



**HAL**  
open science

## Leveraging social cognition to promote effective climate change mitigation

Mélusine Boon-Falleur, Aurore Grandin, Nicolas Baumard, Coralie Chevallier

► **To cite this version:**

Mélusine Boon-Falleur, Aurore Grandin, Nicolas Baumard, Coralie Chevallier. Leveraging social cognition to promote effective climate change mitigation. *Nature Climate Change*, In press, 10.1038/s41558-022-01312-w . hal-03627988

**HAL Id: hal-03627988**

**<https://hal.science/hal-03627988>**

Submitted on 1 Apr 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

1 **Effective environmentalism: leveraging social cognition to promote effective climate**  
2 **change mitigation**

3  
4 Mélusine Boon-Falleur<sup>1</sup>, Aurore Grandin<sup>2</sup>, Nicolas Baumard<sup>1</sup> and Coralie Chevallier<sup>2</sup>

5  
6 <sup>1</sup>Institut Jean Nicod, Département d'études cognitives, École normale supérieure, PSL University,  
7 EHESS, CNRS, 75005 Paris, France

8 <sup>2</sup>Laboratoire de neurosciences cognitives et computationnelles, Département d'études cognitives, École  
9 normale supérieure, PSL University, INSERM, 75005 Paris, France

10  
11  
12 **Abstract:**

13 Effective climate change mitigation is a social dilemma: the benefits are shared collectively  
14 while the costs are often private. To solve this dilemma, we argue that we must first understand  
15 the nature of human cooperation. This constitutes a shift in the field of psychology and climate  
16 change, which has traditionally focused more intensely on risk-perception, miscommunication or  
17 time discounting, to explain the lack of climate action. We review three social cognition  
18 mechanisms that regulate cooperation: norm detection, reputation management, and fairness  
19 computation. We show that these cognitive mechanisms can prevent behavioral change and lead  
20 to ineffective policies. At the same time, the very same mechanisms can be leveraged as  
21 powerful solutions for effective climate change mitigation.

22  
23 **Keywords:**

24 Climate Change, Social Cognition, Reputation, Fairness, Social Norms  
25  
26  
27  
28

29 Over the past three decades, a number of reasons have been put forward to explain the absence of  
30 behavioral change to address climate change. Behavioral scientists have studied issues related to  
31 risk perception <sup>1,2</sup>, misinformation <sup>3,4</sup>, and time discounting <sup>5,6</sup> among others to explain people's  
32 collective apathy. The resulting common view is that climate change is hard to address because it  
33 is a complex, long-term, and diffused phenomenon. However, individual climate engagement  
34 around the world has now hit an inflection point. Today, a majority of people believe that climate  
35 change is a serious threat <sup>7,8</sup>, that it is already happening <sup>9</sup>, and that more should be done to curb  
36 CO2 emissions <sup>10-12</sup>. Yet, despite increasing levels of climate change awareness, mitigation  
37 efforts have been disappointing <sup>13</sup>. People often fail to adopt behaviors that would be impactful,  
38 such as saving home energy or reducing air travel, even when they have access to personalized  
39 information about their carbon footprint <sup>14</sup>. Given the high level of concern around climate  
40 change, what is keeping people from adopting behaviors or supporting policies that effectively  
41 reduce CO2 emissions?

42  
43 Recently, empirical evidence has confirmed that the social dimension of climate change  
44 mitigation both explains the absence of behavioral change and offers potential solutions.  
45 Climate change is a large-scale collective action problem where outcomes are shared but the cost  
46 of behavioral change is often individual. Thus people must resist the urge to free-ride on the  
47 sacrifices of others while enjoying collective benefits without making any effort. One might  
48 initially think that humans' unique capacities to cooperate provide fertile ground to address the  
49 collective action problems posed by climate change. Yet, the cognitive mechanisms supporting  
50 cooperation evolved to increase individual fitness, not to maximize total social welfare <sup>15</sup>. As a  
51 result, the cognitive mechanisms involved in regulating cooperation do not necessarily lead to  
52 the most effective outcome from a societal standpoint.

53  
54 Evolutionary biology has demonstrated that cooperation can only evolve if it is conditional: for  
55 individuals, the only evolutionary stable strategy is to cooperate if others cooperate, and stop  
56 cooperating when others do not cooperate <sup>16,17</sup>. The consequence of this constraint is that humans  
57 must develop cognitive mechanisms to detect social norms (i.e. whether the norm is to cooperate  
58 in my environment), to manage their reputation (i.e. to convince others that I am cooperating),  
59 and to compute what is fair and what is not (i.e. to assess whether my benefits are proportionate  
60 to my contribution, and to others' contribution). In this review, we present evidence that these  
61 three mechanisms - norm detection, reputation management, and fairness computation - push  
62 people to favor reciprocity, observability and equity over effectiveness in climate change  
63 mitigation. We contrast this with the behavior that people would adopt if they acted as "effective  
64 altruists" (see Box 1 for a definition of effective altruism). We then show that the very same  
65 cognitive mechanisms can be leveraged to be part of the solution, as shown in Figure 1. By  
66 carefully considering the social dynamics involved, policy makers can make climate change  
67 mitigation efforts more effective.

68

69 **Norm detection**

70 To contribute to a collective effort, people need to have sufficient evidence that others will also  
71 take action. In fact, people's perception of the right thing to do very much depends on what  
72 others are actually doing. Far from acting as strict moral consequentialists who maximize the  
73 positive impact of their actions, people often rely on what others believe to determine what is  
74 appropriate<sup>18-20</sup>. For example, although people may know that travelling by plane or eating meat  
75 is detrimental to the climate, they may continue to engage in these behaviors if they see others  
76 doing so<sup>21</sup>. Previous studies have shown that social norms have a large influence on people's  
77 pro-environmental behavior<sup>22</sup>. Yet, social norms have also been shown to be ineffective or even  
78 to backfire in the context of pro-environmental behaviors<sup>23-25</sup>. Drawing on recent research, we  
79 discuss three aspects of norm detection that can be both a problem and a solution for the  
80 emergence of effective climate-friendly social norms.

