

## RESEARCH ARTICLE

# Live streaming at international academic conferences: Ethical considerations

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Anthropogenic global warming (AGW) and the long tradition of political failures to address it have created an unprecedented global crisis. Individual carbon footprints are higher in industrialized countries; in that context, academics contribute substantially by flying to conferences. How and why should the global academic community respond to this situation? We evaluate the seriousness and urgency of AGW, consider relevant ethical theory, and compare possible academic strategies, focusing on communication technologies in conference culture. We argue that academic privilege facilitates climate action. Academics are well placed to understand and explain complex material including relevant ethical theory. Academics are extensively networked with local, regional, and international students and colleagues. Academics can significantly reduce their greenhouse-gas (GHG) emissions by avoiding flying to conferences and developing low-GHG conference formats. Academic leadership is needed to courageously address the moral issues and take advantage of modern internet-based communication technologies. Social equity issues are also relevant. International conferences that include live streams are more global and accessible (independent of each participant's finances), and hence more culturally diverse. Video recordings complement existing academic documentation, communication, and dissemination. Individuals can reduce their carbon footprint by focusing on regional conferences, contributing remote presentations to distant events, and by contributing to political discussions—putting pressure on governments, institutions, and corporations to change. By combining individual action with social leadership, academic climate action may significantly reduce future the environmental damage and human impact of AGW.

**Keywords:** Conference; Semi-virtual; Multiple-location; Live stream; Greenhouse-gas Emissions; Cultural diversity

## Introduction

The International Civil Aviation Organization (ICAO.int) estimates that aviation contributed 2% of global CO<sub>2</sub> emissions in 2006. If aviation has been growing at 5.3% per year since 2000 (Freeman et al., 2018), and total global emissions are relatively stable, emissions from aviation have almost doubled since then, and now lie between 3% and 4% of all emissions (cf. ICAO, 2016). Aviation may have produced 4.9% of global radiative forcing as early as 2005, and CO<sub>2</sub> emissions from aviation could increase fourfold between 2000 and 2050 (Owen et al., 2010). ICAO (2019) found that “by 2045, international air traffic (expressed in revenue tonne kilometres) is expected to increase by 3.3 times” (p. 1); during that time, “fuel consumption is projected to increase by 2.2 to 3.1 times compared to 2015” (p. 2). By then, aviation might account for 25% of the global carbon budget. These figures may be a gross underestimate: Graver (2019) calculated that the emissions growth rate over the past five years was 70% higher than that assumed by ICAO.

Greenhouse gases (GHGs) from flying remain in the atmosphere for different periods (Berntsen & Fuglestvedt, 2008) and their effect depends on altitude. In order-of-magnitude estimates, CO<sub>2</sub> and NO<sub>x</sub> (nitrous oxide) stay in the atmosphere for roughly a century, CH<sub>4</sub> (methane) for roughly a decade, and H<sub>2</sub>O (water vapor) for hours or days. Interactions between GHGs from flying are complex, and radiative forcing from relevant GHGs (including ozone and methane) vary considerably. It is nevertheless clear that aviation's total contribution to anthropogenic global warming (AGW) is much larger than that of the emitted CO<sub>2</sub> (Penner et al., 1999).

While emissions per person-km are falling due to increases in aircraft efficiency (roughly 1% per year), the aviation industry as a whole is growing faster. Total emissions from aviation are increasing both absolutely and relative to other sectors. To achieve the 1.5°C AGW limit and avoid the multiple catastrophic and irreversible effects of 2°C of warming (Masson-Delmotte et al., 2018), unprecedented sharp cuts will be required in all sectors, starting in 2020. By 2050, emissions should be zero across the board. If current trends continue, by 2050 emissions from aviation alone will correspond to 100% of the global carbon budget to keep AGW below 2°C (Bows et al., 2008), let

alone 1.5°C. Biofuels are no alternative if they indirectly cause rainforest destruction (Rye et al., 2010).

The university sector is an important contributor to global GHG emissions, especially through the flying activity of academic staff. Aviation represents roughly 1/3 of total emissions of universities and individual academics<sup>1</sup> (Achten et al., 2013), but few universities are providing the relevant data. According to Mobilitätsplattform ETH Zürich (2019), roughly half of the total GHG emissions of Switzerland's leading university are from flying. A recent study at the University of Ghent, Belgium, found that the average employee was flying 20,000 km per year (Paul Peeters, personal communication).

The other emissions of a university involve for example construction, heating, lighting, surface transport, shopping (food, clothes, electronics), and garbage and water management. By comparison, one of the easiest ways for an academic individual, an academic society, or a university to reduce emissions immediately and significantly is to avoid flying. Emerging internet-based communication technologies make it possible to reduce conference emissions while at the same time enhancing academic quality and productivity and improving the conference experience. A corresponding reform of academic conference culture is therefore urgently necessary (Anglaret et al., 2019).

