1 **We must challenge the idea that humans are not designed to solve climate change**

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Abstract

In the face of a slow and inadequate global response to anthropogenic climate change, scholars and journalists frequently claim that human psychology is not designed or evolved to solve the problem, and highlight a range of ‘psychological barriers’ to climate action. Here, we critically examine this claim and the evidence on which it is based. We identify four key problems with attributing climate inaction to ‘human nature’ or evolved psychological barriers: 1) it minimizes variability within and between populations; 2) it oversimplifies psychological research and its implications for policy; 3) it frames responsibility for climate change in terms of the individual at the expense of the role of other aspects of culture, including institutional actors; and 4) it rationalizes inaction. For these reasons, the message from social scientists must be clear - our current collective failure to tackle climate change on the scale required cannot be explained as a product of a universal and fixed human nature because it is a fundamentally cultural phenomenon, reflecting culturally evolved values, norms, institutions, and technologies that can and must change rapidly.

1. Introduction

With the help of numerous high-profile media outlets social scientists have for years popularized the notion that humans are not designed to solve climate change. In his 2006 *LA Times* Opinion piece, psychologist and best-selling author Dan Gilbert argued that Americans are less worried about anthropogenic climate change than terrorism because the human brain did not evolve to respond to threats like global warming (Gilbert, 2006). A 2009 *Washington Post* article begins “To a psychologist, climate change looks as if it was designed to be ignored” (Fahrenthold, 2009). In a 2012 article titled, “We’re all climate change idiots”, the *New York Times* quoted Anthony Leiserowitz, director of the Yale Project on Climate Change Communication: “You almost couldn’t design a problem that is a worse fit with our underlying psychology” (Gardiner, 2012). Similar claims have appeared repeatedly in the media over the last decade (see Table 1 for some other examples), from *Time* magazine’s headline, “Study shows that human beings are too selfish to fix climate change” (Walsh, 2013), to writer Jonathan Franzen’s 2019 essay in the *New Yorker* entitled “What if we stopped pretending?”, in which he asserts a “climate apocalypse” is the inevitable consequence of “human nature.”

Claims that a failure to make the collective changes necessary to solve environmental issues like climate change is part of human nature have not been restricted to the popular press. For example, almost a quarter of a century ago, Wilson, Daly, and Gordon (1998) stated, “both the theory and the available data on human behaviour support the thesis that *Homo sapiens* is not by nature a conservationist, and hence that recognizing environmental problems, deploring them,

and gaining sophisticated understanding of their sources in our actions, may still not be enough to motivate the behavioural changes required to rectify them” (p. 502). Gifford (2011 p. 291), writing in *American Psychologist*, cites the “ancient brain” and its concerns with our “immediate band, immediate dangers, exploitable resources, and the present time,” as well as the fact that it “has not evolved much in thousands of years,” as not “naturally consistent with being concerned, in the 21st century, about global climate change, which is slow, usually distant, and unrelated to the present welfare of our selves and our significant others.” And Van Vugt, Giskevicius, and Schultz (2014, p. 23) claim in *Social Issues and Policy Review* that “Our minds are not designed to respond to environmental problems when such problems are distant, global, and presented in abstract terms.”

Much of this work (which largely originates in North America, although several proponents are based in the UK and Europe) is grounded in a conceptualisation of the human mind as a collection of putative psychological “barriers”, “biases” or “challenges” that thwart climate action. Table 2 lists at least 25 such features from a selection of articles published over the last two decades. While far from comprehensive, this sample gives an indication of the range of psychological processes that have been identified. The most commonly cited include the human propensity to discount events that are remote in time and space, problems perceiving slow, ‘insensible’ changes, and conflict between self-interest and the common good. However, appeals to psychological barriers to climate action span the full gamut of human psychology, from the tendency to conform to social norms (Asch, 1956), to moral tribalism (Markowitz & Shariff, 2012), denial (Baumeister, Dale, & Sommer, 2002), habit (Wood & Rnger, 2016), excessive optimism (Sharot, 2011), rebound

effects (Wegner, Schneider, Carter, & White, 1987), tokenism (Laws, 1975), the fundamental attribution error (Ross, 1977), prospect theory (Kahneman & Tversky, 1979) and excessive faith in the supernatural or technological fixes (e.g., Clark, Robert, & Hampton, 2016).

