sciences* **107**:40 (2010), 17433–17438.

course, it could be objected that just because oxytocin and serotonin are not good targets for moral enhancement, there may be other ways to bring about the necessary psychological states for climate change mitigation. This, however, seems unlikely for a couple of reasons.

Firstly, the brain is a very complex, fine-tuned mechanism which continuously processes and combines hundreds of different highly-specialised chemicals which all work together to maintain the cognitive, emotional, and moral processes of a person. Our understanding of the brain and even its basic processes is still very limited and it is not clear whether we can ever achieve that understanding, simply due to the sheer complexity of the multitude of processes that continuously work together to create a conscious being. For example, as Crockett explains, many of the brain's neurotransmitters, which would presumably play a key role in moral enhancement, serve multiple different functions and can be found in many different areas of the brain.⁶⁵ Serotonin, she argues, besides its key role in social behaviour, also regulates sleep, appetite, pain, memory, sexual behaviour, and vision. Moreover, there are many different types of serotonin, all of which have different effects on neurotransmission. The task of selecting the right type of serotonin and making sure that its effects will increase our willingness to lower our carbon emissions seems close to impossible. The issue would be complicated further by the fact that we would presumably need different chemicals to achieve the desired effect. The task of discerning how these chemicals would work together and what else they would influence in the brain seems daunting. And, most importantly, given our poor understanding of these processes, we would likely not know whether the enhancement could achieve its aims until after we have implemented it.

Secondly, Handfield, et al. argue that our altruistic and trusting behaviours are always accompanied by defensive behaviours, which means that if we enhance altruism or trust, we also need to account for change in our defense mechanisms.⁶⁶ It is, of course, not clear what change would be brought about, but the studies on the effects of oxytocin mentioned before could perhaps be a good indication of what we should expect. For example, consider the De Dreu study from 2011, where participants with increased altruism levels were much less trusting and more hostile towards out-group persons. It seems that in that study the enhanced participants “compensated”

⁶⁵ M. J. Crockett, ‘Moral Bioenhancement: A Neuroscientific Perspective’, *Journal of Medical Ethics* 40:6 (2014), 370–371.

⁶⁶ Toby Handfield, et al., ‘Climate Change, Cooperation and Moral Bioenhancement’, *Journal of Medical Ethics* 42 (2016), 742–747.

for their increased levels of trust and empathy with increased levels of mistrust and hostility towards those not belonging to their group. Handfield, et al. argue that evolutionarily it would be an extremely dangerous situation if our altruistic, trusting behaviours were enhanced while our defensive mechanisms stayed the same.⁶⁷ That is why our defensive mechanisms, such as our cognitive bias towards immediate kin, will likely not disappear with moral enhancement, but rather get strengthened, as a part of the brain's natural defense mechanism. We do not know exactly what effects different kinds and doses of chemicals could have, but it is guaranteed to upset the balance between the altruistic and the defensive mechanisms embedded in our brains. Hence, the effect of moral enhancement will vary greatly, and it is not clear in what ways our brain will adapt to the new situation. This increases the uncertainty of the outcome.

Thirdly, the outcome of moral enhancement will likely be uncertain as there will still be room for us to make wrong decisions. This is because Persson and Savulescu, prompted by criticism, argue that they never meant moral enhancement to be so radical that it turns us all into "moral saints", unable to do the wrong thing. Rather, they now propose that we should enhance people with normal levels of altruism or sense of justice to the levels of those who by nature possess high levels. But of course, this does not guarantee that we will engage in actions that mitigate climate change. Many altruistic people do not care much for the environment, instead putting their priorities in social causes, for example. Moreover, altruistic people can also make mistakes, based on a misunderstanding of the problem or the ways in which it can be solved. Hence, given that our enhancement will not be radical, we could never predict the goals and behaviours of the enhanced person.

