

**DIMENSIONS OF INTRA- AND  
INTERGENERATIONAL JUSTICE IN  
THE DEBATES ABOUT SUSTAINABILITY**

Edited by Silviya Serafimova

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Avangard Prima  
Sofia, 2020



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ISBN 978-619-239-433-2  
Avangard Prima  
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## EPISTEMOLOGICAL PERSPECTIVES UPON CLIMATE CHANGE DEBATES

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### A CLIMATE OF DIALOGUE

*Andrea Saltelli and Paul-Marie Boulanger*

The authors are linked by common interests, including for the analysis of controversies involving science and society. While they agree on several of their diagnoses, e.g. on vaccines (Saltelli and Boulanger 2019), they disagree on climate. How is that? The present dialogue explores this disagreement in a style which remains – to the best of the authors’ capacity, pacated.

#### **Science’s Public Image and Science’s Roles: A Problem of Epistemic Authority?**

**AS:** I take issue with the role of science in the present discussion on the urgency of action on climate. Science is here not just providing dispassionate facts. As noted by U. Beck in 1986:

Scientists act *as if* they held a lease on truth, and they must do this for the outside world, because their entire position depends on it [...] Business, science and the like can no longer act as if they were not doing what they are doing, that is, changing the conditions of social life and hence making policy *by their own means*. (Beck 1992).

(Italics from UB). This ‘making policy by its own means’ is precisely what we see now. In support to this interpretation, one can read what is written in *Nature*:

Whatever they decide, nations will have to reckon with some difficult numbers that will ultimately determine whether the world can avoid the rapidly approaching climate meltdown. (Marris 2019).

By talking about an impending climatic Armageddon science – or a large sector of the scientific establishment – is staking its epistemic authority on climate, thus creating a virtuous image for itself as committed to the saving of



the planet, when the role of science in the present socio-economic trajectories would lend itself to a more mixed judgment (Saltelli and Boulanger 2019). As a result, the media thus incited have come to present a series of processes dominated by decadal dynamic (rise in temperature, in sea level, in frequency and intensity of extreme events) as having jumped through the roof, as happening here and now. Hurricane Dorian is described by two scientists on the columns of *The Guardian* as the ultimate proof of climate induced state of exception (Mann and Dessler 2019). What is exceptional – I admit, is instead the White House’s interference with how NOAA – the US National Oceanic and Atmospheric Administration, should report about the hurricane (Flavelle, Friedman and Baker 2019). In my opinion, the excesses of the White House do not justify parallel excesses from scientists, nor science’s silence when we are told that ‘billions will die’, the ‘world will end in 12 days’, and so on.

This state of excitement – not to say war – on climate is becoming critical. It detracts attention away from other pressing environmental concerns, from the collapse of fisheries to the decline in insects (Monbiot 2017) (van der Sluijs and Vaage 2016) – not to mention a long list including atmospheric pollution, persistent organic pollutants, endocrine disruptors, and so on.

The unfortunate epithet ‘denier’ may be applied even to those scientists who do not believe that climate is the most urgent environmental threat – let alone the economic and geopolitical one, while “sceptic is a term of derision” (Turner 2015). One needs impeccable ecological credentials to be allowed to say climate is not perhaps the most urgent environmental threat (Monbiot 2017). One of the best-known sociologists of science can be heard declaring his allegiance to the climatic cause and expressing concern about the misuse of his earlier work from deniers (Kofman 2018). The resemblance of these practices to those of official religion is surprising.

More in general, focusing on the ‘fear’ of the public for the climatic threat appears a convenient distraction from a rapidly evolving crisis involving new media, loss of democratic representation, rising inequality and insurgent populism and nativism (Saltelli and Boulanger 2019). That policy is being ‘distracted’ by climate has been noted, for example, in relation to the G7 meeting in Biarritz of August 2019, where in spite of work done in Chantilly in July in preparation for the meeting, promising to address ‘fairer capitalism’ and inequality, i.e. economic and financial topics befitting the G7 more than global threats, the climate discussion ended up obliterating these important themes (Jaillet 2019). The G7 represent 45 % of the world GDP and just 10 % of the world population; the same club is responsible for 90 % of the financial transactions, for currencies representing 90% of world

reserves, and dominates all organisms regulating world's finances and banking (Ibid.). That this club elects to discuss climate suggests that some of the world leaders find climate a convenient theme. As president Macron has learned, it is safer to criticize president Bolsonaro's handling of Amazonian fires than to impose a tax on fuel in his own country. Not even the celebrated Scandinavian model of trust in the state and its planning makes exception to this allergy to green taxation. In Norway the project of a new tax on roads led to the emergence of a 'no-more-tolls' party, conquering a sizeable representation in regional elections. Taxes on consumption are regressive – they hit the poor more than the rich, so why should this be a surprise? The new president of the European Commission has promised to make Europe carbon neutral by 2050 (Schiermeier 2019). Even here, one could reflect on the socio-economic and geopolitical relevance of the theme compared to the problem facing today the EU project.

If we believe sociologist Niklas Luhmann, every observation requires a distinction between an indicated and an unmarked zone. The distinction itself represent an implicit, a blind spot (Figure 1) as the system operating the distinction is hardly aware of it. Thus, marking climate unmarks a host of other urgent issues, which become the environment, the theatre, where the climatic drama unfolds.

Comparing the climatic Extinction Rebellion movement of today (*The Guardian* 2019) with the Occupy Wall Street in Zuccotti Park in 2011 (Levitin 2015), with their focus on inequality, intergenerational fairness and the financialization of the economy. One can wonder which appears more threatening to the powers that be. I personally find the agenda for action of the indignados (Hessel and Duvert 2011) more cogent and relevant than a cooler future, especially for the young generations cornered between the fourth industrial revolution and the neoliberal project “to render as many people as superfluous as possible” (Mbembe) (Bangstad and Nilsen 2019) – the so called ‘unnecessary’ (Bastani) (Bastani 2019).

If the Amazonian forest is not being killed by climatic change but by Mr. Bolsonaro, then the climate emergency forced on us is perhaps ill-advised.