81

82 **Pluralistic ignorance**

83 Because of the costs associated with cooperating with a cheater, people's cheater detection  
84 mechanism functions as a smoke detector: people minimize the risk of false negatives (not  
85 detecting a cheater) while allowing more false positives to occur (mistaking a cooperative  
86 individual for a cheater)<sup>26</sup>. This means that people are likely to believe that others are not  
87 cooperating. This can lead to pluralistic ignorance, a situation in which people privately reject a  
88 norm (such as driving SUVs) but go along with it because they falsely assume that most others  
89 accept it. For example, Americans hold the inaccurate belief that a majority of their fellow  
90 citizens do not care much about mitigating climate change<sup>27</sup>, and are overly pessimistic about  
91 the views of conservatives on climate change<sup>28</sup>. A study conducted with a representative sample  
92 in the USA suggests that part of the reason why the poorest and ethnic minorities are  
93 underrepresented in environmental organisations and US government environmental agencies is  
94 the widespread false belief that they are not interested in environmental protection<sup>29</sup>. Because  
95 people are very sensitive to cheating, a few visible cheaters may also be enough to make an  
96 entire cooperative system collapse<sup>30,31</sup>. By identifying important areas of pluralistic ignorance,  
97 governments and other entities can promote cooperation through simple information campaigns  
98<sup>32,33</sup>.

99

100 **Credibility of norms**

101 For a social norm to be effective in promoting cooperative behavior, people must find it credible.  
102 Credibility comes both from the source promoting the social norm and from the content of the  
103 norm<sup>34</sup>. People are more sensitive to social norms when they are promoted by leaders in their  
104 community<sup>27</sup> or when the individuals promoting the norm have themselves adopted the  
105 behavior. For example, a study of a programme that promotes residential solar panel installation  
106 in 58 towns in the United States found that community organizers who themselves installed  
107 panels through the programme recruited 62.8% more residents to install solar panels than  
108 community organizers who did not<sup>35</sup>. For governments to effectively promote social norms, they

109 must first earn the trust of their constituents. In addition, norms about behaviors tend to be more  
110 effective than simple injunctive norms, such as telling people what most others approve of<sup>36,37</sup>.  
111 For example, saying that most people recycle their waste is more effective than saying that most  
112 people *approve of* recycling waste. Finally, in some situations norms are more effective if they  
113 do not appear as coercive<sup>38,39</sup>. Normative appeals that seem to limit people's freedom may have  
114 the opposite effect because of 'psychological reactance' - a negative feeling arising from threats  
115 to one's freedom. For example, telling people to "have fewer children, do your part" may be  
116 counter productive. Policy makers can leverage credible sources such as the scientific  
117 community to promote norms, and make sure that the content of a norm is descriptive and  
118 describes a behavior that reveals preferences. Finally, people are more likely to respect social  
119 norms within a group that they expect to cooperate with again in the future. The more local a  
120 social norm is, the more effective it will be<sup>40,41</sup>.

121

### 122 **Dynamic norms**

123 People care not only about current social norms, they also anticipate what will be normative in  
124 the future. Hence, they are more likely to adopt a new behavior if they anticipate the change to  
125 persist than if they believe the change is a passing fad. Many behaviors that fuel climate change  
126 such as driving alone, eating meat, flying, or having multiple children, are currently the norm. In  
127 such cases, using normal social norm messaging will fail to promote change as the norm is  
128 indeed unsustainable<sup>42</sup>. Evidence shows that instead, communicating about the dynamic norm --  
129 that is the current direction of change in people's behavior -- can have a major impact<sup>43,44</sup>. For  
130 example, Loschelder has shown that by conveying to people a dynamic norm about using a  
131 reusable coffee cup rather than a disposable one ("Our guests are changing their behavior: More  
132 and more are switching from the to-go-cup to a sustainable alternative."), the proportion of  
133 consumers using reusable cups increased by 17.3%<sup>45</sup>. This component of people's norm  
134 detection mechanism provides a powerful tool for policy makers. By emphasizing a new trend  
135 and showing evidence that it will last, they can promote behaviors that are not yet normative.

136

### 137 **Reputation management**

138 Given the high benefit of collective actions, being perceived as a good cooperator is crucial for  
139 humans. Thanks to their reputation management system, people can anticipate how others will  
140 perceive their actions and act accordingly. Having a good reputation is considered so important  
141 that people often would prefer enduring physical injury (e.g. losing their dominant hand), rather  
142 than having people believe that they are not trustworthy (e.g. becoming known as a Nazi)<sup>46</sup>.  
143 Beyond being simply perceived as trustworthy, people compete on traits that signal their  
144 willingness or ability to confer benefits upon others such as intelligence, athleticism, but also  
145 generosity and benevolence<sup>47</sup>. Indeed, cooperation takes place in a competitive social market,  
146 such that people can abandon a cooperation partner in favor of another. When deciding between  
147 different options, people take into account both their direct costs and benefits and their indirect  
148 reputational costs and benefits, often without any conscious awareness of such considerations.

149 When indirect reputational benefits are larger, people are more likely to be cooperative. For  
150 example, studies show that people are more cooperative when they believe that they are being  
151 observed, even when simply being exposed to an image of eyes<sup>48,49</sup>. It is however important to  
152 distinguish between the ultimate advantages of having a good reputation and the proximate  
153 psychological level. Far from being Machiavellian, evidence shows that people genuinely enjoy  
154 helping others, without any conscious representation of the fitness advantage their behavior may  
155 lead to<sup>50</sup>. In the following paragraphs, we detail how people manage their reputation and how it  
156 can be leveraged to promote effective climate mitigation<sup>51</sup>.

