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Affect and emotions as drivers of climate change perception and action: a review

Tobias Brosch

Recent findings and emerging trends concerning the role of affect and emotion in climate change perceptions and judgments as well as their potential as drivers of sustainable action are reviewed. The affective responses people experience toward climate change are consistently found to be among the strongest predictors of risk perceptions, mitigation behavior, adaptation behavior, policy support, and technology acceptance. As correlational results do not imply that inducing affective states will necessarily lead to the corresponding changes in a target population, research efforts now should focus on establishing the causal pathways from affect and emotion towards climate action. Communication and intervention studies show that inducing both positive and negative emotions may under certain conditions promote sustainable behavior, but the field would benefit from a stronger integration of concepts and findings from affective psychology. Explicitly considering the mechanisms by which emotions influence decisions and actions may help design more efficient affective interventions.

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Introduction

Accumulating research in the affective sciences has revealed that human information processing, decision-making, and behavior are to a large extent influenced and guided by affect and emotions [1,2]. In contrast to the long-held view that the human mind is driven by the battle between rational, deliberate reason and impulsive, irrational emotions, this research highlights the importance of affective processes for a successful functioning of the mind [3]. Affect and emotions are strongly intertwined with cognitive and motivational processes, they provide important evaluative information and reorient information processing and behavior towards events that are relevant to overarching goals and concerns (see Box 1 for a glossary of important terms). Consistent with their major influence on human thinking and behavior, affect and emotions have been shown to play an important role in driving human responses toward climate change. In this review, recent findings and emerging trends concerning the role of affect and emotions in climate change perceptions and judgments as well as their potential as drivers of sustainable action are identified, with a focus on the literature published during the last five years (2015–2020).

Experienced affect and emotion as drivers of climate change perception and action

Recent empirical and meta-analytic research has consistently found affect and emotions experienced toward climate change to be among the most important predictors of climate change-related judgments and behaviors. In a comprehensive analysis of factors influencing climate change risk perception that combined cognitive, experiential, and socio-cultural determinants, negative affect toward climate change was the single largest predictor of all examined factors [10]. In a replication and extension of the model, negative affect was moreover the largest predictor of individual willingness to engage in climate change mitigation behaviors such as using public transport or saving electricity [11]. In a meta-analysis of 106 studies investigating motivators of climate change adaptation behaviors (such as purchasing insurance or seeking information about hazards), negative affect was identified as one of the largest predictors, together with descriptive norms, perceived self-efficacy and outcome efficacy [12]. Public support for climate policies was found to be strongly predicted by affect as well as by emotions such as worry, interest, and hope toward climate change [13,14•]. Comparing the influence of multiple predictors of climate policy support, worry about global warming was the most important predictor, closely followed by affect toward global warming, which together explained about 20% of the variance [15]. Similarly, affect toward energy technologies was shown to be the most important driver of technology acceptance [16,17]. Using data from the European Social Survey (N = 44 387), worry about climate change was identified as direct predictor of climate policy support and as indirect driver of personal energy-saving behaviors via increases in feelings of personal responsibility [18•]. Together, these findings illustrate that affect and emotions play an important role

Box 1 Glossary

Affect: A positive/pleasant or negative/unpleasant feeling towards an event (e.g., climate change) or an object (e.g., a technology), a 'faint whisper of emotion' or gut feeling that can inform judgments and decisions by providing a quick evaluation heuristic [4]. Compared to full-blown emotions, the experience of affect is less intense and less differentiated.

Appraisal: The rapid evaluation of the relevance of an event or an object for one's concerns and well-being, which drives and differentiates the elicitation of emotions. Appraisal can occur via associative mechanisms based on previous experiences (fast, automatic, memory-based) and via deliberate, reasoning-based mechanisms (slower, controlled, effortful) [5].