**PMB:** I distinguish two main questions here, each of them deserving an

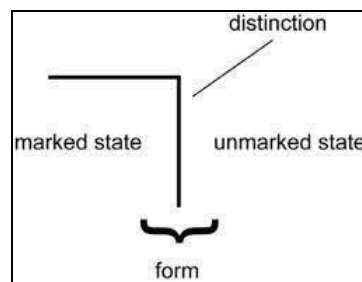


Figure 1 Luhmann's theory of observation, adapted from (Boulanger 2018)

article of its own. The first question has to do with the relationship between science and politics, a question you are raising about the climate issue, but which is actually much more general. The second is the question of what should have priority on the global political agenda. You contend that climate is given too much attention with respect to other issues that you consider more important and urgent. In this respect, you mobilize Luhmann's theory of observation, highlighting the "blind spot" of the climate activists, which would make them unable to consider other issues and urgencies. Of course, since every observation is based on a distinction with its own unmarked space and blind spot, then your argument can very easily be turned against any other standpoint, including obviously the climate-denier's one. Instead of doing this, I will seize the opportunity you give me in invoking Luhmann's theory of observation to try to uncover the principle of our respective distinctions, the matrix that structures our different understanding of the issues and realities.

Luhmann's theory of observation is only a starting point. It is general and abstract, and gives us no indication on the actual distinctions that are made in debates such as ours. This requires the use of other tools. In this respect, the cultural or "Grid-Group" theory first proposed by anthropologist Mary Douglas and then further developed by Aaron Wildavsky and Michael Thompson (Thompson, Ellis and Wildavsky 1990) seems to be the ideal complement to Luhmann's observation theory. To my knowledge, the two have seldom been articulated with each other so far, but I think the experience is worth trying. Cultural or "Grid-Group" theory consists in classifying lifestyles, systems of thought and norms, and institutional discourses within a Cartesian space defined by two orthogonal axes: one called "Grid" denoting the degree of dependence of individual behaviour on prescriptions related to the social stratification system; the other, called "Group" denoting the degree of dependence of individual beliefs, attitudes and behaviours on commitments in and towards inclusive social groups.

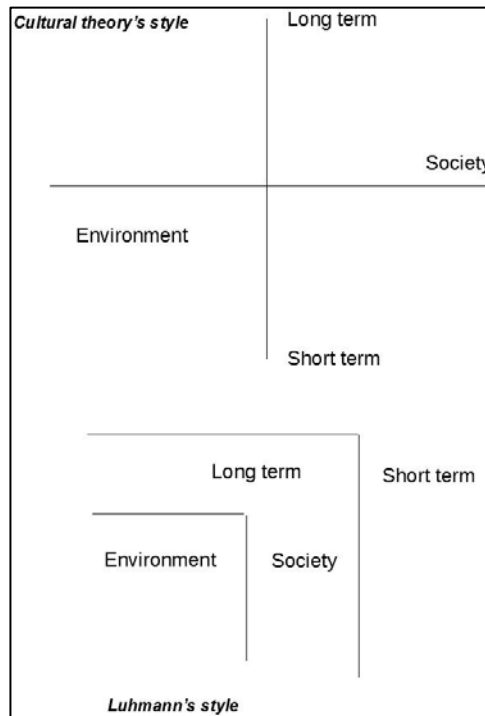
I suggest keeping the skeleton of the cultural theory but substitute to the grid-group axes the following ones: short term/long term and society/environment. I submit these categories structure the perception of the risks and stakes that confront our society today and lurk beneath our discussion. The first axis refers to the time span considered, the second to the species and domain of vulnerability. For instance, the "Long-Term & Environment" configuration means that one considers that the most urgent and harmful risks are ahead of us in a medium or long term and will come from changes in our natural environment. This is, as I understand it, the standpoint of climate and environmental activists in general. A "Long-Term &

Society” configuration sees society collapsing in a medium to long future because of its internal contradictions, class struggles or whatever. “Short-Term & Environment” gives priority to the current threats to health and well-being arising from pollution and shortages of water and other natural resources. “Short-Term & Society” focuses on the tensions, inequalities and social contradictions already at work in our society.

As advocates of the cultural theory argue (as well as Luhmann about observation), no attitude is necessarily more accurate or legitimate than any other. All are legitimate and necessary in a complex society. Yet, according to the circumstances, it is possible that one of them becomes prominent for a time because of the necessity to act in a domain that has been hitherto neglected. This, I submit, is the current situation with regard to the climate issue. I am convinced that as soon as significant advances will have been made towards its control and/or adaptation, the corresponding attitude will recede, leaving the place to another priority, long or short-term, environmental or social.

Figure 2 shows the proposed framework in both the cultural theory and theory of observation fashions (Boulanger 2018). We note that the theory of observation adds an additional dimension with respect to the cultural theory. Indeed, in the theory of observation the distinctions are embedded so that it is possible to distinguish between first observing with temporal lenses and then with material or substantive ones or the reverse. This invites to consider subtle nuances that the cultural theory cannot take into account.

The conclusion of all this is that there is no point in opposing one mode of obser-



vation to another. None is inherently more legitimate, more justified than another. As every observation has its unmarked space and its blind spot, no one is complete, totally comprehensive and sufficient. It follows that politics cannot for long favour one point of view at the expense of the others. It must endeavour to satisfy each of them, at least (and necessarily), partially. If climate activists are shouting so loudly at the moment, it is because they feel that their point of view has been for too long neglected since all the Nation-States of the world have endorsed the United Nations Framework Convention on Climate Change, in 1992.

Being a “Long-Term & Environment” observer, I partake this feeling but as such I give equal weight to others mid- and long-term environmental issues, amongst which especially the biodiversity crisis (“insectagedon”). However, what is special with climate change is that it impacts negatively and therefore worsens all other environmental (and social) issues.

This being said, let us turn to the wide question of the relationship between science and politics and speculate about what has gone wrong in the climate change case.

Paradoxically, in the case of climate change, the relationships between science and policy is very peculiar. Why? Because of the IPCC; it is a rather exceptional institution which had (almost?) no other equivalent in other fields at the moment of its settlement. Actually, the IPCC is a hybrid of science and policy.

Now, has science been successful in staking its epistemic authority on climate? I am not sure. Except perhaps on vaccination, no domain has been as fiercely controversial as the climate one, especially the issue of human influence on climate. It is not to be denied that something unfamiliar has happened with climate science and the climate issue. Whilst “normal science” conforms traditionally to the ethos described by Robert K. Merton as the conjunction of communism, universalism, disinterestedness, and organized scepticism (Merton 1973) – an ethos that guarantees its legitimacy and credibility – climate science, on the contrary, as institutionalized in the IPCC, has been characterized by a stubborn search for consensus, banishing organized scepticism from the scientific arena and leaving room for unorganized scepticism in the media. In some sense, we are here not very far away from what can happen in the religious domain; the climate-sceptics being considered as heretics and being indicated for disrepute.

Contrary to what happened with the H-Bomb Committee where two rivals labs have been settled and financed on an equal basis (Turner 2015), Chapter 15. “Expertise in Post-Normal Science”), the climate issue has been en-

trusted to a unique scientific (more exactly, a mix of scientific and administrative) body devoid of internal mechanisms for competition and contest.

