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Rethinking climate communications and the ‘psychological climate paradox’

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Title:

**Rethinking Climate Communications and the “Psychological
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ABSTRACT

Climate science has provided ever more reliable data and models over the last 20-30 years, thereby indicating increasingly severe impacts in the coming decades and centuries. Nonetheless, public concern for climate change and the issue’s perceived importance has been declining over the past few decades, thus giving less public support for ambitious climate policies. Conventional climate communication strategies have failed to resolve this “climate paradox.” This article reviews research on the psychology of the climate paradox, and rethinks new emerging strategies for how to resolve it in the coming decades.

Keywords: climate psychology, climate communication, barriers, strategies, dissonance, framing, denial, narratives, nudging, the science of science communication

Introduction

There is a growing discrepancy between the increasing scientific certainty about anthropogenic interference with the climate system and a decreasing concern and popular support for ambitious and effective climate policies [1]–[8]. There has never been a more accurate and consistent understanding of how serious climate change is as in the latest assessment report from IPCC, as well as such a strong scientific consensus [9]. However, public concern and prioritization is declining in many countries, particularly wealthy ones [10]–[12]. Even if solid majorities in most Western countries report some or high concern, the issue’s importance is generally low relative to other issues [4], [10], [13]. We call this surprising and growing discrepancy the psychological climate paradox [14], [15].

A number of tentative explanations of the climate paradox have been proposed, including: climate change perceived as distant in both time and space, the lack of a global treaty and political action, the quest for economic growth, the financial crisis, the complexity of the problem leading to numbing and helplessness, cultural filters, cognitive dissonance, limited individual responsibility, an active counter-campaign and denial as a fear-avoidance strategy [10], [16]–[21]. The default response from many climate scientists and policymakers to what they perceive as a lack of the public to respond adequately to “facts” has been to increase the volume and amount of information. This approach to climate science communication has failed, and there is ample criticism of the default information deficit approach taken by conventional climate communication in the literature [10], [22]–[25]. But there is much less knowledge as to which alternative climate communication strategies are applicable and effective in different cultural contexts [10], [24]. This article will give a review of the main psychological barriers for climate communication that

contribute to the climate paradox, and more importantly, also rethink new strategies for the energy and climate message that have the potential for overcoming the paradox.

Thus far, the climate debate has been mostly informed by the physical sciences in defining the climate problem, and by one narrow branch of social science—neoclassical economics—in evaluating policy. Both disciplines fully rely on rational and quantitative methods to help analyze the issue of climate change. There has been a correspondingly less use of qualitative and cultural approaches to the public's behavior, and institutional and societal responses. The earth sciences and economic disciplines have been critical in defining what is at stake and which economic measures are ideal to efficiently reduce emissions. Yet, more varied voices from the social sciences (e.g. sociology, psychology, anthropology, political science) are needed to address how the problem is accepted by the public and how governments and the public will respond to the proposed solutions [26]. Understanding individual and social responses to climate change is clearly becoming just as important as understanding physical climate change itself. Public support is needed in democracies for efficient and sufficient policies to be legislated.

To explain the psychological climate paradox, it is not sufficient to simply blame the one-to-many model of information campaigns or poor communication models such as the information deficit model. There are additional and deeper psychological barriers that impair our reaction to the unsettling facts of climate change [10], [20], [21]. Improved strategies for climate communication can only be developed from a better understanding of these barriers. Let us take a look at five barriers in the modern human's psychology that prevent the facts about climate change from being internalized and influencing behavior.

Section I - Psychological Barriers that Uphold the Climate Paradox

By reviewing the research and literature from four traditions within psychology (primarily from evolutionary psychology, cognitive psychology, social psychology and depth psychology) over the past two decades, I have identified five main barriers to effective climate communication: 1) Climate change is perceived as *distant*, 2) It is often framed as *doom*, cost and sacrifice, 3) Few opportunities for action weaken attitudes through *dissonance*, 4) Fear and guilt strengthens *denial*, and 5) Climate messages are filtered through cultural *identity*.

1.1 Climate seems distant in time, space and influence

Climate change is often presented to the public so that impacts seem distant in *time*. The years given such as 2050 and beyond seem very far into the future. Secondly, the climatic events being described are often distant in *space* (the effects are typically strongest in the Arctic, Antarctica, the El Niño in the Pacific Ocean, in Bangladesh, the Maldives, the Philippines, port cities such as New Orleans, in remote Himalayan glaciers, etc.). The culprit itself, carbon dioxide, is *invisible* to the human eye (CO₂ is colorless and odorless), and greenhouse gases are still very *rare* (now around 400 ppm CO₂ in the atmosphere). They are depicted in very *abstract* terms to the public (measured in so-called CO₂ ppm equivalents, which very few non-experts truly understand). Its

effects work through invisible “radiative forcing” in the atmosphere, measured in W/m^2 (whatever that means, it cannot be seen nor felt, only abstractly reckoned with).

Moreover, the global scale of the climate issue makes many feel *helpless* since – even if we stopped emitting now scientists say – its delayed effects (including from what our grandfathers burned with coal from the last century) will continue to trouble us in decades and even centuries ahead. And even if I or we stop emitting, then the US or China will still continue. This feeling of helplessness therefore grows from the fact that looming climate disruptions are very distant from our own *locus of control*. Research has shown that feelings of risk of harm and responsibility for the environment are greatest at the neighborhood level and decreases the further away the impacts happen [1], [27]. Additionally, nearly everyone (in wealthy countries) are implicated by burning fossil fuels to support our lifestyle, thus everyone has a responsibility for the common results to benefit all. Hence, it is easy to attribute responsibility to distant others such as members of parliament, congressional representatives or international leaders, but there is a long *social or power distance* to all those with the perceived power to do something with it.

