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Lessons for climate policy from behavioral biases towards COVID-19 and climate change risks

Wouter Botzen [a,b,*], Sem Duijndam [a], Pieter van Beukering [a]

[a] Institute for Environmental Studies, Vrije Universiteit, Amsterdam, The Netherlands
[b] Utrecht University School of Economics (U.S.E.), Utrecht University, Utrecht, The Netherlands

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ABSTRACT

COVID-19 and climate change share several striking similarities in terms of causes and consequences. For instance, COVID-19 and climate change affect deprived and vulnerable communities the most, which implies that effectively designed policies that mitigate these risks may also reduce the widening inequalities that they cause. Both problems can be characterized as low-probability–high consequence (LP-HC) risks, which are associated with various behavioral biases that imply that individual behavior deviates from rational risk assessments by experts and optimal preparedness strategies. One could view the COVID-19 pandemic as a rapid learning experiment about how to cope more effectively with climate change and develop actions for reducing its impacts before it is too late. However, the ensuing question relates to whether the COVID-19 crisis and its aftermath will speed up climate change mitigation and adaptation policies, which depends on how individuals perceive and take action to reduce LP-HC risks. Using insights into behavioral biases in individual decisions about LP-HC risks based on decades of empirical research in psychology and behavioral economics, we illustrate how parallels can be drawn between decision-making processes about COVID-19 and climate change. In particular, we discuss six important risk-related behavioral biases in the context of individual decision making about these two global challenges to derive lessons for climate policy. We contend that the impacts from climate change can be mitigated if we proactively draw lessons from the pandemic, and implement policies that work *with*, instead of *against*, an individual's risk perceptions and biases. We conclude with recommendations for communication policies that make people pay attention to climate change risks and for linking government responses to the COVID-19 crisis and its aftermath with environmental sustainability and climate action.

1. Introduction

The COVID-19 pandemic exposes the fragility of our globalized society to shocks originating from the natural system and raises fundamental concerns about the sustainability of our way of living. It also reveals how population growth, urbanization, globalization, and mass travel result in a complex externality with far-reaching global impacts. Parallels are frequently drawn with another global externality, namely climate change. Striking similarities exist between both problems in terms of causes, such as unsustainable transport and food systems, and consequences, including health risks (IPCC, 2014). In addition, both COVID-19 and climate change disproportionally affect deprived communities (IPCC, 2014; Douglas et al., 2020), thereby intensifying world inequalities. Both the impacts of the current pandemic and many consequences from climate change, such as more frequent and intense natural disasters, can be characterized as low-probability–high consequence (LP-HC) risks.

One could view the COVID-19 crisis as a rapid learning experiment about how to cope with climate change. On the one hand, it demonstrates that changes in lifestyles, although they may be temporary, appear possible. On the other hand, the observed lack of preparedness and slow response to the pandemic causing immediate colossal health and economic impacts, are reasons for concern. Drawing lessons from the experiences of the pandemic for climate policy is imperative. An important question is whether the COVID-19 crisis and its aftermath will prompt key interested parties to pay more attention to climate change mitigation and adaptation, which depends on how individuals perceive and act to reduce LP-HC risks. Using insights into six behavioral biases in individual decisions about LP-HC risks based on decades of research in psy-

* Corresponding author at: Vrije Universiteit, Institute for Environmental Studies, De Boelelaan 1085, 1181HV Amsterdam, The Netherlands.

E-mail addresses: wouter.botzen@vu.nl (W. Botzen), sem.duijndam@vu.nl (S. Duijndam), pieter.van.beukering@vu.nl (P. van Beukering).

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chology and behavioral economics, we illustrate how parallels can be drawn between decision-making processes about COVID-19 and climate change. We argue that impacts from climate change can be mitigated if we proactively derive lessons from the pandemic and implement policies that work *with*, instead of *against*, an individual's biases.