Few social scientists would claim that “psychological barriers” are insurmountable, that our species is outright incapable of mitigating dangerous climate change, or that there are not other important ‘structural’ barriers to overcome - many researchers in the area are indeed careful to note these provisos. Moreover, there is clearly value in psychological research seeking to understand how different people perceive, process and act on the many challenges that climate change presents. Nevertheless, we believe headlines, quotes and articles like those cited above ultimately promote a reading of the psychological evidence that essentialises our lack of progress, either explicitly as a product of universal human nature, or implicitly by portraying the human mind as a collection of evolved psychological barriers to climate action. Such arguments are not new, having been circulated for more than two decades, and some might claim that time has only strengthened the case – what better demonstration of the inadequacies of human psychology in the face of climate change than decades of increasing greenhouse gas emissions? However, we are concerned that essentialising climate inaction in this way not only misrepresents psychological research and theory, but frames the climate policy narrative in a way that may itself be a potential barrier to tackling climate change.

2. Four problems with research that essentialises climate inaction

2.1 Minimizing variation within and between populations

When social scientists or science communicators claim or imply that our collective failure to tackle climate change on the scale required is a natural outcome of human psychology, they ignore or minimize variation in psychological responses to the problem. Often proposed psychological barriers are referred to as ‘universal’ or described as a trait of humanity or ‘*Homo sapiens*.’ Hence Prof Dan Gilbert tells us “...the human brain evolved to respond to...features that terrorism has and that global warming lacks” (Gilbert, 2006). More often the simple collective ‘we’ is used – “...we overestimate threats that are less likely but easier to remember, like terrorism, and underestimate more complex threats, like climate change” (King, 2019). Who is the ‘we’ the research references? US citizens? The Anglophone middle class? Westerners? The implication is that it applies to all humans, but the way people respond to the threat of climate change varies profoundly within and between human populations around the globe.

A 2019 Pew Research global survey found that whilst 59% of the US population rated climate change as a major threat (still most of the population), this proportion ranged from 38% in Israel to 86% and 90% in South Korea and Greece, respectively (Poushter & Huang, 2019). And whilst US respondents were indeed more likely to rank as a major threat ISIS (62%) and cyberattacks from other countries (74%), climate change was the top ranked threat in most nations surveyed (Poushter & Huang, 2019). Even within a population like the US, a focus on average levels of concern about climate change masks very high within-population variability across

demographics, social identity and values. For example, a 2015 Pew Research survey found that while 68% of US Democrats believe climate change is a very serious threat, that proportion falls to 20% among Republicans (Poushter & Huang, 2019).

Setting aside the fact that, if anything, these survey results seem to suggest most people do in fact care more about climate change than terrorism, they serve to highlight three realities that are critical to effectively tackling climate change but are lost in essentialist explanations. First, there is no universal human response to climate change. This applies to ‘higher-level’ beliefs about the realities of climate change like those expressed above, but even ‘lower-level’ cognitive processes identified as barriers to climate change in Table 2, such as temporal discounting, risk perception, self-interest, moral reasoning, and motivation to conform, can operate very differently between populations (Henrich et al., 2010). Variation of this kind renders the concept of a universal human nature highly problematic in general (Buller, 2005), but particularly so when applied to a complex, socio-cultural phenomena like responding to climate change.

Second, cultural institutions, norms, values and beliefs are enormously important determinants of individual responses to climate change. When 68% of Democrats but only 20% of Republicans say they see climate change as a serious threat, this suggests we ought to look for barriers in, for example, aspects of political ideology, not human nature. Cross-cultural work has demonstrated that, around the globe, democratic values and, particularly in the West, worldview and political ideology, are among the most powerful and consistent predictors of climate change concern (Lewis, Palm & Feng, 2019; Hornsey, Harris, Bain & Fielding, 2016). Other powerful cultural factors

include level of education and, in Europe and Latin America, understanding of climate change (Lee, Markowitz, Howe, Ko and Leisertowitz, 2015).