Lastly, while weather is concrete, climate is a calculated *average* over many years and decades, and the only thing we can concretely sense is the weather. Even though extreme events may make strong impressions of urgency when they occur, these are still the exceptions, while more normal weather is always the dominant condition. Research has shown that both the public’s level of concern and the issue’s importance is highly dependent on recent weather [28], [29]. Abstracting from weather to the climate over many decades is very difficult for the intuitive, fast cognitive system to comprehend [30], [31].

Consequently, there are several dimensions along which a huge distance is felt between the personal self and the global climate issue, such as time, space, causes, physical mechanisms, uncertainty, locus of control, power distance and abstraction [20], [32], [33].

The main effect of this barrier of psychological distancing is to reduce the sense of risk and the urgency of impending climate disruption [32], [34]: As soon as someone says “climate change,” people are already beginning to turn off their feelings of risk [35] and morality, as they place it in a box marked “someone else's problem” or “a problem I will deal with in the future” [27]. Climate change can be called a diabolical problem [30] in that it is almost like a “ghost”: odorless, colorless and invisible. It is easily perceived as a half-real, evil omen from the past hinting of future death and disaster – but it does not really register as real, substantial and urgent in our perceptual system.

In case of a concrete immediate threat, like a speeding truck coming towards you or a basketball thrown towards your face, your whole body reacts. The fight-or-flight response gets the adrenaline rushing. This is a bodily response pattern that has developed over millions of years. The human body is very good at responding to threats that are close and visible, has happened before, has immediate effect, a clear purpose, a clear enemy and has serious consequences for me or my family. Evolutionary psychology states that threats perceived as remote and distant to the self arouse far less concern and visceral response [20], [36], [37].

This distancing effect contributes to our understanding of why information campaigns are insufficient to convince people of the dangers of climate change. The abstract and rational expositions, utilizing graphs, data, measurements and global prognoses into future decades, do not manage to trigger the evolutionary risk perception system to create a sense of a real local threat with a sense of urgency that produces a sustained high issue importance. However, this is what is needed to create stable democratic support for more ambitious public climate policies.

1.2 Using the wrong framings backfires on the message

The second psychological barrier comes from the unintended effects of the framing used by conventional climate communication. The concept of framing refers to the unseen, often subconscious frame around concepts and discussions that affect how an issue is perceived. Through the metaphors used, different words and concepts evoke different frames. For example, there is a huge difference between an “illegal immigrant” and a “humanitarian refugee,” while the expression “abuse survivor” comes with a different frame than an “incest victim.” If you are told *not* to think of a pink elephant, it still brings out a cognitive frame that envelops the conversation, even if you actually manage not to think about pink elephants. The background image, the linguistic framing, is there whether you agree or not, and simply using a negating frame activates it [38], [39].

In the climate discourse and climate policy, the three dominant framings have been apocalypse, uncertainty and high costs / losses [40]–[42]. We have heard for years from activists about a coming climate hell, from climate contrarians as to how uncertain climate change is, and from economists and politicians how terribly expensive the different mitigation measures are. According to this third cost framing, the measures and instruments that we ought to implement are not cost effective. These message describes solar power, electric cars and charging points as expensive, that carbon capture and storage solutions are too costly, and that it is much more cost effective to implement emission reduction abroad than at home. The cost per ton of CO₂ reduction (\$/tCO_{2e} reduced) has become the major means for the prioritization of mitigation measures and instruments. But when this cost framing is applied, it is not surprising that many perceive that we cannot afford to implement an ambitious climate policy. The linguistic framing has already declared that it is too expensive, particularly in light of the uncertainties involved [43].

Some climate communications also use puritan framings of sacrifice and life-denying moralism: “Thou shalt not fly. Thou should eat less meat. Thou should not consume” – at least do not let anyone see your consumption. “Stop eating beef and meatballs. Eat carrots and broccoli. Give money to environmental organizations and vote green. Buy organic and so on.” The trouble with such framings are that humans are loss-averse. Cognitive psychology tells us that reactions such as these are what we may expect when we primarily refer to images of loss and sacrifice through framing, since we truly hate losses more than the corresponding gains. We may like it or not, but Western people’s consciousness seems to operate this way [31]. We can then either accept that and work with it, or try to fight it on moral grounds. I think the smarter option is to work with it. And as we become aware of how framing influences the mind, we can see how to turn that bias from a barrier into (part of) a solution. It is therefore possible to shift from a framing where loss

aversion works against the climate message to one where loss aversion is utilized to assist us in caring for the air.

The combined effects of doom, cost and sacrifice frames seem to be counterproductive because actions to mitigate global climate change are perceived to require a large short-term sacrifice of concrete, immediate benefits for the sake of abstract, distant goals [44], [45].

Researchers Feinberg and Willer contend that one cause of skepticism concerning global warming may be that such dire messages threaten individuals' need to believe that the world is just, orderly and stable, a motive that is widely held and deeply ingrained in many people. Research shows that many individuals have a strong need to perceive the world as just, believing that rewards will be bestowed on individuals who judiciously strive for them and punishments will be meted out to those who deserve them [40].