6. Cognitive Enhancement?

Persson and Savulescu mention that it would be beneficial to enhance more cognitive aspects of our moral psychology. However, they do not account for the fact that without cognitive enhancement their proposal could not get off the ground. This, however, complicates the project further as now two separate enhancements would have to be developed in order to make "moral enhancement" a viable solution to the climate crisis. Persson and Savulescu argue that increasing

⁶⁷ Handfield, et al., 'Climate Change, Cooperation and Moral Bioenhancement'.

our levels of altruism would result in our being more altruistic towards distant others, the planet, and animals. In other words, they believe that enhancing our levels of altruism would increase the *scope* of our altruism, which would then make us better able to respond to global problems. This, however, seems unlikely. As we have seen in the previous section, altruism enhanced through bio-medical means did not result in the increased *scope* of altruism, but rather, in the increased *intensity* of altruism, which means that people felt more altruistic towards those with whom they were already socially bonded. This, in turn, led to a number of anti-social behaviours towards the out-group members. Hence, as one study concluded, ‘although in humans OT [oxytocin] may strengthen existing social bonds (for example, between relatives/friends), [...] it does not create bonds de novo (for example, between strangers)’.⁶⁸ It seems that in order to get past this problem and realise Persson and Savulescu’s proposal of enhancing the scope of our altruism, we will need to cognitively enhance ourselves. This is because a cognitive bias, parochialism, is responsible for our prioritising the interests of our immediate kin over the interests of the strangers.^{69,70} Simply increasing levels of altruism does not get rid of cognitive bias, and, hence, is unlikely to impact on our concern for distant others and motivate us to join strangers in co-operative actions aiming to mitigate climate change. Rather, it is only through cognitive enhancement that we could forgo our bias towards family and friends and become more concerned for global issues and distant strangers.

However, enhancing altruism in scope would not be enough to achieve the desired effect of mitigating climate change. This is because we would still be biased towards our near future, and as such, we would prioritise issues that require our immediate attention, rather than issues that seem more distant. Imagine that a person X is enhanced so that she is more altruistic towards strangers, and, hence, more motivated to alleviate their suffering. Given that she is still biased towards the near future, she will focus on the issues that will alleviate the suffering of the distant others in the present. For example, X may support charities that aim to feed the hungry or build new houses for the homeless. It is only when we cognitively enhance ourselves so that we can forgo our bias

⁶⁸ Christian Grillon, et al., ‘Oxytocin Increases Anxiety to Unpredictable Threat’, *Molecular Psychiatry* **18**:9 (2013), 958–960.

⁶⁹ Bernhard, ‘Parochial Altruism in Humans’.

⁷⁰ Gifford, ‘The Dragons of Inaction’.

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towards the near future, that we can become truly concerned and motivated to alleviate the suffering of future generations by acting in the present, and, hence, become more motivated to adopt climate-friendly behaviours. Otherwise we will continue to focus on the issues that require immediate attention – such as hunger, homelessness, direct injustice, etc. Of course, this is not to say that these issues are not important. The point we wish to make is simply that moral enhancement without cognitive enhancement is not likely to achieve the goals that Persson and Savulescu assume it will.

It also seems that cognitive enhancement of some sort would have to accompany moral enhancement in order to ensure that morally enhanced people know what actions they should engage in in order to mitigate climate change. This is because many of us do not understand the causes and drivers of climate change and, hence, do not know in what ways we can help to mitigate it.⁷¹ They would not suddenly achieve that understanding following moral enhancement, which would mean that many of them would be motivated to fight climate change, but would not know how. Cognitive enhancement would fill that gap, ensuring that the morally enhanced would be able to take the right course of action for climate change mitigation.

Moral enhancement without cognitive enhancement could not achieve its aims. However, the current state of science of cognitive enhancement of this sort is still very much limited. We do not know in what ways, if any, it would be possible to engineer our brains so that we could get rid of something so specific as parochialism or bias towards the near future. This makes Persson's and Savulescu's proposal even more complicated, and, hence, less viable as a response to the ongoing climate crisis.