### Changing academic conference culture

Contrary to the well-known findings of climate science, today's academic conference culture continues to put academic colleagues under pressure to burn large amounts of fossil fuels. A typical call for papers indirectly sends the following message: Either participate physically in our conference or miss out on exposure that could lead to a grant, fellowship, position, or any other benefit of informing others about your work. Whereas only publications in good journals are directly career-relevant, it is widely believed that informal contacts made at conferences have a strong indirect effect.

In recent years, emerging internet communication technologies have made it possible to replace this problematic message by a new, positive alternative: Anyone anywhere whose abstract submission is accepted by double-blind peer review can participate remotely, which makes the conference more global and diverse without affecting its dynamic, personal character. This promise can be fulfilled in different ways. Live streams can be incorporated into both single- and multiple-location semi-virtual conferences (described in detail in a companion submission). In both cases, the personal character of the conference can be maintained. While participants can no longer meet all other participants face to face, the total number of possible virtual encounters can be increased, along with their cultural diversity and hence the likelihood of developing novel, productive collaborations.

Such formats also make it easier for participants with limited financial resources to participate. The combined cost of travel (usually by plane), accommodation (usually in a rich country), and registration far exceeds the budget of many international colleagues; electronic communication makes it possible to reduce all of these costs. In this

way, an academic conference can become more accessible and culturally diverse at the same time as it reduces its carbon footprint.

YouTube live streams have been publicly available since 2013, but to our knowledge academic conference organizers failed to take advantage of this development until 2018. In that year, the authors co-organized the International Conference on Music Perception and Cognition (ICMPC) at four interconnected hubs (located at universities in Austria, Canada, Argentina, and Australia). Carbon emissions per participant were reduced by 60–70% relative to a single-location conference (had all participants traveled to that location).

All participants at all hubs (about 600—mainly active, presenting talks and posters) were asked to take a short internet survey toward the end of the conference, for whom about 200 did so; organisers, support teams (hospitality), and technicians did not participate. Participants were first asked to “evaluate the semi-virtual conference format from your personal viewpoint on the following scale” (0 = extremely bad, 10 = extremely good). Twenty respondents chose the scale's mid-point and 109 (61% of the remainder) chose a higher number. Although there were many complaints about the new format in the qualitative part of the survey, the main quantitative result demonstrated that the average participant approved.

Given that a development of this kind has been possible for a long time, it is interesting to consider broader issues. Why are academic conference traditions so slow to change, in spite of the emerging technical possibilities? What is preventing organizers from moving forward? There has been recent progress in this direction, including the Stay Grounded Network ([stay-grounded.org](http://stay-grounded.org), with over 100 member organisations) and the Academic Flying Blog ([academicflyingblog.wordpress.com](http://academicflyingblog.wordpress.com)). But most academics are still flying in the conventional way to conventional conferences, and the total amount of academic flying is presumably increasing at about the same rate as the aviation industry (5% per year).

### General ethical considerations

More than ever, morality and ethics have become a question of human survival in the 21<sup>st</sup> century. The word “morality” emphasizes individual approaches to right or virtuous conduct, whereas “ethics” refers to moral systems, theories, and groups such as religions. It is interesting to consider existing ethical theory in the context of AGW. The academic discipline of philosophy distinguishes the following approaches:

- Normative ethics refers to what should be done from an ethical standpoint. It is the main focus of this paper.
- Descriptive ethics is about what is being done, or what people currently think should be done (beliefs about morality). It is also called comparative ethics if it compares the moral beliefs of different groups. Descriptive ethics involves the academic disciplines of empirical sociology and psychology. One might for example ask how randomly selected people think aca-

demics should be responding to the climate crisis, or how academic colleagues justify flying to conferences despite AGW.

- Applied ethics is about putting moral knowledge into practice. The technical guidelines in our companion submission are an example.

These three points focus on humanities, sciences, and practically oriented disciplines respectively, but with considerable overlap. Combining them in new ways could achieve interesting synergies and lead to constructive ethical action.

Regarding normative ethics, Kant (1785/1993, vol. 4, p. 421) proposed that one should “act only according to that maxim whereby you can, at the same time, will that it should become a universal law”. This “categorical imperative” was part of Kant’s deontological (duty- or rule-based) ethics. The categorical imperative implies, for example, that no-one should drive a car, because if driving a car was a universal law, then all adults in the world would drive a car, with disastrous ecological consequences. By contrast, consequential ethics are based on the consequences of an action. In a consequential approach, it is possible for some people to drive cars and not others, provided the proportion of drivers is small enough.

AGW is primarily about consequences, suggesting a consequential approach. The advantage of rule-based (deontological) ethics is that a general ethical principle is easier to explain and quicker to apply. In a political context, it may be pragmatic to avoid the details of AGW, including the enormous academic literature, and instead focus on a primary message based on the categorical imperative, for example: If you want the world to solve the climate crisis for the sake of our children and future generations, and your carbon footprint is relatively high relative to the global average, reduce your own emissions and those in your sphere of influence first.

