

Rabaa, Simon; Geisendorf, Sylvie; Wilken, Robert

Article — Published Version

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation

Zeitschrift für Umweltpolitik und Umweltrecht

Suggested Citation: Rabaa, Simon; Geisendorf, Sylvie; Wilken, Robert (2022) : Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation, Zeitschrift für Umweltpolitik und Umweltrecht, ISSN 0931-0983, Deutscher Fachverlag, Frankfurt am Main, Vol. 45, Iss. 1, pp. 100-134, <https://doi.org/10.5281/zenodo.7677305>

This Version is available at:

<https://hdl.handle.net/10419/279886>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation

Simon Rabaa^{a}, Sylvie Geisendorf^a and Robert Wilken^a*

Abstract

In its recent special reports, the Intergovernmental Panel on Climate Change (IPCC) emphasizes the importance of behavior and lifestyle changes in mitigating climate change and calls for them to be better researched. Yet to date, climate-related behavior has been largely neglected or simplified as rational decision making in the climate debate, both in analyzing and predicting the situation and in the design of policy solutions. This paper aims to fill this gap by presenting a specific kind of cognitive biases as irrational reasons for not taking enough climate action. Specifically, it deals with effects that cause people not to deviate from a given situation, so-called status quo biases. These biases have been described under many different names in behavioral economics and psychology, but so far, a systematic investigation of their influence on climate-relevant behavior is lacking. Consequently, we develop a categorization of 20 such mechanisms from different domains that can be grouped into five clusters within which they have a similar influence on climate-relevant behavior. In this way, we first aim to create a common understanding of the phenomenon and structure the discussion about it. Second, this systematic structure is used to propose policy options for dealing with the aforementioned biases. Third and most interestingly, we show how some of the biases can work both ways, i. e., can also be flipped into the positive to create and support a new climate-friendly status quo. We thus highlight new policy opportunities beyond material incentives to encourage climate-friendly behavior.

Keywords: Climate change mitigation; Status quo bias; Cognitive biases; Behavioral economics; Psychology; Climate policy

1. Introduction

The release of the first part of the 2022 IPCC report made it clear that we are close to breaching climate tipping points (IPCC, 2021). Transgressing such boundaries can lead to irreversible changes in earth systems. While melting permafrost or the danger of a collapse of the gulf stream, however, seem to be fairly well understood, the big-

^a ESCP Business School Berlin, Heubnerweg 8–10, 14059 Berlin, Germany.

* Corresponding author (e-mail address: srabaa@escp.eu).

gest uncertainty, as Christian Jakob, an Australian climate scientist is quoted, is not knowing which of the possible emission scenarios we, humans, will follow through our choices. This insecurity is „much larger than the uncertainty we have in the science“ (Hannam, 2021, para. 25).

There is a notable gap between optimal mitigation efforts calculated by climate economic models and the much slower actual progress (Schwalm et al., 2020; Ueckerdt et al., 2019). In its recent special reports, the Intergovernmental Panel on Climate Change (IPCC) therefore points out the barriers to behavior and lifestyle changes (IPCC, 2018, 2019). This paper seeks to shed light on possible reasons, in particular by investigating a specific kind of effects keeping individuals from making rational¹ decisions: cognitive biases that make people stick to a given status quo. We argue that such effects are mostly overlooked in the thus far largely optimization-driven logic of climate economics.

The aggregated interactions between the human economic system and the climate system are predominantly studied with Integrated Assessment Models (IAMs). These models follow a least-cost optimization logic. They calculate the cost-optimal mitigation level or the cheapest transformation path to a given mitigation target (Asefi-Najafabady et al., 2020; Keppo et al., 2021; Nikas et al., 2019). Collectively it would be rational to follow such a path, but actual behavior does not figure in these macro-economic mathematical constructs.

Climate-relevant behavior is partially analyzed in game-theoretic models. Yet, these models assume individually rational decisions which only lead to collectively inefficient solutions because of cooperation dilemmas (Buchholz et al., 2014; Cheng et al., 2019; Kutasi, 2012). These models are thus still in the realm of rational behavior.

The possibility of irrational individual decisions is not considered in these predominant models. This means that the limitations on human rationality (Simon, 1957, 1993) are largely ignored in the climate change debate, both in analyzing and predicting the situation and in the design of policy solutions (Gsottbauer & van den Bergh, 2011; Roos & Hoffart, 2021). This is problematic because a large part of uncertainty about the magnitude of climate change depends on how individuals choose to act (Ivanova et al., 2016). It is also surprising that behavioral aspects are not investigated more systematically considering that research in behavioral economics and psychology has shown for decades that people consistently, systematically, and predictably deviate from rationality (Green & Shapiro, 1994; Tversky & Kahneman, 1974).

¹ Economic rationality assumes that individuals always choose the behavior that maximizes their subjective utility; irrationality describes any behavior or decision that violates this assumption (Becker, 1976; Kahneman, 2000).

Many so-called cognitive biases lead humans to not decide in their own best interest, even in economic terms. Among the biases described, some can help understand why people often stick to a given status quo, even if deviating from it could bring known benefits (Samuelson & Zeckhauser, 1988). These biases are particularly interesting candidates to explain at least part of the inertia in climate change-relevant behavior because they illustrate why people are reluctant to accept changes in their lifestyle or habits, or why they simply opt for a particular default setting even when better alternatives exist.

The purpose of this paper is threefold: First, it wants to add to the climate change debate by shifting the focus to biases as irrational hurdles to the necessary behavior and lifestyle changes, which are still a blind spot in the debate. It does so by presenting and systemizing 20 identified status quo biases. They are clustered into five categories with each category having a similar impact on climate change mitigation. The paper explains how and in which situations each group affects people's decisions. This categorization shall create a common understanding of the phenomena and structure the discussion of political solutions to overcome or work with these biases. Second, the paper offers five policy directions derived from the categories to spark the discussion on how to amend the current status quo bias-driven climate-damaging behavior. Third, and most interesting, in proposing these policies the paper shows that some of the behavioral patterns do not inevitably impede climate protection, but can also facilitate it. When properly understood, some of the biases can be flipped into the positive to encourage climate-friendly behavior. We present ideas on how those biases can be used to support climate policy, which highlights opportunities to advance climate protection beyond material incentives.

2. Climate change mitigation and the overlooked behavioral dimension

2.1 Current modeling approaches in the climate debate

The standard tools for climate change mitigation analysis are climate economic IAMs. They are built on the core of a macro-economic growth model which is linked to a climate model. Depending on the chosen technology, economic production generates more or less CO₂ emissions which provoke climate change. The latter, in turn, feeds back on the economy via damage costs (Gambhir et al., 2019; Nikas et al., 2019).

There are two types of such models. First, cost-benefit IAMs, such as the DICE model (Nordhaus, 1992, 2018), focus on the monetized impacts of climate change and its mitigation, weighing the long-term damage costs of climate change against the costs of reducing greenhouse gas emissions, to find an optimal level of climate protection. Second, process-based, cost-effectiveness IAMs, such as the IMAGE model (Stehfest

et al., 2014), evaluate the prerequisites and consequences of transformation pathways and greenhouse gas emission trajectories. They are used for example by the IPCC to assess the feasibility of the Paris Agreement's 1.5°C or 2°C targets under various assumptions about economic and population growth and climate policy implementation (Hare et al., 2018; IPCC, 2018). Both do not model human behavior.

In addition to IAMs, the debate draws on game-theoretic approaches to analyze decisions and interactions of individual actors. They are most commonly used to illustrate the coordination dilemma of climate negotiations between countries and are applied to investigate strategies through which international agreements in support of climate action could be reached (Chander, 2018; Kutasi, 2012; P. J. Wood, 2011). Besides, game theory is also used to analyze people's individual decisions, which is expected to help design policies to promote climate-friendly lifestyles (Cheng et al., 2019; Mond, 2021).

While IAMs do not model human behavior and rely on an equilibrium and least-cost optimization logic (Asefi-Najafabady et al., 2020; Keppo et al., 2021; McCollum et al., 2017), game theoretical models depict behavior as utility-maximizing rational choice and assume that players have the knowledge to predict both the strategies of other players and their own optimal strategy in response (Colman, 2003; Gowdy, 2008). In other words, people would only follow the calculated paths of IAMs if they were collectively rational and game theory only helps to understand why individual rationality often stands in the way of collectively best solutions when agreements between larger groups of people are required (Raihani & Aitken, 2011; Welsch, 2020).

2.2 Relevance of status quo biases

Anthropogenic climate change, however, is not just the result of collective processes. At the same time, it is determined by the aggregation of a huge number of individual decisions, with household consumption behavior accounting for the largest share of emissions (Hertwich & Peters, 2009; Ivanova et al., 2016). Yet, the debate on climate change mitigation and climate policy making largely neglects the characteristic features of human behavior.

This section therefore highlights the need for more behavioral knowledge in the climate change debate. It seeks to make a case for acknowledging the relevance of irrational behavior as an important factor to understand in the climate debate. In particular, it discusses literature on status quo biases and related behavior as one potential reason for an individually irrational lack of climate protection. In doing so, it illustrates how dispersed that knowledge is and why there is a need for a more systematic categorization.

Empirical research in behavioral economics and psychology shows that people consistently, systematically, and predictably deviate from rationality also when making climate change-relevant decisions (Gifford, 2011; Gowdy, 2008; Rachlinski, 2000;

Stankuniene et al., 2020). Consequently, the climate debate and policy making should be oriented toward real human behavior by acknowledging irrational decision making and including it in models and policy design (Beckenbach & Kahlenborn, 2016; McCollum et al., 2017; K. S. Nielsen et al., 2021). Corresponding approaches include system dynamics models (Fiddaman, 2002), dynamic stochastic general equilibrium models (Farmer et al., 2015), or agent-based models (An, 2012; Geisendorf, 2016; Moss et al., 2001). There are also efforts on behavioral and experimental game theory approaches in the climate context (Buchholz & Eichenseer, 2021). Nevertheless, the notion of irrational behavior has so far not entered the mainstream debate.

Some of the most striking anomalies² – in terms of irrationality – described by behavioral economics are reasons to maintain a given status quo, even if it is more costly than a change. The theoretical and empirical groundwork is built by Samuelson and Zeckhauser (1988), who coined the term status quo bias, and Kahneman et al. (1991). They demonstrate the effect through experiments and define it as an individual's tendency of „doing nothing or maintaining one's current or previous decision“ (Samuelson & Zeckhauser, 1988, p. 7). Kahneman et al. (1991) attribute it to a combination of loss aversion – the phenomenon that when making decisions, people give greater weight to losses than to gains – and the endowment effect – the tendency to value a good more when one owns it. According to Samuelson and Zeckhauser (1988), the underlying causes are more manifold, additionally including psychological commitment due to sunk costs, regret avoidance, anchoring effects, and a drive for consistency.

What is called status quo bias (singular) has thus, from the outset on, been explained by different biases (plural). For this paper, we adopt this combinatory view and take it further by identifying additional effects that provoke sticking to a status quo in climate-relevant behavior. Several of them are described under other names. One contribution of this paper is thus to show that they are different ways to the same result: a potentially unfavorable status quo is maintained. We thus call all these effects status quo biases (in the plural form).