Strong representations of disaster and catastrophe can attract people's immediate attention to climate change, although fear is generally an ineffective tool for motivating sustained personal engagement [46]. Simply framing climate change in catastrophic emotive terms (a tactic often used by some environmentalist groups, but also often perpetuated in the popular press [41], [47]) may itself be counterproductive. If used, this approach must also show people which effective actions to take, because audiences otherwise might switch off or become numbed to the negative message [48]. Thus, climate activists and journalists may have used up the emotional capacity to respond to the apocalypse and doom. We may call this "issue fatigue" or even "apocalypse fatigue" [10], [49]. As early as in 1987, The Brundtland Commission on sustainable development stated that "It is urgent ... and the time for action is now!" This frame instructs us that unless we act now (which we will not), we are heading towards disaster. We have heard that message every year since 1987. It may well be objectively correct, but such fear and doom framing and stories have less and less of an effect in people's minds [46], paradoxically reinforcing the status quo.

1.3 - Dissonance: Lack of meaningful action weakens the attitude

Attitudes are half-automated pre-dispositions to react to people or things in a positive or negative way [50]. Attitudes consist of three components: affect, behavior and cognition, according to the so-called ABC-model [51]. To maintain a positive engagement, the three components should not be in an internal conflict when relating to a person or an issue such as climate change [21], [52].

Attitudes toward global warming and climate change are neither learned nor modified by new information alone. The assumption that it is a lack of public understanding or knowledge that has led to the present skepticism towards climate policy underpins what has come to be known as the "deficit model" [53]. One problem with the conventional rational climate information approaches is that they have mostly targeted the cognitive component of attitudes. It is by now broadly well known on a cognitive level that CO₂ from fossil fuels contribute to global warming [1], but what is the link to the other two components of emotion and action? Journalists have used a lot of pictures of charismatic animals such as polar bears to try supplement information with some emotional appeal [41]. For some time, the images of forlorn polar bears on sinking ice with sad

faces served an evocative function. However, after a prolonged overuse of polar bears as emotional triggers, the public seem increasingly habituated through environmental numbness [20].

The affects and emotions that have become dominant in attitudes toward this issue are a mixture of underlying unease, fear and guilt created by a climate message that constantly repeats that we should drive and fly less, eat less meat and generally not consume so much to avoid disaster [21], [46], [54]. Even more important than the emotional component is perhaps the behavior component of climate attitudes: If actual behavior does not match the other components, then cognitive dissonance will occur [10], [54].

We know, that if authorities come out with a strong public message (Use seat belts!/ Stop smoking!), but does not provide sufficient opportunities for consistent action (no seatbelts, no restrictions on smoking in public places), inconsistent behavior and habits will gradually weaken the corresponding attitudes. Dissonance theory states that if you fail to change actions, you can always change how you interpret the action. Aesop's fable about the fox that covets the inaccessible grapes is perhaps the first description of this pattern: "Those grapes surely must be sour." Similarly: Climate cannot be that important since I and others are doing nothing about it.

This is best known from social psychological research on smoking. Many smokers know (thinking) that smoking is harmful, yet they still continue to smoke (action). This evokes an inner discomfort, as one's self-image is threatened if there is too much difference between what we think and what we do. But it is certainly not always easy to change our pattern of behavior in accordance with what we know to be best or most rational. Our modern societies are built around driving, heat-regulated buildings, eating animals fed energy-intensive crops and air travel. The inner tension and perhaps even self-contempt grows – and this is what is called dissonance. To get rid of this dissonance, our brain will come up with more or less fancy unconscious coping strategies. Four such strategies to reduce dissonance are well identified: 1) modifying one or both of the components, 2) changing the meaning of a component, 3) the adding of an additional component, or 4) simply denying the problematic component.

In the case of smoking, it would be like: 1) I really do not smoke that much – others smoke much more, 2) It is far from certain that smoking causes cancer, my one aunt never smoked but had cancer anyway, while my other aunt smokes 40 cigarettes a day, but is fit as a fiddle, 3) I exercise quite a bit, and that makes up for the smoking, and 4) There is no evidence that smoking actually causes cancer. It is propaganda produced by people who just like to control others. It is my right to smoke as much as I want.

In this way it is easier to reduce the dissonance between knowledge and action through self-justification than to actually change one's behavior (quitting smoking). Cognitive dissonance – particularly in the field of smoking – is one of the best-researched areas of social psychology, and has a very solid empirical foundation [55]. Now we are starting to see studies which confirm that the same coping strategies seen in smoking are also taking place in climate attitudes [15], [54]: 1) My emissions are so small, it is the Americans or the Chinese who have to cut theirs, 2) It is far from certain that CO₂ causes global warming. This winter has been freezing cold! It seems as

though the IPCC must have gotten their models wrong, 3) I have installed a new A-class heat pump in my house, so now we deserve a vacation to Thailand, and 4) There is no evidence for the theory that CO₂ emissions lead to global warming. The whole climate thing is a hoax that left-wing alarmists have come up with in order to get more money for their research and put higher taxes on everyone else.

The point is that cognitive dissonance creates a demand side for messages of doubt about the climate message, because it is much more comfortable to explain away climate as a non-issue to oneself than to change one's corresponding behavior. A psychological explanation of the climate paradox is that cognitive dissonance makes people want to dismiss global warming. Then, this demand-side has been addressed by supplying contrarian ideas from climate deniers. Climate scientists and advocates have created unintended discomfort and dissonance with their message about climate change.