Emotions: Adaptive reactions that are elicited when an event or an object is appraised as relevant to one's concerns, resulting in changes in motivational action tendencies, physiological reactions, expressions, and subjective feeling [6]. Emotions are defined by the appraisal pattern underlying the situation [7] (e.g., fear: an uncontrollable threat, sadness: an irrevocable loss, guilt: a transgression of a moral standard). They trigger motivational tendencies that facilitate coping with the situation [8] (e.g., fear: defensive stances such as fight, flight, or freeze, sadness: changing one's circumstances, guilt: reparation and social reintegration), and influence cognitive processing, evaluation, and judgment (e.g., by influencing risk appraisals and control appraisals) [1], considerably impacting subsequent decision-making and behavior.

Worry: An active cognitive-emotional state characterized by repeated anxiety-laden thoughts about potentially threatening future events. Worry is closely linked to cognitive problem-solving and self-regulation processes, resulting in adaptive behavioral responses aiming to reduce the threat [9].

across a wide range of climate change-related judgments and behavioral responses, and point to their potential as levers to promote sustainable behavior change. However, the research summarized above is largely correlational. It is thus not evident whether affect and emotions are antecedents or consequences of climate change judgments and behaviors (or whether both are driven by another process). Understanding the causal relationship is however crucial to assess whether the induction of affect and emotions can successfully promote sustainable action. The next section reviews recent research investigating the effects of emotion induction on climate change judgments and behaviors.

Emotional climate change communications and interventions

Multiple intervention strategies have been developed to induce emotions or amplify existing emotions in attempts to motivate sustainable actions. Climate change messages have thereby either focused on eliciting negative emotions such as fear and guilt, or, more recently, emphasized positive messages that aim to promote hope and optimism [19]. A current debate in the climate change communication literature is addressing the issue of whether fear-based messages may drive people into a passive state of avoidance, denial, or helplessness, as the threat posed by climate change may be perceived as too large to be solved successfully, and thus hope-based messages should be preferred [20–23]. While a lot of empirical data from the health communication literature is consistent with the claim that communicating about threats without pointing out potential solutions can lead to the described maladaptive coping reactions [24], surprisingly few empirical studies validate that this would also be the case in the climate and environmental domain [25]. To the contrary, climate messages with negative emotional content increased climate change adaptation intentions across differently concerned population segments [26], and messages emphasizing the threat posed by climate change increased both risk perceptions and perceived collective control to deal with the threat compared to low-threat messages [27]. Additional research is needed to reconcile the fear-related results of the health communication literature with the climate change literature.

Critics of hope-based appeals have pointed out that emphasizing progress in climate change mitigation in order to create hope may lead to complacency, as people may not see the need for personal action any more [21]. Consistent with this claim, optimistic messages about progress in reducing global carbon emissions increased hope, but reduced risk perceptions, and did not increase mitigation motivation [28]. However, messages focusing on solutions and efficacy (e.g., how easily an individual can take action, how likely politicians will respond to public opinion, how effective proposed climate policies will be) increased climate-related political participation via increases in hope [29,30]. A study focusing on the appraisal pattern of hope showed that hope is best elicited by messages that emphasize the goal-congruence, the importance, and the feasibility of protecting the climate [31]. Additional research pointed out the importance of differentiating subtypes of hope, driven by different underlying appraisals [32,33]. 'Constructive hope', related to trust that climate change can be mitigated by collective action was positively related to self-reported pro-environmental behavior [33], policy support, and political engagement [32], while 'false hope' or denial-based hope, related to doubts about climate change and a focus on positive consequences of climate change, was negatively related to these actions [32,33]. Thus, hope can indeed promote climate action and policy support. However, to avoid complacency or false hope, hope-based appeals need to focus on a specific set of appraisals, emphasizing the importance of solution-oriented individual and collective action, rather than focusing on general progress in climate change mitigation.