157

### 158 **Observability**

159 When behaviors can be easily identified as signals of cooperation, people are more likely to  
160 engage in them. This is the case in the so-called “prius effect”, by which individuals are more  
161 likely to buy a hybrid Toyota Prius rather than another electric car model as the unique design of  
162 the Prius makes it conspicuously green<sup>52,53</sup>. Researchers have identified that many pro-  
163 environmental behaviors have a signaling function<sup>52,54,55</sup>. However, many behaviors related to  
164 climate change are invisible such that reputational gains cannot take place<sup>56</sup>. This is true of all  
165 invisible efforts (e.g., adding a layer of insulation under one’s roof), private voting practices  
166 (e.g., going to the polling station to support green policies) and, by definition, of abstinent  
167 choices (e.g., not taking the plane or not eating beef). An obvious solution to this problem is to  
168 make pro-environmental behaviors more visible. For example, in the Spring of 2020, the British  
169 government adopted a new regulation allowing all electric vehicles to have a green flash on the  
170 left hand side of the license plate (see Figure 2). This not only makes it easier for local  
171 authorities to enforce policies such as reserved parking space for electric vehicles, it also allows  
172 people to display their green behavior. In addition, given that governments have limited financial  
173 resources to promote mitigation behaviors, they should focus their subsidies on hard-to-observe  
174 behaviors such as renovating one’s home insulation<sup>57</sup>.

175

### 176 **Competence and Effort**

177 People care a lot about enhancing their value to their social network as this will impact how they  
178 are perceived and thus whether they are chosen as a cooperation partner<sup>58</sup>. Appearing  
179 competent, wealthy, or well-connected are all potential ways to demonstrate a high value to  
180 others. However, appearing competent or wealthy can sometimes conflict with appearing pro-  
181 environmental. For example, residents in a neighborhood might continue watering their lawn  
182 despite calls to save water in order to maintain their image as wealthy neighbors who tend to  
183 their lawn. Because environmental activists have on occasion been associated with negative  
184 stereotypes such as being eccentric or too militant, people may be reluctant to adopt the  
185 behaviors they promote<sup>59</sup>. Similarly, environmentally friendly products are associated with  
186 warmth, a trait that is not always desirable for consumers<sup>60</sup>. When mitigation behaviors are  
187 aligned with traits that people value, such as openness or innovation, then they are more likely to  
188 be adopted.

189

190 Beyond competence, humans also care about how much effort people are investing when  
191 cooperating, because all else equal, it is better to cooperate with someone who is willing to go  
192 the extra mile. In addition, someone's efforts may be the only available information to evaluate  
193 their quality as a cooperation partner. In many cooperative exchanges, the outcome or the impact  
194 is hard to determine. For example, it may be hard to estimate someone's carbon footprint, while  
195 it is easier to observe how much effort a person is making to reduce it, such as making long  
196 journeys by train or boat instead of by plane. As a result, people are often insensitive to true  
197 impact when evaluating others' reputation. In an experiment on charity donation, Burum et al.  
198 show that people are insensitive to the impact of donation when evaluating the donor's character,  
199 but they are sensitive to the effort <sup>61</sup>. By aligning effort with impact, policy makers can orient  
200 citizens towards more effective mitigation behaviors.

201

## 202 **Intentions**

203 Evidence shows that intentions matter a lot when people judge each other's character <sup>62</sup> .  
204 Achieving a good outcome based on bad intentions is often perceived as much worse than  
205 achieving a bad outcome based on good intentions <sup>63</sup>. Indeed, as consequences are the product of  
206 many factors, intentions may be a more reliable cue than impact for someone's value as a  
207 cooperation partner. In addition, when consequences or efforts are not visible, intentions may be  
208 the only available information to judge someone. Recent empirical research shows that people  
209 even punish others if they appear to act too rationally <sup>64</sup>. Montealegre et al. conducted a number  
210 of experiments revealing that participants judged people who deliberate more about the  
211 consequences of their charity donations to have less positive moral character and to be less  
212 desirable as social partners than individuals who relied more on empathy to make their choice <sup>65</sup>.  
213 In other words, although prioritising the impact of one's altruistic behavior is good from a  
214 societal standpoint, it may come with a reputational cost. This may explain why despite  
215 bulletproof rational arguments in favor of effective altruism, this movement is still confined to a  
216 small group. For impact to matter as much as intentions, it must be easily measured and known  
217 to people. Making the link between people's action and their environmental consequences more  
218 clear will allow people to take impact into account more easily. Once causes are linked to  
219 consequences, it is much easier to make a case for choosing the most efficacious course of action  
220 <sup>66</sup>. Thankfully, there has been much progress in that direction in recent years. Impact assessments  
221 have become a common practice in many areas of public policy, and even researchers have  
222 called for impact-focused environmental psychology <sup>67</sup>.

223

## 224 **Fairness computation**

225 When engaging in cooperation, people not only decide who they should cooperate with, but also  
226 how the costs and benefits of cooperation should be shared. Research shows that our fairness  
227 computation mechanism evaluates the costs and benefits based on the outside options available  
228 to people <sup>68</sup>. Individuals with more valuable outside options are usually given a larger share of

229 the benefits, thus ensuring that a cooperative interaction is advantageous to all parties involved.  
230 To sustain cooperation, people constantly monitor the costs and benefits accrued to others, for  
231 example how much effort people from other countries are making to reduce CO2 emissions. This  
232 helps people identify the appropriate response, such as changing their lifestyle drastically or  
233 spending little effort on reducing emissions. This sort of computation is constantly happening in  
234 people's minds, most often beyond their conscious awareness<sup>68</sup>. When people feel like the cost  
235 and benefits of cooperation are not fairly distributed, they will refrain from cooperating. The  
236 allocation of costs and benefits depends on specific principles, and is often deemed more  
237 important than the aggregate outcome of cooperation. A good illustration of that is the fact that  
238 citizens in low-income countries are less supportive of international agreements forcing their  
239 country to take climate change mitigation measures than are citizens in wealthier nations and  
240 tend to think that high-income countries should make more effort to protect the environment<sup>69</sup>.  
241 By understanding how fairness is computed, policy makers can design mitigation policies that  
242 gather more support.