The outcome of cognitive dissonance from conflicting beliefs and behaviors, is that people start to adjust their beliefs to be consistent with their behavior. They also adjust their attitudes to conform with significant others, such as colleagues, friends and family, to avoid social dissonance [56]. This is an important part of the explanation of why there has been a backlash in climate attitudes since about 2007 [10], [57]. That was the year after the Stern review, when the IPCC released its fourth report, and Al Gore released the film "An Inconvenient Truth." The two shared the Nobel Peace Prize and the EU's emissions trading system seemed to become comprehensive and building momentum towards a global climate agreement. Interest and concern soared.

But then, the financial crisis occurred in combination with failing international negotiations in Copenhagen 2009 [10], [57]. At the same time, there were very few opportunities to do something on a personal level – nor to be acknowledged by others for doing it. In that situation, the daily dissonance will gradually grind down one's attitude: It is difficult to maintain a strong belief and motivation over time. This barrier of dissonance contributes to explaining why – even if people are concerned – they tend to avoid the issue or give the issue less importance. Rather than changing one's behavior in an encompassing way, it is more convenient to reduce cognitive dissonance by self justification and thus reduce the perceived importance of climate change. This paves the way for denying it, which constitutes the next barrier.

1.4 Doubt and dissonance strengthens denial

The modern concept of denial originates from psychoanalysis, influenced in particular by its founder, Sigmund Freud. He described it as an inner infantile "defense mechanism" of repression [58]. This defense refers to how the ego – or the mind's "I" – avoids inner threats that evoke anxiety. To take to heart, for instance, the knowledge that within the lifetime of a little human baby born today, the planet will be hotter than at any time for the past 15 million years is anxiety provoking. Denial is a powerful defense mechanism with roots in early developmental stages, but is often artfully expressed in the way that it explains away threatening realities. According to psychoanalysis, humans have a profound resistance to knowing and facing up to harsh and ugly realities. "There seem to be no lengths to which people will not go, no measures, however

desperate, that they will not devise or improvise to hide partly known realities from the self and others” [59, p. 75].

Denial can be seen as a form of wishful thinking to defend against anxiety or shame: If something is unacceptable to the ego, then it cannot be true. A new story is then created and seemingly genuinely believed in. This story may be irrational or rational; it does not matter, as its sole purpose is to restore and uphold the person’s core sense of self when confronted with a major threat to their positive self-image. Such stories include “climate change is due to sun-spot activity” and “we can only act when we are certain of all the facts and sure of the outcomes” [60].

Denial can be fueled by dissonance, but it is an independent, stronger barrier than dissonance, since in denial the entire issue is simply refused. There are limits as to how long it is possible for individuals to live with the very pessimistic environmental perspectives reflected in many climate change prognoses. It seems as if people stop paying attention to global climate change when they realize that there are no easy solutions for it. Many people instead judge as serious only those problems for which they think action can be found [15], [61].

In general, denial stems from the need to be innocent about a troubling recognition. It is both to know and simultaneously not-to-know. It is to be aware and know about something, and yet at the same time argue and present its opposite in a convincing way [62, p. 24]. Climate denial can take a variety of forms. One study involving focus groups reported on several ways in which this denial may be justified:

- * To condemn the accuser: “You have no right to challenge me.”
- * Denial of responsibility: “I am not the main cause of this problem.”
- * Rejection of blame: “I have done nothing so wrong as to be destructive.”
- * Ignorance: “I simply do not know the consequences of my actions.”
- * Powerlessness: “I am only an infinitesimal being in the order of things.”
- * Fabricated constraints: “There are too many impediments.”
- * After the flood: “What is the future doing for me?”
- * Comfort: “It is too difficult for me to change my behavior.”

From an emotional viewpoint, such responses help to assuage guilt, to reinforce victim status, to justify resentment or anger, and to emphasize the negative feelings towards disliked behavior (e.g. the disagreeable qualities of relying on public transport and the loss of social prestige involved) [54].

There are two main types of denial: passive and active. Passive denial is on the indifferent, unresponsive side. One may know, but prefer not to care much, and then silence is often best. Anxiety can be simply reduced by restricting exposure to distressing information, such as by skipping news stories about climate change or disengaging from conversations [63]. Certain inner narratives can also be deployed as rationales for deflecting or ignoring discomforting facts: “scientists are often wrong,” “they cannot make up their minds” or “the media are exaggerating” [64].

In active denial, there is knowledge of the facts to certain degree, but they are energetically refuted and refused and re-written. The most prominent form of denial is displayed by “climate

skeptics,” who actively reject all or most of the main propositions established by climate science [22]. If acknowledged, global warming mitigation measures such as taxes might threaten one’s income, profession or status. Or it would disturb one’s idealized self-image, and thus be psychologically painful to acknowledge. It seems that for many such individuals, the acceptance of climate science and the response it calls for conflict with one or more of their fundamental beliefs, such that continued economic growth should not be disrupted, or that governments should not intervene in the marketplace.

Such active denial projects constitute denialism, as uncertainty, mistrust and reactance easily slide into active denialism. This could be the denial of the existence of climate change and human contribution to climate change, and could include a more specific denial of the role that one’s behavior or one’s group’s behaviors has in harming others. Instead of a personal and private state that might last a lifetime, denialism is expressed in a learned, shared public language; the activities of claim makers and moral entrepreneurs are organized, planned, intentional and – sometimes less obviously – ideological [19]. The production of doubt about the science serves the widespread inner need to stay innocent, which constitutes a demand side for such denialism.

1.5 Climate messages are filtered through cultural identity

During the last decade, the climate message becomes submerged by the left-right axis in Western politics [2], [10]. Those who highly prioritize the climate issue are also typically supporters of higher taxes on energy and CO₂, and more regulation of greenhouse gases. This implies a stronger government with more regulations and requirements to business, as well as more of a focus on the environment and green values. Others have political beliefs and values that will more highly prioritize markets, freedom and less government intervention. Yet others prioritize jobs, financial security and local industry above climate and the environment [57].