While climate change is sometimes too abstract and distant to elicit emotional responses via experience-based mechanisms [34], personal stories about how climate change is harming individuals have been identified as a promising way to increase emotional engagement with climate change. Listening to a personal story about

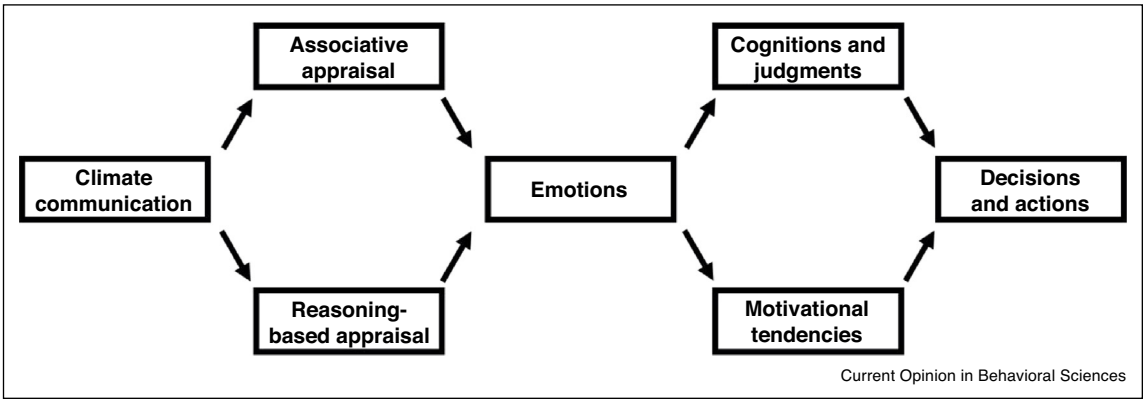
climate change consequences increased worry and compassion, which mediated increased belief in global warming and increased risk perception [35•]. By reducing psychological distance to climate change [36] and promoting experiential processing and associative appraisal [37], narrative-based communication strategies may provide an effective tool to promote climate change engagement.

Experimental studies moreover investigated the effects of inducing collective guilt for human-caused environmental damages, which increased the probability that participants would sign an environmental petition [38], inducing compassion for climate change victims, which increased support for climate mitigation policy [39], and inducing empathy toward the suffering of polar bears, which increased donations to climate change activism [40]. A study simultaneously assessing multiple emotions induced by positive and negative environmental messages found that pride increased intentions to invest in environmental protection, guilt increased willingness to repair environmental damages, and anger increased tendencies to punish others for negative environmental actions [41]. These studies elicited integral emotions, that is, emotions that have the environmental issue as their object. Other studies investigated the impact of incidental emotions, that is, emotions that are being felt at the time of decision, but have been caused by unrelated events. These studies found no or only weak and unsystematic effects of positive affect on pro-environmental behavior [42], amusement, awe, and sadness on pro-environmental donations [43], and guilt and anger on climate policy support [44]. These findings indicate that emotions need to be specifically related to the climate problematic to have significant behavioral effects [45].

It is moreover important to take into account the transient nature of emotional responses. Sadness induced by a film clip about the consequences of climate change predicted time spent on a carbon footprint calculator and subsequent donations [46••]. However, once a time delay of one hour was introduced between film and decision, the impact of sadness was substantially attenuated. Importantly, if participants were asked to make a non-binding commitment right after the film clip on how much they want to donate at a later time point, the effect was re-established. This finding is especially relevant in climate change communications, where a time delay between the emotion induction and the desired behavior (such as purchases or energy saving) can be expected.