Paradoxically, it could be possible to argue that the IPCC has done more harm than good to climate science and climate change awareness. It seems that the climate issue was less controversial before its inception in 1988 than after. According to Nathaniel Rich:

Nearly everything we understand about global warming was understood in 1979. By that year, data collected since 1957 confirmed what had been known since before the turn of the 20<sup>th</sup> century: Human beings have altered Earth's atmosphere through the indiscriminate burning of fossil fuels. The main scientific questions were settled beyond debate, and as the 1980s began, attention turned from diagnosis of the problem to refinement of the predicted consequences (Rich 2018, 2).

**At a point that:**

There can be no understanding of our current and future predicament without an understanding of why we failed to solve this problem when we had the chance. For in the decade that ran between 1979 and 1989, we had an excellent chance. The world's major powers came within several signatures of endorsing a binding framework to reduce carbon emissions — far closer than we've come since. During that decade the obstacles we blame for our current inaction had yet to emerge.

On the other hand, I don't think that science has "staked all its epistemic authority on climate". There is no evidence that scientific communications on climate change have crowded out scientific communications on fisheries, pesticides, and many other environmental issues. Is it science or the media that are responsible for having severed the climatic issue from its natural environment, the ecological question in general? As argued (Boulanger 2007): "the public's capacity for processing information must not be much greater (and probably smaller) than the individual one" and, according to Miller's famous paper in cognitive psychology (Miller 1956), this must not be greater than the 'magic number seven plus or minus two'. The authors (Hilgartner and Bosk 1988) have cogently compared the public arena to a Darwinian ecosystem where social problems struggle for recognition, only a few of them succeeding in capturing the attention of the political system. In Luhmannian terms, we would say "succeeding in irritating the political system". Luhmann again can be invoked here to understand why the theme of

climate change has been more successful than other ecological themes in its struggle for recognition. As suggested here above, the fact that the IPCC didn't provide itself for an internal contradictory debate gave the media an opportunity to organize it itself. As Evelyn Fox Keller notes:

Even our most responsible newspapers and journals, in their very commitment to the traditional ethic of "balance," sometimes contribute to the widespread misimpression that climate scientists are deeply divided about both the extent of the dangers we face and the relevance of human activity to global warming (Keller 2011).

One can regret that the climate issue has overshadowed the theme of sustainable development – clearly too complex and cumbersome a concept to have a chance to become a suitable theme for the media. However, it had the merit of putting the whole environmental issue (not just the climatic one, or any other) on the political agenda and by acknowledging the legitimacy of economic and social concerns with regard to environmental ones, so as to exclude nobody from the debate. In regard to the promises of sustainable development, one can lament over the excessive place climatic concerns have taken today at the expense of others perhaps as urgent and vital environmental issues but this is not a very productive attitude. It is not at all assured that it will help putting these others concerns on the agenda. On the contrary, it could just contribute to discard absolutely all environmental concerns as the examples of Trump or Bolsonaro illustrate.

**AS:** I amicably disagree with your last statement – as discussed, the point of contention is not presence – absence on the agenda, but the Darwinian – and Deweyan, competition for attention in the public sphere. Additionally, while you reproach the media of a false 'balancing' act, inflating the opinion of doubters – or 'deniers', 'delayers', 'contrarians', 'confusionists', 'luke-warmers', or other denigratory denominations sprouted in the heat of the confrontation, there are voices which reproach media for being more receptive to Apocalyptic warning of end of mankind than to a reasoned assessment of climate science (Nisbet 2019) (Shellenberger 2019) (Kloor 2017). Coming to the work of Turner you mention, I find it very relevant, especially your selection of differences between the debate on the H-bomb and that of climate. I would just like to say that in his judgment of how Mertonian norms have been disattended in climate research this author is quite severe:

The record of climate science is quite different. Attacking critics, even editors who allow critical papers into print, stig-

matizing scientists for raising questions, and refusals to supply relevant information have been characteristic of climate science. If we look at the adherence to self-denying norms in isolation from the question of whether the claims of climate science are true, this much seems clear: the fact that these issues have both been raised and the fact that climategate confirmed many of the suspicions of the critics is sufficient to raise questions about the authority of these scientists (Turner 2015, 295).

**PMB:** I don't see the point on which you – amicably – disagree with me. The Darwinian competition is precisely for a place on the public agenda, taking account of the limited capacity of the public to tackle several issues at once. But I totally agree with you that. Turner is excessively severe. Turner is probably not the best reference on that matter.

Nuanced observers such as Sarewitz (Sarewitz 2010) or, still better, the former chairman of the Tyndall Centre for Climate Change Research, Mike Hulme (Hulme 2013), though acknowledging the legitimacy and urgency of the climate change issue, blame the IPCC for having underestimated the autonomy of the political and overestimated the one of science in society. And, as for the "climategate", both of them reduce it to its proper proportion, insufficient to discredit the entire IPCC production. They both know that science is a human enterprise and not a divine one, and that some slip-page is always possible.

But, as already stated, the IPCC is not THE science of climate. It is an intermediary institution between climate science (and other things too) and the unfinished, flawed political system of the world society. Its crime is to have subscribed to the linear model of the relationship between science and politics, the "truth speaks to power" model (Beck 2011). The problem is probably here: in our functionally differentiated society, hybridity is an uncomfortable situation.

But we should not throw the baby out with the bath water forgetting that upstream of the IPCC, there are thousands of scientists who are just concerned with finding and communicating the truth, a truth which they know is temporary and incomplete but that, in all honesty, it is their duty – the duty of science – to communicate. They cannot be held responsible for the errors of the IPCC's Assessment Reports writers; if any.

Now, going back to your concern for what has been called insectageddon (Monbiot 2017) (van der Sluijs and Vaage 2016): it seems you are ready to substitute one catastrophism to another? I – amicably – don't find this very



consistent. First, because it is to science that we owe it to ourselves to know the magnitude of the problem and, above all, the seriousness of its consequences. Secondly, because an "insectageddon" would have the same consequence for other issues, environmental, social and economic as a "climageddon", namely to drive them out at the very bottom of the political agenda.

The challenge is not to set these concerns against each other, but to show their intertwining, their systemic nature and to adapt our modes of governance accordingly. In fact, global warming is not unrelated to the disappearance of insects, although it is one factor among others.

What is certain is that it is not the privileged social categories in terms of wealth and power that will suffer the consequences of climate change. The resources at their disposal will allow them to take shelter without difficulty. There is no doubt that at the subconscious level, they know it and anticipate it.