Outside the context of climate change, there has long been extensive empirical research from behavioral economics on status quo biases. Studies have assessed them in various settings such as electricity plans (Hartman et al., 1991), credit card borrowing (Meier & Sprenger, 2010), and organ donation (Johnson & Goldstein, 2003). Concerning climate-relevant behavior, most of this research focuses on the implementation of energy efficiency. It addresses the gap between the cost-minimizing level of energy efficiency and the level actually realized. These studies show that not using more energy-efficient technologies (e.g., efficient light bulbs and other electrical appliances) is irrational, because it costs more, but can be predicted by status quo preference indicators (Blasch & Daminato, 2020; Frederiks et al., 2015; Martin-

2 We use the terms anomalies and biases to describe patterns of behavior that are central to human decision making, and do not imply that human behavior is usually rational.

Bonnel de Longchamp et al., 2018; Schleich et al., 2019). Blasch and Daminato (2020) quantify the resulting electricity consumption to be about 6 % higher compared to non-biased persons based on a household survey from three European countries.

In addition to behavioral economics, psychological research also investigates reasons why people do not act in a more climate-friendly manner (Marshall, 2015; Steg & Vlek, 2009). Similarly, Rachlinski (2000) argues that psychological effects, such as loss aversion, biased information assimilation, or availability heuristics cause a status quo tendency and hinder humankind from changing behavior to protect the climate. Several specific psychological barriers are identified in this literature as obstacles to individual climate action, which can also be understood as status quo biases. A body of literature focuses on the decelerating influence of habits and routines (Hoolohan et al., 2018; Kurz et al., 2015; Verplanken et al., 1998) or behavioral lock-ins (Maréchal, 2009, 2010) that impede climate protection. Besides, other psychological phenomena, including overly discounting the future, self-serving interpretations of fairness, and sunk costs are identified as reasons why most people are less committed to climate protection than they should be from a rationality perspective (Bazerman, 2006; Gifford, 2011; Hoffman & Bazerman, 2007; Shu & Bazerman, 2012; Stoknes, 2015). Lorenzoni et al. (2007) provide an overview of findings from surveys and interview studies about barriers to engagement with climate protection. Important reasons include technological over-optimism, reluctance to change lifestyles, externalizing responsibility, fatalism, and helplessness.

The relevance of considering behavioral biases in climate mitigation analysis is demonstrated by Knobloch et al. (2019), who include experimental data on loss aversion from Tversky & Kahneman (1991) in a global energy IAM (the E3ME-FTT-GENIE model). The model simulations of technological change are adjusted in such a way that technology choices are made dependent on the technology currently in use as a reference point. In accordance with the experimental data, the relative losses of a new technology (e.g., renewable energy) are weighed more heavily than its relative gains. The authors show that not considering the effect overestimates the market uptake of renewable energies and underestimates carbon emissions by households. With that bias, a carbon tax of 200 €/tCO₂ is required to achieve the same results as with 100 €/tCO₂ in the scenario without loss aversion. Similarly, Safarzyńska (2018) shows how including loss aversion and habit formation changes the climate policies suggested by climate economic models. While neglecting these anomalies leads standard models to overestimate rebound effects, it also leads them to significantly underestimate the social cost of carbon and optimal pollution tax.

Such empirical studies and modeling results indicate that deviations from rational choice behavior may result in a slower transformation compared to current calculations. Apart from the question of whether 1.5°C or 2°C scenarios are feasible, these studies thus raise the question of whether they are plausible given what we know about human nature.

Next to such descriptive explanations of observable behavior and predictive model analyses, acknowledging irrational behavior and the existence of status quo biases can also help design climate policies. To date, research on climate policy has only begun to incorporate insights from behavioral economics and psychology (Beckenbach & Kahlenborn, 2016; Bhargava & Loewenstein, 2015; Gifford et al., 2011; Gowdy, 2008; Hornsey & Fielding, 2020). Beckenbach (2016) systematizes the contributions of behavioral economics in both the evaluation of existing environmental and climate policy instruments and the development of new ones. He argues for including the full breadth of observable behavior – beyond modifying standard economic assumptions – when designing effective environmental and climate policies.

The most prominent policy application of behavioral economic findings – not only on status quo biases but on cognitive biases in general – is the concept of nudging (Michalek et al., 2016; Thaler & Sunstein, 2008). Nudging tries to change individual behavior by altering people's choice architecture (Michalek et al., 2016; Thaler & Sunstein, 2008). They can comprise the provision of information (Bhargava & Loewenstein, 2015; de Vries, 2020; Howlett & Rawat, 2019), the use of social norms and comparison (Bhargava & Loewenstein, 2015; Weber, 2013), goal setting (Howlett & Rawat, 2019; Weber, 2013) or framing (Martin et al., 2019; Osberghaus, 2017; Weber, 2013). An overview of different types of nudges to reduce energy consumption and to encourage green energy uptake in the household sector is provided by Liebe et al. (2018). Some of these nudges, such as the setting of different default rules, explicitly work with status quo biases (Sunstein & Reisch, 2013, 2021; Weber, 2017). Liebe et al. (2021), for example, have shown that this can be very effective: In field studies with 200,000 households and 8,000 businesses, 80 % of customers chose green energy when it was presented as the default.

Thus, both behavioral economics and psychology have addressed the question of why people do not act to protect the climate more and have identified a multitude of irrational reasons leading to the maintenance of a given status quo. Some are explicitly called status quo biases, many others are described under different names, but they all have in common to let people stick to the current or default situation.

Some status quo biases have already been introduced into climate economic models, are analyzed in empirical studies, or are considered in policy design. To date, however, there is no systematic investigation of the effects. While some of the findings overlap, others are at least similar enough to allow for a grouping of several biases in one category. Again others would fall in a different category. Ranging from biases leading to a general underestimation of the need for change to those leading to not questioning preset defaults or habitual behavior, we identified five categories into which we suggest grouping the identified biases. This categorization will be developed in the following chapter.

3. Status quo biases and their role in climate change mitigation

In this section, we compile status quo biases from various research areas and propose a categorization with five clusters within which the biases have a similar influence on climate-relevant behavior. The order of the categories follows the individual's confrontation with possible changes. It starts with biases that influence the perception of the need for change. This is followed by biases that affect the evaluation of personal responsibility for, the feasibility of, and desirability of change. It ends with biases that exclude certain aspects of behavior from consideration. Within the categories, the biases are arranged from the general to the specific, so that one effect is often a consequence or special case of the previous one. Altogether, we discuss 20 cognitive biases from the perspective of how they affect climate protection. This compilation serves as a basis for subsequent discussions of consequences for the climate debate and shall facilitate the design of appropriate policy options.

3.1 Underestimating the need for change

In the first group, we discuss biases that contribute to maintaining a given status quo by leading people to underestimate the need for change.

Optimism bias. The optimism bias causes people to believe that things will turn out better than objective analysis would suggest, thereby leading people to ignore threats (e.g., smoking, financial losses) (de Vries, 2020; Martin-Bonnel de Longchamp et al., 2018). In the context of climate change, this bias nourishes the wishful belief that oneself or one's region will not be affected as much (spatial discounting) (Bazerman, 2006; Gsottbauer & van den Bergh, 2013) and can also manifest itself as a belief in technosalvation – that technologies will be invented to solve the problem (Lorenzoni et al., 2007). The more optimistic people are about climate change, the less likely they are to change their climate-relevant behavior (de Vries, 2020; Shu & Bazerman, 2012).

Availability heuristic. One reason for humans' optimism bias is its use of a cognitive availability heuristic, which rates the likeliness and scope of a possible event according to how easy it is to remember corresponding examples (Beckenbach, 2016; Tversky & Kahneman, 1974). This bias leads people to overrate physically, temporally, and psychologically close events that are easy to remember and undervalue others. Because it is still difficult to link climate change with personal experiences, the availability heuristic rates its danger as rather distant and insignificant. Whether the danger is perceived as worrying at all largely depends on how often it appears in mass media (Bazerman, 2006; Mazutis & Eckardt, 2017).

Turkey fallacy. An extreme effect of the availability heuristic is the ignorance of future negative phenomena that have never occurred before, called the argument from incredulity or turkey fallacy (Taleb, 2007). For a turkey in captivity, all evidence points to a constant quality of life. There is no indication that it will be eaten one day

and, thus, no need to escape. This is similar to the unprecedented and difficult-to-imagine nature of climate change, both on a personal level, considering everything has turned out well so far in one's own life, or on a societal level, considering humanity has always survived. Bazerman and Watkins (2004) observe this bias, noting that policy leaders in particular often fail to react properly to foreseeable but unprecedented dangers. Consequently, Bazerman (2006) questions whether the political will to take action on climate change will emerge at all before demonstrable harm has occurred.

Probability neglect. Overoptimism is reinforced by the inability of the brain to work with probabilities, known as probability neglect. The more emotional an event is (in terms of both hope or fear), the more people focus on the event and neglect its probability (Rottenstreich & Hsee, 2001; Sunstein, 2002, 2007). For example, after the terrorist attacks of September 11, 2001, people in the United States replaced flying with more driving, because they feared the risk of a terrorist attack more than the risk of a car accident (which is actually more likely) (Gigerenzer, 2004, 2006; Sunstein, 2003). Similarly, scientific information on the probability of occurrence of climate hazards is difficult for people to translate into a sense of threat and a demand for change and it might be problematic that even large-scale changes in these probabilities are likely to have little impact on risk assessment (Sunstein, 2007).

Discounting bias. Another way of disregarding the need for climate protection is by overrating present satisfaction or pain, called temporal discounting bias (also referred to as present bias and cognitive myopia). People experience a preference for immediate rewards and aversion toward immediate costs, while long-term benefits are undervalued and distant adverse events are considered insignificant (Kaplan et al., 2014). It is an irrational bias, as people make decisions that their future selves would not have made given the same information (Laibson, 1997). This bias reduces the willingness for investments in climate protection today (Gillingham et al., 2009; Schleich et al., 2019) and, because climate change is perceived as a distant threat in time and space (Lorenzoni et al., 2007), it decreases awareness of its dangers.

3.2 Avoiding assuming individual responsibility

Even if the general need for more climate protection is accepted, this does not automatically translate into a willingness to act individually because several cognitive biases hinder this connection. This second group of biases contributes to the status quo bias by reducing the perceived need for individual change.

Peanut effect. Similar to the probability neglect, people can misjudge the consequences of small gains or losses, such that they are more risk-seeking when small amounts are at stake (Prelec & Loewenstein, 1991). This peanut effect causes irrational behavior because a small loss of money – for example, for a lottery ticket – or the infinitesimal increase in the chance of disease – from, for example, one unhealthy

snack or cigarette – is neglected (Loewenstein et al., 2013). Individual contribution to climate change through damaging behavior such as flying is similarly underrated because it happens incrementally, and people judge their activity as too insignificant to interfere with global processes (Gifford et al., 2011).