2. Behavioral biases

2.1. Simplification

Individuals are likely to make choices by focusing on either the low probability of a disaster occurring or its potential consequences, instead of making a rational assessment of the full risk distribution. Many people use threshold models to decide whether to take protective measures in advance of a potential catastrophe. They often view the likelihood of LP-HC events as falling below their threshold level of concern, whereby no risk-reducing action is taken (Slovic et al., 1977). Many climate change-related risks, such as natural disasters, have a low probability that individuals simplify to being zero or falling below their threshold level of concern.[1] The same case occurs with pandemics. People generally downplay the probability of a pandemic until it occurs in their surroundings (Sands et al., 2016), which is when individuals start to focus on limiting health consequences and undertake measures such as wearing mouth masks (Xiao & Torok, 2020).[2]

2.2. Availability

Individuals underestimate LP-HC risks, such as those related to climate change and COVID-19, until after they experience the consequences of the disaster or learn about friends or family who have suffered from the threat. This underestimation is caused by the availability bias (Tversky & Kahneman, 1973). Empirical studies find that individual concern about climate change and willingness to adopt mitigation measures are positively related to experiences of climate change-related risks such as flood events (Spence et al., 2011).[3] For COVID-19, we have also seen that individuals became more worried about the risk when COVID-19 infections and deaths occurred in their country.[4] The availability bias is especially problematic in the case of climate change, which is not salient to people unless they experience its effects such as more frequent flooding due to sea level rise. Once large-scale climate risks materialize and risk awareness is high enough to support a transition to a low carbon economy, it may already be too late to reverse unwanted climate trends.

2.3. Finite pool of worry

The "finite pool of worry" hypothesis states that when concern about one issue increases, concerns about other issues decrease because individuals only have a limited pool of emotional resources (Capstick et al., 2015).[5] This theory has been used to explain the strong decline in worry about climate change after major events such as 9/11 and the 2008 financial crisis where, respectively, worries about national security and the economic situation prevailed (Weber, 2010). Similarly, COVID-19, given its dire health and economic consequences, may shift the concern for climate change towards pandemics and unemployment. Similar to COVID-19, climate change might only rank high enough on people's "finite pool of worry" when it is too late to prevent severe impacts.

2.4. Myopia

Individuals often evaluate investment decisions over time horizons that are shorter than those that are required before investments in climate change adaptation and mitigation yield positive returns. This behavior, which has been called myopia, is related to the heavy discounting of future risk reduction benefits and overweighting of upfront costs (Gneezy & Potters, 1997). This bias reduces demand for climate change mitigation and adaptation measures with high upfront costs and long-term benefits.[6] An implication of myopia is that individuals act upon urgent near-term risks. It can be illustrated by behavior during the COVID-19 pandemic where many individuals (initially) accepted the strong lockdown measures (Blais et al., 2020) because it was viewed as an urgent and immediate problem to be solved. However, this is not the case with climate change, which is viewed as a long-term problem.

2.5. "Not in my term of office" bias

Politicians often fail to undertake expensive measures to limit low-probability risks that are unlikely to happen in their term of office because they obtain insufficient rewards from voters for limiting the impacts of events that do not occur when they are in office. This situation has been called the "not in my term of office" (NIMTOF) bias (Kunreuther & Useem, 2010). The NIMTOF bias is a major issue in the case of climate change. Mitigating greenhouse gases implies that expensive measures have to be adopted now to minimize the risks from climate change far in the future, which mainly benefits the next generations (Stern, 2013).[7] Similarly, the risks of pandemics were made known to governments well before the COVID-19 outbreak through official reports, along with information about risk mitigation measures such as investing in sufficient intensive care capacity, test facilities, and large supplies of protective equipment (Sands et al., 2016). However, almost none of the governments around the world were adequately prepared for a pandemic, which may be explained by the NIMTOF bias.

2.6. Herding

Individuals' choices are often influenced by other people's behavior, especially under conditions of uncertainty due to social norms, which has been referred to as the herding bias (Meyer &

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[1] For example, studies have found that individuals have lower perceptions of flood risk when they think that the flood probability is below their threshold level of concern (Botzen et al., 2015), and that decisions about purchasing flood insurance are consistent with the threshold model (Robinson & Botzen, 2019).