The fight against climate change is therefore also and perhaps above all a social and political fight. As Greta Thunberg brilliantly put it, she indicts the economic and political elites who consciously let the situation deteriorate ("We could not say that we did not know" Chirac said in Johannesburg in 2002). What I think most shocks the young people who are demonstrating is precisely the gap between the major declarations, the so-called international agreements and the concrete actions. It is the characteristic of youth to think that actions must be in harmony with words. Adults have long ago lost any illusion in that respect, in the political sphere, at least.

This concerns the main difficulty of environmental policies, the beneficial effects of which will only be felt in the medium and long term and therefore benefit future generations, while the costs are borne by current generations. The most sophisticated criticisms of sustainable development are that it seeks to achieve intergenerational justice at the cost of injustice to the poorest of the current generations. And it is obviously a risk, unless public policy instruments are used that place the burden on the most advantaged. Such an instrument would, for example, consist of a basic free basic CO<sub>2</sub> allocation for all, financed by a progressive tax on any CO<sub>2</sub> emissions that exceed the quota, which is calculated to meet the basic needs of poor and middle (low) class households.

**AS:** I believe that one should carefully balance the inertia of the elites with the nature of the demands posed by climate activists. The demand to governments to accelerate our transition away from fossil fuel cannot be met without changing our pattern of consumption, lest we meet the same fate of the German Energiewende – whereby the more solar and wind power is in-

stalled, the more carbon must be burned to offset the intermittency of renewable energies (Renner and Giampietro 2020). These failures have recently led to disillusionment. For Kay Scheller, the president of the German Federal Court of Auditors, “voters could soon lose all faith in the government because of the massive failure [of Energiewende]” given the “extreme disproportion” between expenditures and results” (Dohmen et al. 2019). Another consequence of the demand posed on the governments to enact a rapid transition to a less carbon intensive economy is a renaissance of nuclear ambitions. To give an example, the failure of Energiewende can be blamed – for some commentators, on a too hastily exit from the German nuclear (Seneviratne 2019).

The Breakthrough Institute, one of the upholders of the Ecomodernist Manifesto, is tireless in its advocacy of nuclear as the only way to ensure a carbon neutral future, just glance to the Energy section of their online presence at <https://thebreakthrough.org/energy>.

Last but not least, if the climatic predicament must be avoided by governments assisted by technology, the recourse to ‘negative emissions’ is inescapable. According to the same IPCC (2014) BECCS (bioenergy with carbon capture and storage) and other CDR (carbon dioxide removal), techniques are associated with challenges and risks. I do not want to develop here a critique of geoengineering – for this see the work “Geoengineering dreams” of Paula Curvelo (Curvelo 2015). I only wish to note, in relation to BECCS, that we have been there before, with the folly on official EU targets on biofuels, now generally considered as failure on both sides of the Atlantic (Giampietro and Mayumi 2009) (Editorial of Outline 2018).

In more general terms I see the following paradox at play: a swift transition is being asked from governments – whose elites are charged with inaction. This call can only be answered with technology, i.e. with more of the same, with a risk that the same trajectories which have led to the present ‘rape of the planet’ will produce additional damage and that instead of mastering technology – as advocated by philosophers and ecologists for the best part of a century, we will continue to be ruled by it.

I agree with your progressive tax, also because – as we have discussed, any regressive tax such as a tax on consumption would be rejected by large sectors of society. At the same time, I do not believe we are locked in by governments prey to unscrupulous lobbyists – tough ‘dark money’ is surely there (Mayer 2017); we are locked by our own pattern of consumption.

**PMB:** It is clear that we are stuck in our consumer habits and not only by unscrupulous lobbyists, but above all by infrastructure and buildings that

were designed and built at a time when the climate issue was not yet an issue. The question of the transition to a low-carbon economy has, in my opinion, been dealt with in the most rational way by researchers at the Rotterdam DRIFT (<https://drift.eur.nl/about/>), adopting an approach focusing on the intermediate level of the socio-technological systems of energy, mobility, housing, etc.

This transition must use many and varied instruments: economic, technological, socio-cultural. But, contrary to what you think, technology is not necessarily "more of the same". Energy production with biomass technologies coupled to capture and storage of their CO<sub>2</sub> emissions are not, in my opinion, "more of the same", and this is just one example among others.

Moreover, it is not because Germany acted recklessly by abruptly leaving the nuclear industry because of the emotion caused by Fukushima that all countries are condemned to the same fate. France can obviously count on its large nuclear park to make a smooth transition, even if it renounces the financial abyss represented by the Flamanville EPR. Note also that, despite its coal burning facilities, Germany has decreased its GHG emissions about 31% between 1990 and 2018. However, admittedly, it will be difficult to reach its target of 40% reduction by 2020.

In the USA, nuclear energy would not even be necessary. The 50 states of the USA could "convert their all-purpose energy systems (for electricity, transportation, heating/cooling, and industry) to ones powered entirely by wind, water, and sunlight (WWS). The plans contemplate 80-85% of existing energy replaced by 2030 and 100% replaced by 2050." (Jacobson et al., 2015). Actually, "Countries which are close to 100% renewable electricity include Paraguay (99%), Norway (97%), Uruguay (95%), Costa Rica (93%), Brazil (76%) and Canada (62%). Regions within countries which are at or above 100% include Mecklenburg-Vorpommern in Germany, Schleswig-Holstein in Germany, South Island in New Zealand, Orkney in Scotland and Samsø along with many other parts of Denmark." (Brown et al. 2018). Note the presence of German landers.

**AS:** We won't be here in 2030 by all likelihood, but I greatly doubt the decarbonization of the US will have been completed by 2050. As per Denmark please note that Denmark benefits from generous hydro power provisions from Sweden and Norway. These two countries together account for nearly 70% of Europe's hydropower (Graabak et al. 2017), and there are several weeks every year when Denmark imports on 60-80% of the electrical energy it consumes (Nord Pool 2019).

As per your Energiewende numbers (31% between 1990 and 2018), I just quote from the Financial Times (Buck 2018) which cites the German Federal Environment Agency: “Since 1990, greenhouse gas emissions have fallen 28 per cent, but the bulk of that reduction came courtesy of the collapse of East German industry after reunification”, and “Europe’s largest economy blasted out 905m tonnes of greenhouse gases [in 2017], a level almost unchanged from that eight years ago.” As of today, Germany continues in its policy of burning coal to smooth the intermittency of renewable, and this explains the dissatisfaction of the president of the court of auditors Kay Scheller mentioned above. More recently, German Minister of Economy and Energy Peter Altmaier came out against unfeasible targets of the transition agenda, such as one million electric vehicles in Germany by 2020: “Nowhere in Europe is going to manage that,” he observed. “And even if we did manage to get enough electric cars, we wouldn’t have enough renewable electricity to keep them on the road”, concluding that Europe needs “a compromise that prevents us from having an unachievable target”, and “Citizens across Europe are losing faith in politics. When they see that we are setting very ambitious targets and that a few years later we’re deferring this, we are way off their expectations” (Simon 2018). I personally wish European leaders – including the European Commission president, would listen to Mr. Altmaier.