It turns out that such politically colored worldviews have great significance for how people read the same climate science facts. The higher education you have, the more you prefer to rely on your own interpretation and political worldview, rather than merely relying on thousands of anonymous climate experts’ interpretations. Citizen’s thinking are culturally and politically constructed, which easily overrides purely scientific reasoning. This tends to puzzle apolitical climate scientists, who are primarily in search of the truth, however complex it may be, and who are often perplexed by the public’s rejection of the message [18].

The “cultural cognition of risk” refers to the tendency of individuals to form risk perceptions that are congenial to their values [65]. This builds on the so-called confirmation or assimilation bias, which is a well-documented mechanism in cognitive psychology, and widely used by individuals when understanding climate facts or news [30], [66], [67]. In other words, those who are already concerned and have a sympathy and interest in climate matters and renewable energy typically read more articles with facts that confirm what they already believe, while those with the opposite attitude tend to avoid, distrust or explain away news containing unsettling climate facts. Similarly, most people seek information from sources that they already agree with [68].

A few decades ago, this identity barrier was not very significant. In the US in 1997 there was not much difference between Democratic and Republican voters in their views on global warming, with approximately half saying that warming had begun. However, in 2008 the proportion of Democratic voters taking this view had risen from 52 to 76%, while the proportion of Republican voters fell from 48 to 42%—a 4% gap had become a 34% gap [22]. One explanation for this is that conservative activists, in collaboration with fossil fuel interests and conservative think tanks, have managed to associate the acceptance of global warming science with the political identity of the “liberals.” In addition to the dissonance barrier, they activated the psychological need to identify with social groups that strengthen one’s definition of self. If you are a conservative, then it is part of your cultural identity to be opposed to climate. Since 2008, one can now make a good guess at a typical American’s opinion on global warming by identifying their views on abortion, same-sex marriage and gun-control [22]. America may be an extreme case, but some of the same dynamic has also been seen in other countries [10].

* * *

Table 1. The five main barriers to effective climate communication

- 1 - *Distant*: The climate issue is construed as distant (in a number of ways).
- 2 - *Doom*: Framing the issue as disaster, cost and sacrifice backfires.
- 3 - *Dissonance*: The lack of convenient climate friendly behaviors weaken attitudes over time.
- 4 - *Denial*: Gives refuge from fear, guilt and threats.
- 5 - *iDentity*: Activates cultural filters so that your one’s identity overrides the facts.

The five barriers summarized in table 1 are significant and, taken together, may seem insurmountable. They are interrelated, but still distinct; one could imagine them as concentric circles with distance as the outer and identity as the final, inner defense. The organized anti-climate movement has been successful in activating them against climate science [19], [69], though the interesting thing is that these barriers can also be seen as success criteria by flipping them over. Thus, in the future the new climate communications should be designed in a way so that it meets the requirements given in Table 2. These five success criteria then form the basis for new strategies in climate communication.

Table 2. Requirements for successful climate communication

- 1 - Feels personal, near and urgent.
- 2 - Uses cognitive framings that do not backfire on the climate issue through negative affects.
- 3 - Reduces dissonance by providing opportunities for visible and consistent action.
- 4 - Avoids triggering the emotional need for denial.
- 5 - Reduces cultural and political polarization on the issue.

Section II - New Psychological Strategies for Climate Communication

In the coming decades, the dissemination of climate science findings is necessary, but certainly not *sufficient* for overcoming the above barriers. But if factual information, natural science information campaigns or economic cost-effectiveness are not sufficient for convincing the public to support ambitious climate policies, then what is? Furthermore, no political issue can hold people's attention at consistently high levels year after year, and having such expectations for climate communication would be completely unrealistic [70]. Even large events or catastrophes such as superstorm Sandy from 2012 did not lastingly turn around public opinion [71]. Thus, a radical rethink of climate communications is necessary. But this requires a certain willingness to think differently and innovatively, as well as lots of determination and perseverance to experiment with trial and error. Luckily, this is already ongoing among innovators and researchers in the field, and by now there is a growing range of both tested and untested alternatives. Central to this rethinking is to move from focusing on the *information and the message* to a more pragmatic approach to *interactive communications* that *engage positive emotion and behavior*.

From this burgeoning field, the broad direction of the new strategies to overcome the barriers are emerging, and they match the success criteria outlined above. At least five such strategies or solutions are worth outlining, see Table 3.

Table 3: The five new emerging strategies and solutions for climate communication

- 1 - Social: Use the power of social networks.
- 2 - Supportive: Find deep framings that are positive and support action.
- 3 - Simple: Make it easy and convenient to act in a climate-friendly manner.
- 4 - Story: Use the power of storytelling.
- 5 - Signals: Use indicators and metrics that monitor progress on green growth and jobs.

2.1 Use the power of social networks

In conventional economics, it is primarily price incentives that induce people to change their behavior: Consumers are rational and will choose whatever is cheapest. But with recent behavioral economic research, the importance of social norms and peer pressure has become much more prominent. Studies from psychological research on social norms and social networks, such as those done by psychologist Robert Cialdini, illustrate this [72]–[76]. In order to look at a reduction of power consumption, a study was made comparing four groups of households. Each group was given different reasons for conserving energy. Group 1: because it is better for the earth (sustainability). Group 2: for the sake of future generations (your grandchildren), Group 3: because it pays (more money), and Group 4: because your neighbors do it (social comparison).