[2] Misperceptions of exponential growth constitute another form of simplification bias. During the COVID-19 pandemic, people misperceived the exponential growth of COVID-19 cases leading to delayed public responses (Kunreuther & Slovic, 2020), which is also problematic with climate change where individuals misperceive the nonlinearity of climate dynamics and CO_2 emissions (Sterman, 2011).

[3] Moreover, a large body of literature confirms this availability bias for natural disaster risks, by showing that experiencing natural disasters increases individual risk perceptions (Kellens et al., 2013) and preparedness for future natural disasters (Bubeck et al., 2012).

[4] Another analogy is the discovery of holes in the ozone layer, after which the health risks of ozone depletion were communicated as "being imminent" and public support for the Montreal Protocol to ban CFCs rapidly grew (Green, 2009).

[5] Simply stated, individuals cannot simultaneously worry about too many matters, and some issues might occupy a higher rank in someone's finite "pool of worry" than others.

[6] These investments, such as making homes more energy efficient or resistant to impacts from natural disasters, are typically costly in the beginning and beneficial in the long run when individuals save on their yearly energy bills and experience less damage once a natural disaster strikes (Gillingham & Palmer, 2014; Gelino & Reed, 2020).

[7] This bias may also explain under-investments in climate change adaptation measures, such as preparing for natural disasters, because voters reward politicians who provide financial relief after a disaster and not politicians who invest in preventing future disasters (Healy & Malhotra, 2009).

Kunreuther, 2017). Herding can partly explain the widespread support and compliance with rules to limit COVID-19 risk, such as social distancing and wearing a mouth mask. For climate change-related risks, individuals are evidently more likely to take measures in their homes to limit the damage from natural disasters when they know their friends or neighbors adopted similar measures (Lo, 2013). Conversely, individuals who lack people in their close environment that implement adaptation or mitigation measures are less likely to undertake such measures. The herding bias suggests that triggering social norms, for example, by highlighting the climate-friendly behavior by others, may be an effective means of stimulating climate action.

3. Lessons

Several challenges for climate action emerge from the identified behavioral biases. The "simplification bias" implies that individuals view the likelihood of LP-HC events as falling below their threshold level of concern and fail to take risk reduction measures, unless they experience the impacts of a disaster according to the "availability bias." The "finite pool of worry" denotes that due to the health and unemployment consequences of COVID-19, individuals become more concerned about their health and the economy and less concerned about climate change. "Myopia" has the effect that individuals insufficiently value the future benefits from actions that reduce risks from climate change, which also applies to politicians according to the "NIMTOF bias." The "herding bias" signifies that individuals mimic a lack of preparedness for risks observed from others. Next, we provide recommendations that work *with*, instead of *against*, these biases.

Addressing the "simplification and availability biases" necessitates the development of communication strategies that stress the consequences of risks associated with climate change and COVID-19 to ensure that individuals start paying attention (Meyer & Kunreuther, 2017). Such strategies should be carefully designed to limit cognitive dissonance by, for example, using constructive framings and personalizing climate issues so they are perceived as less distant (Stoknes, 2014).[8] For instance, Bradt (2019) indicates that demand for flood protection increases after people received information on the consequences of personally experiencing flooding caused by hurricanes.[9] Awareness of pandemics is currently high, but once it fades, communication strategies should keep people's memory of its consequences alive. One reason for the high public support for the COVID-19 lockdown measures is the reality of immediate health risks, which is also the main rationale for the support of the Montreal Protocol against ozone depletion (Pillay & van den Bergh, 2016). Therefore, climate communication strategies that emphasize health risks, in particular, may be effective in enhancing support for climate policy.