243

#### 244 **Fairness depends on perceived status quo**

245 The fair allocation of costs and benefits to individuals who are cooperating depends on the  
246 perceived status quo. Indeed, costs and benefits are calculated according to a given baseline,  
247 which includes the outside options of each individual<sup>70</sup>. People who have different perceptions  
248 of the status quo may have a hard time agreeing on what constitutes a fair outcome. Perhaps the  
249 most dramatic instance in which status quo perception matters is for a country's pledge to reduce  
250 CO2 emissions<sup>71</sup>. If people consider that the status quo is the current emissions level, then all  
251 countries should make commitments proportional to their current emissions and to their ability to  
252 mitigate them<sup>72</sup>. However, if people consider that the appropriate baseline is the status quo *ante*,  
253 which corresponds to the state of the world before the industrial revolution, then western  
254 countries such as the United States, Canada or members of the European Union, who have  
255 already contributed to more than 50% of the global cumulative CO2 emissions should  
256 compensate this disproportionate historical contribution to climate change<sup>73</sup>. Status quo  
257 considerations may also affect more local decisions, such as how to allocate public space  
258 between drivers, pedestrians and bicycles. If one considers that the baseline is that streets are  
259 mostly designed for cars, then any policy aiming at increasing bicycle paths will be seen as a loss  
260 for car drivers. However, if one considers that the relevant baseline situation is one where cities  
261 are built for all people and not just car drivers, then such policies will be construed as claiming  
262 back what rightfully belongs to pedestrians and cyclists. Changing our frame of reference can  
263 therefore have a huge impact on how we see the world<sup>74</sup>. By reframing the status quo, policy  
264 makers can increase the perceived fairness of environmental policies and thus garner more  
265 support.

266

#### 267 **Fairness over effectiveness**



268 People often value fairness above and beyond the aggregate outcome of a given action. In other  
269 words, people’s sense of fairness does not follow consequentialist principles, which favor “the  
270 most good for the most people”. For example, a majority of people are unwilling to increase cure  
271 rates for a large group if it comes at the cost of reducing cure rates for a smaller group <sup>75</sup>.  
272 Additional examples include that most people will favor income distributions that are more equal  
273 rather than those with higher total income<sup>76</sup>; prefer retributive justice (in which the punishment is  
274 proportional to crime) to deterrence, even though basing punishments on deterrence leads to  
275 lower crimes than basing punishments on retribution <sup>77</sup>; and condemn pushing one person off of  
276 a footbridge to stop a trolley from killing five people further down the tracks <sup>78</sup>. When  
277 individuals must decide between different environmental policies, they will favor fairness as  
278 much as effectiveness <sup>79–81</sup>. Policies that are seen as unfair have very little chance of success, as  
279 the recent example of the “Yellow Vest” movement in France has shown <sup>82,83</sup>. The movement  
280 started after the government announced a new tax on carbon that would lead to increases in gas  
281 prices (which predominantly would affect poorer rural communities commuting by car to work),  
282 without impacting kerosene prices (which would affect richer individuals travelling by plane), If  
283 policy makers are to gain support for far reaching regulations such as a universal carbon tax, they  
284 must take into account their perceived fairness by the general population.

285

## 286 **Outstanding questions**

287 Our review highlights a critical need for further research on at least three fronts. First, more  
288 research should be done on the dynamic component of social norms. Experiments should be  
289 conducted to identify how new social norms can emerge rapidly in a group and how to use  
290 network analyses to target individuals who will accelerate the adoption of the norm. By  
291 understanding the dynamics of social norms, we can steer groups towards reaching a moral  
292 tipping point: a threshold beyond which it will become a moral obligation to adopt  
293 environmentally virtuous behaviors. Second, more research should be done around the  
294 promotion of effectiveness as a moral standard. To mitigate global warming, people will not only  
295 need to change their behavior, they will have to systematically adopt those behaviors that are  
296 most effective at reducing their carbon footprint. Making people adopt an “effective  
297 environmentalist mindset” is a central issue for climate change mitigation. Finally, as many  
298 economists and climatologists have argued, large scale policies such as a carbon tax are essential  
299 tools for effective climate change mitigation. As such, further research on the acceptability of  
300 these policies and the factors influencing perceived fairness is crucial.

301

## 302 **Leveraging people’s social cognition to accelerate the sustainable transition**

303 Cooperation is supported by dedicated cognitive mechanisms and can be seen as an adaptation to  
304 solve humans’ collective action problems. By detecting social norms, managing their reputation  
305 and computing what is fair, people ensure that they benefit from their cooperative endeavors.  
306 Climate change is a perfect example of a social dilemma in which people’s social cognition plays  
307 a large role. Even seemingly unrelated issues, such as informational deficits, can make more

308 sense when studied through the lense of social cognition. For example, one might wonder why  
309 many people are unaware of the most effective ways to mitigate climate change. A simple  
310 answer would be that people do not have access to enough information. However, careful  
311 consideration might reveal that the real problem lies in people’s motivation to become informed.  
312 People have the ability to become very knowledgeable in domains where information is hard to  
313 access, such as medical information about rare diseases, when they are motivated enough. In the  
314 case of climate change, a lot of information is accessible online for free on how to reduce one’s  
315 carbon footprint. Yet, people do not actively seek this information because they would gain little  
316 benefit from it. Indeed, one’s marginal impact is negligible and the reputational benefits from  
317 being more effective are also trivial, or could even be negative. By studying this issue from a  
318 cooperation perspective, it becomes clear that people have little incentive to identify effective  
319 strategies when the benefits are shared collectively. Worse, they may think that knowing the true  
320 cost of their behavior will force them to align their behavior with this new information or run the  
321 risk of appearing hypocritical. People’s social cognition can often act as a barrier for change as  
322 people will consider reciprocity, observability and equity over efficiency. However, by  
323 understanding people’s social motivation, policy makers can leverage people’s social cognition  
324 to accelerate the sustainable transition.

325  
326  
327  
328

### **Box 1: Effective altruism**

Effectiveness is often defined as the size of the impact relative to the resources used to create such an impact. Under this definition, someone spending 100 euros to avoid 1 ton of greenhouse gas emissions is more effective than another individual spending 200 euros to avoid the same amount. This concept has gained some traction, moving from the field of engineering and economics to a diversity of domains such as organisation management or even charity.

The movement “Effective Altruism” was created in the late 2000’s around individuals such as Toby Ord, William MacAskill, and Peter Singer. This movement advocates being impartial and prioritizing causes that are great in scale, highly solvable, and tractable<sup>84</sup>. This movement encourages its members to donate to charities that are effective, leading to the largest positive impact per amount spent. It also helps people define what career to choose to maximize their positive impact given their skill set<sup>85</sup>.