Consequentialism and deontology are two approaches within normative ethics. A third is virtue ethics. Virtues such as honesty or generosity are reliable, positive character traits that are held to make their possessors good human beings. The four cardinal virtues of Greek antiquity may be implicit ingredients in any workable solution to any social crisis—including the climate crisis and the question of flying to academic conferences. *Wisdom* (prudence) is the ability to judge the correct course of action, for example individual footprint reduction versus political activism. *Justice* (fairness) is central given that rich countries are the main source of emissions but the consequences will be felt more strongly in poorer countries, and the present generation is destroying the environment for future generations. *Courage* helps concerned academics challenge reluctant colleagues to realize climate-friendly policies in the interest of the majority. *Temperance* ensures that action is both collective and constructive, keeping counterproductive conflict to a minimum.

### Anthropogenic global warming

The impending global climate catastrophe has been described from various perspectives including human

rights (Caney, 2010), health (Friel et al., 2008; Haines, 2006), food security (Gonzalez, 2011), conflict (Nordås & Gleditsch, 2007), and migration (Smith, 2007; Warner et al., 2010). We are experiencing the earth’s sixth mass extinction event, to which AGW is a major contributor (Ceballos et al., 2015). Likely consequences include increasing ocean temperatures and acidity, the irreversible destruction of all coral reefs (Burke et al., 2011), melting polar ice and glaciers, rising sea levels, and more frequent dangerous storms, floods, droughts, heatwaves, and bushfires (Masson-Delmotte et al., 2018).

From a human rights perspective, the main consequence of AGW will be the premature deaths of untold millions of people as it exacerbates famine, disease, war, and forced migration (Parncutt, 2019). Based on a series of plausible assumptions, Nolt (2011) calculated that “The average American is responsible, through his/her greenhouse gas emissions, for the suffering and/or deaths of one or two future people” (p. 3). Similarly, “Climate change will cause large numbers of casualties, perhaps extending over thousands of years” (Nolt, 2015, p. 347). The end of human civilization is a possible outcome (Leahy et al., 2010). Whether and under what conditions humanity will survive (Hamilton, 2010; Lovelock, 2009) will depend on how swiftly humans reduce their carbon emissions and how the global climate system responds to critical “tipping points” (Bolt et al., 2018).

Even without AGW, life expectancies in developing countries are decades lower than in rich countries. Life expectancy by country depends on per capita income (Bloom & Canning, 2000) and varies between roughly 40 and 80 years (United Nations, 2017). As the 21st century proceeds, AGW will increase existing mortality rates in connection with hunger, disease, conflict and migration, and reverse progress toward the Sustainable Development Goals. In Africa, where hunger is still causing millions of deaths every year, food and water resources may halve by 2100 due to multiple interacting negative effects of AGW, including loss of biodiversity (and associated effects on food, water, erosion, and dryland salinity; Simon, 2018), location-specific effects on agriculture (Sonwa et al, 2017), soil degradation (Lai, 2007), and extinction cascades (Schleuning et al., 2016). During the same period, African population will triple (Samir & Lutz, 2017).

According to risk assessment theory (as applied in medicine, engineering, and actuarial science), an event that kills the entire future human population of ~10 billion with a probability of 10% is equivalent to an event that causes one billion deaths with a probability of 100%. The risk, expressed mathematically as the loss multiplied by the probability, is equal in both cases. Even if the probability of human extinction due to AGW in coming centuries is relatively low (say, 10%), the risk is nevertheless the greatest humanity has ever faced. A rational response should therefore be massive and unprecedented.

As cautiously formulated here, the above points have the status of scientific facts. They are consistent with the reports of the Intergovernmental Panel on Climate Change (ipcc.ch)—perhaps the most carefully reviewed texts in academic history. On the whole, IPCC predictions have

tended to be conservative (Brysse et al., 2013; Rahmstorf et al., 2012; Scherer, 2012).

The 2015 Paris conference was hailed as a milestone, but economically it changed little (Spash, 2016). Even if all nations kept their agreements, global mean surface temperature would probably reach +3°C (relative to pre-industrial temperatures) by 2100 (Rogelj et al., 2016). The world's nations have repeatedly failed to keep climate agreements (Esty & Moffa, 2012), suggesting that humanity may be heading for 4°C by 2100. Reasons include “the multiple scales of political decision making involved; the fragmented and blurred roles of state and non-state actors; and the deeply embedded nature of many of the processes that lead to emissions of GHG in everyday processes of production and consumption” (Bulkeley & Newell, 2015, p. 2).