**PMB:** You omit to mention that Altmaier, in his parliament speech in 2018 also declared:

It is true that Germany has not been, recently, up to its ambitions in terms of energy transition, but the picture is not as bleak as you like to show it. For instance, renewables have become the main sources of energy, accounting for 33% of the total in 2017, among which hydro power’s share is not bigger than 3,1%. And primary energy consumption has been cut significantly, by 7.6% between 2008 and 2015.

You can find this figures together with a scientific, dispassionate discussion of Germany’s Energiewende in a recent article on Energy Reports (Chen et al. 2019). By the way, it evokes also the minister Altmaier, but for having declared that “The Energiewende will succeed if we make progress with the grid extension” (Ibid., 1251).

All in all, it is less a question of technical and economical possibility than of political will. And let us remember Mark Twain’s famous “They didn’t know it was impossible, so they did it.”

**AS:** Well, I hope I have shown that this is unfeasible in the stipulated time windows, both technically and economically. As per the political will, this is not just the will of politicians, but of their constituencies who are not ready to withstand a change of lifestyle. Not all scientists share this ‘can do’ euphoria. British scientists point out that the UK electric car target for 2050 collide with a physical impossibility – the UK would need about two times the current total annual world cobalt production, nearly the entire world production of neodymium, three quarters of that of lithium production and at least half of that of copper (Editors 2019a). Of course, if you are a techno-optimist, mining asteroids is only a few techno-steps away (Bastani 2019).

In order to keep the attention of the citizenry focused on the climate battle, a ‘can do’ attitude is being held, offering simplistic images of an economy which can be made circular, or rapidly decarbonized, against historical evidence of past transformations (Voosen 2018). Mathematical models are shown as capable of predicting the damage in dollars from hurricanes and draughts up to the year 2050 or 2100 (Saltelli et al. 2015). Problematic quantifications play a key role in these narratives. Thus, an educated public has been led to believe that in order to limit temperature increase to 2 degree centigrade with a 50% certainty a greenhouse-gas concentration of 450 ppm CO<sub>2</sub>-equivalent should not be exceeded. Needless to say, these numbers (0.5, 450, 2) are model-generated (Meinshausen 2005).

For the authors in (Renner and Giampietro 2020) the low carbon narrative of the European Commission is simultaneously heroic and reductionist. These authors deploy tools from relational biology and societal metabolism to identify physical infeasibilities, economic non-viability and – to conclude, dubious social desirability of what would be needed to equip Europe to deal with renewable intermittent energy sources reliant on wind and solar within a few decades. Based on data for Spain and Germany, this analysis identifies in the problem of energy storage, in the monetary costs, and in the greenhouse gas externalities associated with the creation and use of batteries the existing bottlenecks which prevent a plausible rapid way out of carbon by adoption of intermittent renewable sources – in contrast to the domination narrative and promises. These authors confirm the implausibility (for lack of natural resources) of a Lithium based storage system even at the level of a single country, and note how European leaders cannot simultaneously promise (a) to curtail CO<sub>2</sub> emissions and (b) to scale-up the supply of intermittent sources of electricity (wind- and solar-based) to obtain a significant decarbonization of European economies within two or three decades, as the construction of the new infrastructure and storage will in all likelihood more than double the emission during the transition period. The

concept that more renewable installed capacity will automatically lead to a new greener future – in the absence of a parallel societal change of institutional regimes and patterns of consumption, clashes against historical records that more renewable is weakly linked to reduction of conventional (fossil) energy production (Renner and Giampietro 2020).

### **Is Action Urgent?**

**AS:** There can be little doubt that science has played a very active role in putting climate change at the top of the policy agenda on a planetary scale. Is this priority and urgency justified? Are we right in moving from concern to alarm? Should we panic as suggested by a passionate young activist (Greta Thunberg 2019)?

**PMB:** I have no professional competence allowing me to decide of the urgency of action against climate change. I have no other choice than to trust those who have that competence, people like, for example, David Chandler of the MIT who wrote (Chandler 2009):

“The most comprehensive modelling yet carried out on the likelihood of how much hotter the Earth's climate will get in this century shows that without rapid and massive action, the problem will be about twice as severe as previously estimated six years ago – and could be even worse than that.”

Or, more recently, the 11.263.scientists who recently signed the warning of climate emergency (Ripple et al. 2019).

As I have understood the problem, it is fundamentally a stock and flow one, CO<sub>2</sub>-equivalent gases are accumulating in the atmosphere, at a greater pace than they dissipate or are absorbed by the oceans and the biomass. As for every situation of this kind, the more you delay the closing of the inlet valve, the more you risk to exceed the absorbing capacity of the container.

Now, panic is never a good counsellor. However, Thunberg's call for panic is understandable knowing – as argued here above – that the main information was already available at the end of the seventies and that even Georges Bush (the father) was very close to take measures that would have helped avoiding any panic or hysteria today (Rich 2018).

What Nathaniel Rich demonstrates when he says that everything we understand about global warming was understood in 1979 (quoted a few pages above) is that we have been very close to a scientific AND political consensus already in the early eighties.

Of course, the heating effect of the CO<sub>2</sub> was known since the 18<sup>th</sup> century with the work of the physician and mathematician Joseph Fourier. In 1959 the Irish physicist John Tyndall demonstrated that carbon dioxide absorbed heat and that variations in the composition of the atmosphere could create change in climate. In 1896 the Swedish chemist Svante Arrhenius published his article *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground* which stated the basis of our knowledge of the greenhouse effect and the role of CO<sub>2</sub> in global warming.

It is not an exaggeration to say that a scientific consensus existed in the United States in the seventies and until the end of the eighties. In February 1979, scientists coming from 60 countries gathered in Geneva for the first World Climate Conference agreed upon the necessity to act urgently. With the exception of the Reagan administration, the American political class, Republicans and Democrats combined, did not question the findings of scientists and supported measures to limit greenhouse gas emissions. Even Reagan, after the success of the Montreal Protocol, which banned CFCs to combat the rise of the ozone layer, seemed ready to change its mind.

It was not until the end of the 1980s that systematic and concerted challenges to the findings accepted so far were brought to light.