We define effective environmentalism as giving priority to mitigation efforts that have the most impact per amount of resources invested. For example, an individual deciding between spending 100 euros to buy organic groceries or spending 100 euros to finance a solar powered stove in a developing country should prioritize the latter as the environmental impact will be larger. Similarly, policy makers deciding between allocating resources to providing all citizens with a composting bin or improving public transportation should prioritize the latter.

So far, the effective altruism movement has been confined to an active but small community, located mainly in the United States and United Kingdom. In order for this movement to gain traction, it should take into account people’s social cognition. Many studies have shown that people’s intuitions often go against principles of effective altruism, such as the idea that geographic distance should not affect our willingness to help people. By taking people’s psychology into account, the effective altruism movement can become more popular.

329

330

331

## Box 2: The case of meat eating

Reducing meat consumption represents a major opportunity to mitigate climate change<sup>86</sup> with 14.5% of all anthropogenic greenhouse gas emissions coming from the livestock sector<sup>87</sup>. In addition, there are few structural barriers to adopting a plant-based diet. Not only is such a diet often cheaper, it is nutritionally adequate and may provide health benefits for the prevention and treatment of certain diseases<sup>88</sup> and plant-based alternatives are easily accessible in most developed economies. Some informational barriers may still be an obstacle to adopting a plant-based diet, such as the belief that eating meat is important to stay healthy<sup>89</sup> or a lack of information regarding the environmental footprint of meat. Yet, many people frequently eat meat despite being well-aware of the negative impacts of these behaviours and having the means to make different choices<sup>14</sup>.

Taking into account people's social psychology is essential to encourage them to reduce their meat consumption<sup>90</sup>. Wyker & Davison have shown that **normative beliefs** regarding how much one's friends, family, and colleagues believe one should follow a plant-based diet are strong predictors of intentions to do so<sup>91</sup>. People may suffer from **pluralistic ignorance** on the issue of reducing meat consumption. Although many people may privately believe that reducing meat consumption is important to mitigate climate change, they may hold the false belief that a majority of people would disagree with them. In addition, eating meat is the current norm, offering little social pressure for people to change their behavior<sup>92</sup>. However, as Sparkman and colleagues have shown in multiple experiments, when given information about the **dynamic norm** - that is the increase in the number of people switching to vegetarian diets - people are more willing to select vegetarian options<sup>43,44</sup>. From a **reputation management** perspective, reducing meat consumption raises two issues. First, people's dietary choices are hard to observe, creating little incentives for people to reduce their meat consumption, for example when eating at home. Second, eating less meat may conflict with other aspects of one's reputation, such as appearing like a generous host<sup>93</sup>. As a result, people may gain little reputational benefits from adopting a vegetarian diet. By making dietary choices more conspicuous and by aligning people's values with plant-based diets, policy makers and companies can encourage people to reduce their meat consumption. Finally, **equity concerns** may also impact people's dietary choices. People may perceive the reduction in meat consumption as an unfair cost placed on meat producers. Policy makers should thus ensure that no segment of the population is unfairly affected by such dietary changes.

332

333

334

335

336 Figures:

337

338

## Cognitive Mechanisms Supporting Cooperation



## Adapted Policy Interventions



### NORM DETECTION

- People tend to underestimate the proportion of cooperators.
- People are sensitive to the credibility of social norms.
- People only respond to norms that are already prevalent.



- Make social norms more visible.
- Focus on action rather than opinions, use local community leaders to promote a norm.
- For behaviors that are not widespread, communicate about the dynamic norm.<sup>5</sup>

### REPUTATION MANAGEMENT

- People prefer engaging in observable behaviors.
- People are insensitive to impact when judging other's efforts.
- Maximizing impact can backfire as people will be seen as too calculating.



- Make sustainable behaviors more visible.
- Make the impact more direct and understandable.
- Make the most impactful behavior the default option.

### FAIRNESS COMPUTATION

- People will often prefer fairness over efficiency when deciding between policies.
- People base their fairness computation on their perceived status quo (e.g. "streets are for cars").



- Include redistributive programs in policies and communicate about their impact.
- Provide information to help people change their vision of the status quo (e.g. "streets are for pedestrians and cyclists").

339  
340  
341  
342  
343  
344  
345  
346  
347  
348  
349  
350

**Figure 1.** Cooperation between humans is supported by three cognitive mechanisms, (1) norm detection, (2) reputation management, (3) fairness computation. These cognitive mechanisms evolved to make cooperation beneficial at the individual level, which can often lead to ineffective outcomes at the collective scale. For example, people's fairness computation mechanism induces them to favor equity over effectiveness when supporting public policies. By taking into account the nature of human social cognition, policy makers can promote more effective behaviors. For example, by including redistributive programs in policies and communicating about their impact, policy makers can gather more support for environmental policies.



351  
352 **Figure 2.** In the fall of 2020, the UK government implemented a green number plate policy for electric  
353 vehicles. The government argues that “the plates will make it easier for cars to be identified as zero  
354 emission vehicles, helping local authorities design and put in place new policies to incentivise people to  
355 own and drive them.” This policy will also allow individuals to signal more easily their commitment to  
356 reduce their CO2 emissions and thus improve their reputation.