The group with the greatest reduction in power consumption was *not* the first group, maybe to the despair of idealists. And in Group 2, the care for our grandchildren did not last long as a motivator. Contrary to the rational actor of economic theory, not even the third group, which had learned how much money they would save, responded much [77], [78]. The most committed, and

with the greatest savings, were those who could compare their own efforts with similar neighbors. Social status and peer review are very strong motivators, whereas a comparison with peers is an emotional driver that in many situations is stronger than isolated self-interest. There is no real fun in just conserving power or saving money, but being recognized by others makes it so. People do not just want to conserve energy, they want to be *acknowledged* for conserving energy [79]–[83].

No man is an island. Most of our behavior is social – with family, friends, colleagues or even strangers on the commute to work. Many strategies for promoting sustainable behavior seem to forget this, particularly if framed as economic consumers and focusing exclusively on people as individuals. Too often, climate change communications are directed to the individual as a single unit, as a “cog in the machine.” This can make the problems feel overwhelming, but through an emphasis on what other people are doing, a stronger sense of in-group and collective purpose can be developed [84].

The company OPower has developed a plug-in app for Facebook, where you can access your own power consumption measurements and compare your performance with your friends in energy-saving. If you feel competitive, you can invite more friends to join. Currently, mobile apps connected directly to both real-time measurements at home and energy suppliers are being introduced into advanced domestic power markets along with smarter appliances [85]. Social norms connected with tailored communication based on a two-way, real-time readout of consumption and prices could mean a very different awareness of our own energy consumption.

The strength of social networks can also involve tapping into local patriotism, to get Bergen to compete with Oslo, Los Angeles to San Francisco, Copenhagen against Stockholm, etc. Other ways to use this strength is to engage unions, clubs and sports teams, particularly in sports exposed to climate change such as skiing. In that situation, you can get the message out via senders who are much closer to the target groups than climate scientists are, senders to whom they already identify themselves with. For those with the means available, purchasing high-end electric cars such as Tesla also inspires such social visibility and attractiveness for low fossil fuel behaviors. It can therefore be expected that the drivers of electric cars will be more in favor of higher fossil fuel taxes than the owners of conventional SUVs. In-group information sources and messengers have a much higher level of credibility than climate scientists or advocates working through national media can ever achieve.

This social strategy for network- and behavior-based climate communications counteracts or simply circumvents the number one barrier of psychological distancing. It brings the topic geographically and socially closer to the individual, one’s network and the local community, in addition to moving the focus from the distant future into the here and now. It also makes the urgency very immediate and puts it inside one’s locus of control, while activating the powerful social motivations that peer pressure represents. By focusing the social networks on measures that can have a high impact (such as energy conservation rather than recycling), the perceived relevance of the peer influence will be more substantial and effective, hence countering the feelings of helplessness that engenders dissonance and denial (Barriers 3 and 4).

2.2 Reframing the climate messages with supportive frames

“Framing” refers to the invisible cognitive contexts around our concepts and conversations that give meaning and guidance to our understanding of something, which are typically formed in our brains using metaphors, images and neuro-linguistic networks. So rather than continuing the climate discourse within the “disaster-,” “too uncertain-” or “too expensive” framings, we could employ other metaphors and put them to work. Examples of such new frames could be insurance, protection-, health- and opportunity framings [41], [86].

Economists have been prone to using the too-expensive framing. As an alternative to going on and on about the economic costs of climate measures today compared to the future costs of global warming, one could reframe this public discourse to one of *risk and insurance*. [10], [87]. Climate change needs an altogether different logic than the one given by economic cost: We do not have a national defense because it is profitable or has a low cost. We do not pay fire insurance bills because it is cheap, nor that our house certainly will burn down this year or the next. We do not believe anymore that we will be a military invasion soon, yet most western countries spend a lot of money to ensure against such risks. Wars *could* happen again, and if so the impacts would be really severe.

Within the insurance framing, the discussion will turn to questions such as: How much is it worth to pay today to avoid a burn-down of the planet in the future? Is it more important today to insure against climate change than against military attacks? As a society, we pay taxes for the state to maintain an army to protect the values we believe in at the level of 2-3% of global GDP. We also pay 3.5% of the global GDP per year to the insurance industry against risks such as theft and fire [41, p. 5]. The same could be the case for climate action: We should maybe pay insurance against the climate system falling over the edge with large, irreversible consequences. We must invest and build a “climate defense” today, so we can avoid that the climate declares “war” on us in the future. A related reframing is preparing for possible mass migrations of climate refugees from areas that become uninhabitable due to heat and drought or sea level rise.

Another important framing of the climate issue is health and a quality of life. Global warming would cause a change in our landscapes, and a part of our identity would disappear. A lot more invasive insects, floods, storms and landslides, roads that fail, homes destroyed, lives and health are at risk. At the same time, it can be excellent for one’s health and the climate to eat less meat and more vegetables. It is good for both the body and the climate to bike more and drive less. The two, human health and the climate, have much in common. By applying a positive health framing to mitigation behaviors, we also strengthen the climate message.

Knowledge of the consequences of climate change has tended to focus on its long term physical impacts, such as melting glaciers, rising temperatures, sea levels, flooding or other disaster frames. A focus group study conducted in US by Eco-America concluded that discourses about “preventing pollution” and “protecting the air that we breathe” persuade many more people than conventional frames. Eighty-five percent of voters seek “preparedness” as the preferred approach to address climate impacts, whereas “adaptation” is much less effective, falling 15 points below

“preparedness.” Such frames essentially work with (rather than against) people’s pre-existing mental models of climate change [88], [11].