Third, if the US population, where much research into the psychology of climate change has been located, is less concerned about the problem than most of the world (Stokes, Wike & Carle, 2015; Poushter & Huang, 2019), it is a particularly misleading source of data for general claims about the likely ‘human’ response. This is just one example of a broader problem in the field of psychology (and other social science disciplines), which has relied primarily on WEIRD (Western, Educated, Industrialized, Rich, Democratic) subjects, who are outliers on many psychological metrics and therefore a poor proxy for general claims about human psychology (Henrich, Heine, & Norenzayan, 2010). Of course, this does not mean that work on the psychology of climate change in the US is not valuable. On the contrary, given the US’s geopolitical power and contributions to global emissions, US-based research is of critical importance. However, the value of this work lies in showing the contextual nature of why many US institutions, leaders and citizens continue to oppose meaningful climate action, not as the basis for essentialist explanations for inaction.

2.2 Oversimplifying psychological research and its implications for policy

When scholars or journalists identify broadly specified features of human psychology (e.g., ‘future discounting’ or ‘the fundamental attribution error’) as barriers to climate action they risk oversimplifying the link between current psychological evidence and effective collective action, and producing false confidence in the relative efficacy of possible strategies to address climate change. The utility of identifying evolved

psychological barriers to climate action has frequently been presented as allowing us to recognize and understand our cognitive limits and thereby design strategies to overcome them (e.g., Johnson & Levin, 2009; Gifford, 2011; Griskevicius, Cantú, & Van Vugt, 2012; Van Vugt, Griskevicius, & Schultz, 2014; Ross et al., 2016). For example, if our psychology is less sensitive to threats distant in time and space, we should motivate action by highlighting how tackling climate change can provide benefits in the here and now (Weber, 2006; Leiserowitz, 2007; Moser, 2010; Griskevicius et al., 2012; Leviston, Price, & Bishop, 2014; van der Linden, 2015). If it is difficult to perceive slow, insensible changes in a complex and uncertain climate system, then immediately perceptible changes and simple cause and effect relationships should be emphasized (Weber, 2006; Leviston, Price, & Bishop, 2014). If individuals are more motivated by self-interest and nepotism than the common good, then communicators need to appeal more to the interests of individuals and their kin (Griskevicius et al., 2012; van Vugt et al., 2014).

Such recommendations point to apparently simple solutions grounded in our species' evolutionary history, but the link between the commonly cited psychological barriers in humans and climate action at scale is rarely straightforward. For example, the human tendency to discount potential threats that are remote in time and space is among the most widely cited barriers to tackling climate change (Table 2). In response, it has been suggested that we promote climate action by highlighting the proximal consequences of climate change in the here and now (Weber, 2006; Leiserowitz, 2007; Moser, 2010; Griskevicius et al., 2012; Leviston, Price, & Bishop, 2014; van der Linden et al., 2015). However, research indicates mixed effects of 'proximizing' climate change in this way (Bohm & Pfister, 2005; Gattig &

Hendrickx, 2007; Brügger, Dessai, Devine-Wright, Morton, & Pidgeon, 2015). Some studies find a positive relationship between perceived proximity and willingness to act (Scannell & Gifford, 2011; Spence, Poortinga, Butler, & Pidgeon, 2011), but others find no relationship or the opposite effect (*e.g.*, Shwom, Dan & Dietz, 2008; Spence, Poortinga, & Pidgeon, 2012). A review of the research by Brügger et al. (2015) found that the relationship between perceived proximity of climate change and motivation to act was complex and depended upon many factors, including how individuals valued the resources in question and how they felt about the ease and efficacy of possible actions available to them. Conceptualising these effects of psychological distance on threat salience as a barrier to tackling climate change directs attention away from the complex and sometimes unexpected ways that elements of our psychology interact with one another and with our culture and environment. In addition, it overshadows what may be a powerful weapon in the fight against climate change - our ability to imagine scenarios in distant times and places (Suddendorf, 2013) or as Gilbert (2006) acknowledged (but did not emphasize), an “ability to duck that which is not yet coming.”