357

358

359 **Bibliography**

- 360 1. Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C.-Y. & Leiserowitz, A. A. Predictors of public  
361 climate change awareness and risk perception around the world. *Nat. Clim. Change* **5**, 1014–1020  
362 (2015).
- 363 2. van der Linden, S. The social-psychological determinants of climate change risk perceptions:  
364 Towards a comprehensive model. *J. Environ. Psychol.* **41**, 112–124 (2015).
- 365 3. Kahan, D. M. Climate-Science Communication and the Measurement Problem. *Polit. Psychol.* **36**, 1–  
366 43 (2015).
- 367 4. van der Linden, S., Leiserowitz, A., Rosenthal, S. & Maibach, E. Inoculating the Public against  
368 Misinformation about Climate Change. *Glob. Chall.* **1**, 1600008 (2017).
- 369 5. Dasgupta, P. Discounting climate change. *J. Risk Uncertain.* **37**, 141–169 (2008).
- 370 6. Jacquet, J. *et al.* Intra- and intergenerational discounting in the climate game. *Nat. Clim. Change* **3**,  
371 1025–1028 (2013).
- 372 7. Doherty, C., Kiley, J. & Asheer, N. As Economic Concerns Recede, Environmental Protection Rises  
373 on the Public’s Policy Agenda. *Pew Res. Cent.* (2020).
- 374 8. Pew Research Center. A look at how people around the world view climate change. *Pew Research*  
375 *Center* [https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-](https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-view-climate-change/)  
376 [view-climate-change/](https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-view-climate-change/) (2019).
- 377 9. UNDP. People’s Climate Vote Results. (2020).
- 378 10. Tyson, A. & Kennedy, B. Two-Thirds of Americans Think Government Should Do More on Climate.  
379 *Pew Res. Cent.* (2020).
- 380 11. CNN, M. R. The growing power and anger of climate change voters. *CNN*  
381 <https://www.cnn.com/2019/09/04/politics/climate-change-voters-demographics/index.html>.
- 382 12. Newport, F. Americans Want Government to Do More on Environment. *Gallup.com*  
383 <https://news.gallup.com/poll/232007/americans-want-government-more-environment.aspx> (2018).
- 384 13. Tollefson, J. COVID curbed carbon emissions in 2020 — but not by much. *Nature* **589**, 343–343

- 385 (2021).
- 386 14. Büchs, M. *et al.* Promoting low carbon behaviours through personalised information? Long-term  
387 evaluation of a carbon calculator interview. *Energy Policy* **120**, 284–293 (2018).
- 388 15. West, S. A., Griffin, A. S. & Gardner, A. Social semantics: altruism, cooperation, mutualism, strong  
389 reciprocity and group selection. *J. Evol. Biol.* **20**, 415–432 (2007).
- 390 16. Trivers, R. L. The Evolution of Reciprocal Altruism. *Q. Rev. Biol.* (2015) doi:10.1086/406755.
- 391 17. Nowak, M. A. Five Rules for the Evolution of Cooperation. *Science* **314**, 1560–1563 (2006).
- 392 18. Shteynberg, G., Gelfand, M. J. & Kim, K. Peering into the “Magnum Mysterium” of Culture: The  
393 Explanatory Power of Descriptive Norms. *J. Cross-Cult. Psychol.* **40**, 46–69 (2009).
- 394 19. Jachimowicz, J. M., Hauser, O. P., O’Brien, J. D., Sherman, E. & Galinsky, A. D. The critical role of  
395 second-order normative beliefs in predicting energy conservation. *Nat. Hum. Behav.* **2**, 757–764  
396 (2018).
- 397 20. Paluck, E. L. Reducing intergroup prejudice and conflict using the media: A field experiment in  
398 Rwanda. *J. Pers. Soc. Psychol.* **96**, 574–587 (2009).
- 399 21. Barasi, L. Guest post: Polls reveal surge in concern in UK about climate change. *Carbon Brief*  
400 <https://www.carbonbrief.org/guest-post-rolls-reveal-surge-in-concern-in-uk-about-climate-change>  
401 (2019).
- 402 22. Allcott, H. Social norms and energy conservation. *J. Public Econ.* **95**, 1082–1095 (2011).
- 403 23. Dempsey, R. C., McAlaney, J. & Bewick, B. M. A Critical Appraisal of the Social Norms Approach  
404 as an Interventional Strategy for Health-Related Behavior and Attitude Change. *Front. Psychol.* **0**,  
405 (2018).
- 406 24. Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J. & Griskevicius, V. The Constructive,  
407 Destructive, and Reconstructive Power of Social Norms. *Psychol. Sci.* **18**, 429–434 (2007).
- 408 25. Richter, I., Thøgersen, J. & Klöckner, C. A Social Norms Intervention Going Wrong: Boomerang  
409 Effects from Descriptive Norms Information. *Sustainability* **10**, 2848 (2018).
- 410 26. Haselton, M. G., Nettle, D. & Murray, D. R. The Evolution of Cognitive Bias. in *The Handbook of*



- 411 *Evolutionary Psychology* 1–20 (American Cancer Society, 2015).  
412 doi:10.1002/9781119125563.evpsych241.
- 413 27. Geiger, N., Swim, J. K. & Glenna, L. Spread the Green Word: A Social Community Perspective Into  
414 Environmentally Sustainable Behavior. *Environ. Behav.* **51**, 561–589 (2019).
- 415 28. Abeles, A. T., Howe, L. C., Krosnick, J. A. & MacInnis, B. Perception of public opinion on global  
416 warming and the role of opinion deviance. *J. Environ. Psychol.* **63**, 118–129 (2019).
- 417 29. Pearson, A. R., Schuldt, J. P., Romero-Canyas, R., Ballew, M. T. & Larson-Konar, D. Diverse  
418 segments of the US public underestimate the environmental concerns of minority and low-income  
419 Americans. *Proc. Natl. Acad. Sci.* **115**, 12429–12434 (2018).
- 420 30. De Courson, B. & Nettle, D. Why do inequality and deprivation produce high crime and low trust?  
421 *Sci. Rep.* **11**, 1937 (2021).
- 422 31. Keizer, K., Lindenberg, S. & Steg, L. The Spreading of Disorder. *Science* **322**, 1681–1685 (2008).
- 423 32. Burszty, L., González, A. L. & Yanagizawa-Drott, D. Misperceived Social Norms: Women  
424 Working Outside the Home in Saudi Arabia. *Am. Econ. Rev.* **110**, 2997–3029 (2020).
- 425 33. Geiger, N. & Swim, J. K. Climate of silence: Pluralistic ignorance as a barrier to climate change  
426 discussion. *J. Environ. Psychol.* **47**, 79–90 (2016).
- 427 34. Hallsworth, M. *et al.* Provision of social norm feedback to high prescribers of antibiotics in general  
428 practice: a pragmatic national randomised controlled trial. *The Lancet* **387**, 1743–1752 (2016).
- 429 35. Kraft-Todd, G. T., Bollinger, B., Gillingham, K., Lamp, S. & Rand, D. G. Credibility-enhancing  
430 displays promote the provision of non-normative public goods. *Nature* **563**, 245–248 (2018).
- 431 36. Bicchieri, C. & Dimant, E. Nudging with care: The risks and benefits of social information. *Public*  
432 *Choice* 1–22 (2019).
- 433 37. Niemiec, R. M., Champine, V., Vaske, J. J. & Mertens, A. Does the Impact of Norms Vary by Type  
434 of Norm and Type of Conservation Behavior? A Meta-Analysis. *Soc. Nat. Resour.* **33**, 1024–1040  
435 (2020).
- 436 38. Sparkman, G., Howe, L. & Walton, G. How social norms are often a barrier to addressing climate