In sum, there is scientific consensus on the following points:

- The IPCC reports suggest that AGW will be catastrophic. It already represents a mortal threat to a billion children now living in developing countries. In the longer term, it threatens the survival of all humans. The repeated failure of the global political community to act on scientific warnings has made AGW a global emergency.
- AGW is mainly caused by humans burning fossil fuels, clearing forests, raising cattle and so on. The contribution of anthropogenic GHG emissions to the gradual rise in global mean surface temperature during the past century is an order of magnitude greater than that of natural process such as volcanoes or changes in the earth's orbit (Matthews et al., 2014).
- Although governments and multinational corporations will play a central role, AGW is ultimately driven by billions of individuals who are making predominately free choices on predominately free markets in areas such as food, transport, and consumption. These include academics deciding to fly to conferences.
- Humans are not well adapted to respond constructively to this problem, but may be motivated to act if presented with clear explanations, rules, and guidelines.

### The psychology of denial

It is not easy to understand the consequences of AGW, especially if they are new or invisible (Stoknes, 2014). During evolution, primates and other animals adapted for fast and efficient assessment of real-life situations. Humans are predisposed to focus on events that are proximate in time and space (e.g., fight or flight), to conserve visible local rather than invisible global resources, and to respond to immediate events rather than gradual changes (Stoknes, 2014). Abstract, opaque, or complex interactions were usually less relevant for survival.

The human mind cannot easily assess the outcome of combined or interconnected probabilities, or complex chains of cause and effect (Fiedler et al., 2000; Gigerenzer & Hoffrage, 1995; Pennycook & Thompson, 2017; Tversky & Kahneman, 1974). When making decisions today, humans still overwhelmingly apply simple heuristics. We

tend not to evaluate the interplay of abstract novel factors including complex non-linear interactions (Dietrich, 2010), which is increasingly necessary in modern technological societies (Haselton et al., 2015). That can explain why politicians and voters have been slow to respond to the horror scenarios of the documentary film *An Inconvenient Truth* (David et al., 2006).

It may be easier for the general public to understand and promote a general moral duty or rule. Consider the histories of religion and law. One of the most influential ideas in Christianity is the ten commandments—a list of universal moral principles. The Universal Declaration of Human Rights has a similar rule-based character. Whether that applies to academics attending conferences is an open question. A rule-based approach may be demotivating if rule-breaking leads to punishment or guilt (Tyler, 2006).

When the effects of AGW are downplayed or denied, psychological coping or defense mechanisms may be the reason. Avoidance strategies (Krohne, 1993), such as positive illusions (Makridakis, & Moleskis, 2015) and external attribution of emerging problems (Lilienfeld et al., 2010) can reduce stress. In the short term, coping mechanisms may be beneficial to individual well-being, but in the long term they may lead to social and environmental problems.

### Climate ethics for academics

Given the lethal consequences of human emissions for current and future people, especially (but not only) in developing countries, one might reasonably argue that every individual has a moral obligation to reduce those emissions, share relevant information, and get involved in civil and political processes to put governments, institutions and corporations under pressure to respond constructively to the findings of climate science. For practical reasons, this applies especially to those whose personal emissions are relatively high relative to the global average (that is, most rich and middle-class people in rich and industrialized countries).

This claim is based on the following logic.

1. All emissions can be assigned, either directly or indirectly, to individuals. For example, all emissions produced by a flight can be assigned to the passengers in proportion to the price of the tickets, business class passengers effectively producing more emissions than economy class. The emissions produced by a coal-mine feeding a power plant can be assigned similarly to those who are using the electricity.
2. That being the case, global emissions can only be reduced if individuals reduce their personal emissions. Conversely, if individuals do not reduce their emissions, global emissions cannot be reduced.
3. One individual might theoretically claim to have greater right to produce emissions than another. But that claim would have to be based on criteria of a kind that could feasibly become universally accepted and subject to international agreement. The authors are not aware of any such criteria.

The following very rough order-of-magnitude estimates illustrate the size of the academic emissions problem. There are some 30,000 institutes of higher education in the world, of which 1000 or so are typically included in global rankings (QS, Times Higher, Leiden, Reuters and so on). Consider 20,000 institutions with 250 research-active staff members each: that's 5 million academic colleagues. Each of them flies 3 times per year to an international conference (usually in a foreign country), and in so doing burns 1.5 tonnes of carbon (equivalent) per year, producing 5 tonnes of CO<sub>2</sub>; these numbers are relative to the average annual footprint, which for Austrians is 7 tonnes CO<sub>2</sub> and for Australians 15 tonnes (World Bank, 2019). These academics alone are burning roughly 7 million tons of carbon per year, which is almost 0.1% of global fossil-fuel consumption (10 billion tons of carbon per year).

Relatively, 0.1% may seem like a small proportion. But these 5 million people also have a special status as knowledge multipliers. Academic privilege facilitates climate action (Nevins, 2014). Academics are well educated and relatively well informed about AGW, good at explaining the underlying concepts, and well connected—both to students and to academic colleagues in national and international networks. One academic can reach thousands of people. A change in the flying habits of academics, motivated by the above arguments, could have significant global effects. If some academics stop flying, a significant proportion of other academics and their students will follow suit, which will help put business people under pressure to change their flying behavior, and so on.