Diffusion of responsibility. When responsibility for a necessary intervention is shared among several people, the perceived individual sense of responsibility dissipates, and the more people involved, the greater the effect (Baddeley, 2016; Gifford, 2011). This is also known as the bystander effect since Darley & Latane (1968) showed that the presence of bystanders reduces the speed at which a person reports an emergency. This bias is fueled by an excessive aversion to responsibility for negative outcomes (discussed further in the omission bias section). Since nobody actively decides to put the climate at risk, it is easy to not feel responsible for climate protection and to refrain from taking action. Externalizing and denying personal responsibility and blaming governments or corporations are major barriers to individual climate protection engagement (Blake, 1999; Lorenzoni et al., 2007; Stoll-Kleemann et al., 2001) as well as for private corporations (Mazutis & Eckardt, 2017).

Self-serving bias. Self-serving bias (or egocentrism) causes people to confuse what is in their interest with what is fair, leading to biased judgments about credit, guilt, and burden sharing. With this bias, people expect others to do more than themselves (Brekke & Johansson-Stenman, 2008; Shu & Bazerman, 2012). Loss aversion and the endowment effect reinforce it so that people overstate their own sacrifices. This creates a major problem in international climate negotiations, for example, because even if every government seeks to find a fair agreement for all parties, what is considered fair is biased (Bazerman, 2006; Shu & Bazerman, 2012). Similarly, individuals and companies tend to overestimate their climate protection measures and to see more need for change in others (Mazutis & Eckardt, 2017).

3.3 Perceiving change as overwhelming

Effective climate protection requires substantial behavior and lifestyle changes, which can be overwhelming. Several biases cause the demands of change to be perceived as too great, leading to individual abstinence from action.

Cognitive dissonance. Cognitive dissonance is an unpleasant psychological tension, triggered when a person's beliefs and behavior collide with new information (Festinger, 1957; Stoll-Kleemann et al., 2001). Because changing beliefs and behavior is stressful, people resort to framing the outside world to fit their existing beliefs and behavior, known as confirmation bias (Nickerson, 1998). Information that would require a change in the status quo is ignored (defensive avoidance), interpreted in a fitting way (assimilation bias), or judged to be fake news based on a prejudiced assessment (motivated reasoning). All of these mechanisms are common reactions to information on necessary climate protection (Brekke & Johansson-Stenman, 2008; Patt &

Schröter, 2008; Stoll-Kleemann et al., 2001), and the longing for clues that legitimize climate-damaging behavior makes it easy for special interest groups to cast doubt even with weak arguments (Hornsey & Fielding, 2020).

Ostrich effect. An extreme version of cognitive dissonance avoidance is the ostrich effect, in which people completely shut themselves off from negative, dangerous, or overwhelming information to avoid unpleasant feelings, which prevents learning and change (Karlsson et al., 2009). This reaction is often seen in the financial sector (Karlsson et al., 2009), but it has also been observed when people process information in the climate context (Brechin, 2008; Haltinner & Sarathchandra, 2018; Meyer & Kunreuther, 2017; Norgaard, 2006). A situational example is travel habits of people who perceive vacations as an escape from reality and therefore ignore related emissions (Webb et al., 2013).

Drop in the ocean feeling. In the same way that the peanut effect undervalues one's contribution to climate change, the drop in the ocean feeling (or learned helplessness) undervalues one's own capability to act. In the climate change context, it is difficult to link action to effect and control over the outcome is perceived as low; this feeling facilitates the perception of diffusion of responsibility and, together with the peanut effect, creates the feeling that individual action is irrelevant (Lorenzoni et al., 2007; Strauss, 2016; Whitmarsh et al., 2012).

Fatalism. Even stronger than the drop in the ocean feeling, fatalism is the belief that nothing can be done (anymore) about a problem, neither by the individual nor by collective human action, and it represents the opposite to the optimism bias (Gifford, 2011; Sunstein, 1998). Both feelings, however, lead to inaction and foster the status quo. Many people confronted with climate change exhibit a certain degree of fatalism as a psychological defense mechanism (Doherty & Clayton, 2011; Lorenzoni et al., 2007). Fatalism is evidenced in the growing incidence of eco-anxieties in response to the increasing environmental problems and overwhelming images of disaster, which lead to psychic numbing, silencing, and paralysis (Stoknes, 2015).

3.4 Associating change with disproportionate negative emotions

Even when people see the necessity of individual action, they can hold back if changes are associated with negative consequences. The following biases link changes with negative emotions, thus disproportionately increasing the perception of their downsides.

Loss aversion. A strong driver for disproportionate negative emotions is loss aversion, humans' tendency to weigh losses more than benefits and to choose to avoid losses over acquiring equal or even higher gains (Kahneman et al., 1991; Sunstein & Reisch, 2021). It undermines the willingness to change the status quo of consumption patterns or living standards whenever these changes are perceived as involving some sacrifice of existing personal endowment, power, or lifestyle – even if they will result

in greater gains and net benefits – because the downsides are overrated (Heutel, 2019; Schleich et al., 2019; Weber, 2013).

Endowment effect. People tend to value a good more highly when they own it; thus, they demand more in return for giving it up (willingness to accept) than they would give to acquire it (willingness to pay) (Kahneman et al., 1991). This endowment effect is related to and can be partly ascribed to loss aversion, but it goes further: studies show that even mere ownership increases subjective value (Morewedge & Giblin, 2015). It amplifies negative feelings toward climate action by inflating people's valuation of their current endowment not only of goods but also, for example, of food choices (Antonides & Cramer, 2013) or housing conditions (Lipson, 2008). Furthermore, the fact that the initial allocation matters for individual valuation undermines the idea of the Coase theorem of efficient bargaining solutions for externalities (Kahneman et al., 1990) and it is described as a source of systematic deviation from optimal solutions in emission trading and climate negotiations (Beckenbach, 2016; Venkatachalam, 2008).

Risk bias in loss aversion. While people are generally risk averse, they take disproportionate risks for the chance of avoiding a loss. They thus take the risk of a large loss in the hope of losing nothing, rather than accepting a smaller but certain loss (Kahneman & Tversky, 1979). Accordingly, they tend to prefer the possibility of a larger but seemingly uncertain loss from climate change, hoping it will not occur, over the smaller but certain loss from climate protection expenditures now (Rachlinski, 2000).

Sunk cost bias. Once people have invested money, effort, or time, they show a disproportionate propensity to continue an endeavor, even after negative results become apparent (also known as escalation of commitment or argument from waste) (Gifford, 2011; Thaler, 1980). Such sunk costs are a specific implication of loss aversion in that people seek to avoid the feeling that an expense has been thrown away. The bias is found to build an attachment to damaging technologies and can increase the intensity of using, for example, electrical appliances (Frederiks et al., 2015) and cars (Reiser, 1980) to justify the investment. In the climate change context, sunk costs for plants and equipment prevent managers from implementing corporate sustainability changes (Hoffman & Bazerman, 2007). Likewise, this bias is used to explain ongoing public and private investment in fossil fuels despite available alternatives (Arbuthnott & Dolter, 2013).

Omission bias. Finally, studies show that active agreement to losses hurts people more than losses that just happen. In other words, harmful activity is judged worse than inactivity that causes the same damage (Anderson, 2003; Baron & Ritov, 2004; Kind & Savelsberg, 2016). The omission bias (or choice deferral) is the resulting tendency to choose not to choose, to avoid active responsibility for negative outcomes (Baron & Ritov, 2004). As decisions in the context of climate protection can have long-term negative consequences, this bias increases the attractiveness of inaction

and dispels the notion that it can lead to even more harmful changes (Barreiro-Hurle et al., 2018; Bazerman, 2006).

3.5 Not questioning the given state of affairs

The last category of biases differs from the previous ones in that these biases lead people to ignore important areas for individual change, which results in them not questioning many aspects of daily life, even if they acknowledge a general need for climate protection.

Default bias. When confronted with options, people tend to choose the standard or default one. They assume that the given and established option will be satisfying (backed by existence bias) and accept what is preselected to reduce cognitive effort (Loewenstein et al., 2013). In the climate protection realm, the default bias impedes change in individual behavior because a more climate-friendly lifestyle today still often implies active decisions that deviate from the standard option, such as switching from a standard to a green electricity tariff or asking explicitly for a vegetarian meal (Liebe et al., 2018, 2021; Sunstein & Reisch, 2021).

Habits. A large part of human behavior is guided by habits and routines that are ingrained through repetition and embedded in everyday life (Hobson, 2003; Maréchal, 2010; Schlüter et al., 2017). They bypass the conscious reasoning process with an automated cognitive process (Steg & Vlek, 2009). Since habits are only reconsidered if the context changes dramatically, they can form behavioral lock-ins that impede appropriate change (Kurz et al., 2015; Maréchal, 2009; Verplanken & Aarts, 1999). Researchers have used this bias to explain the efficiency paradox of people not saving more energy despite the financial benefits and the paradox of increasing climate impacts of humanity despite growing public awareness (Maréchal, 2009, 2010). Studies show that even if external incentives (e.g., a carbon tax) can generate the intention to change, habits limit actual changes (Bamberg & Schmidt, 2003; Carrus et al., 2008; Verplanken et al., 1998).

Existence bias. Finally, people treat the mere existence of something, be it a social practice, habit, or default option, as proof of its goodness. The longer something exists, the better it is evaluated (thus, it is also called longevity bias) (Eidelman & Crandall, 2014; Shockley et al., 2016). Long existence can even improve the evaluation of something that is generally considered bad (Eidelman & Crandall, 2012, 2014). Therefore, this bias can unconsciously protect climate-damaging lifestyles, policies, and institutions, despite the knowledge of their defectiveness.

4. Consequences for the climate debate and climate policy

The compilation above shows effects that are relevant for climate change analysis and climate policy. The status quo biases discussed support criticisms of the current

mainstream analysis of climate change and illustrate why irrational behavior should not be ignored in policy making. Clearly, some of the biases are likely to have a larger effect on climate-relevant behavior than others and should therefore receive more attention. In this paper, we do not compare the different effect sizes because, to date, there is insufficient data to do so. It may encourage empirical research to further quantify the effect sizes, especially in comparison to each other. For the few policies for which a measure of effect size exists, it is provided below.

One area of application of this overview could be a better representation of irrational behavioral patterns in climate models. Similar to Schlüter et al.'s (2017) framework of behavioral theories from the social sciences (e.g., Prospect Theory; Theory of Planned Behavior) to facilitate their incorporation into IAMs, our classification serves to ensure that various forms of status quo biases can be integrated. Some recent research indicates that this is possible in principle. For loss aversion, Knobloch et al. (2019) show that including it in a global energy model drastically slows down the projected uptake of renewable energy, thus doubling the carbon tax needed to meet decarbonization targets. Safarzyńska (2018) shows how including loss aversion and habit formation changes the climate policies derived from climate economic models: while the optimal pollution tax and the social cost of carbon are underestimated in standard models, rebound effects are overestimated. Geisendorf (2016) shows that a fatalist worldview in parts of the population slows down learning about and adaptation of more climate-friendly behavior.