- 437 change but can be part of the solution. *Behav. Public Policy* 1–28 (2020) doi:10.1017/bpp.2020.42.
- 438 39. de Groot, J. I. M. & Schuitema, G. How to make the unpopular popular? Policy characteristics, social  
439 norms and the acceptability of environmental policies. *Environ. Sci. Policy* **19–20**, 100–107 (2012).
- 440 40. Bollinger, B. & Gillingham, K. Peer Effects in the Diffusion of Solar Photovoltaic Panels. *Mark. Sci.*  
441 **31**, 900–912 (2012).
- 442 41. Lede, E., Meleady, R. & Seger, C. R. Optimizing the influence of social norms interventions:  
443 Applying social identity insights to motivate residential water conservation. *J. Environ. Psychol.* **62**,  
444 105–114 (2019).
- 445 42. Elgaaied-Gambier, L., Monnot, E. & Reniou, F. Using descriptive norm appeals effectively to  
446 promote green behavior. *J. Bus. Res.* **82**, 179–191 (2018).
- 447 43. Sparkman, G. & Walton, G. M. Dynamic Norms Promote Sustainable Behavior, Even if It Is  
448 Counternormative. *Psychol. Sci.* **28**, 1663–1674 (2017).
- 449 44. Sparkman, G., Weitz, E., Robinson, T. N., Malhotra, N. & Walton, G. M. Developing a Scalable  
450 Dynamic Norm Menu-Based Intervention to Reduce Meat Consumption. *Sustainability* **12**, 2453  
451 (2020).
- 452 45. Loschelder, D. D., Siepelmeyer, H., Fischer, D. & Rubel, J. A. Dynamic norms drive sustainable  
453 consumption: Norm-based nudging helps café customers to avoid disposable to-go-cups. *J. Econ.*  
454 *Psychol.* **75**, 102146 (2019).
- 455 46. Vonasch, A. J., Reynolds, T., Winegard, B. M. & Baumeister, R. F. Death Before Dishonor:  
456 Incurring Costs to Protect Moral Reputation. *Soc. Psychol. Personal. Sci.* **9**, 604–613 (2018).
- 457 47. Barclay, P. Strategies for cooperation in biological markets, especially for humans. *Evol. Hum.*  
458 *Behav.* **34**, 164–175 (2013).
- 459 48. Sparks, A. & Barclay, P. Eye images increase generosity, but not for long: the limited effect of a false  
460 cue. *Evol. Hum. Behav.* **34**, 317–322 (2013).
- 461 49. Barclay, P. & Willer, R. Partner choice creates competitive altruism in humans. *Proc. R. Soc. B Biol.*  
462 *Sci.* **274**, 749–753 (2007).

- 463 50. Taufik, D., Bolderdijk, J. W. & Steg, L. Acting green elicits a literal warm glow. *Nat. Clim. Change*  
464 **5**, 37–40 (2015).
- 465 51. Barclay, P. & Barker, J. L. Greener Than Thou: People who protect the environment are more  
466 cooperative, compete to be environmental, and benefit from reputation. *J. Environ. Psychol.* **72**,  
467 101441 (2020).
- 468 52. Delgado, M. S., Harriger, J. L. & Khanna, N. The value of environmental status signaling. *Ecol.*  
469 *Econ.* **111**, 1–11 (2015).
- 470 53. Sexton, S. E. & Sexton, A. L. Conspicuous Conservation: The Prius Effect and Willingness to Pay  
471 for Environmental Bona Fides. 25.
- 472 54. Babutsidze, Z. & Chai, A. Look at me Saving the Planet! The Imitation of Visible Green Behavior  
473 and its Impact on the Climate Value-Action Gap. *Ecol. Econ.* **146**, 290–303 (2018).
- 474 55. Johnson, C. M., Tariq, A. & Baker, T. L. From Gucci to Green Bags: Conspicuous Consumption as a  
475 Signal for Pro-Social Behavior. *J. Mark. Theory Pract.* **26**, 339–356 (2018).
- 476 56. Aagerup, U. & Nilsson, J. Green consumer behavior: being good or seeming good? *J. Prod. Brand*  
477 *Manag.* **25**, 274–284 (2016).
- 478 57. Bénabou, R. & Tirole, J. Incentives and Prosocial Behavior. *Am. Econ. Rev.* **96**, 1652–1678 (2006).
- 479 58. Barclay, P. Biological markets and the effects of partner choice on cooperation and friendship. *Curr.*  
480 *Opin. Psychol.* **7**, 33–38 (2016).
- 481 59. Bashir, N. Y., Lockwood, P., Chasteen, A. L., Nadolny, D. & Noyes, I. The ironic impact of activists:  
482 Negative stereotypes reduce social change influence: The ironic impact of activists. *Eur. J. Soc.*  
483 *Psychol.* **43**, 614–626 (2013).
- 484 60. Antonetti, P. & Maklan, S. Hippies, Greenies, and Tree Huggers: How the “Warmth” Stereotype  
485 Hinders the Adoption of Responsible Brands. *Psychol. Mark.* **33**, 796–813 (2016).
- 486 61. Burum, B., Nowak, M. A. & Hoffman, M. An evolutionary explanation for ineffective altruism. *Nat.*  
487 *Hum. Behav.* **4**, 1245–1257 (2020).
- 488 62. Hoffman, M., Yoeli, E. & Nowak, M. A. Cooperate without looking: Why we care what people think