Similar caveats apply to other proposed psychological barriers to climate action. Whilst it is true that self-interest presents a challenge for social dilemmas like climate change that involve collective responsibility, simplistic appeals to self-interest can backfire by inhibiting intrinsic values (*e.g.*, to protect our planet) in favour of extrinsic values (*e.g.*, to save money) (Evans et al., 2013; Markowitz & Shariff, 2012; Brown & Kasser, 2005). Moreover, people can and frequently do cooperate to solve social dilemmas (Fehr & Fischbacher, 2003; Ostrom, 1990) and their ability to do so is a hallmark of our species (Tomasello et al., 2012). Similarly, presenting the low

237 salience of slow, insensible changes as a barrier to climate action implies we ought to
238 emphasize tangible climate outcomes, rather than things we cannot see or feel
239 directly. But things we cannot see or feel are among the most salient of human
240 concerns (e.g., religion).

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242 Indeed, many aspects of human psychology are flexible and contingent enough that
243 they can be conceived as either a barrier or bridge to tackling climate change.
244 Uncertainty about the future can make room for complacency or denial and reduce
245 motivation (Gifford, 2011; Markowitz & Shariff, 2012), but can also promote a
246 conservative approach to avoid risk of loss (Wade-Benzoni, Hernandez, Medvec, &
247 Messick, 2008). Social conformity and the desire for status can work against climate
248 action (Sturman, Dufford, Bremser, & Chantel, 2016), or in favour of action
249 (McDonald & Crandall, 2015; Griskevicius, Tybur, & Van den Bergh, 2010). An
250 ‘optimism bias’ can make us foolishly hopeful and complacent (Johnson & Levin
251 2009; Gifford, 2011), but hope can equally motivate action in the face of all odds
252 (Scheier et al, 1987; Bury, Wenzel, & Woodyatt, 2019). Religion and the promise of
253 salvation can be a distraction (Ecker & Blockberg, 1989) or a call to arms (Francis,
254 2015, *Laudato Si*).

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256 Whether a cognitive process (Table 2) constitutes a barrier is frequently contingent
257 on structural and cultural context. In some cases this is obvious – e.g., ‘belief in
258 supernatural salvation’ or ‘lack of trust in scientists’ are inherently cultural
259 phenomena. In other cases, a barrier exists, but by framing it as a cognitive process,
260 the role of structural and cultural factors is underemphasized. For example, cognitive
261 dissonance and system justification (i.e., an orientation to defend the status quo) may

lead to climate change skepticism in societies where the status quo results in high per capita emissions (Feygina, Jost, & Goldsmith, 2010). Understanding the cognitive processes that lead some people to defend the current unsustainable system is therefore an important area of research in psychology. But it seems blinkered to us to locate the barrier in the cognitive processes themselves (cognitive dissonance or defence of the status quo) separate from and ahead of the cultural values, norms and incentives in which they operate. Even small shifts in framing with respect to values can turn system justification into a desire to defend our current way of life in the face of an environmental threat (Feygina, Jost, & Goldsmith, 2010).