Moreover, the described status quo biases are not only a problem for climate economic modeling but also for climate protection itself. Even more important than improving models is that people actually behave in a way that puts humanity on a path of emission reduction. Derived from the understanding of the categories of status quo biases, we next outline policy options to reduce their negative impact. In this second step, we present five directions for countermeasures, each of which addresses two or more categories of status quo biases (first column of Figure 1). The directions describe general ideas, complemented by concrete examples of practical application. Some of the ideas (e.g., default green energy tariffs) come directly from research on behavioral climate policy, while for others we draw on the behavioral economics and psychology literature and outline applications of their recommendations for the climate change context. The developed policy ideas are addressed to governmental and civil society actors working for more climate action at the individual level.

Furthermore, and next to these suggestions on how to overcome or alleviate different biases, we show that some of the biases – although they currently hinder climate protection – can actually be useful in supporting it. We sketch potential applications of how these biases can be flipped and leveraged by showing how they can support the five countermeasures developed before (third column of Figure 1).

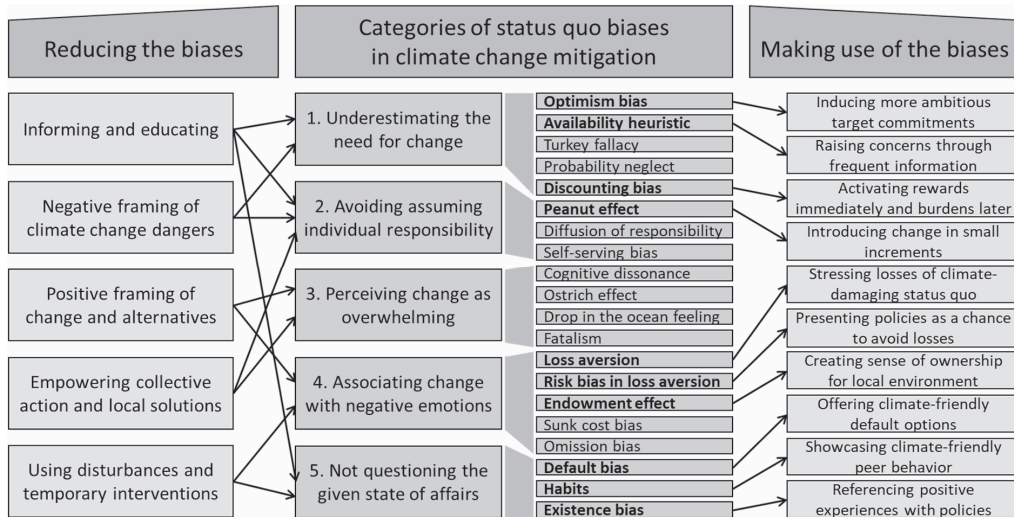


Figure 1: Overview of status quo biases and directions for policy options

Informing and educating. The negative effect of biases that cause the underestimation of the general (category 1) and the individual (category 2) need to fight climate change as well as not questioning the state of affairs (category 5) can be reduced by disseminating more knowledge on climate change and the individual contributions with information and education measures. Tackling categories 1 and 2 can be achieved with low-threshold campaigns that reach the broad masses such as climate change-focused prime time news, as pioneered by *The Daily Climate Show* on Sky News (Collier, 2021), or by including climate science in school curricula, as Italy does (Horowitz, 2019). Moreover, establishing easily accessible tools to compare the individual climate behavior with others and industry-level standards for corporations can increase transparency and reduce the avoidance of assuming individual responsibility (Mazutis & Eckardt, 2017). Besides, targeted information can also help to question a given state of affairs (category 5). Considering that people align their habits with social influence, informing about influential people's climate-friendly behavioral changes could also be an effective strategy to change climate-relevant habits that are otherwise not questioned (Nolan et al., 2008). In organizations, this can be achieved by providing structured decision making processes and specialized training for decision makers to reduce biased („we have always done it this way“) practices (Engler et al., 2019).

The informing and educating strategies can be strengthened by making use of the availability heuristic and the optimism bias. The availability heuristic can be of help because it ensures that the mere frequent and vivid occurrence of climate change issues brings them to the forefront of people's minds and increases their perceived im-

portance. Research shows that simple, recurrent, and immediate reminders increase the feeling of individual responsibility for climate-relevant behaviors such as energy and gasoline conservation and recycling (Osbaldiston & Schott, 2012; Tetlow et al., 2014; Thaler & Sunstein, 2008). In a field experiment by Abrahamse et al. (2007), frequent and tailored information on household energy use resulted in 5.1 % energy savings compared to the control group. A currently status quo enhancing bias could thus be used to fight the effects of categories 1 and 2. Furthermore, Loewenstein et al. (2013) show that individual overoptimism can be used to encourage higher precommitments to weight loss goals backed by financial incentives; this method could be adapted to, for example, energy-saving goals for households and industry. While overoptimism has been shown to contribute to the underestimation of the problem, it could thus be flipped to incite people to believe in their power to change a situation and would thereby work against not assuming responsibility (category 2).

Negative framing of climate change dangers. People tend to underestimate the general need for more climate protection (category 1) as a result of alienating themselves from the dangers. Emotionally negative communication of the risks of climate change can help evoke concern, worry, and feelings of threat, which has been shown to reduce distance and apathy toward a given topic (Hornsey & Fielding, 2020; Milfont, 2012; Pongiglione, 2012) as long as it is not in an apocalyptic form, which can trigger fear and helplessness (see category 3). Messages should rely on personal and emotional stories instead of data and should focus on damages in the here (instead of melting polar caps) and now (instead of future generations) to make them visible. People are, for example, more receptive to believing in the problem of climate change on a particularly warm day (Zaval et al., 2014) and more inclined to climate action in response to news on local impacts (Loy & Spence, 2020). Information can be connected with catastrophic events such as floods and the remains of disasters can be visited for education. Likewise, climate fiction (literature dealing with climate change) can be used as a tool to make the severity and urgency of the problem tangible (Schneider-Mayerson, 2018). Finally, emphasizing the individual (in addition to the societal) losses of staying in the status quo (e.g., by continuing to use energy-inefficient appliances or driving a car (Frederiks et al., 2015) can increase personal motivation to change and also counteract the perception that one has nothing to do with climate change (category 2).

Loss aversion, the risk bias in loss aversion, and the endowment effect can be allies in the strategy of negative framing of climate change dangers. By stressing sure losses (societal and individual) from continuing with the status quo, people's aversion to losses may be turned against their current course of action instead of against the required changes (Frederiks et al., 2015). If people perceive climate change as a looming loss, the two biases can be powerful drivers to take on the perceived risks of climate action in order to avoid or reduce the damage of climate change. This motivation can be amplified by triggering the endowment effect. With the right framing,

people should be made more aware that the current environmental quality (e.g., healthy forest, safety from extreme weather) is something that belongs to them and that could be lost.

Positive framing of change and alternatives. Conversely, to counteract the powerful biases that cause change to be perceived as overwhelming (category 3) or associated with negative feelings (category 4), climate action could be framed positively. The debate should be directed toward beneficial consequences such as promoting scientific and economic progress, security, and health. People are more willing to accept the costs of climate protection when confronted with statements on resulting economic benefits than they are when confronted with statements on negative impacts of climate change (Gsothbauer & van den Bergh, 2013). Also, merely renaming a carbon price, that is, renaming a „tax“ (which is strongly linked to a loss) an „offset“, can increase its acceptance (Hardisty et al., 2019). Moreover, policy bundling is useful to increase approval, for example by combining a new carbon tax with a reduction in income tax (Bergquist et al., 2020). However, to reduce the feeling that demanded change is overwhelming or hostile (category 3), communication not only must underline the positive aspects but should also be framed in a way that is appealing to the values of the addressees so that worldviews are less likely to collide. For example, U.S. conservatives are much more likely to accept and support climate protection when messages are formulated in terms of conservative values (Bain et al., 2012; Campbell & Kay, 2014; Feygina et al., 2010; Wolsko, 2017).

The positive framing of climate protection can be supported by exploiting the existence bias, the peanut effect, the discounting bias, and loss aversion. The existence bias makes it easier to point to positive experiences with new lifestyles or long-standing climate policy mechanisms in other countries as viable alternatives. Moreover, the acceptance of climate policy can increase the longer it is in place, as was the case with the carbon tax in British Columbia, Canada (Murray & Rivers, 2015). Thus, the existence bias is likely to increase the acceptance of climate-friendly alternatives (e.g., better bicycle infrastructure or automatic subscription to public transportation) once people become accustomed to them. Furthermore, the peanut effect can also be useful in that people overlook burdens (e.g., climate taxes) and behavioral changes if they come in small increments. In addition, the discounting bias could increase the effectiveness of incentivizing policies to change behavior if the reward happens immediately. The discounting bias can also make people more willing to commit to restrictive policies if they are activated in the future, although it must be ensured that the measure will not be abolished when the future draws near. Finally, Rowell & Van Zeben (2016) argue that loss aversion might trigger additional motivation for climate protection to stay within the 2°C objective of the Paris Agreement if the target becomes a reference point with a positive connotation that prompts decision makers and the public to perceive deviations from this baseline as losses they

want to avoid, which could similarly work for any other vision of a climate-friendly world.

Empowering collective action and local solutions. To be able to accept individual responsibility (category 2) and to overcome the feeling that the required change is overwhelming or hostile (category 3), people need to be told that they can play a positive role in reducing the problem, instead of being told that their climate impact is too high (de Vries, 2020). Participating in a community that is aware of the issues and is practically contributing to solving them can create an empowering moment and effectively eradicate paralyzing feelings (Uusi-Rauva & Heikkurinen, 2013; Whitmarsh et al., 2012). Therefore, working with existing groups such as sports clubs, local churches, and unions and helping them become hubs for common climate action can help spread innovations, information, and values. In particular, mobilizing soccer fans (as is already happening around racism, homophobia, and sexism) can be an interesting strategy, not only because of their large numbers worldwide, but also because their identification, group-based emotions, and collective efficacy beliefs can be a leverage for climate campaigns (Campelli, 2021).

Even though universalistic moral principles (related to action toward all people) are considered necessary for climate protection as opposed to group-based principles, which are important for local environmental protection (Welsch, 2020), it is possible to bridge this and encourage climate protection both for and through environmental protection. This can generate locally contextualized knowledge necessary to translate information and concerns into action (Pongiglione, 2012). When people see local solutions and others taking action to solve problems, these problems become closer and more personal issues (Stoknes, 2015). Taking responsibility for climate protection can promise a sense of pride, purpose, and identity and might subsequently also reduce the tendency to avoid personal responsibility for the issue (category 2). Instead of focusing on global concentrations, climate change advocacy could, for example, present greenhouse gas emissions as more of a local problem, because they are generated in one place and can be reduced by people there.

Local, collective empowerment for climate action can draw on the endowment effect and habits. One driver of why such engagement is observable at the local level is the endowment effect, as it makes people feel that their local environment is particularly valuable and worth protecting in its current state (Bischoff, 2008). This can be leveraged by presenting local community climate action as a way to preserve the local ecological endowment with the side effect of mitigating climate change. Furthermore, habits can also be useful for climate action. Because habits are contagious (Thaler & Sunstein, 2008) and people align their habits to what they believe similar others are doing (Gifford, 2011; Nolan et al., 2008), targeted showcasing of climate-friendly peer behavior in local communities can help make these lifestyles become the new normal.