The "myopia and NIMTOF biases" make citizens and decision makers focus on near-term risks, which currently is COVID-19; by contrast, long-term risks such as climate change gain insufficient attention. This lack of climate action can be overcome by linking policies and measures that are currently adopted to limit the risks from pandemics, to actions that also reduce the risks from climate change. Such possibilities can be explored in various domains, as several causes of COVID-19 are also drivers of climate change, such as unsustainable transport, tourism, and food systems. Hence, future actions to prevent a new pandemic could also help to combat climate change, and vice versa. Moreover, climate change itself could increase the spread of infectious diseases (Ryan et al., 2019). This further implies that climate mitigation policies can be promoted as pandemic prevention policies, thus making a stronger case for their implementation. Communicating the link between these two risks to the public might help with maintaining support for climate policies. The COVID-19 crisis has convincingly demonstrated that societies can adapt quickly and individuals can change aspects of their lifestyles, if an imminent threat occurs. Hence, achieving behavioral changes that mitigate climate change might be more within reach than previously thought.

Governments will most likely provide enormous financial support to companies and citizens to recover from the COVID-19 crisis and to limit unemployment (IMF, 2020). A co-benefit of such support is that it may limit declines in concern for climate change that would occur if individuals, due to the "finite pool of worry", were to experience more concern about economic distress and joblessness. Moreover, this support can be combined with requirements to do business more sustainably.[10] Government regulations and financial incentives for climate action can trigger a critical mass supporting these measures, which could further spread positive climate behavior through the "herding bias." For example, building code regulations can enhance resilience to natural disasters, whereas appropriately set carbon prices can stimulate businesses and consumers to reduce greenhouse gas emissions by making them pay for these emissions (van den Bergh et al., 2020).

Measures that limit risks from pandemics and climate change may also contribute to reducing existing inequalities because both problems especially impact the most vulnerable in society. However, these measures can also reinforce inequalities. For example, lockdown measures disproportionally impact underprivileged people, and climate change adaptation and mitigation measures are least affordable for low-income households. On the contrary, well-funded and carefully designed policies and mitigation strategies can minimize the exacerbation of such inequality, such as by providing financial support and securing basic needs. In this article, we have shown how carefully designed policies and strategies can overcome behavioral tendencies that prevent us from effectively responding to pandemics and climate change before it is too late.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Blais, A., Bol, D., Giani, M., & Loewen, P. (2020). The effect of COVID-19 lockdowns on political support: Some good news for democracy? QPE Working Paper 2020-1.

Botzen, W. J. W., Kunreuther, H., & Michel-Kerjan, E. (2015). Divergence between individual perceptions and objective indicators of tail risks: Evidence from floodplain residents in New York City. *Judgment and Decision Making, 10*(4), 365–385.

Bradt, J. (2019). Comparing the effects of behaviorally-informed interventions on flood insurance demand: An experimental analysis of 'boosts' and 'nudges'. *Behavioural Public Policy*. forthcoming. Available at SSRN: https://ssrn.com/abstract=3424279.

Bubeck, P., Botzen, W. J. W., & Aerts, J. C. J. H. (2012). A review of risk perceptions and other factors that influence flood mitigation behavior. *Risk Analysis, 32*(9), 1481–1495.

[8] An example for COVID-19 is to encourage young people to adhere to social distancing rules to prevent their loved ones from becoming ill.

[9] The reason is that they switch their attention from the low hazard probability towards severe consequences (Bradt, 2019).

[10] Political willingness to connect financial aid with sustainability requirements may be higher than during the 2008 financial crisis in some countries, as illustrated by the ambitious EU Green Deal.

Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N., & Upham, P. (2015). International trends in public perceptions of climate change over the past quarter century. *Wiley Interdisciplinary Reviews: Climate Change, 6*(1), 35–61. https://doi.org/10.1002/wcc.321.

Douglas, M., Katikireddi, S. V., Taulbut, M., McKee, M., & McCartney, G. (2020). Mitigating the wider health effects of covid-19 pandemic response. *BMJ, 369*. https://doi.org/10.1136/bmj.m1557 m1557.

Gelino, B. W., & Reed, D. D. (2020). Temporal discounting of tornado shelter-seeking intentions amidst standard and impact-based weather alerts: A crowdsourced experiment. *Journal of Experimental Psychology: Applied, 26*(1), 16–25.

Gillingham, K., & Palmer, K. (2014). Bridging the energy efficiency gap: Policy insights from economic theory and empirical analysis. *Review of Environmental Economics and Policy, 8*(1), 18–38.