Nevertheless, in 1992 at Rio, 154 countries and the European Commission signed the United Nations Framework Convention on Climate Change and they were 195 at the 15th Conference of the Parties in Paris in 2015. Currently, 192 parties endorse the Kyoto Protocol convened in 1997. The problem is that despite all these treaties and repeated commitments, nothing significant has ever been done. No wonder the population stops believing in its leaders and politicians, no wonder young people get outraged by the casual attitude of these leaders towards the fundamental conditions of trust: that the words we use and the words we utter have meaning.

**AS:** Well, thanks for this recap of climate science. If I may, the first person to measure that “The highest effect of the sun’s rays I have found to be in carbonic acid gas” was a woman, Eunice Foote, in 1856. A copy of that ancient paper is now available (see <https://bit.ly/339odZS>) (Darby 2016). As you know, we do not disagree on the fundamentals of anthropogenic climate change, and I have done my share of work on the topic, specifically on atmospheric chemistry and the effect of the sulphur cycle on the carbon cycle – with some effort I resist the temptation to quote my work here. Does this waving of academic credentials make me into an expert? I fear that it does not. None of us can be an expert in this immense field. Comparing facts is undoubtedly useful, but here we are comparing how us, two differ-

ent scientists, have come to assimilate their knowledge into an opinion about what should be done, in the hope that something we say may resonate with our readers – or ‘irritate’ them in a Luhmannian sense.

Coming back to the climate of emergency on climate – pun intended, why do I find it counterproductive? In intimating to be scared Greta Thunberg calls for what Hans Jonas called the hermeneutics of fear – the idea of fear as a paradoxically maximizing energy. Against this moral ‘maximalism of climate emergency’ an appeal to the classical virtues of prudence and phronesis appear in order. The French philosopher Pascal Bruckner shares this vision:

“The idea that decarbonizing economies will be a long and tortuous process, and that an incremental ecological policy therefore makes more sense than thundering declarations, is totally unacceptable to the prophets of the coming Apocalypse. Whereas ecology demands policies that actually work, that take into account the human costs of transition, and that do nothing to harm the poorest among us, they prefer aggressive fanaticism.” (Bruckner 2019).

**PMB:** I don’t know of whom Bruckner is talking about. I note that in the section of the article devoted to climate change, he gives no reference, no name, no publication, except for Hans Jonas. He is talking about abstract, imaginary “ecologists” or cherry picking the very few most excessive amongst a wide community of rational, moderate people concerned with the ecological problems we pass on to the next generation, to castigate the whole community. It is as if you reduced the whole Christian nation to Torquemada! Worst, and this is something I resent, he writes: “Those who speak in the name of the planet seek to oppress.” This is purely and simply impugning motives, or indulging in conspiracy theory. Or else it can be said of anyone who speaks in the name of general values or “godlike” entities: Reason, History, even Science if taken as an absolute, or a mythical Europe, as does Bruckner in this article.

Greta Thunberg and other whistle-blowers are just the tip of the iceberg. It is foolish and dangerous to reduce an iceberg only to what emerges of it but what is visible must be seen as an indicator of what is invisible and constitute more than 80% of the stuff. In our case, the submerged part is made up of hundreds of reports and articles on the energy transition, its difficulties, its constraints, but also its possibilities. A journal such as *Environmental Innovation and Societal Transitions* is entirely devoted to it and I invite you to have an eye on it.



**AS:** I am sure that the comparison has been made by others between Greta and Joan of Arc. In both cases the appeal of these figures is extraordinary, and their moral stature is – in a sense, beyond criticism, surely above the non-edifying noise originating from the present contention. In both cases we see ‘sanctity’ of a sort at play. When Greta tells leaders that they should be ashamed, we ‘feel’ that she is right in a higher sense which we should respect, as was the 12-year-old Severn Cullis-Suzuki addressing the U.N. Earth Summit in Rio de Janeiro in 1992 – over a large array of social injustices and ecological damages, who said to the adults in the room “If you don’t know how to fix it please stop breaking it” (Fernandes 2012).

At the same both Church and Science have promoted causes which in retrospect we have come to condemn. I stand by my opinion that science cannot prove that climate is more urgent than the Gaza strip, or an incumbent new war in the Gulf, or insectageddon, or too-big-to-fail banks, and I disapprove of those fellow scientists who seem engaged in trying to do precisely that.

**PMB:** I agree with you on that. It is a thing science can't prove. It is up to each of us, as citizens, with multiple diplomas or illiterate, to form an opinion based on the information available and our hierarchy of values. However, when you take care of, for instance, what happens in the Gaza strip you can benefit the population living there (but perhaps only a part of it); when you take care of climate change you benefit populations all over the world including of course the one living in the Gaza strip, and this whatever their standing in the conflict. Climate change, more than any other environmental global issue, gives us an opportunity, for the first time in history, to have all nations in the world united in a common endeavour, beyond all that opposes them besides, as is the case in the Gaza strip.

### **Do We Need Climate Change to Reduce Fossil Fuels Consumption?**

**AS:** In the hot debate about climate change it is not infrequent to witness a representation of science as victim of big oil in relation to climate change. According to this narrative, science attempts to save us and the planet, and if our lifestyles have not changed yet it is because of the so-called deniers, helped by the well documented (Mayer 2017) fossil fuel industry strategy to make energy and climate as an intellectual battleground of conservatives, especially in the US. This reading is perhaps disingenuous. We could change our consumption pattern ourselves irrespective of what deniers and president Trump choose to do. If the World Health Organization is right in estimating that seven million people die every year because of atmospheric pollution (outdoor and indoor, WHO, 2018) we would have seven million

reasons to reduce the consumption of fossil fuels without awaiting the extreme events, draughts, and the rising sea levels attributed to climatic change. For this reason, I am not sure that the text which you quote (Rich 2018), that “Nearly everything we understand about global warming was understood in 1979” has a point. Even death by atmospheric pollution is an old story, which hasn’t changed out patterns of consumption any more than the number of casualties from car accidents has affected the way we manufacture cars, let alone the way we move around. People don’t die yet because of the rising sea level, but while trying to cross the Mediterranean and other seas or deserts in search for a better life.

**PMB:** Of course, there exist many good reasons, other than climate concerns, to shift to cleaner source of energy and it is something that should have been done since long. The damage to human health coming from the burning of fossil fuels has been known since at least the 19<sup>th</sup> century (McNeill 2000) and despite improvements in the efficiency of furnaces, boilers and engines, the pollution it causes continues to kill millions of people around the world prematurely, as you rightly remind us.