The academic failure to respond adequately to the implications of climate science is not only a problem for future generations in developing countries. It is also undermining purely academic interests. Academic societies and associations exist to promote their respective disciplines. They do that by maintaining and developing structures that will serve future generations of academics. Awards and financial support are given to promising young scholars and researchers. It is counterproductive to undermine the future development of those structures by contributing to AGW or missing valuable opportunities to mitigate it.

### **Has the conventional conference format become unethical?**

In the decades following the Second World War, it gradually became increasingly common for academics to fly to international conferences. Until about the 1990s, most colleagues were uninformed about the relationship between emissions and AGW, so the image of international conferences was entirely positive. Among other things, they contributed to international understanding and world peace. Since about the turn of the millennium, the problematic nature of international conferences (given AGW) has become increasingly clear, but there has been little change in academic flying behavior.

The underlying social process is political. The most influential and respected academic colleagues are those who publish in the best journals and are frequently invited to give keynotes. Flying frequency or miles may therefore

predict academic prestige, and popular keynote speakers may therefore perceive any discussion about conference GHG emissions as a personal accusation. Other colleagues depend on the goodwill of these “high flyers”, which can explain why the emissions problem is seldom discussed.

There may be a collective reluctance to discuss the extent to which academic conferences are contributing to AGW, or to consider solutions. Instead, there is widespread agreement about the importance of presenting research at international conferences and meeting influential colleagues personally. Young academics who are aware of the ethical implications are under subtle pressure to quietly cooperate or risk future unemployment.

But the seeds to a solution have been growing in parallel with the problem. Communication technology has improved incrementally. Major steps included internet, email, and social media. Powerpoint became available on Macintosh computers in 1987, but only replaced overhead plastics as the normal mode of conference presentation some 15 years later. YouTube live streaming became publicly available in 2013; it could now be the key development that allows conference organizers to improve conferences while at the same time reducing emissions. For this reason, and considering the well-known negative consequences of AGW, one could argue that it has become ethically unacceptable to require an academic colleague to burn a large amount of fossil fuel as a precondition for participation in a major academic event.

The solution is not to give up academic conferences, but to improve them. We need to approach the problem practically, considering the relevant arguments and implementing promising ideas (Costello et al., 2011). Emerging technologies can be used to improve conferences in several ways:

- include academic colleagues who would not otherwise have participated for financial reasons;
- increase the number of submissions and the cultural, geographic, and economic, diversity of participants, which in the long term enhances the standard and relevance of the academic content;
- make the conference global (achieving a global balance) rather than merely international;
- improve the conference experience for individual participants; and
- drastically reduce per-capita emissions.

This constructive approach resolves a moral dilemma. Emerging internet-based communication technologies allow conference organizers to respond to the needs of both contemporary colleagues and future generations at the same time. It is no longer a matter of choosing between the two.

It might also be useful to develop a systematic approach to evaluating the importance of flying to conventional conferences in specific cases. The existential implications of climate change suggest that traveling to conventional conferences (and hence indirectly exacerbating a future global catastrophe) could be only justified if that activity was contributing significantly to:

- reducing the risk associated with future climate change (for example, by promoting understanding, political collaboration, mitigation, or adaptation to reduce the impact of future climate change);
- reducing the frequency or severity of human rights violations of any kind, either in the context of climate change or independently of it; or
- resolving international conflicts that could otherwise lead to violence and associated deaths.

### The moral potential of academics

Given this background, what relationships might exist among the relevant knowledge, morality, motivation, and flying behavior of academics? In a hypothetical qualitative study of academic attitudes to this problem, in which individual academics are asked why they choose to fly to a conference knowing that the flight would considerably increase their annual carbon footprint and that AGW is an existential threat to humanity, one might reasonably expect the following answers:

- My career depends on my attending this conference.
- I feel powerless to change the system.
- I am waiting for others to show leadership; when they do, I will follow.
- I am too occupied with other thoughts to consider this; I have to write my talk and consider how my family will cope in my absence.
- To be a successful academic, competing with many for a small number of academic positions, one needs to be obsessed with one's topic, which doesn't leave much cognitive space for political or environmental issues.

These are reasonable responses when considered out of context, but the addressed issues are trivial relative to the implications of AGW. One might expect academics to be better informed than the general public about the details and implications of climate research, because academic qualifications put people in a better position to evaluate the public discussion. Many are already working to reduce academia's carbon footprint.<sup>2</sup>

If that is so, why are many academics still ignoring the increasingly urgent scientific warnings? The situation is remarkable for several reasons. The warnings are coming from within the academic system—not from politics or society. It has been known for decades that the carbon emissions of individuals in rich countries (where most people have paler skin) are far higher than in poor countries (where most have darker skin), which contradicts the anti-racist stance of most academics. Many academic disciplines have developed extensive ethical guidelines to promote human rights and social justice (especially for women and minorities) and avoid causing net harm to humans or non-human animals in the course of research (e.g., Leong et al., 2017); academic flying habits clash embarrassingly with such guidelines. Academics may rightly complain about a lack of authentic leadership in modern politics (e.g., Gardner et al., 2011), but at the same time fail to provide climate leadership within academia.