Thus, both positive and negative emotions have been successfully leveraged in climate change communications and interventions to increase intentions and actual climate action. The mixed findings illustrate, however, that it is important to consider the mechanisms underlying the elicitation of emotions during intervention design to maximize their impact (see Figure 1). The emotion that is elicited by a climate communication (and whether an emotion is elicited at all) depends on the extent to which the individual appraises the message as being relevant to specific overarching goals and concerns [47•]. Research in affective psychology has specified the appraisal patterns underlying different emotions [7], which can be a helpful guide in the design of efficient emotion-eliciting messages [31]. Once elicited, emotions will exert an impact on decisions and actions mainly via two pathways: By

Figure 1



The elicitation of emotions and the pathways by which emotions influence decisions and actions. Emotions are elicited and differentiated based on the appraisal of the relevance of an event to the concerns of the individual. The appraisal process can occur via associative and via reasoning-based mechanisms. Associative appraisal is largely based on previous experiences and can occur quickly and automatically. Reasoning-based appraisal refers to a slower and more effortful process which can assess new and abstract information, providing a more thorough and flexible analysis. Once elicited, emotions exert an impact on decisions and actions by influencing cognitions and judgments (e.g., global warming beliefs, risk perceptions, control perceptions) and by triggering motivational tendencies (e.g., reparation, support, complacency).

influencing cognitions and judgments (e.g., global warming beliefs [48], risk perceptions [27,28], control perceptions [27]), and by triggering motivational tendencies (e.g., reparation [41], support [40], complacency [28]). To maximize the potential impact of emotional climate messages and interventions, target emotions need to be carefully selected based on the extent to which the cognitive and motivational consequences of the emotion match the desired behavior change.

It is moreover important to consider the temporal dynamics of emotions by placing the message as closely as possible to the desired behavior or by including safeguard mechanisms such as pre-commitments. Finally, even though negative emotional messages have been shown to be effective in promoting intentions to act [26], communicators should consider that people tend to evaluate these messages as negative [49] and generally prefer climate messages without negative emotional content [50].

Anticipated emotions and warm glow as drivers of climate action

Not only the emotions that people are experiencing at a given moment, but also the emotions they anticipate to experience after a behavior may be important drivers of action. Economists have introduced the concept of 'warm glow' to explain pro-social behavior [51]: People behave pro-socially because the act of helping others results in a positive emotional experience that rewards and reinforces the behavior. Recent research has begun exploring to what extent warm glow and anticipated emotions can motivate pro-environmental action. An initial study illustrated that people do indeed experience a warm glow when acting pro-environmentally [52]. Longitudinal studies showed that anticipated warm glow, that is, the extent to which participants expect to feel good when acting sustainably, predicted self-reported pro-environmental behaviors four weeks later [53,54•]. Anticipated warm glow from acting pro-environmentally was a stronger predictor of intentions to act than anticipated instrumental gains related to the behavior [55]. Warm glow moreover mediated the impact of previous pro-environmental behaviors on intentions to engage in future pro-environmental behaviors [56••].

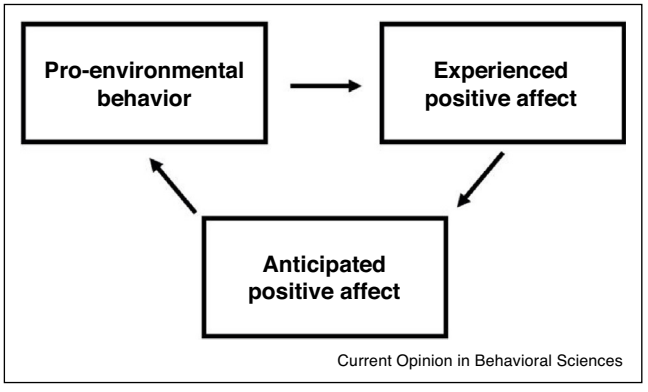
Other studies examined the impact of discrete anticipated emotions on environmental intentions and behaviors. Anticipated pride for acting pro-environmentally and anticipated guilt for not acting both predicted self-reported pro-environmental behavior, mediating the effect of personal environmental norms [57]. Making anticipated pride more salient right before a decision led to more pro-environmental intentions compared to anticipated guilt [58]. A study using an experience sampling protocol showed that pride experienced after pro-environmental behaviors predicted subsequent pro-environmental behaviors, but only for participants who perceived that important others also do a lot for the environment [59]. Positive anticipated emotions were shown to have a stronger effect on intentions to fight climate change for individuals who already engage in climate mitigation, while negative emotions had a stronger effect for individuals who are not yet engaged [60].