On the other hand, we definitely need to reduce fossils fuels consumption to mitigate climate change. So, we have all the reasons in the world to stop burning fossils fuels where and when possible. As we have very good reasons to stop smoking, drinking too much alcohol and eating too much sugar or fat and to practice more physical activities. Would you affirm that the tobacco, alcohol, and fast food industries have absolutely no responsibility in the adoption of these unsafe consumption patterns?

Your reference to migrants dying whilst trying to cross the Mediterranean gives me the opportunity to stress that it is African people which are likely to suffer the most from climate changes, as well as those living near the sea at lowest elevation. Africa is particularly vulnerable to climate change for many reasons but mostly because of the fact that the greater part of its population is composed of farmers and herders who are totally dependent on ecosystems services (Connolly-Boutin and Smit 2016). Of course, African migrants are in search of a better life and as their conditions of living will deteriorate partly because of climate changes (more droughts and higher temperatures mean more malaria, more diarrheal diseases, more nutritional deficiencies) there certainly will be more and more of them trying to escape such a fate (Black et al. 2011). One should add also that they are also dying because of our unwillingness to welcome them. Let us be clear: I am far from underestimating the role of the economic and political (dis)organization of the world society in the living conditions of the poor all over the

planet and especially in Sub-Saharan Africa. I am just arguing that letting the climate deteriorate, knowing that it is the already destitute that will suffer the most from it, participate to this disorganization of the world society.

**AS:** Your mention of drug and alcohol makes me think of the editor of *Lancet* Richard Horton (Horton 2019) for whom “The climate crisis is one of the greatest threats to the health of humanity today”. I mentioned already the seven million deaths from air pollution. For WHO alcohol kills 3.3 million a year; drugs – including the tragic opioids epidemics – 450 thousands. As per human health, heart diseases kill 15.2 million; 3.0 million die from pulmonary disease, 1.7 million from lung cancer, and 1.6 million from diabetes, and the list continues (<https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>). The statement of “one of the greatest threats” from Horton comes from science – it is an editorial of *Lancet*. Thus, one would like to see the evidence behind climate coming to the top of this list. The impression is that scientists partake the present climate of urgency – and so does Richard Horton – who – writing on a medical journal – is surely well aware of the host of preventable deaths which medicine could tackle.

**PMB:** There are two big differences between the climatic risk and the other ones you rightly mention. The first is that mortality by heart diseases, lung cancer, etc. is for a large part related to individual behaviours that can be changed by individuals themselves. On the contrary, malaria, diarrheal diseases and nutritional deficiencies have nothing to do with risky behaviours. The second is that, considering the inertia of the climatic system, is not one or two generations that will be harmed without of course any responsibility in it but several ones.

**AS:** You note that the issue of migrants is not uncoupled from the issue of climate. I would say that migration is not uncoupled from demographic pressure. If we take again the year when we ‘knew’ (Rich 2018), i.e. 1979, the world population was then ~4.4 billion and it is ~7.7 today, not far from double. As noted by the Norwegian philosopher Gunnar Skirbekk, the world faces a crisis which is as factual as it is epistemic. In our science-based risk-societies the importance of the epistemic challenge is not to be discounted. By analysing texts produced by international institution Skirbekk notes that issue like demography (unsustainable population growth) and class (a socio-economic class perspective) are apparently latent in what he describes as “A lack of important concepts”. Skirbekk identifies additional challenges in relation to the “tensions between the various goals”, the “mutual interconnectedness of various factors in a modern world in crisis”, to end up with

the “Realism and credibility” of present-day narratives. The dense text of Skirbekk cannot be summarized here but the sense of urgency he conveys about the superficiality of the stories we tell ourselves, e.g. in relation to promoting growth with sustainability, is compelling.

**PMB:** You are talking to someone who spent more than 10 years of his career on population issues.... And of course, P for population is one of the three main factors, with affluence (A) and technology (T) jointly responsible for the environmental impact of human activities in the well-known I=PAT equation.

### **What Is the Role of Public Intellectuals and Politicians in This Discussion?**

**AS:** There is no public figure which is not convinced that climate poses the most urgent threat to mankind, and the patent institutional failures to address the climate threat are presented as a symptom of the deterioration of our global political systems. Thus, the tones of the debate have escalated. For *New York Times* columnist Timothy Snyder (Snyder 2012) climate scepticism is a crime against humanity comparable to the Nazi exterminations of innocent children. The leader of the extinction rebellion movement embarrassed his followers and angered German politicians by iterating the same poor use of similitude, aligning the Belgian colonial atrocities, the holocaust, and climate on the same trajectory (Taylor and Connolly 2019). Paul Krugman deplores the ‘depravity’ of climate deniers (Krugman 2018), while Vandana Shiva, Naomi Klein, Noam Chomsky and others intellectual sign an open letter calling for citizens to rise up and organise for the climate ‘emergency’. The democratic party in the US proposes a Green New Deal (Wyden 2019), where Joseph Stiglitz assures with a confidence only economists can muster that “It is better to leave a legacy of financial debts, which our children can somehow manage, than to hand down a possibly unmanageable environmental disaster” (Joseph E. Stiglitz 2019). Is leaving the future generations to the wonders of the gig economy a reassuring prospect? Ironically, the only institution suggesting that jobs come before climate is the catholic church (Pope Francis 2015). The same pope even recently made clear that “there can be no true ecological approach... without the attainment of social justice... not only for present generations but those yet to come” (Editors 2019b).

As discussed in relation to green taxes on fuel, to use a form of taxation which hits the poor more than the rich to fix the environment appears to many protesters as the ultimate effrontery of the elites. This new phenome-

non of protest – which appears to pit the aspirations of the have against the needs of the have-not, takes place after Brexit and the election of Donald Trump. All of these events have come as a surprise to the same elites, and new media have played a role in all, offering an example of the interplay between techno-science on the one hand and policy and society on the other (Saltelli and Boulanger 2019). In relation to climate, a majority of the progressive believe that a climate-dominated agenda, as the Green New Deal is the US, is the best strategy to fight populism and authoritarianism. Perhaps they could follow the pope in not ignoring “social justice”.

**PMB:** The environmental issue is all through an ethical one. This means that social justice includes environmental justice. In this regard, the attractiveness of the idea of sustainable development, as articulated in the Brundtland Report, is to be rediscovered. In my opinion, except for the population issue (that you pinpointed yourself here above), *Laudato Si* is the best articulation of the sustainable development ideal since the Brundtland Report,

I don't see where the Green New Deal of US democrats is oblivious of social justice. Personally, what I am more afraid of is the risk of a kind of a political climato-socialism oblivious of civil liberties. Now, you ask what is the role of the public intellectual? I think it is to do exactly what we are doing here: communicating open mindedly with one another (or at least trying to, but I am not sure succeeding...) exchanging arguments and only arguments, not insults and without impugning motives, in order to help the people who hear or read us to make their mind in the most rational way. And then, let anybody act personally in accordance with his-her conscience and let the political democratic procedures and law decide what is to be done collectively.