Using disturbances and temporary interventions. Accustomed behavior patterns where change is associated with very negative emotions (category 4), and especially those that are shielded from being called into question at all (category 5) are difficult to address with incentives to change behavior. However, policy makers can use disturbances (i. e. times of change) in the contexts of these behaviors as well as temporary enforcement strategies (Verplanken & Wood, 2006; W. Wood et al., 2005). Maréchal (2010) shows that offering incentives to change energy use to residents who are moving into a new area (disturbance) and need a new contract anyways is more effective than offering these incentives to long-established residents. Likewise, temporary interventions can help people reconsider their ties to the status quo. Fujii et al. (2001) observe that temporarily forcing habitual car drivers to use alternative travel options changes drivers' perceptions and use of public transport. Similarly, banning plastic bags, even temporarily, can encourage people to change their habits to a more climate-friendly alternative (T. D. Nielsen et al., 2019). Such trial measures can help people challenge habitual behavior in the first place (category 5) and overcome their negative preconceptions toward change (category 4) when they realize the change is not as bad as they feared.

Using disturbances and temporary interventions can be effectively combined with making use of the default bias. Actively switching what is presented as the default option to a more climate-friendly alternative can be a way of temporary intervention and can be especially effective when targeted at situations of disturbances. Moreover, climate-friendly defaults, subject to opt out, can themselves be relatively cheap and easily implementable measures to break ingrained habits (Sunstein & Reisch, 2013, 2021). So-called green defaults are one of the best researched nudging options to encourage individual climate-friendly behavior. Proven applications range from vegetarian food as a default choice in canteens, to setting double-sided printing as standard for printers, to green electricity (Stoknes, 2015). In a large-scale ($n = 41,952$) randomized controlled trial, Ebeling & Lotz (2015) found a green default setting to increase green energy purchases tenfold.

5. Conclusion

Mitigating climate change requires much more significant changes in behavior and lifestyles than we see today. While there are individually rational reasons for maintaining the current state of affairs (e.g., cooperation dilemma), behavioral economics and psychology studies have also demonstrated that irrational psychological phenomena prevent people from individual behavior and lifestyle changes in favor of climate change mitigation. In this paper, we provided an overview of how these status quo biases fall into categories that contribute in different ways to the perpetuation of too little climate action. Our findings contribute to the understanding and reduc-

tion of the gap between the optimal level of climate protection suggested by climate economic models and the much lower level actually observed.

The presented biases substantiate the existing criticism that the climate change mitigation debate does not adequately consider irrational characteristics of human behavior. They demonstrate that the actual transformation process to more climate protection has been hindered through various psychological biases that cause people to prefer the status quo. This status quo can comprise energy and mobility choices, consumption habits, and, more generally, a lifestyle that individuals do not want to give up causing low engagement in climate protection. Our findings support the view that the current climate economic analysis tools – IAMs and game-theoretic approaches – should be supplemented by a better understanding of the irrational elements of human behavior.

Moreover, we demonstrated the relevance of the identified status quo biases for climate policy making. By developing policy directions derived from the functioning of the bias mechanisms, we showed how understanding them can help design specific solutions to reduce their impact. Finally, we suggested that policy making can even actively work with some of the biases and use them in support of climate policy. These behavioral patterns, which currently work against climate protection, can be implemented as levers for encouraging the shift to more climate-friendly behavior. They can supplement traditional measures such as economic incentives for more climate-friendly behavior.

Further research is needed, primarily on quantifying the overall size of status quo effects to assess their severity for different kinds of climate change-relevant decisions, as has been pioneered for the adoption of energy-efficient technologies. In addition, the identified underlying mechanisms need to be better tested empirically, quantified, and compared to decide how to most effectively address the phenomenon.

As the presented biases explain only a part of the inertia in climate protection, we acknowledge that they cannot predict all aspects of human behavior concerning climate change. Our focus on the individual level neglected the context of complex interactions of psychological tendencies, social relationships, and societal structures, as well as technological and infrastructural lock-ins. This paper also did not consider possible other irrational behaviors that do not fall under the definition of status quo biases but nevertheless indirectly undermine change, such as psychological rebound effects. Finally, although individual politicians are likely to be affected by those same biases as well, we did not take into account the dynamics of political processes, which are also driven by interests and power structures. All of these topics remain directions for future research, as does examining the relevance of status quo biases in climate change adaptation, which is concurrently important and could be influenced similarly by some of the biases and differently by others.

In conclusion, the present paper showed the potential of behavioral economics and psychology research in fighting climate change and calls for more research between behavioral and climate scientists and economists for a more behaviorally accurate climate change debate, as well as between behavioral scientists and policy researchers and policy makers for more effective policy tools.

References

- Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2007). The effect of tailored information, goal setting, and tailored feedback on household energy use, energy-related behaviors, and behavioral antecedents. *Journal of Environmental Psychology*, 27(4), 265–276. <https://doi.org/10.1016/j.jenvp.2007.08.002>.
- An, L. (2012). Modeling human decisions in coupled human and natural systems: Review of agent-based models. *Ecological Modelling*, 229, 25–36. <https://doi.org/10.1016/j.ecolmodel.2011.07.010>.
- Anderson, C. J. (2003). The psychology of doing nothing: Forms of decision avoidance result from reason and emotion. *Psychological Bulletin*, 129(1), 139–167. <https://doi.org/10.1037/0033-2909.129.1.139>.
- Antonides, G., & Cramer, L. (2013). Impact of limited cognitive capacity and feelings of guilt and excuse on the endowment effects for hedonic and utilitarian types of foods. *Appetite*, 68, 51–55. <https://doi.org/10.1016/j.appet.2013.04.020>.
- Arbuthnott, K. D., & Dolter, B. (2013). Escalation of commitment to fossil fuels. *Ecological Economics*, 89, 7–13. <https://doi.org/10.1016/j.ecolecon.2013.02.004>.
- Asefi-Najafabady, S., Villegas-Ortiz, L., & Morgan, J. (2020). The failure of Integrated Assessment Models as a response to ‘climate emergency’ and ecological breakdown: the Emperor has no clothes. *Globalizations*, 1–11. <https://doi.org/10.1080/14747731.2020.1853958>.
- Baddeley, M. (2016). Behavioral approaches to managing household energy consumption. In F. Beckenbach & W. Kahlenborn (Eds.), *New Perspectives for Environmental Policies Through Behavioral Economics* (pp. 213–235). Springer. https://doi.org/10.1007/978-3-319-16793-0_9.
- Bain, P. G., Hornsey, M. J., Bongiorno, R., & Jeffries, C. (2012). Promoting pro-environmental action in climate change deniers. *Nature Climate Change*, 2(8), 600–603. <https://doi.org/10.1038/nclimate1532>.
- Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students’ car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior*, 35(2), 264–285. <https://doi.org/10.1177/0013916502250134>.

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation ZfU 1/2022 100–134

Baron, J., & Ritov, I. (2004). Omission bias, individual differences, and normality. *Organizational Behavior and Human Decision Processes*, 94(2), 74–85. <https://doi.org/10.1016/j.obhdp.2004.03.003>.

Barreiro-Hurle, J., Espinosa-Goded, M., Martínez-Paz, J. M., & Perni, A. (2018). Choosing not to choose: A meta-analysis of status quo effects in environmental valuations using choice experiments. *Economía Agraria y Recursos Naturales*, 18(1), 79–109. <https://doi.org/10.7201/earn.2018.01.04>.

Bazerman, M. H. (2006). Climate change as a predictable surprise. *Climatic Change*, 77(1–2), 179–193. <https://doi.org/10.1007/s10584-006-9058-x>.

Bazerman, M. H., & Watkins, M. D. (2004). *Predictable surprises: The disasters you should have seen coming and how to prevent them*. Harvard Business School Press.

Beckenbach, F. (2016). Innovative behavioral approaches to analyze the incentives of environmental instruments. In F. Beckenbach & W. Kahlenborn (Eds.), *New Perspectives for Environmental Policies Through Behavioral Economics* (pp. 15–68). Springer. https://doi.org/10.1007/978-3-319-16793-0_2.

Beckenbach, F., & Kahlenborn, W. (2016). *New perspectives for environmental policies through behavioral economics*. Springer. <https://doi.org/10.1007/978-3-319-16793-0>.

Becker, G. S. (1976). *The Economic Approach to Human Behavior*. University of Chicago Press. <https://doi.org/10.7208/chicago/9780226217062.001.0001>.

Bergquist, P., Mildenerger, M., & Stokes, L. C. (2020). Combining climate, economic, and social policy builds public support for climate action in the US. *Environmental Research Letters*, 15(5). <https://doi.org/10.1088/1748-9326/ab81c1>.

Bhargava, S., & Loewenstein, G. (2015). Behavioral economics and public policy 102: Beyond nudging. *American Economic Review*, 105(5), 396–401. <https://doi.org/10.1257/aer.p20151049>.

Bischoff, I. (2008). Endowment effect theory, prediction bias and publicly provided goods: An experimental study. *Environmental and Resource Economics*, 39(3), 283–296. <https://doi.org/10.1007/s10640-007-9126-3>.

Blake, J. (1999). Overcoming the „value-action gap“ in environmental policy: Tensions between national policy and local experience. *Local Environment*, 4(3), 257–278. <https://doi.org/10.1080/13549839908725599>.

Blasch, J., & Daminato, C. (2020). Behavioral Anomalies and Energy-related Individual Choices: The Role of Status-quo Bias. *The Energy Journal*, 41(1). <https://doi.org/10.5547/01956574.41.6.jbla>.

- Brechin, S. R. (2008). Ostriches and change: A response to 'Global warming and sociology'. *Current Sociology*, 56(3), 467–474. <https://doi.org/10.1177/0011392107088239>.
- Brekke, K. A., & Johansson-Stenman, O. (2008). The behavioural economics of climate change. *Oxford Review of Economic Policy*, 24(2), 280–287. <https://doi.org/10.1093/oxrep/grn012>.
- Buchholz, W., & Eichenseer, M. (2021). Leadership in Climate Policy: What Can We Learn from Economic Experiments on Public Good Provision? *Zeitschrift Für Umweltpolitik Und Umweltrecht*, 44(2), 97–129.
- Buchholz, W., Peters, W., & Ufert, A. (2014). Spielräume für uni- und multilateralen Klimaschutz. *Zeitschrift Für Umweltpolitik Und Umweltrecht*, 37(3), 326–344.
- Campbell, T. H., & Kay, A. C. (2014). Solution aversion: On the relation between ideology and motivated disbelief. *Journal of Personality and Social Psychology*, 107(5), 809–824. <https://doi.org/10.1037/a0037963>.
- Campelli, M. (2021). *Could mobilising football fans be a key climate action strategy?* The Sustainability Report. <https://www.sustainabilityreport.com/2021/07/08/could-mobilising-football-fans-be-a-key-climate-action-strategy/>.
- Carrus, G., Passafaro, P., & Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of Environmental Psychology*, 28(1), 51–62. <https://doi.org/10.1016/j.jenvp.2007.09.003>.
- Chander, P. (2018). *Game Theory and Climate Change*. Columbia University Press. <https://doi.org/10.7312/chan18464>.
- Cheng, X., Long, R., Chen, H., & Yang, J. (2019). Does social interaction have an impact on residents' sustainable lifestyle decisions? A multi-agent stimulation based on regret and game theory. *Applied Energy*, 251(January), 113366. <https://doi.org/10.1016/j.apenergy.2019.113366>.
- Collier, I. (2021). *The Daily Climate Show: Sky News launches prime time programme dedicated to global crisis*. <https://news.sky.com/story/the-daily-climate-show-sky-news-launches-prime-time-programme-dedicated-to-global-crisis-12252536>.
- Colman, A. M. (2003). Cooperation, psychological game theory, and limitations of rationality in social interaction. *Behavioral and Brain Sciences*, 26(2), 139–153. <https://doi.org/10.1017/S0140525X03000050>.
- Darley, J. M., & Latane, B. (1968). Bystander intervention in emergencies: Diffusion of responsibility. *Journal of Personality and Social Psychology*, 8(4, Pt.1), 377–383. <https://doi.org/10.1037/h0025589>.