Hales and Caton (2017, p. 94) summarized the dilemma facing internationally mobile academics:

Our stories highlight that the tensions between normative positions on climate change and travel activities are bound up in the ethical proximal relations that compel intimate contact with others, create the need for face-to-face contact and impel obligation in family/work/social domains in a globalised world. Proximity ethics illuminates the flyer's dilemma as a complex and tenuous web of moral decisions, in which care and proximity play key roles in guiding actions.

Gössling and Peeters (2007) listed structural and psychological reasons why people in industry might downplay the negative impact of flying on the environment, such as inflexible infrastructures, limited knowledge, skepticism of expert opinion, anti-environmental worldviews, comparisons with key peers, economic issues, and fear of change. Gifford (2011) observed that

too few global citizens engaged in high-greenhouse-gas-emitting behavior are engaged in enough mitigating behavior to stem the increasing flow of greenhouse gases and other environmental problems. (...) Although many individuals are engaged in some ameliorative action, most could do more, but they are hindered by seven categories of psychological barriers, or "dragons of inaction": limited cognition about the problem, ideological worldviews that tend to preclude pro-environmental attitudes and behavior, comparisons with key other people, sunk costs and behavioral momentum, discredence toward experts and authorities, perceived risks of change, and positive but inadequate behavior change.

Regarding peer comparison, individuals may expect other individuals to reduce first rather than reducing themselves. Does the same apply to groups? The conference-attending behavior of academics suggests an implicit belief that other professions should reduce their carbon footprints before academics do so. Perhaps many are not yet aware of the catastrophic consequences of such an attitude or the relevance of Kant's categorical imperative.

Does the higher level of education of academics make them more likely to respond constructively to the climate crisis? In a survey of the climate-change risk perceptions of 1540 U.S. adults, Kahan et al. (2012) observed that

Members of the public with the highest degrees of science literacy and technical reasoning capacity were not the most concerned about climate change. Rather, they were the ones among whom cultural polarization was greatest. This result suggests that public divisions over climate change stem not from the public's incomprehension of science but from a distinctive conflict of interest: between the personal interest individuals have in

forming beliefs in line with those held by others with whom they share close ties and the collective one they all share in making use of the best available science to promote common welfare. (p. 732)

This statement suggests that the motivation of academics to respond constructively to the challenge of AGW depends more on their ethical stance than on their scientific understanding. If that is true, texts of the present kind may do little to solve the problem. Rather, we need to demonstrate how conference culture can be changed, as the authors did at ICMPC15/ESCOM10 (music-psychology-conference2018.uni-graz.at).

After interviewing groups of randomly selected individuals in Switzerland about climate mitigation measures, Stoll-Kleemann et al. (2001) reported that

To overcome the dissonance created in their minds they created a number of socio-psychological denial mechanisms. Such mechanisms heightened the costs of shifting away from comfortable lifestyles, set blame on the inaction of others, including governments, and emphasised doubts regarding the immediacy of personal action when the effects of climate change seemed uncertain and far away. (p. 107)

Similarly, it is common among academic conference participants to regard the “conference experience” and the needs of conference participants as more important than mitigating AGW, or to refer to AGW as if it were an everyday problem among many others. When academics discuss the implications of AGW for conference culture, as they did at special sessions in ICMPC15/ESCOM10, the focus is typically on what is best for conference participants. The discussion tends to sidestep the well-known catastrophic consequences of AGW and the rights of today’s children and future generations and foreseeable improvements in the experience of audiovisual electronic communication at conferences, depending on how often it is used.

Discussions about alternatives to the conventional conference focus on the importance of face-to-face interaction—considered essential for the progress of research. One might even argue that academics have a right to fly regularly to exotic locations—a justifiable reward in exchange for long, lonely hours working on research projects and academic paper submissions. The excitement of conference travel may be seen as an advantage of academic careers that makes up for time spent in front of a computer. But the right to life of a billion children in developing countries is surely incomparably more important than any of the issues that academics may confront when deciding whether or not to fly to a conference. That includes decisions that affect academic, social, and family relationships and caring commitments for both older and younger family members.

To be sure, there are other ways to address the climate crisis than to reduce or stop flying. But regardless of coming international political developments, and given current global rates of deforestation and reforestation and

the massive risks associated with geoengineering solutions, CO<sub>2</sub> concentration can only be stabilized if the average person reduces her or his personal carbon footprint to below the sustainable level, which is 2 to 3 tonnes CO<sub>2</sub> per year per person (cf. Le Quéré et al., 2018). That estimate corresponds to the sum of all global natural carbon sinks in the ocean, soil, and biomass divided by world population. In practice, that will not allow for any flying at all.