2.3 Framing climate change as an individual moral dilemma

A focus on psychological barriers and human nature frames responsibility for climate change in terms of individual actions. Some work in this area has been careful to acknowledge the role of higher-level institutional and structural factors (e.g, Swim et al., 2009; Johnson & Levin, 2009; Gifford, 2011), and has noted that solutions at higher levels need to consider individual psychology in order to garner support from political leaders and their constituents (Swim et al., 2009; Clayton et al., 2015). Nevertheless, explaining climate inaction as a product of psychological barriers present in all of us asks us to view responsibility for climate change through the lens of individual actions rather through the cultures and behaviour of powerful corporations, governments and other norms and institutions. For example, research can examine the fit between climate change and “the human moral judgement system” without considering the structural and policy issues that give rise to moral dilemmas in the first place (e.g., Markowitz & Shariff, 2012). Others conceive of

structural barriers primarily with regards to individual action. For instance, Gifford (2011) compares action on climate to problems like smoking and wearing safety belts (there are possible overlaps but there are also fundamental differences, particularly in the degree to which those problems are collective or ‘threshold’ social dilemmas that require a minimum amount of cooperation among a certain percentage of actors to achieve success). This focus on the individual level tracks a broader pattern in mainstream psychology, which has long been criticised for under-emphasising the role of higher-level cultural and social structures (Reicher, 2004), and is itself the product of a long cultural tradition of individualism in the West (Schulz et al., 2019).

In addition, research on individual psychology has tended to focus on ‘household consumers’ (e.g. Swim et al., 2009; Swim, Clayton, & Howard, 2011) or some representative sample from the citizenry. Far less attention has been paid by psychologists in particular to the psychological traits of powerful actors, including politicians, corporate executives, and prominent climate contrarians (e.g., Jacquet, 2017). What, for example, are the prominent psychological differences between former ExxonMobil CEO Lee Raymond, who ramped up the company’s opposition to climate change policy and research (including a large-scale climate change denial campaign) and BP former CEO John Browne, who publicly accepted climate science and decided against making political donations to counter climate action in the U.S. (Coll, 2012)?

By focusing on household consumers, research about psychological barriers to climate change naturally invites recommendations for ‘nudges’ (Sunstein & Thaler, 2008) or ‘behavioral wedges’ (Dietz et al. 2009). Much has been made of recent work

applying insight about human cognition to design individual behaviour change interventions that promote public goods. The widely praised Behavioural Insights Team or “Nudge unit” in the UK, for example, has produced measurable outcomes in areas as diverse as promoting healthy eating (Halpern, 2016) and increasing tax compliance (Hallsworth, List, Metcalfe, & Vlaev, 2017). However, results from behaviour change interventions targeting more complex, large-scale collective action problems like energy systems and climate change are less obvious. A review of attempts to change behaviour related to home energy use, for example, found average gains of just 1-3% (RAND Europe, 2012). These gains are far short of the transformative level of change required (e.g., Wilson, 2015; IPCC, 2018; Diaz et al, 2019).

2.4 Rationalizing inaction

Finally, the idea we were not designed to solve climate change risks rationalizing our inaction. There is a long history of appeals to ‘human nature’ or similar biological arguments to justify the status quo and deny the potential for social change. Socially sanctioned slavery, racism, sexism, and discrimination for sexual orientation all used appeals to biological innateness as justification. Some researchers suggested (and still do) that the gender gap in certain fields, including mathematics, was because men are better spatial thinkers than women. Yet the gender gap between girls and boys on math tests disappears in more gender-equal cultures (Guiso, Monte, Sapienza, & Zingales, 2008). We are not suggesting that those researching and reporting on the psychology of climate change are intentionally misinterpreting the psychological

evidence to preserve the status quo. But there is an obvious relationship between psychological claims and social arrangements.

Perhaps most concerning is the possibility that essentialising climate inaction creates a false perception that a failure to act is not just natural, but inevitable. In the last two years, high profile articles like Jem Bendell’s “Deep Adaptation: a map for navigating climate tragedy” (Bendell, 2018), Catherine Ingram’s long form essay “Facing Extinction” (Ingram, 2019) and Jonathan Franzen’s piece in *the New Yorker* “What if we stopped pretending” (Franzen, 2019) have presented a deeply pessimistic reading of human psychology and our capacity to act. When reviewing humanity’s progress to date, Franzen (2019) tells us that “Psychologically, this denial makes sense” and goes on to “apply the constraints of human psychology” to generate dystopian predictions for our future. Ingram (2019) states that “being concerned about climate change does not come naturally to us” before summarizing psychologist Dan Gilbert’s (2006) *LA Times* article on the topic. These influential pieces illustrate how the notion that we are not designed to solve climate change can be and is already being used to justify climate change fatalism.

