Combating the climate crisis with cognitive science

Rachit Dubey[1] and **Joshua Peterson**[1]

[1]Department of Computer Science, Princeton University, Princeton, NJ 08544, USA

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Overview

The climate crisis is one of the most alarming issues of our time. Our planet is deteriorating at an unprecedented scale and accelerating rate, putting human societies and countless biological species in grave danger. The root cause of this problem is human behavior and thus it could prove crucial to examine the psychology behind the human behaviors that drive unsustainable living and impede enactment of climate policy. Unfortunately, despite the importance of psychological research in responding to the climate crisis, the field has had very little influence on the climate policy process as well as in mobilizing action on climate change, handicapping progress towards a sustainable future (Clayton et al., 2015; Nielsen et al., 2020; Fischhoff, 2020).

This workshop aims to bring together scientists working in the broad area of climate change and sustainability, along with cognitive scientists, to engage in development of ideas related to using cognitive science research in understanding, reducing, and responding to the climate crisis. To achieve this goal, we have invited leading researchers from cognitive science, public policy, and climate science to present an accessible summary of their research, and allocate ample time for dialogue and audience participation across a panel discussion.

More specifically, the workshop will be a forum for addressing the following key questions:

- What are effective methods to counter climate change denial and reduce climate misinformation?
- What are the psychological barriers that impede mass action on the climate crisis?
- What are the factors that can lead to long-lasting changes in motivating action against the climate crisis?
- How can human societies adapt towards reducing consumption and living within limits for a more sustainable future?
- What are the steps needed for a better future integration of psychological research with the climate policy process?

Target Audience

Our target audience is anyone who would like to be more involved in fighting this threat, and we expect it to be of interest to cognitive psychologists, comparative psychologists, social psychologists, neuroscientists, economists, philosophers, science communication, and education researchers alike. We also believe that this workshop is quite apt for this year's theme of "Comparative Cognition: Animal Minds". The climate crisis along with destructive human activity is rapidly accelerating the sixth mass extinction event, putting our entire ecological system under irreversible existential threat (Ceballos et al., 2017; Bar-On et al., 2018; Cardoso et al., 2020). In addition to the obvious danger to humanity, this ecological collapse is also concerning to comparative psychologists: this mass extinction is resulting in an unprecedented loss of diverse swaths of intelligent behavior that is yet to be fully understood.

Organizers and Presenters

Below, we introduce the organizers and the presenters. The organizers are cognitive scientists whose goal is to engage the community in this very important problem. The presenters are leading experts in domains including cognitive science, climate communication, sustainability, and economics.

Rachit Dubey (Organizer) is a PhD student at Princeton University working in Tom Griffiths' Computational Cognitive Science lab. His research is centered around understanding intrinsic rewards, primarily curiosity, motivation, and happiness.

Joshua Peterson (Organizer) is a postdoctoral fellow at Princeton University, where he studies the use of machine learning algorithms and large datasets to build better psychological theories. He has successfully co-organized the full-day SVRHM workshop at NeurIPS two years in a row (`www.svrhm.com`).

Tali Sharot (Presenter) is a Professor of Cognitive Neuroscience in the department of Experimental Psychology at University College London and a Wellcome Trust Senior Research Fellow. Her research integrates neuroscience, behavioural economics, and psychology to study how emotion influences people's beliefs, decisions, and social interactions.

Jiaying Zhao (Presenter) is the Canada research chair and an Associate Professor in the Department of Psychology and the Institute for Resources, Environment, and Sustainability at the University of British Columbia. Her research uses psychological principles to design behavioral solutions to

address sustainability challenges. Specifically, she examines how resource scarcity impacts human cognition and what interventions are effective at alleviating cognitive burdens in the poor; how to reduce water and energy consumption, and engage the public on biodiversity conservation; and what cognitive biases people have regarding climate change.

Gordon Pennycook (Presenter) is an Assistant Professor of Behavioural Science at University of Regina's Hill/Levene Schools of Business. His research focuses on the causes and consequences of analytic thinking and he has published on topics such as religious belief, morality, climate misinformation, political ideology, and fake news.

Stephan Lewandowsky (Presenter) is Professor of Cognitive Science at the University of Bristol. His research examines people's memory, decision making, and knowledge structures, with a particular emphasis on how people update information in memory. His most recent research interests examine the potential conflict between human cognition and the physics of the global climate, which has led him into research in climate science and climate modeling.

Julia Steinberger (Presenter) is a Professor of Social Ecology and Ecological Economics at the University of Leeds. Her research examines the connections between resource use (energy and materials, greenhouse gas emissions) and societal performance (economic activity and human wellbeing). She is interested in quantifying the current and historical linkages between resource use and socioeconomic parameters, and identifying alternative development pathways to guide the necessary transition to a low carbon society.

Shahzeen Attari (Presenter) is an Associate Professor at the O'Neill School of Public and Environmental Affairs at Indiana University Bloomington. Her research focuses on the psychology of resource use and how to motivate action on climate change. Along with her lab, she works on problems that draw on both cognitive and environmental science, and focus on perceptions, motivations, and biases related to climate change and sustainability.

Matthew Goldberg (Presenter) is an Associate Research Scientist at the Yale Program on Climate Change Communication at Yale University. His research focuses on persuasion, social influence, ideology, and strategic communication. He applies insights from his research to build public understanding and motivation to address climate change and other urgent environmental, social, and political issues.

Workshop structure

We propose a half day workshop which will be centered around two key themes. The first theme will be centered around understanding climate change denial and countering climate misinformation. The second theme will focus on motivating action on climate change. Each presenter will give a talk that will be 17 minutes long followed by a 2-3 minutes session for Q & A. We will end the workshop with a 45 minute panel discussion that will cover current challenges, opportunities, and future directions for research. The panel will also include discussions about how early career researchers can get more involved in climate communication and policy-making.

Table 1: Workshop structure and confirmed presenters.

Presenter	**Topic**
Theme 1: *Climate belief formation*	
Tali Sharot	Forming beliefs about climate change
Jiaying Zhao	Attentional and perceptual biases of climate change
Gordon Pennycook	Why do people believe what they believe about climate change?
Stephan Lewandowsky	Public acceptance of climate science in a 'post-truth' world.
Theme 2: *Motivating action on climate change*	
Julia Steinberger	Living well within planetary limits
Shahzeen Attari	Credibility and climate communication
Matthew Goldberg	Strategic communication about climate change.
All presenters	Panel discussion

References

Bar-On, Y. M., Phillips, R., & Milo, R. (2018). The biomass distribution on earth. *Proceedings of the National Academy of Sciences*, *115*(25), 6506–6511.

Cardoso, P., Barton, P. S., Birkhofer, K., Chichorro, F., Deacon, C., Fartmann, T., … et al. (2020). Scientists' warning to humanity on insect extinctions. *Biological Conservation*, *242*, 108426.

Ceballos, G., Ehrlich, P. R., & Dirzo, R. (2017). Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines. *Proceedings of the National Academy of Sciences*, *114*(30), E6089–E6096.

Clayton, S., Devine-Wright, P., Stern, P. C., Whitmarsh, L., Carrico, A., Steg, L., … Bonnes, M. (2015). Psychological research and global climate change. *Nature Climate Change*, *5*(7), 640–646.

Fischhoff, B. (2020). Making behavioral science integral to climate science and action. *Behavioural Public Policy*, 1–15.

Nielsen, K. S., Clayton, S., Stern, P. C., Dietz, T., Capstick, S., & Whitmarsh, L. (2020). How psychology can help limit climate change. *American Psychologist*.