### Strategies

In this situation, it is important to translate theory into action (Ostrom, 2012), striving for a balance between the following three approaches:

*Personal.* Set an example by reducing personal emissions. Reduce demand for carbon-based products in the marketplace and encourage others to do the same. Attend and promote high-quality online conferences. Don’t fly to a conference unless invited. Take the train if the trip is less than 24 hours (work during the day and sleep on a night train). Expand disciplinary horizons by attending nearby conferences in neighboring disciplines. If you do fly uninvited to a conference, attend the entire conference and combine the trip with a long holiday to reduce your daily GHG footprint (cf. Luzecka, 2016). If that is not possible, ask to give a remote presentation. Depending on location, strategies of this kind are easier for some than for others; the first author has implemented these ideas since 2014, attending more conferences in his hometown Graz and taking the train to conferences in Madrid, Oxford, Birmingham, Dijon, Ghent, Maastricht, Prague, Vienna, Geneva, Genova, Katowice, Warsaw, Łódź, Budapest, and Cluj. Note that train infrastructure is generally better in Europe than in USA or Australia. But it still takes about 24 hours to travel from Vienna to Barcelona or London, just as it does from Boston to Chicago. By comparison, Melbourne to Sydney by train takes 12 hours. Depending on destinations and routes, it may help to combine buses and trains.

*Collegial.* Work together with colleagues to reduce the collective emissions of academic conferences. University cultures and professional norms are generally flexible and can be negotiated. Instead of financing flying, universities could finance excellent but unfunded research projects. Instead of deriving inspiration from long trips to exotic conferences, academics could focus on untapped regional or industry collaborations. In discussions of work-life balance, the relative importance of holiday time with families by comparison to international conference travel could be systematically evaluated.

*Political.* Get involved in political climate action. That is no less important, given that 100 companies have caused 71% of all global emissions (Griffin, 2017). Every academic has a different legitimate sphere of influence.

The development of alternative conference formats and procedures is an important collegial strategy. Conference organizers can choose between:

- one versus many or zero physical conference locations
- one-way (e.g., YouTube live streams) versus two-way (e.g., Zoom) streaming versus a mixture
- real-time versus delayed transmission of individual presentations depending on international time differences
- written versus spoken discussion (use of electronic chat forums)
- with or without a *global foyer* (virtual socializing during coffee breaks)

But mere awareness raising and goodwill may be insufficient to sustainably reduce aviation emissions in the long term:

Participation in the high-carbon air travel regime is a social convention, and transition from social conventions requires coordination among players. Our theoretical discussions lead us to conclude that it is our moral duty to promote coordinated collective action, via national or global policy mechanisms, to address tourist aviation emissions. (Higham et al., 2018)

It appears that “coordinated collective action” is now necessary, given that AGW will probably get worse every decade for the next century. The process could begin with decisions by individual academic societies to reduce flying to conferences (e.g., *escom.org*). Universities could invest in the development of low-carbon conferencing and promote talks, articles and videos that explain the advantages to academic colleagues. Societies might then get together across disciplines (perhaps within the UN) to encourage governments to implement corresponding legislation.

Regarding politics, the general public would be in a better position to respond constructively to the climate crisis if people had more time to reflect on their situation; if education gave children the tools they need for that kind of reflection; and if financial means covered basic needs. Long-term political strategies may therefore include promoting shorter working hours and universal basic income. For schoolchildren, it is possible to train empathy and prosocial behavior (Feshbach & Feshbach, 2009), for example through meditation, conflict resolution, artistic activities, and awareness raising about how students feel about each other and the social consequences of behavior. We should also consider fundamental aspects of human psychology. Human behavior depends on both emotion, processed primarily by the limbic system, and rational thought, processed by the cortex (Vaezipour, 2013); “affective decision strategies may be more effective relative to deliberative strategies for certain complex decisions” (Mikels et al., 2011, p. 743).

### Working with administrators

Colleagues proposing a low-carbon conference may experience resistance from university administrators. Although most universities are trying to promote a positive environmental image, with detailed information in the internet about their projects in the area of sustainability, conference organizers will nevertheless need to explain repeatedly and in different ways how a low-carbon

conference can visibly and effectively contribute to that larger project. Administrators might then be inspired to take concrete steps toward sustainably reducing conference emissions. Arguments might include the following:

*Quality.* Remote presentations benefit academic conference programs by adding material. Quality improves if there is more competition for limited program space and the rejection rate is increased.

*Equity.* All potential conference participants should be treated equally. Inclusion in the program should depend only on academic quality. At regular conferences, this criterion is not fulfilled; many cannot afford the cost of registration, travel, and accommodation. Travel awards and scholarships are costly in terms of finance and administrative effort. The cost of remote presentation (technology, technicians) is smaller relative to its multiple benefits.