Setting aside claims that dangerous climate change is outright inevitable, attributing a lack of progress on climate change globally to human nature or psychological barriers can still be taken to imply that inaction is natural (and hence morally acceptable) or ‘normal’ human behaviour. Arguments that in their inaction on climate change “people are being both rational and consistent with their evolutionary past” (Low & Ridley, 1993) or that “it’s unfair to expect people...to do this kind of decision making, because we’re not wired for that” (Elke Weber, Professor of Management

and Psychology, Columbia University, quoted in Harman, 2014) risk giving moral license to inaction and the inaction of our leaders. Similarly, newspaper headlines claiming that we are “all climate change idiots”, “too selfish to fix climate change”, or “not made to deal with climate change” can create a perceived norm of apathy and inaction that becomes self-fulfilling. Research has shown similar unintended consequences when people are made aware of gender stereotyping and implicit bias, demonstrating that such effects are possible and may, in fact, be a more general problem for applied psychology. For example, people are less judgmental of and willing to punish discrimination when it is presented as due to automatic ‘implicit’ processes, and are more likely to express gender stereotypes and behave in stereotype-consistent ways themselves when they are made aware of the prevalence of gender stereotyping in the population (Duguid & Thomas-Hunt, 2015).

Claims that normalize climate inaction and apathy are all the more problematic because they are at odds with reality. A 2019 Pew research survey showed more than two thirds (67%) of people around the globe consider climate change a ‘major threat’ and this proportion appears to be rising sharply in many countries (up from 56% in 2013), including in the USA, where the figure is now 59% (Poushter & Huang, 2019). A more recent 2020 survey has shown that even while Europe was reeling from the impacts of COVID-19, Europeans still rated climate change a greater threat to their countries than the pandemic (2020). Surveys also show meaningful and ambitious policies like a global carbon tax are politically tenable, with majority support across countries (e.g., Carattini, Kallbekken, & Orlov, 2019). Beyond the survey data, declarations of climate emergencies by governments, councils, and universities around the world (cedamia, 2020) and global events like the School Strike for

Climate, led by younger members of society, (e.g., Thurnburg, 2018) further
undermine the claim that climate action is not in our nature.

3. Conclusion

Psychological research is necessary to understand variation in climate change related
beliefs and behaviours around the globe and must continue to inform how we
communicate climate change to various audiences (Swim et al., 2009; Berentson-
Shaw, 2018; Diaz et al, 2019). However, social scientists and science communicators
must actively challenge the idea that ‘the human mind’ is a collection of
psychological barriers to climate action, or that any current failure to address climate
change is due to the way evolution designed our brains. As we have outlined,
essentialising climate inaction in this way is wrong and dangerous – it is wrong,
because it misrepresents current psychological research and theory, and dangerous
because it may itself be a potential barrier to tackling climate change.

Instead, we call on researchers in this area to more actively acknowledge and
emphasize the substantial individual and cultural variation in responses to climate
change and be realistic about the generalisability of findings, particularly those from
WEIRD populations often living in countries with extremely powerful institutional
actors resistant to climate policy. In addition, we need to work much harder to
communicate that the most tractable barriers to tackling climate change are not in our
biology, but in our culture (Beddoe et al., 2009; Díaz et al., 2019).