Taken together, these findings illustrate the importance of anticipated affect and emotions as intrinsic motivators of sustainable action. They operate both as a consequence of pro-environmental behavior (experienced warm glow) and as a behavioral antecedent (anticipated warm glow), suggesting a reinforcement mechanism [56••] where previously experienced warm glow can motivate and drive future pro-environmental behaviors (Figure 2). A promising behavioral intervention strategy to promote climate action would thus be to create opportunities to experience warm glow for acting pro-environmentally in order to kick-start this feedback loop. Consistent with this notion, emphasizing the positive affect experienced after an initial pro-environmental behavior has been shown to increase intentions to perform a subsequent pro-environmental behavior [61] (while emphasizing negative affect or guilt did not impact this type of behavioral spillover [61,62]) (Box 2).

Discussion and outlook

The research reviewed here illustrates the extent to which affect and emotions are powerful drivers of climate change perception and actions. The affective reactions that people 'naturally' experience toward climate change (i.e., outside the context of intervention studies) are consistently found among the strongest predictors of climate change risk perceptions, mitigation behavior, adaptation behavior, policy support, and technology acceptance (see Box 2 for negative consequences of

Figure 2



The 'virtuous cycle' of positive affect. Positive affect experienced after a pro-environmental behavior can motivate and drive future pro-environmental behavior via anticipated positive affect.

Box 2 Climate anxiety

Climate anxiety has been described as the 'biggest pop-culture trend of 2019 [63]', reflecting the increasing preoccupation of the public with the topic of climate change. Climate anxiety refers to the experience of intense anxiety about climate change, even among people who have not personally experienced substantial adverse impacts of climate change [64]. In 2016, between 20% and 40% of Europeans indicated they were 'very or extremely worried' about climate change [65], while in 2020, 26% of Americans indicated that they were 'very worried' [66]. While anxiety serves adaptive functions and can lead to appropriate preparations to deal with a threat, in its more extreme forms it can be maladaptive and lead to an impairment of daily functioning [67]. In a representative U.S. sample, about 10% of respondents indicated that they 'often' or 'almost always' present clinically significant cognitive and functional impairments in their daily life because of intense climate change anxiety [68]. While negative emotional responses toward climate change can be important motivators for climate action, they are also becoming an issue for individual mental health and well-being.

affective reactions toward climate change). As these results are mainly correlational in nature, however, they do not imply that inducing these affective states will necessarily lead to the corresponding changes in a target population. Research efforts should therefore now focus on establishing the causal pathways from affect and emotion towards climate action.

Research on emotional climate change communications and interventions has made substantial progress in this direction over the last five years, but would benefit from a stronger integration of theoretical concepts and empirical findings from affective psychology. Explicitly considering the mechanisms by which emotions are elicited and the pathways by which they influence decisions and actions may help design more efficient affective interventions. The field would moreover benefit from a stronger integration of neurophysiological approaches to assess the impact of emotional climate messages on neural regions involved in appraisal, emotion, and decision-making [69]. Research in the health domain has shown that activation patterns in amygdala and ventromedial prefrontal cortex predict the impact of emotional messages both at the individual and the population level [70]. So far, no such research exists in the climate domain.

Finding ways to harness positive emotions and warm glow as motivators of pro-environmental behavior is another promising avenue for future research. Given the potential long-term effects of reinforcement mechanisms such as the 'virtuous cycle' of positive affect, triggering this mechanism may help induce the sustained behavior change needed to fight climate change [71].

Taken together, this review illustrates the substantial impact of affect and emotions on climate change perception and action. Researchers, practitioners, and policy makers should aim to leverage their potential to tackle one of the most fundamental challenges of our time.

Conflict of interest statement

Nothing declared.

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