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation ZfU 1/2022 100–134

de Vries, G. (2020). Public communication as a tool to implement environmental policies. *Social Issues and Policy Review*, 14(1), 244–272. <https://doi.org/10.1111/sipr.12061>.

Doherty, T. J., & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, 66(4), 265–276. <https://doi.org/10.1037/a0023141>.

Ebeling, F., & Lotz, S. (2015). Domestic uptake of green energy promoted by opt-out tariffs. *Nature Climate Change*, 5(9), 868–871. <https://doi.org/10.1038/nclimate2681>.

Eidelman, S., & Crandall, C. S. (2012). Bias in favor of the status quo. *Social and Personality Psychology Compass*, 6(3), 270–281. <https://doi.org/10.1111/j.1751-9004.2012.00427>.

Eidelman, S., & Crandall, C. S. (2014). The intuitive traditionalist: How biases for existence and longevity promote the status quo. *Advances in Experimental Social Psychology*, 50, 53–104. <https://doi.org/10.1016/B978-0-12-800284-1.00002-3>.

Engler, J. O., Abson, D. J., & von Wehrden, H. (2019). Navigating cognition biases in the search of sustainability. *AMBIO A Journal of the Human Environment*, 48(6), 605–618. <https://doi.org/10.1007/s13280-018-1100-5>.

Farmer, J. D., Hepburn, C., Mealy, P., & Teytelboym, A. (2015). A third wave in the economics of climate change. *Environmental and Resource Economics*, 62(2), 329–357. <https://doi.org/10.1007/s10640-015-9965-2>.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford University Press.

Feygina, I., Jost, J. T., & Goldsmith, R. E. (2010). System justification, the denial of global warming, and the possibility of ‘system-sanctioned change’. *Personality and Social Psychology Bulletin*, 36(3), 326–338. <https://doi.org/10.1177/0146167209351435>.

Fiddaman, T. S. (2002). Exploring policy options with a behavioral climate-economy model. *System Dynamics Review*, 18(2), 243–267. <https://doi.org/10.1002/sdr.241>.

Frederiks, E. R., Stenner, K., & Hobman, E. V. (2015). Household energy use: Applying behavioural economics to understand consumer decision-making and behaviour. *Renewable and Sustainable Energy Reviews*, 41, 1385–1394. <https://doi.org/10.1016/j.rser.2014.09.026>.

Fujii, S., Gärling, T., & Kitamura, R. (2001). Changes in drivers’ perceptions and use of public transport during a freeway closure: Effects of temporary structural change on cooperation in a real-life social dilemma. *Environment and Behavior*, 33(6), 796–808. <https://doi.org/10.1177/00139160121973241>.

Gambhir, A., Butnar, I., Li, P. H., Smith, P., & Strachan, N. (2019). A review of criticisms of integrated assessment models and proposed approaches to address these,

through the lens of BECCs. *Energies*, 12(9), 1747. <https://doi.org/10.3390/en12091747>.

Geisendorf, S. (2016). The impact of personal beliefs on climate change: the “battle of perspectives” revisited. *Journal of Evolutionary Economics*, 26(3), 551–580. <https://doi.org/10.1007/s00191-016-0461-9>.

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66(4), 290–302. <https://doi.org/10.1037/a0023566>.

Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioral dimensions of climate change: Drivers, responses, barriers, and interventions. *Wiley Interdisciplinary Reviews: Climate Change*, 2(6), 801–827. <https://doi.org/10.1002/wcc.143>.

Gigerenzer, G. (2004). Dread Risk, September 11, and Fatal Traffic Accidents. *Psychological Science*, 15(4), 286–287. <https://doi.org/10.1111/j.0956-7976.2004.00668>.

Gigerenzer, G. (2006). Out of the frying pan into the fire: Behavioral reactions to terrorist attacks. *Risk Analysis*, 26(2), 347–351. <https://doi.org/10.1111/j.1539-6924.2006.00753>.

Gillingham, K., Newell, R. G., & Palmer, K. (2009). Energy Efficiency Economics and Policy. *Annual Review of Resource Economics*, 1(1), 597–620. <https://doi.org/10.1146/annurev.resource.102308.124234>.

Gowdy, J. M. (2008). Behavioral economics and climate change policy. *Journal of Economic Behavior and Organization*, 68(3–4), 632–644. <https://doi.org/10.1016/j.jebo.2008.06.011>.

Green, D., & Shapiro, I. (1994). *Pathologies of rational choice theory: A critique of applications in political science*. Yale University Press.

Gsottbauer, E., & van den Bergh, J. C. J. M. (2011). Environmental Policy Theory Given Bounded Rationality and Other-regarding Preferences. *Environmental and Resource Economics*, 49(2), 263–304. <https://doi.org/10.1007/s10640-010-9433-y>.

Gsottbauer, E., & van den Bergh, J. C. J. M. (2013). Bounded rationality and social interaction in negotiating a climate agreement. *International Environmental Agreements: Politics, Law and Economics*, 13(3), 225–249. <https://doi.org/10.1007/s10784-012-9182-1>.

Haltinner, K., & Sarathchandra, D. (2018). Climate change skepticism as a psychological coping strategy. *Sociology Compass*, 12(6), e12586. <https://doi.org/10.1111/soc4.12586>.

Hannam, P. (2021). ‘How lucky do you feel?’: The awful risks buried in the IPCC report. The Sydney Morning Herald. <https://amp.smh.com.au/environment/climate->

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation

ZfU 1/2022 100–134

change/how-lucky-do-you-feel-the-awful-risks-buried-in-the-ipcc-report-20210811-p58hut.html.

Hardisty, D. J., Beall, A. T., Lubowski, R., Petsonk, A., & Romero-Canyas, R. (2019). A carbon price by another name may seem sweeter: Consumers prefer upstream offsets to downstream taxes. *Journal of Environmental Psychology*, *66*, 101342. <https://doi.org/10.1016/j.jenvp.2019.101342>.

Hare, B., Brecha, R., & Schaeffer, M. (2018). *Integrated Assessment Models: what are they and how do they arrive at their conclusions?* https://climateanalytics.org/media/climate_analytics_iams_briefing_oct2018.pdf.

Hartman, R. S., Doane, M. J., & Woo, C.-K. (1991). Consumer rationality and the status quo. *The Quarterly Journal of Economics*, *106*(1), 141–162. <https://doi.org/10.2307/2937910>.

Hertwich, E. G., & Peters, G. P. (2009). Carbon footprint of nations: A global, trade-linked analysis. *Environmental Science and Technology*, *43*(16). <https://doi.org/10.1021/es803496a>.

Heutel, G. (2019). Prospect theory and energy efficiency. *Journal of Environmental Economics and Management*, *96*, 236–254. <https://doi.org/10.1016/j.jeem.2019.06.005>.

Hobson, K. (2003). Thinking habits into action: The role of knowledge and process in questioning household consumption practices. *Local Environment*, *8*(1), 95–112. <https://doi.org/10.1080/135498303200041359>.

Hoffman, A. J., & Bazerman, M. H. (2007). Changing practice on sustainability: Understanding and overcoming the organizational and psychological barriers to action. In *Organizations and the Sustainability Mosaic: Crafting Long-Term Ecological and Societal Solutions* (pp. 84–105). Edward Elgar Publishing. <https://doi.org/10.4337/9781847205544.00012>.

Hoolohan, C., McLachlan, C., & Mander, S. (2018). Food related routines and energy policy: A focus group study examining potential for change in the United Kingdom. *Energy Research and Social Science*, *39*, 93–102. <https://doi.org/10.1016/j.erss.2017.10.050>.

Hornsey, M. J., & Fielding, K. S. (2020). Understanding (and reducing) inaction on climate change. *Social Issues and Policy Review*, *14*(1), 3–35. <https://doi.org/10.1111/sipr.12058>.

Horowitz, J. (2019, November 5). Italy's students will get a lesson in climate change. Many lessons, in fact. *The New York Times*. <https://www.nytimes.com/2019/11/05/world/europe/italy-schools-climate-change.html>.

Howlett, M., & Rawat, S. (2019). Behavioral science and climate policy. In *Oxford Research Encyclopedia of Climate Science*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190228620.013.624>.

IPCC. (2018). *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change*. [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

IPCC. (2019). *Climate Change and Land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press.

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A., & Hertwich, E. G. (2016). Environmental Impact Assessment of Household Consumption. *Journal of Industrial Ecology*, 20(3). <https://doi.org/10.1111/jiec.12371>.

Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives? *Science*, 302(5649), 1338–1339. <https://doi.org/10.1126/science.1091721>.

Kahneman, D. (2000). New challenges to the rationality assumption. In D. Kahneman & A. Tversky (Eds.), *Choices, Values, and Frames* (pp. 758–774). Cambridge University Press. <https://doi.org/10.1017/CBO9780511803475.043>.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of Political Economy*, 98(6), 1325–1348.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives*, 5(1), 193–206.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–292. <https://doi.org/10.2307/1914185>.

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation

ZfU 1/2022 100–134

Kaplan, B. A., Reed, D. D., & McKerchar, T. L. (2014). Using a Visual Analogue Scale to Assess Delay, Social, and Probability Discounting of an Environmental Loss. *Psychological Record*, 64(2), 261–269. <https://doi.org/10.1007/s40732-014-0041-z>.

Karlsson, N., Loewenstein, G., & Seppi, D. (2009). The ostrich effect: Selective attention to information. *Journal of Risk and Uncertainty*, 38(2), 95–115. <https://doi.org/10.1007/s11166-009-9060-6>.

Keppo, I., Butnar, I., Bauer, N., Caspani, M., Edelenbosch, O., Emmerling, J., Fragkos, P., Guivarch, C., Harmsen, M., Lefevre, J., Le Gallic, T., Leimbach, M., Mcdowall, W., Mercure, J. F., Schaeffer, R., Trutnevyte, E., & Wagner, F. (2021). Exploring the possibility space: taking stock of the diverse capabilities and gaps in integrated assessment models. *Environmental Research Letters*, 16(5). <https://doi.org/10.1088/1748-9326/abe5d8>.