7. Implementation Problems

Finally, there are also some practical problems with Persson and Saculescu's proposal. Firstly, it seems that moral enhancement will have to be compulsory in order to have the potential of mitigating climate change. This is because the overwhelming majority of people on the globe will not voluntarily agree to moral enhancement. Moral enhancement will be perceived as dangerous and there will certainly be many misconceptions and conspiracy theories regarding its

⁷¹ T. W. Reynolds, et al., 'Now What Do People Know About Climate Change? Survey Studies of Educated Laypeople', *Risk Analysis* 30:10 (2010), 1520–1538.

implementation. Moreover, since the majority of us are not overly concerned about climate change and are not very willing to engage in climate-friendly behaviours, we will likely not have any motivation to undergo such risky biomedical intervention. Most Probably only those of us who are already concerned about climate change and highly motivated to mitigate it will choose to undergo moral enhancement. This of course will not lead to any satisfactory outcomes, as moral enhancement could only be successful in mitigating climate change if we enhanced those of us who are not highly motivated to adopt climate-friendly behaviours. Hence, in order to have the potential to mitigate climate change, moral enhancement would have to be compulsory.

However, it is not clear whether such moral enhancement could even be possible to implement. After all, the majority of us tend to consider freedom to be one of the most important rights. Those policies that propose to limit our freedom in some narrow social or economic domain are usually strictly opposed by the majority of citizens and often lead to violent protests. It is easy to imagine the uproar and hostility with which the proposal of forced moral enhancement would be met.

Hence, the only way in which we could implement forced moral enhancement would be to do it without the knowledge of the public. This proposal, however, raises further problems. Not only would it be morally wrong to enhance people without their knowledge and consent, such “hidden” enhancement could also easily lead to a situation where politicians, businessmen, or otherwise powerful people could avoid being enhanced either because they would be the ones implementing moral enhancement or because they could bribe those who would be in charge of implementing moral enhancement. Those people, however, are the ones that are probably in most urgent need of moral enhancement, as they hold an enormous power to implement climate-friendly policies and put money into research on climate technologies. It is also difficult to imagine how the public would not realise that there are being enhanced. After all, those people who were previously less altruistic would suddenly become much more altruistic than before. Moreover, we would also presumably notice the changes in our mental states.

This is of course just a brief sketch of the problems that we may encounter when planning forced or voluntary moral enhancement. However, it already tells us that the project will be incredibly difficult, if not impossible, to implement in a way which would not create social havoc and disorder yet still allow for successful climate change mitigation.

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One last point: Persson and Savulescu argue that if we are able to develop satisfactory moral enhancement we should enhance everyone on the globe. This is presumably to avoid the issues of free-riding of the unenhanced on the enhanced and ensure that enough people co-operate in joint goals to mitigate climate change. Moreover, this also ensures that we enhance those who, if enhanced, could have a significant positive impact on the planet. These would include presidents, heads of environmental agencies, businessmen, and so on. However, once again this proposal raises many difficult problems. Some are moral, and they have been widely discussed already, which is why we will not discuss them here. Others are legal and administrative. The legal and administrative process required to ensure that 7 billion people on the planet are enhanced seems, frankly, impossible. A more plausible solution here could perhaps be to genetically engineer future populations so that they are more just and altruistic. However, as Persson and Savulescu admit, we are not anywhere near developing such complicated technology. Moreover, such technology would result in a world consisting of the younger, morally “better” people and the older, morally “worse” people. Such an unequal situation would be likely to have a detrimental effect on intergenerational relations and increase potential free-riding. Hence it seems that it is both problematic to enhance only some people and to enhance everyone.

8. Conclusion

To conclude: even if we could, somehow, overcome all these various problems, it is very unlikely that we would be able to develop moral enhancement necessary for mitigating climate change in time. The science of moral enhancement is still very much in its infancy,⁷² while climate change is already having serious effects on the planet. If we proceed with the “business as usual” scenario, meaning that we fail to reduce our emissions of GHGs, and hence, the concentrations of GHGs in the atmosphere, then climate change will start becoming a serious problem very soon and potentially prove deadly in the second half of this century.⁷³ This would mean that our time

⁷² Crockett, ‘Moral Bioenhancement’.

⁷³ IPCC, *Climate Change 2007*.

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for developing sufficient moral enhancement, proving its safety, establishing world-wide regulation and laws necessary for making sure that everyone is enhanced, and then distributing morally-enhancing pills and ensuring that everyone takes them, is very limited, and in all likelihood much too short.

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