A final framing that deserves mention in this limited space is one that connects with the story and signals the strategies presented below. It is the positive “opportunity” framing [41]: That companies and societies with low emissions are also more efficient, competitive and provide better jobs. Building and demonstrating industrial and social leadership in these areas is an investment in future profitability, as well as being better for the climate. These framings would not create the type of backlash that “doom” and “cost” framings do.

2.3 Make it simple to choose eco-friendly by nudging

To avoid dissonance and maintain supportive attitudes, it is important that as many daily actions as possible are consistent with climate knowledge, while not demanding too much extra effort since the breaking of habits is a demanding task [21]. Many of the choices that consumers make have large and long-lasting consequences for energy consumption and therefore emissions. This is particularly true in relation to the purchases of houses, cars, household appliances, clothing and food, especially red meats. Can we modify choice situations to help facilitate people to make it easy to purchase climate-friendly? This approach to changing daily behavior and habits is frequently called nudging, building on research from psychology and behavioral economics. Small changes in choice architecture, e.g. by shifting from an active choice to a passive choice by default, may have a large impact on consumer behavior, potentially even larger than that of economic incentives [89]–[91].

I will give some examples, starting with one study conducted by a Norwegian non-profit foundation, GreeNudge. They collaborated in 2012 with Elkjop, a retailer of electrical products, in getting people to buy energy-efficient dryers by providing life-cycle costs in large fonts next to the purchase price. It helps people to see the benefits of investing in the most efficient appliances. The nudging simply consists of re-organizing the price information in decision-making moments. If this instance of nudging was applied to all purchasing situations to favor the most energy efficient electrical appliances, it could lower appliance consumption by up to 5% simply by rearranging sales labels in the shop [92].

Another study showed that simply reducing plate size and providing some social cues, in restaurants, reduced the amount of food waste in hotel restaurants by approximately 20%. Since food production is a major contributor to climate change and other forms of environmental degradation, this is a significant improvement with little investment. The measures reduce the amount of food the restaurants need to purchase, and there is no change in guest satisfaction, thereby making it likely that profits will increase. Such nudges provide an opportunity for win–win–win: restaurants, consumers and the environment all win [93].

An idea for a future climate nudge could be to automatically add and include the price of CO₂ emission allowances when you buy a plane ticket, just as aviation taxes already do. You can still make it optional to pay for the CO₂ allowance, but you would actively have to opt out in order not

to pay. The airlines could retain a certain cut of CO₂ allowance sales, so they would have an incentive to develop it. A fourth example would be to improve public transportation with lower prices and increasing frequency, while at the same time restricting parking in city centers. The nudge here is that people find it faster, easier and more comfortable to take public transportation than to drive and park. A fifth example is the zero-cost option of simply changing the default on all printers from simple to duplex (two-sided) printing. In one study, this reduced paper consumption by more than 15%, and the effect remained intact over a period of at least six months. If applied to all US offices alone, this could give a net reduction of 800ktCO_{2e} per year, which is equivalent to 150,000 cars [94].

There are a large number of nudges we could implement to improve the climate and environment. The good news from this field is that the same factors that lead us to make a mindless and polluting choice can often be reversed to help us make a mindless better choice. Behavioral economics offers a means to encourage more optimal behavior without inducing the resistance and reactance often associated with restrictive enforcement policies [95]. Of course it is also true that further progress in actual emission reductions will require the use of more standard tools, including economic incentives and regulation [91]. No one contends that climate nudges are sufficient alone. The more modest suggestion is that an understanding of choice architecture and libertarian paternalism will significantly expand the toolbox for climate communications [89], [95].

In reality, the crucial argument in our context is that behavior-focused initiatives such as nudges are also ways of doing climate communication. In relation to the barriers previously identified, they would contribute to making the climate issue seem near and relevant to personal behavior (Barrier 1) in a way that would nudge one out of the cost- and sacrifice framing that haunts the climate issue (Barrier 2) into a smart- and easy framing. One hypothesis, based on dissonance theory, which states that behavior influences attitudes, is that a broad range of such nudges would – by shifting behavior – reduce dissonance and denial (Barriers 3 and 4). This is because it is easier to behave consistently with the attitude when nudged.

2.4 Use the power of narratives

As humans we create meaning through stories and narrative. “Global warming” is also one such grand narrative, although many scientists may lose sight of this story aspect of it when fully immersed in “hard” evidence and “real” temperature readings. But any presentation, whether graph or article, no matter how factual or objective they may look, also has story features. The question is which type of story to tell when communicating to non-scientists, in order for them to understand the extent, urgency and need for action [96].

The story that has been used most often, implicitly and without reflection in climate communication, is the apocalyptic narrative [41], [48]. That is not surprising, because it is a core story in our Christian, Western culture: Its roots go back to the last book in the New Testament about the end times, with environmental and climate disasters described in exquisite detail as a form of punishment for sin and decay. “If we continue on these evil ways, we will all burn in hell.” The climate message too easily falls into this well-worn story track, even with no conscious

intention at all from the messengers – the climate experts. You might say that the apocalyptic story comes uninvited and spreads like a thick wooly carpet around graphs, figures and calculations. What is described is increased storms, drought, wildfires, floods, sea level rise, damaged ecosystems and self-reinforcing feedback mechanisms that escalate greenhouse gases in the atmosphere. In other words: The end of our world as we know it is coming soon, and it is all due to our sins.