Kind, C., & Savelsberg, J. (2016). Implications of Behavioral Economics for Designing Adaptation Policies. In F. Beckenbach & W. Kahlenborn (Eds.), *New Perspectives for Environmental Policies Through Behavioral Economics* (pp. 254–273). Springer. https://doi.org/10.1007/978-3-319-16793-0_11.

Knobloch, F., Huijbregts, M. A. J., & Mercure, J. F. (2019). Modelling the effectiveness of climate policies: How important is loss aversion by consumers? *Renewable and Sustainable Energy Reviews*, 116. <https://doi.org/10.1016/j.rser.2019.109419>.

Kurz, T., Gardner, B., Verplanken, B., & Abraham, C. (2015). Habitual behaviors or patterns of practice? Explaining and changing repetitive climate-relevant actions. In *Wiley Interdisciplinary Reviews: Climate Change* (Vol. 6, Issue 1, pp. 113–128). Wiley-Blackwell. <https://doi.org/10.1002/wcc.327>.

Kutasi, G. (2012). Climate change in game theory context. *Interdisciplinary Environmental Review*, 13(1), 42. <https://doi.org/10.1504/ier.2012.046099>.

Laibson, D. (1997). Golden eggs and hyperbolic discounting. *Quarterly Journal of Economics*, 112(2), 442–477. <https://doi.org/10.1162/003355397555253>.

Liebe, U., Gewinner, J., & Diekmann, A. (2018). What is missing in research on non-monetary incentives in the household energy sector? *Energy Policy*, 123, 180–183. <https://doi.org/10.1016/j.enpol.2018.08.036>.

Liebe, U., Gewinner, J., & Diekmann, A. (2021). Large and persistent effects of green energy defaults in the household and business sectors. *Nature Human Behaviour*, 5(5), 576–585. <https://doi.org/10.1038/s41562-021-01070-3>.

Lipson, M. (2008). *Climate Change Adaptation: The psychonomics of flood risk (Doctoral dissertation, Centre of Environmental Policy, Imperial College London)*.

Loewenstein, G., John, L. K., & Volpp, K. (2013). Using decision errors to help people help themselves. In E. Shafir (Ed.), *The behavioral foundations of public policy* (pp. 361–379). Princeton University Press.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17(3–4), 445–459. <https://doi.org/10.1016/j.gloenvcha.2007.01.004>.

Loy, L. S., & Spence, A. (2020). Reducing, and bridging, the psychological distance of climate change. *Journal of Environmental Psychology*, 67, 101388. <https://doi.org/https://doi.org/10.1016/j.jenvp.2020.101388>.

Maréchal, K. (2009). An evolutionary perspective on the economics of energy consumption: The crucial role of habits. *Journal of Economic Issues*, 43(1), 69–88. <https://doi.org/10.2753/JEI0021-3624430104>.

Maréchal, K. (2010). Not irrational but habitual: The importance of “behavioural lock-in” in energy consumption. *Ecological Economics*, 69(5), 1104–1114. <https://doi.org/10.1016/j.ecolecon.2009.12.004>.

Marshall, G. (2015). *Don't even think about it: Why our brains are wired to ignore climate change*. Bloomsbury Publishing USA.

Martin-Bonnel de Longchamp, L., Lampach, N., & Parisot, L. (2018). How Cognitive Biases Affect Energy Savings in Low Energy Buildings. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3114262>.

Martin, M., Rae, J., Struck, B., & Krastev, S. (2019). *Toward behavioural climate policy: Framing of carbon pricing policy has deep effects on Canadian attitudes and behaviours*. <https://doi.org/10.31234/osf.io/pvq4j>.

Mazutis, D., & Eckardt, A. (2017). Sleepwalking into Catastrophe: Cognitive Biases and Corporate Climate Change Inertia. *California Management Review*, 59(3), 74–108. <https://doi.org/10.1177/0008125617707974>.

McCollum, D. L., Wilson, C., Pettifor, H., Ramea, K., Krey, V., Riahi, K., Bertram, C., Lin, Z., Edelenbosch, O. Y., & Fujisawa, S. (2017). Improving the behavioral realism of global integrated assessment models: An application to consumers' vehicle choices. *Transportation Research Part D: Transport and Environment*, 55, 322–342. <https://doi.org/10.1016/j.trd.2016.04.003>.

Meier, S., & Sprenger, C. (2010). Present-biased preferences and credit card borrowing. *American Economic Journal: Applied Economics*, 2(1), 193–210. <https://doi.org/10.1257/app.2.1.193>.

Meyer, R., & Kunreuther, H. (2017). *The ostrich paradox: Why we underprepare for disasters*. Wharton School Press.

Michalek, G., Meran, G., Schwarze, R., & Yildiz, Ö. (2016). Nudging as a new ‘soft’ tool in environmental policy – An analysis based on insights from cognitive and social psychology. *Zeitschrift Für Umweltpolitik Und Umweltrecht*, 39(2–3), 169–207.

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation

ZfU 1/2022 100–134

Milfont, T. L. (2012). The Interplay Between Knowledge, Perceived Efficacy, and Concern About Global Warming and Climate Change: A One-Year Longitudinal Study. *Risk Analysis*, 32(6), 1003–1020. <https://doi.org/10.1111/j.1539-6924.2012.01800>.

Mond, D. (2021). Game theory and climate change. In *The Impacts of Climate Change* (pp. 437–451). Elsevier. <https://doi.org/10.1016/b978-0-12-822373-4.00005-7>.

Morewedge, C. K., & Giblin, C. E. (2015). Explanations of the endowment effect: An integrative review. *Trends in Cognitive Sciences*, 19(6), 339–348. <https://doi.org/10.1016/j.tics.2015.04.004>.

Moss, S., Pahl-Wostl, C., & Downing, T. (2001). Agent-based integrated assessment modelling: The example of climate change. *Integrated Assessment*, 2(1), 17–30. <https://doi.org/10.1023/A:1011527523183>.

Murray, B., & Rivers, N. (2015). British Columbia's revenue-neutral carbon tax: A review of the latest „grand experiment“ in environmental policy. *Energy Policy*, 86, 674–683. <https://doi.org/10.1016/j.enpol.2015.08.011>.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175–220. <https://doi.org/10.1037/1089-2680.2.2.175>.

Nielsen, K. S., Clayton, S., Stern, P. C., Dietz, T., Capstick, S., & Whitmarsh, L. (2021). How psychology can help limit climate change. *American Psychologist*, 76(1), 130–144. <https://doi.org/10.1037/amp0000624>.

Nielsen, T. D., Holmberg, K., & Stripple, J. (2019). Need a bag? A review of public policies on plastic carrier bags – Where, how and to what effect? *Waste Management*, 87, 428–440. <https://doi.org/10.1016/j.wasman.2019.02.025>.

Nikas, A., Doukas, H., & Papandreou, A. (2019). A detailed overview and consistent classification of climate-economy models. In H. Doukas, A. Flamos, & J. Lieu (Eds.), *Understanding Risks and Uncertainties in Energy and Climate Policy: Multidisciplinary Methods and Tools for a Low Carbon Society* (pp. 1–54). Springer, Cham. https://doi.org/10.1007/978-3-030-03152-7_1.

Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is underdetected. *Personality and Social Psychology Bulletin*, 34(7), 913–923. <https://doi.org/10.1177/0146167208316691>.

Nordhaus, W. D. (1992). An optimal transition path for controlling greenhouse gases. *Science*, 258(5086), 1315–1319. <https://doi.org/10.1126/science.258.5086.1315>.

Nordhaus, W. D. (2018). Evolution of modeling of the economics of global warming: changes in the DICE model, 1992–2017. *Climatic Change*, 148(4), 623–640. <https://doi.org/10.1007/s10584-018-2218-y>.

- Norgaard, K. M. (2006). "People want to protect themselves a little bit": Emotions, denial, and social movement nonparticipation. *Sociological Inquiry*, 76(3), 372–396. <https://doi.org/10.1111/j.1475-682X.2006.00160>.
- Osbaldiston, R., & Schott, J. P. (2012). Environmental sustainability and behavioral science: Meta-analysis of proenvironmental behavior experiments. *Environment and Behavior*, 44(2), 257–299. <https://doi.org/10.1177/0013916511402673>.
- Osberghaus, D. (2017). Prospect theory, mitigation and adaptation to climate change. *Journal of Risk Research*, 20(7), 909–930. <https://doi.org/10.1080/13669877.2015.1121907>.
- Patt, A. G., & Schröter, D. (2008). Perceptions of climate risk in Mozambique: Implications for the success of adaptation strategies. *Global Environmental Change*, 18(3), 458–467. <https://doi.org/10.1016/j.gloenvcha.2008.04.002>.
- Pongiglione, F. (2012). Climate Change and Individual Decision Making: An Examination of Knowledge, Risk Perception, Self-Interest and their Interplay. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1960496>.
- Prelec, D., & Loewenstein, G. (1991). Decision Making Over Time and Under Uncertainty: A Common Approach. *Management Science*, 37(7), 770–786. <https://doi.org/10.1287/mnsc.37.7.770>.
- Rachlinski, J. J. (2000). The psychology of global climate change. *University of Illinois Law Review*, 1, 299–319.
- Raihani, N., & Aitken, D. (2011). Uncertainty, rationality and cooperation in the context of climate change. *Climatic Change*, 108(1), 47–55. <https://doi.org/10.1007/s10584-010-0014-4>.
- Reser, J. P. (1980). Automobile addiction: Real or imagined? *Man-Environment Systems*, 10(5–6).
- Roos, M., & Hoffart, F. M. (2021). What's Problematic About Mainstream Climate Economics? In *Climate Economics. Palgrave Studies in Sustainability, Environment and Macroeconomics* (pp. 57–96). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-48423-1_4.
- Rottenstreich, Y., & Hsee, C. K. (2001). Money, kisses, and electric shocks: On the Affective Psychology of Risk. *Psychological Science*, 12(3), 185–190. <https://doi.org/10.1111/1467-9280.00334>.
- Rowell, A., & Van Zeben, J. (2016). A new status quo? The psychological impact of the Paris Agreement on Climate Change. *European Journal of Risk Regulation*, 7(1), 49–53. <https://doi.org/10.1017/S1867299X00005377>.

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation ZfU 1/2022 100–134

Safarzyńska, K. (2018). Integrating behavioural economics into climate-economy models: some policy lessons. *Climate Policy*, 18(4), 485–498. <https://doi.org/10.1080/14693062.2017.1313718>.

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, 1(1), 7–59. <https://doi.org/10.1007/BF00055564>.

Schleich, J., Gassmann, X., Meissner, T., & Faure, C. (2019). A large-scale test of the effects of time discounting, risk aversion, loss aversion, and present bias on household adoption of energy-efficient technologies. *Energy Economics*, 80, 377–393. <https://doi.org/10.1016/j.eneco.2018.12.018>.