*Ethics.* It has become easy to add high-quality remote presentations to a conference program while at the same time reducing emissions. Therefore, it has become ethically problematic to organize a single-location conference without the option of remote presentation. It is similarly problematic to promote a conference format that indirectly excludes non-rich participants. Increased cultural diversity can bring new unconventional ideas and a more open and tolerant discussion culture.

The more colleagues try out alternative electronic conference formats, the better the technology will become. The better the technology becomes, the better will be the “conference experience”. In future, people might wonder why our generation took such a long time to take advantage of the benefits of modern communication technologies, just as we today wonder why we continued to use overhead projectors for 10–20 years after the advent of Powerpoint in 1987.

Administrators who are unconvinced by arguments of this kind might instead consider the financial aspect. Universities spend enormous amounts funding academic conference trips. When low-carbon conferences become the norm, that price tag will be significantly reduced. For an academic in a high-GDP country that participates in a semi-virtual conference, travel costs will usually fall, while registration and accommodation stay about the same. For an academic in a low-GDP country who travels to a semi-virtual conference hub in the same or another low-GDP country, all three main costs will fall substantially: travel, registration, and accommodation. At the same time, international and long-distance national participation in local events will increase due to virtual participation. In this way, conferences will attract more attention to the research of the university and increase the chance of successful long-distance collaboration.

### Conclusions

At first sight, it may seem unrealistic to expect academics to lead the world out of the climate crisis. But by comparison to people in other professions, academics are in a remarkably good position to do that (Nevins, 2014):



- Academics with secure positions in rich countries have considerable freedom of speech in practice. Global infrastructures of academic research and publication can only work efficiently if they allow for and promote diverse viewpoints.
- The above-average education and social/electronic networking of academics makes it easier for them to act for the common good. The potential to contribute significantly to a better future implies a moral obligation to do so—just as rich countries have a greater obligation to contribute to solutions than poor countries, by virtue of their greater resources.
- Academics are in a good position to understand and resist racism and discrimination. In an intersectional approach, AGW may be considered racist in the sense that the main perpetrators are or were white and the main victims are or will be non-white (Kaijser & Kronsell, 2014). We are horrified that earlier generations of academics passively supported racism, especially in the context of the Holocaust and other cases of genocide. Today, we are passively supporting a global economic system that appears to be slowly but surely destroying the future of humanity. Academics are more likely than others to understand and accept such arguments.
- Academics are well-equipped to self-reflect and understand behaviors and motivations. One might expect that background to facilitate prosocial behavior, including the kind of fairness and care (rather than authority) that motivates individuals to reduce their emissions: “care is the most cross-culturally significant predictor of climate change attitudes and norms” (Jansson & Dorrepaal, 2015, p. 391). Kohlberg’s psychological theory of moral development (Kohlberg & Hersh, 1977) may also be relevant, notwithstanding feminist critique (Jorgensen, 2006). The theory defines three levels, of which Level 3 is the “post-conventional, autonomous, or principled level”—oriented toward social contracts and universal ethical principles. While anyone might approach Level 3 regardless of background (including educational level), the privilege of academic training may make it easier for academics to deliberately aspire to this level and develop consequentialist rather than rule- or duty-based strategies. The latter are typical of levels 1 (obedience and punishment) and 2 (individualism and exchange).
- Academics constitute only a small proportion of the overall population that travels by air and their behavior is unlikely to significantly influence the larger worlds of business travel and tourism. Academics are nevertheless in a good position to motivate new social trends. Media contributions by high-profile non-flying academics could inspire business discussions on the ethics of flying, eventually leading to higher flight or carbon taxes. Environmental taxes are commonly regarded as an efficient economic strategy to reduce flying in all sectors including academic, business, and tourism, while at the same time creating revenue to finance alternatives such as high-speed rail (Fukui & Miyoshi, 2017; González & Hosoda, 2016; Zhang & Zhang, 2018).

Trends of these kind are already becoming visible. Virtual conferencing technologies are becoming more popular and accepted. Many colleagues have signed academic petitions to avoid flying. The number of research publications and media contributions in this area is increasing. The present article will have succeeded if it motivates further progress in these and similar directions.

### Data Accessibility Statement

Neither author of this article has a Data Accessibility Statement.

### Notes

- <sup>1</sup> An “academic” is a member of an academic institution or a person pursuing an academic career (including advanced students). The equivalent German term is *Wissenschaftler/in* (not *Akademiker/in*).
- <sup>2</sup> For examples of academics working to reduce academia’s carbon footprint, see: <https://academicflyingblog.wordpress.com/>; <http://www.aashe.org/calendar/climate-friendly-conference/>; <https://m.youtube.com/watch?v=1QkZMOPSwDo>.

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The authors have no competing interests to declare.

### Author contributions

- Concept, conference organization, text: RP
- Conference co-organisation, psychological literature: ASP

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