It is not impossible that the future will in fact be something similar to a climate hell, but that is just one story, just one type of scenario. And one that generates fear, guilt, anger, despair and helplessness as its shadow side in the here-and-now [46]. There are other stories, with other emotions associated with them: What is needed are more *positive environmental* stories that describe and help us imagine a renewal of wildlife and ecosystems. We could instead tell tales of joy about the people who stand up against destruction and do great things. There are untold stories about people who care and act on the basis of vision, determination and joy. Many scientists are achieving wonderful things, discovering magnificent ecological relationships and amazing but vulnerable behavior of animals such as monarch butterflies. We can tell stories of the amazing opportunities arising from smarter relationships between economic production and nature. Damaged or unproductive land can return to being forests and wetlands, and nature can demonstrate its often marvelous ability to restore vital ecosystems. Many wild species can settle surprisingly close to rural areas, as long as humans do not destroy them. Stories like this would stretch the horizon further than just working to stop the destruction of pristine nature, while also describing an ecologically richer, re-wilded better world where you and I look forward to live in [97], [98].

Changes are happening at a furious pace towards the green economy within technology, business and lifestyle. Creativity and capacity for change appears in small-scale solutions, such as bottle-sunlight, solar cookers, electric bicycles, passive and plus-houses, bioenergy systems and the reuse of waste to high value products. There is no shortage of ingenious solutions for green growth that can be told inspiring stories about [99]–[101]. However, the shortage seems to be of captivating storytellers who give hope and inspiration, as well as attractive images of a future in which we live with more jobs, higher well-being *and* lower emissions. If it cannot be imagined, then people will surely not work for it to happen. This strategy can address both barrier 4 - denial, and 5 - identity.

2.5 Develop and use new metrics for societal progress

In order to maintain interest in climate mitigation and adaptation, there has to be a way to get feedback to stakeholders on the progress made. Without such feedback, there is little learning and less motivation. The climate problem is a so-called “wicked” problem, in that it is complex and interrelated, and there is no good way to know when it is solved – or ever in our timescales [48, p. 334]. There is therefore a need to measure whether one is making headway, and in particular whether each person, company, city, nation is doing at least its fair share or too little? The concept of indicators refers to such tools to visualize complex information in compact ways that should be clarifying and useful to decision-makers, and to the public as to speed and the direction of societal change. The usefulness of a policy indicator set must be evaluated in terms of its contribution

toward the end goals, in our case a reduction of the psychological climate paradox, and ultimately the reduction of GHG emissions combined with a higher well-being.

Furthermore, for an indicator to be useful, it must make sense to policymakers and others who employ the indicator by connecting these larger narratives of green growth and development. Properly crafted indicators make it possible for the general public (citizens) to evaluate current national environmental policies (politicians). Even so, there is little knowledge about how to use communication strategies in close combination with feedback in the form of indicators for measuring progress. For instance, people prefer behaviors for recycling rather than energy efficiency. But of the two, the most effective for emission reduction is energy conservation, so an indicator for energy conservation would therefore make more sense [8].

Still, a couple of examples of such indicators can be given. The first is the Kantian Climate Policy Indicator. Starting from a Kantian ethics, each nation should act *as if* a sufficient international treaty was already in place. This would require each nation state to carry out all greenhouse gas mitigation projects down to the point where emissions per person is equal to the global average footprint in a <2C world in 2050. This measure is relatively easy to track, and can thus serve as an indicator for what is good enough at the national level [102].

While the Kantian CPI is on a national level, another indicator, the “GEVA,” can be broken down to any level, such as a city, an organization or a group. The indicator states that an average 5% reduction in Greenhouse Gas Emissions per Value Added (GEVA) per year is estimated as being sufficient to stay below a <2C world in 2050, while doubling the GDP of the economy during the period [103]. In this way, those that have an average 5% GEVA reduction per year are green companies in that they are part of the solution, while those that are below 5% are at best only “green washing.” Being able to evaluate and document according to these new metrics that one is on track to be a part of the solution towards 2050, is crucial to benchmark whether the other strategies are sufficient and are keeping up the momentum in the societal transformation. By documenting progress this strategy addresses barriers 1, 2 and 5.

3. Conclusions

Today, most countries already have access to the needed technological solutions, documented best practices and economic resources to solve the climate problem. The challenge now is to get a majority of citizens in each democracy to support policies for implementing existing solutions. Politicians seem reluctant about the costs and prefer to wait for stronger demands from citizens, just as citizens are waiting for stronger action from politicians, a chicken-and-egg situation that has been termed the “governance trap” [10]. In order to break this deadlock, a radical rethinking of climate communication is necessary, insofar as moving from a cognitive information model to one of psychological involvement and interaction through behavioral strategies.

By no means do social psychology and behavioral economics have all the answers, but with a multidisciplinary approach climate scientists and people dealing with energy and climate

information can avoid well-known pitfalls in climate communications. New institutional arenas, including government, climate scientists, social scientists, businesses and NGOs, are all necessary to coordinate, rethink, test, document and learn how to implement the strategies into specific actions in different cultural contexts. Through the use of such a multidisciplinary approach, we can develop an evidence-based range of practical communication solutions for overcoming the psychological climate paradox along the strategies outlined above. These new climate communication initiatives must be aware of and actively address the psychological barriers in a way that makes the climate issue felt as being more personal (less distant), while utilizing more constructive framings, nudging the public towards actions so that cognitive dissonance and denial are reduced, telling new stories of opportunity and attractive futures with appeal across the political spectrum, and, lastly, giving meaningful signals and response indicators on our progress towards societal transformation.

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