Whilst our psychology shapes the political landscape in important ways (Claessens, Fischer, Chaudhuri, Sibley, & Atkinson, 2020), current institutions and policies are not biologically determined, no matter how ‘natural’ they seem. Politics around the globe has, for example, become dominated by a neoliberal worldview that is not an inevitable by-product of our psychology, but reflects a cultural tradition of ideas and institutions that rose to prominence in the second half of the 20th century (Harvey, 2007). There is a much broader body of psychological research that can help us step outside this cultural matrix and understand how culture shapes climate action. This includes work on the factors that gave rise to Western norms of self-interest (Miller, 2001) and individualism (Schulz et al., 2019; Beddoe et al., 2009), how ideology and moral tribalism (Markowitz & Shariff, 2012; Jacquet Dietrich, & Jost, 2014; Claessens, Fischer, Chaudhuri, Sibley, & Atkinson, 2020), media (Eveland & Cooper, 2013; Feldman, Maiback, Roser-Renouf, & Leiserowitz, 2012) and online networks (Guilbeault, Becker, & Centola, 2018; Stewart et al., 2019) influence climate change discourse, how culture trumps the individual conscience (Cohn, Fehr, & Maréchal, 2014), the role of self-conscious emotions, social exposure, and reputation (e.g., Jacquet & Jamieson, 2016; Jacquet, 2017), our relationship to ‘the economy’ and curing our obsession with economic growth (e.g., Hickel, 2019), how wealthy elites and corporate lobbying can sway decision makers and public opinion (Gilens & Page, 2014; Farrell, 2016; Leonard, 2019), and how new technologies and cultural norms can be harnessed to change the way we eat (Willett et al., 2019), travel (e.g., Higham, Cohen, Cavaliere, Reis, & Finkler, 2016), work (e.g., Dwelly & Lake, 2008) and recreate (Hall & Higham, 2005).

Of course, there is a sense in which humans did not evolve to solve climate change, just as we did not evolve to read, sit at desks all day, live in cities, scuba dive, or have gender equality. Culture allowed for these behaviours. At the same time, we are not *not* evolved to deal with climate change. The psychological features that have made us uniquely able to cause this problem also make us uniquely capable of solving it. We are not the only ones to acknowledge this (e.g., Paramaguru 2013; Grinspoon 2015). As Jamieson (2014, p. 81) noted, “Ultimately, the failure to take action on climate change rests with our institutions of decision-making, not on our ways of knowing”. It is time to challenge the idea that we are not designed to solve climate change, and instead identify the cultural shifts required to ensure that we do.

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826 **Table 2. List of proposed psychological barriers to solving climate change and**
827 **other environmental problems**

Psychological barrier	References
1 Difficulty prioritising events remote in time and space (i.e.,	1,2,3,4,5,6,7,8,9,10,11
2 Low salience of slow, insensible changes	1,3,4,6,9,10,11
3 Propensity for self interest over the common good	1
Denial and rationalization due to cognitive dissonance and threat to status	1,2,3,4,6,9
4 quo	1,5,6,8,9,12
5 Inability to grasp uncertainty and complexity	1,5,6,11
6 A bias toward optimism	1,5,8,12
Lack of perceived control (drop in the bucket effect, or belief in inadequacy	
7 of institutions)	1,6,9,11
8 Social conformity and copying	1,3,4,9
9 Ingroup bias and inequality of causes and effects	1,2,9,12
10 Moral tribalism and conflicting worldviews	1,5,9
11 Perceived risks of changing behaviour	1,2,9
12 Rebound effect	1,9
13 Belief in supernatural salvation	1,9
14 A belief in technological salvation	1,9
15 Behavioural momentum/habit	1,9
16 Lack of place attachment	1,9
17 Lack of trust of scientists, government officials	1,9
18 Favouring easy tokenistic change over difficult meaningful change	1,9
19 Pursuit of relative versus absolute status	3,4
20 Blamelessness of unintentional action	5,10
21 Unwillingness to relinquish sunk financial costs of existing infrastructure	1
Bias towards information (and interpretation) that reinforces one's own	
22 views	8
Lack of moral intuitions regarding world constituting phenomena (like	
23 climate change)	11
Fundamental attribution error (attributing own behaviour to situation but	
24 others' behaviour to intentional action)	12
Prospect theory (risk prone when choosing among potential losses, risk	
25 averse when choosing among potential gains)	12

828
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