Schlüter, M., Baeza, A., Dressler, G., Frank, K., Groeneveld, J., Jager, W., Janssen, M. A., McAllister, R. R. J., Müller, B., Orach, K., Schwarz, N., & Wijermans, N. (2017). A framework for mapping and comparing behavioural theories in models of social-ecological systems. *Ecological Economics*, 131, 21–35. <https://doi.org/10.1016/j.ecolecon.2016.08.008>.

Schneider-Mayerson, M. (2018). The Influence of Climate Fiction: An Empirical Survey of Readers. *Environmental Humanities*, 10(2), 473–500. <https://doi.org/10.1215/22011919-7156848>.

Schwalm, C. R., Glendon, S., & Duffy, P. B. (2020). RCP8.5 tracks cumulative CO2 emissions. *Proceedings of the National Academy of Sciences*, 117(33), 19656–19657. <https://doi.org/10.1073/pnas.2007117117>.

Shockley, E., Rosen, R. K., & Rios, K. (2016). Change resistance moderates existence and longevity biases. *Social Influence*, 11(2), 87–100. <https://doi.org/10.1080/15534510.2016.1154104>.

Shu, L. L., & Bazerman, M. H. (2012). Cognitive Barriers to Environmental Action: Problems and Solutions. In P. Bansal & A. J. Hoffman (Eds.), *The Oxford Handbook of Business and the Natural Environment*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199584451.003.0009>.

Simon, H. A. (1957). *Models of Man*. John Wiley & Sons.

Simon, H. A. (1993). Decision Making: Rational, Nonrational, and Irrational. *Educational Administration Quarterly*, 23(3), 392–411. <https://doi.org/10.1177/0013161X93029003009>.

Stankuniene, G., Streimikiene, D., & Kyriakopoulos, G. L. (2020). Systematic literature review on behavioural barriers of climate change mitigation in households. *Sustainability*, 12(18), 1–18. <https://doi.org/10.3390/SU12187369>.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317. <https://doi.org/10.1016/j.jenvp.2008.10.004>.

Stehfest, E., van Vuuren, D., Bouwman, L., & Kram, T. (2014). *Integrated assessment of global environmental change with IMAGE 3.0: Model description and policy applications*. Netherlands Environmental Assessment Agency (PBL). <http://dspace.library.uu.nl/handle/1874/308545>.

Stoknes, P. E. (2015). *What We Think About When We Try Not To Think About Global Warming*. Chelsea Green Publishing.

Stoll-Kleemann, S., O'Riordan, T., & Jaeger, C. C. (2001). The psychology of denial concerning climate mitigation measures: Evidence from Swiss focus groups. *Global Environmental Change*, 11(2), 107–117. [https://doi.org/10.1016/S0959-3780\(00\)00061-3](https://doi.org/10.1016/S0959-3780(00)00061-3).

Strauss, S. (2016). Global models, local risks: Responding to climate change in the Swiss Alps. In S. A. Crate & M. Nuttall (Eds.), *Anthropology and Climate Change: From Encounters to Actions* (Issue 7, pp. 166–174). Left Coast Press.

Sunstein, C. R. (1998). Selective fatalism. *Journal of Legal Studies*, 27, 799–823. <https://doi.org/10.1086/468043>.

Sunstein, C. R. (2002). Probability neglect: Emotions, worst cases, and law. *Yale Law Journal*, 112(1), 61–108. <https://doi.org/10.2307/1562234>.

Sunstein, C. R. (2003). Terrorism and probability neglect. *Journal of Risk and Uncertainty*, 26(2), 121–136. <https://doi.org/10.1023/A:1024111006336>.

Sunstein, C. R. (2007). On the divergent American reactions to terrorism and climate change. *Columbia Law Review*, 107(2), 503–557. <https://doi.org/10.2139/ssrn.901217>.

Sunstein, C. R., & Reisch, L. A. (2013). Automatisch Grün: Verhaltensökonomik und Umweltschutz. *Zeitschrift Für Umweltpolitik Und Umweltrecht*, 36(2), 119–147.

Sunstein, C. R., & Reisch, L. A. (2021). Climate-Friendly Default Rules. In R. Bali Swain & S. Sweet (Eds.), *Sustainable Consumption and Production, Volume I* (pp. 141–164). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-56371-4_8.

Taleb, N. N. (2007). *The black swan: The impact of the highly improbable*. Random House.

Tetlow, R. M., Beaman, C. P., Elmualim, A. A., & Couling, K. (2014). Simple prompts reduce inadvertent energy consumption from lighting in office buildings. *Building and Environment*, 81, 234–242. <https://doi.org/10.1016/j.buildenv.2014.07.003>.

Thaler, R. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, 1(1), 39–60. [https://doi.org/10.1016/0167-2681\(80\)90051-7](https://doi.org/10.1016/0167-2681(80)90051-7).

Thaler, R., & Sunstein, C. R. (2008). Nudge: Improving decisions about health, wealth, and happiness. In *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press. [https://doi.org/10.1016/s1477-3880\(15\)30073-6](https://doi.org/10.1016/s1477-3880(15)30073-6).

Why change does (not) happen: Understanding and overcoming status quo biases in climate change mitigation ZfU 1/2022 100–134

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124–1131. <https://doi.org/10.1126/science.185.4157.1124>.

Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, 106(4), 1039–1061. <https://doi.org/10.2307/2937956>.

Ueckerdt, F., Frieler, K., Lange, S., Wenz, L., Luderer, G., & Levermann, A. (2019). The economically optimal warming limit of the planet. *Earth System Dynamics*, 10(4), 741–763. <https://doi.org/10.5194/esd-10-741-2019>.

Uusi-Rauva, C., & Heikkurinen, P. (2013). Overcoming barriers to successful environmental advocacy campaigns in the organizational context. *Environmental Communication*, 7(4), 475–492. <https://doi.org/10.1080/17524032.2013.810164>.

Venkatachalam, L. (2008). Behavioral economics for environmental policy. *Ecological Economics*, 67(4), 640–645. <https://doi.org/10.1016/j.ecolecon.2008.01.018>.

Verplanken, B., & Aarts, H. (1999). Habit, Attitude, and Planned Behaviour: Is Habit an Empty Construct or an Interesting Case of Goal-directed Automaticity? *European Review of Social Psychology*, 10(1), 101–134. <https://doi.org/10.1080/14792779943000035>.

Verplanken, B., Aarts, H., Van Knippenberg, A., & Moonen, A. (1998). Habit versus planned behaviour: A field experiment. *British Journal of Social Psychology*, 37(1), 111–128. <https://doi.org/10.1111/j.2044-8309.1998.tb01160>.

Verplanken, B., & Wood, W. (2006). Interventions to break and create consumer habits. *Journal of Public Policy and Marketing*, 25(1), 90–103. <https://doi.org/10.1509/jppm.25.1.90>.

Webb, T. L., Chang, B. P. I., & Benn, Y. (2013). „The Ostrich Problem“: Motivated avoidance or rejection of information about goal progress. *Social and Personality Psychology Compass*, 7(11), 794–807. <https://doi.org/10.1111/spc3.12071>.

Weber, E. U. (2013). Doing the right thing willingly: Using the insights of behavioral decision research for better environmental decisions. In *The behavioral foundations of public policy* (pp. 380–397). Princeton University Press.

Weber, E. U. (2017). Breaking cognitive barriers to a sustainable future. *Nature Human Behaviour*, 1(1), 0013. <https://doi.org/10.1038/s41562-016-0013>.

Welsch, H. (2020). Vernunft, Moral und Klimawandel: Das Kooperationsdilemma und die moral- psychologischen Grundlagen freiwilliger Kooperation. *Zeitschrift Für Umweltpolitik Und Umweltrecht*, 43(4), 496–521.

Whitmarsh, L., O'Neill, S., & Lorenzoni, I. (2012). Engaging the public with climate change: Behaviour change and communication. In *Engaging the Public with Climate*

Change: Behaviour Change and Communication. Taylor & Francis. <https://doi.org/10.4324/9781849775243>.

Wolsko, C. (2017). Expanding the range of environmental values: Political orientation, moral foundations, and the common ingroup. *Journal of Environmental Psychology, 51*, 284–294. <https://doi.org/10.1016/j.jenvp.2017.04.005>.

Wood, P. J. (2011). Climate change and game theory. *Annals of the New York Academy of Sciences, 1219*(1), 153–170. <https://doi.org/10.1111/j.1749-6632.2010.05891>.

Wood, W., Tam, L., & Witt, M. G. (2005). Changing circumstances, disrupting habits. *Journal of Personality and Social Psychology, 88*(6), 918–933. <https://doi.org/10.1037/0022-3514.88.6.918>.

Zaval, L., Keenan, E. A., Johnson, E. J., & Weber, E. U. (2014). How warm days increase belief in global warming. *Nature Climate Change, 4*(2), 143–147. <https://doi.org/10.1038/nclimate2093>.

Zusammenfassung

Gemäß den jüngsten Sonderberichten des Intergovernmental Panel on Climate Change (IPCC; Zwischenstaatlicher Ausschuss für Klimaänderungen) müssen Menschen ihren Lebensstil und ganz allgemein ihr Verhalten ändern, um dem Klimawandel effektiv entgegenzuwirken. Klimarelevantes Verhalten wird in der aktuellen Klimadebatte jedoch weitgehend vernachlässigt oder als rationale Entscheidungsfindung vereinfacht, was nicht nur die Analyse der gegenwärtigen Lage und Vorhersagen, sondern auch die daraus ableitbaren politischen Gestaltungsmöglichkeiten beeinflusst. Der vorliegende Beitrag soll diese Forschungslücke füllen, indem er Status-quo-Verzerrungen, eine bestimmte Art von kognitiven Verzerrungen, als irrationale Gründe für unzureichenden Klimaschutz vorstellt. Status-quo-Verzerrungen veranlassen Menschen, nicht oder nur zögerlich von einer gegebenen Situation oder einem bestehenden Verhalten abzuweichen. Diese Neigung wurde in der Verhaltensökonomie und Verhaltenspsychologie unter verschiedenen Bezeichnungen beschrieben, aber bisher fehlt eine systematische Untersuchung ihres Einflusses auf klimarelevantes Verhalten. Daher entwickeln wir eine Kategorisierung von 20 solcher Mechanismen, die sich hinsichtlich ihres Einflusses auf klimarelevantes Verhalten in fünf Gruppen zusammenfassen lassen. Auf diese Weise möchten wir erstens ein gemeinsames Verständnis des Phänomens schaffen und die diesbezügliche Diskussion strukturieren. Zweitens schlagen wir auf Grundlage der Systematisierung politische Handlungsoptionen vor, die auf die Reduzierung klimaschädlichen Verhaltens abzielen. Drittens schließlich zeigen wir, dass einige der Verzerrungen in beide Richtungen wirken können, d. h. auch ins Positive gewendet werden können, um einen neuen klimafreundlichen Status quo zu schaffen und zu erhalten. Insgesamt zeigt das Spektrum der Handlungsoptionen auch neue politische Möglichkeiten zur Förderung klimafreundlichen Verhaltens auf, die über eine rein materielle Anreizsetzung hinausgehen.