- 489 and not just what they do. *Proc. Natl. Acad. Sci.* **112**, 1727–1732 (2015).
- 490 63. Marie, A., Trad, H. & Strickland, B. Intentions vs. efficiency in policy evaluations. *Psyarxiv* (2021)  
491 doi:10.31219/osf.io/sed4w.
- 492 64. Everett, J. A. C., Faber, N. S., Savulescu, J. & Crockett, M. J. The costs of being consequentialist:  
493 Social inference from instrumental harm and impartial beneficence. *J. Exp. Soc. Psychol.* **79**, 200–  
494 216 (2018).
- 495 65. Montealegre, A., Bush, L., Moss, D., Pizarro, D. & Jimenez-Leal, W. *Does Maximizing Good Make*  
496 *People Look Bad?* <https://osf.io/2zbax> (2020) doi:10.31234/osf.io/2zbax.
- 497 66. Caviola, L. & Schubert, S. Is it obligatory to donate effectively? Judgments about the wrongness of  
498 donating ineffectively. (2020) doi:10.31234/osf.io/j2h4r.
- 499 67. Nielsen, K. S., Cologna, V., Lange, F., Brick, C. & Stern, P. The case for impact-focused  
500 environmental psychology. (2021) doi:10.31234/osf.io/w39c5.
- 501 68. Baumard, N., André, J.-B. & Sperber, D. A mutualistic approach to morality: The evolution of  
502 fairness by partner choice. *Behav. Brain Sci.* **36**, 59–78 (2013).
- 503 69. Çarkoğlu, A. & Kentmen-Çin, Ç. Economic development, environmental justice, and pro-  
504 environmental behavior. *Environ. Polit.* **24**, 575–597 (2015).
- 505 70. Baumard, N. *The Origins of Fairness: How Evolution Explains Our Moral Nature*. (Oxford  
506 University Press, 2016).
- 507 71. Chan, N. Climate Contributions and the Paris Agreement: Fairness and Equity in a Bottom-Up  
508 Architecture. *Ethics Int. Aff.* **30**, 291–301 (2016).
- 509 72. Pan, X., Elzen, M. den, Höhne, N., Teng, F. & Wang, L. Exploring fair and ambitious mitigation  
510 contributions under the Paris Agreement goals. *Environ. Sci. Policy* **74**, 49–56 (2017).
- 511 73. Who has contributed most to global CO2 emissions? *Our World in Data*  
512 <https://ourworldindata.org/contributed-most-global-co2>.
- 513 74. Aarøe, L. & Petersen, M. B. Crowding Out Culture: Scandinavians and Americans Agree on Social  
514 Welfare in the Face of Deservingness Cues. *J. Polit.* **76**, 684–697 (2014).

- 515 75. Baron, J. Nonconsequentialist decisions. *Behav. Brain Sci.* **17**, 1–10 (1994).
- 516 76. Dawes, C. T., Fowler, J. H., Johnson, T., McElreath, R. & Smirnov, O. Egalitarian motives in  
517 humans. *Nature* **446**, 794–796 (2007).
- 518 77. Carlsmith, K. M., Darley, J. M. & Robinson, P. H. Why do we punish? Deterrence and just deserts as  
519 motives for punishment. *J. Pers. Soc. Psychol.* **83**, 284–299 (2002).
- 520 78. Awad, E., Dsouza, S., Shariff, A., Rahwan, I. & Bonnefon, J.-F. Universals and variations in moral  
521 decisions made in 42 countries by 70,000 participants. *Proc. Natl. Acad. Sci.* **117**, 2332–2337 (2020).
- 522 79. Huber, R. A., Wicki, M. L. & Bernauer, T. Public support for environmental policy depends on  
523 beliefs concerning effectiveness, intrusiveness, and fairness. *Environ. Polit.* **29**, 649–673 (2020).
- 524 80. Maestre-Andrés, S., Drews, S. & van den Bergh, J. Perceived fairness and public acceptability of  
525 carbon pricing: a review of the literature. *Clim. Policy* **19**, 1186–1204 (2019).
- 526 81. Svenningsen, L. S. & Thorsen, B. J. Preferences for Distributional Impacts of Climate Policy.  
527 *Environ. Resour. Econ.* **75**, 1–24 (2020).
- 528 82. Douenne, T. & Fabre, A. Yellow Vests, Carbon Tax Aversion, and Biased Beliefs. (2020).
- 529 83. Douenne, T. & Fabre, A. French attitudes on climate change, carbon taxation and other climate  
530 policies. *Ecol. Econ.* **169**, 106496 (2020).
- 531 84. Introduction to Effective Altruism. *Effective Altruism*  
532 <https://www.effectivealtruism.org/articles/introduction-to-effective-altruism/>.
- 533 85. Greaves, H. & Pummer, T. *Effective Altruism: Philosophical Issues*. (Oxford University Press, 2019).
- 534 86. Schiermeier, Q. Eat less meat: UN climate-change report calls for change to human diet. *Nature* **572**,  
535 291–292 (2019).
- 536 87. FAO - Nouvelles: Key facts and findings. <http://www.fao.org/news/story/fr/item/197623/icode/>.
- 537 88. Melina, V., Craig, W. & Levin, S. Position of the Academy of Nutrition and Dietetics: Vegetarian  
538 Diets. *J. Acad. Nutr. Diet.* **116**, 1970–1980 (2016).
- 539 89. de Gavelle, E. *et al.* Self-declared attitudes and beliefs regarding protein sources are a good  
540 prediction of the degree of transition to a low-meat diet in France. *Appetite* **142**, 104345 (2019).

- 541 90. Stea, S. & Pickering, G. J. Optimizing Messaging to Reduce Red Meat Consumption. *Environ.*  
542 *Commun.* **13**, 633–648 (2019).
- 543 91. Wyker, B. A. & Davison, K. K. Behavioral change theories can inform the prediction of young  
544 adults' adoption of a plant-based diet. *J. Nutr. Educ. Behav.* **42**, 168–177 (2010).
- 545 92. Einhorn, L. Normative Social Influence on Meat Consumption. 36.
- 546 93. Park, T. & Barker, J. A Menu for Change: Using behavioural science to promote sustainable diets  
547 around the world. (2020).