**AS:** Gro Harlem Brundtland, the UN Secretary-General's Special Envoy on Climate Change, is rightly remembered for the words: “Doubt has been eliminated”. The words were uttered in 2007 at a speech before the United Nations. In a Greta-ante-litteram style, she went on to say “It is irresponsible, reckless and deeply immoral to question the seriousness of the situation.” This intimation put Brundtland in trouble with the Norwegian Research Ethics Committee for Science and Technology (NENT), which received in November 2009 a complaint about Brundtland's speech. The complaint argued that Brundtland had violated the principles of research ethics, in particular academic freedom, anti-dogmatism and organized scepticism. The interested reader can find the story at (Strand 2012). NENT blandly reminded Brundtland that what she said did not amount to ‘scien-

tific language' but it was considered that hers was a political – as opposed to scientific – speech, be it that she based her arguments on one of IPCC reports (AR4) and on the Stern review on the Economics of Climate Change. I recall this episode here as it is instructive of how public intellectuals mobilize science – and of what problematic vision of science in society, this role entails. As noted by Strand, a science-based life-philosophy cannot derive authority from science itself. Of course, the sin of former prime minister of Norway – a politician after all, pale before the texts of the scientists / activists such as Naomi Klein (latest book: *On Fire: The (Burning) Case for a Green New Deal*) and Bill McKibben (latest work: *Falter: Has the Human Game Begun to Play Itself Out?*). I hope not to appear unreasonable insisting that, beyond the limits of the IPCC reporting, we have today a problem with science itself.

#### **What Will a Future Historian Say?**

**AS:** Take a future historian looking at the XXI century – plagued as it was by a rather normal mix of wars, social and environmental catastrophes, augmented by a rather aggressive season of technological disruptions. This historian might look with puzzlement at humans electing the greenhouse effect as the existential threat of the epoch. She will be studying mathematical models as her predecessors studied papyrus scrolls. To her, models will be read as confessions of an epoch's unspoken metaphors and zeitgeist. She will be surprised by model-based cost benefit analysis of climate impact. Existential threats, after all, are not counted in monetary numeraires. Yet she knows that each epoch is paradoxical in its own specific way.

**PMB:** What about a future historian (if it exists at all) looking with puzzlement at humans of the XXI century who whilst having all the information concerning the risks of climate change decided to let go because “the American (or European as well now, with our new EC) way of life is not negotiable”?

#### **Concluding Remarks**

**AS:** We are divided by the relative balance of what we resent; I resent Europeans marching against climate while Erdogan marches against Kurds, and – incidentally, as European, I agree with Bruckner (and Amin Maalouf and many others) that Europe may one day pay a price for its insouciance. By the time this dialogue has been written, the signals of a shifting geopolitical landscape have multiplied, and I resent scientists' role in forcing us to look elsewhere.

I suspect that the climatic day of reckoning is an idol in the Baconian sense, whose function is to assuage anxieties about the present by projecting the threat into a convenient not-so-close-to-affect-me future. Instead of acting as nourishment for a deeper ecological sensitivity it boxes ecological problem into a single planetary container, where an odourless and colourless gas slowly increases the temperature of the planet. This idol risks subtracting energies from the fight against the messier aspects of our impact on the planet, let alone a disturbing social and geopolitical transient.

Science is thus contributing to a hiatus which is likely to alienate from science a majority. This is regrettable, as science is our most valuable tool, and leaving it as the preserve of the elites, as predicted by the so-called technospit scenario (Lent 2017), is dystopian. In this scenario one would be left with an affluent super-technological and possibly trans-human/immortal minority (Harari 2016), and a useless, confused and distracted majority left glued to its mobile phones and tablets (No author 2018).

Before leaving the word to Paul-Marie for his final comment, I wish to report a personal episode which perhaps adds to the reason why a civilized dialogue as the present one is necessary. Recently *La Repubblica*, the second Italian daily newspaper by copies sold, attacked L' Accademia dei Lincei (usually abridged to The Lincei, plural, 'Those who see far'), arguably the most venerable Italian academy. The title of *La Repubblica* was *The Lincei organize a workshop on climate, and give the floor to denier Battaglia* (my translation). Battaglia is an Italian professor faulted by *La Repubblica* for having attacked Greta. The article also noted that one of the organizers resigning in protest for this presence. The program of the event (I was one of the invitees) listed 14 talks and eight poster presentations. Only one talk, signed by eight authors, and entitled "Critical considerations regarding the anthropogenic global warming theory" included the aforementioned professor. A few days after the article, the academy cancelled the event, thus offering the opportunity to journals of different orientation, which accused The Lincei of censoring dissent. The intellectual suicide of The Lincei poses ethical problems and vindicates the existence of a science police, whereby "On highly charged issues, such as climate change and endangered species, peer review literature and public discourse are aggressively patrolled by self-appointed sheriffs in the scientific community" (Kloor 2017).

**PMB:** In both camps, you will find excessive, irrational, even neurotic people and statements. For me, it doesn't prove anything. It is never the ones who shout the louder who are right. These are just the skum of the wave, the

tip of the iceberg. What matters is the wave, the hidden part of the iceberg. The question is not of the kind *either-either*, but of the kind *and-and*. As I tried to argue at the very first of our discussion, a complex world doesn't need simplistic and one-sided views but combinations of long term and short term, society and nature's oriented, perspectives.

Climate change is only one of the many dimensions of the current socio-political-ecological crisis we are facing now, not especially as Europeans or whatever, but simply as part of a human species gone mad by hubris. It has been identified for long now and it is a pity we spent (and are still spending) so much energy pushing for some, pulling for others so that nothing really significant has been made. If only our inability to do so was the price we pay for acting on the others problems you mentioned, but it is not the case. It is not because we are busy helping the Kurds, solving the Gaza strip problem, welcoming and helping migrants that we let the climate deteriorate, with the risk of harming everybody on earth, except for the happy few rich enough to insulate themselves from its consequences. All these incapacities are linked and I do believe that if only we could unite oneself around the climate stake, it would make us stronger and more able to address successfully our others challenges.

There are certainly lessons to be drawn from what happened with the climate issue, both for the scientific system and for the political one. I think the first should have refrained from mixing itself too closely with the second in the IPCC and kept its full autonomy. Conversely, the second should have endorsed the full responsibility of the collective treatment of the question without putting itself under the authority of science. We see this has been deleterious for both systems and therefore for society as a whole.

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