Gneezy, U., & Potters, J. (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics, 112*(2), 631–645.

Green, B. A. (2009). Lessons from the Montreal Protocol: Guidance for the next international climate change agreement. *Environmental Law, 39*(1), 253–283.

Healy, A., & Malhotra, N. (2009). Myopic voters and natural disaster policy. *American Political Science Review, 103*(3), 387–406.

IMF. (2020). World economic outlook update: A crisis like no other, An uncertain recovery. International Monetary Fund (IMF). June 2020.

IPCC (2014). *Climate change 2014: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Kellens, W., Terpstra, T., & De Maeyer, P. (2013). Perception and communication of flood risks: A systematic review of empirical research. *Risk Analysis, 33*(1), 24–49.

Kunreuther, H., & Slovic, P. (2020). Learning from the COVID-19 pandemic to addressclimate change. *Management and Business Review, 1*(1), 1–8. In press.

Kunreuther, H., & Useem, M. (2010). *Learning from catastrophes*. New Jersey: Prentice Hall.

Lo, A. (2013). The role of social norms in climate adaptation: Mediating risk perception and flood insurance purchase. *Global Environmental Change, 23*(5), 1249–1257.

Meyer, R., & Kunreuther, H. (2017). *The ostrich paradox: Why we underprepare for disasters*. Philadelphia, PA: Wharton Digital Press.

Pillay, C., & van den Bergh, J. C. J. M. (2016). Human health impacts of climate change as a catalyst for public engagement: Combining medical, economic and behavioural insights. *International Journal of Climate Change Strategies and Management, 8*(5), 1756–8692.

Robinson, P., & Botzen, W. J. W. (2019). Determinants of probability neglect and risk attitudes for disaster risk: An online experimental study of flood insurance demand among homeowners. *Risk Analysis, 39*(11), 2514–2527.

Ryan, S. J., Carlson, C. J., Mordecai, E. A., & Johnson, L. R. (2019). Global expansion and redistribution of Aedes-borne virus transmission risk with climate change. *PLOS Neglected Tropical Diseases, 13*(3). https://doi.org/10.1371/journal.pntd.0007213 e0007213.

Sands, P., Mundaca-Shah, C., & Dzau, V. J. (2016). The neglected dimension of global security: A framework for countering infectious-disease crises. *New England Journal of Medicine, 374*(13), 1281–1287. https://doi.org/10.1056/NEJMsr1600236.

Slovic, P., Fischhoff, B., Lichtenstein, S., Corrigan, B., & Combs, B. (1977). Preference for insuring against probable small losses: Insurance implications. *Journal of Risk and Insurance, 44*(2), 237–258.

Spence, A., Poortinga, W., Butler, C., & Pidgeon, N. F. (2011). Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change, 1*, 46–49.

Sterman, J. D. (2011). Communicating climate change risks in a skeptical world. *Climatic Change, 108*(4), 811–826. https://doi.org/10.1007/s10584-011-0189-3.

Stern, N. (2013). The structure of economic modeling of the potential impacts of climate change: Grafting gross underestimation of risk onto already narrow science models. *Journal of Economic Literature, 51*, 838–859.

Stoknes, P. E. (2014). Rethinking climate communications and the "psychological climate paradox". *Energy Research & Social Science, 1*, 161–170. https://doi.org/10.1016/j.erss.2014.03.007.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5*(2), 207–232.

van den Bergh, J. C. J. M., Angelsen, A., Baranzini, A., Botzen, W. J. W., Carattini, S., Drews, S., ... Schmidt, R. (2020). A dual-track transition to global carbon pricing. *Climate Policy*. https://doi.org/10.1080/14693062.2020.1797618.

Weber, E. U. (2010). What shapes perceptions of climate change?. *Wiley Interdisciplinary Reviews: Climate Change, 1*(3), 332–342. https://doi.org/10.1002/wcc.41.

Xiao, Y., & Torok, M. E. (2020). Taking the right measures to control COVID-19. *The Lancet Infectious Diseases, 20*(5), 523–524.