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Revisiting the Psychology of Denial Concerning Low-Carbon Behaviors: From Moral Disengagement to Generating Social Change

Susanne Stoll-Kleemann [1,*] and Tim O'Riordan [2]

[1] Chair of Sustainability Science and Applied Geography, University of Greifswald, 17487 Greifswald, Germany
[2] School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK
* Correspondence: susanne.stoll-kleemann@uni-greifswald.de; Tel.: +49-03834-420-4680

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Abstract: This paper reassesses the scope for shifting high-carbon personal behaviors in the light of prevailing insufficient political and regulatory action. Our previous research has shown that citizens regard such behavioral shifts as extremely daunting and create a number of psychological denial mechanisms that draw attention to the inaction of others, including governments. Further theoretical insights and relevant new findings have been attained from a more recent survey of more than 1000 German residents. This reveals that direct denial of anthropogenic climate change is replaced by a denial of responsibility for individual climate action. Ways of moral disengagement play a more dominant role, such as the diffusion and displacement of responsibility, although a majority is aware of—and very much concerned about—the climate crisis. More attention needs to be given for further reinterpretation of the role of moral disengagement to single out adequate strategies for different individuals and groups of people, such as making role models more visible to encourage social learning that could accelerate further necessary moral and behavioral transformations.

Keywords: climate change; behavior change; denial; emotions; low-carbon behavior; moral disengagement; collective action; responsibility; self-efficacy

1. Introduction

Since the appearance of our first article in 2001 [1], many aspects of the climate change story have evolved. The science and its supporting evidence from all over the globe have become more secure and more universally accepted [2–5]. The encompassing recognition of the overwhelming human influence underlying climate change includes broad public and political acceptance on the human trigger [6,7]. It is now much more obvious that the mitigation of dangerous climate change [8] is imperative in order to limit severe and prolonged public health dangers, social and economic disruption, forced migration, and increased regional conflict, as well as vast swathes of destruction to biota and ecosystems, mainly produced by the world's wealthiest countries, their high income inhabitants, and a cross-national global elite. In this context, Markowitz and Shariff observe that because the front line victims of climate change are far away and not even born [9] (p.244f), they tend to have lower, inefficacious, moral standing (see also Bandura [10]).

Personal response to addressing climate change is presented here mainly as a moral issue, confronted by the phenomenon of "climate silence" [11]. The consequences of climate change threaten three key human rights: to life, health, and decent subsistence [12–14]. Droughts and floods undermine food security [12,14], and there is widespread evidence that avoidance of harm is violated. The number of vulnerable people exposed to heat wave events is currently 175 million [15], and the number of

people who will be victims of floods annually is estimated to increase by 10–25 million by 2050 and 40–140 million by 2100 [16]. Droughts exacerbated by climate change have instigated conflicts over depleting water availability and eroding arable land [17].

Our purpose is to revisit our 2001 results in the light of a new survey conducted in 2017. Our aim here is to examine how far interpretations of denial of congruent behavior have altered in the context of the new science and emerging propulsive politics of climate change. In particular we are interested to discover how the mechanisms of moral disengagement are enabling more aware and concerned citizens to continue with their current high-carbon creating behaviors. In this endeavor, we seek to illuminate what further can be done in the realms of personal and communal behavior to bring about further mitigation of greenhouse gas emissions, especially in wealthy nations.

1.1. Challenges for the Individual in the Climate Crisis in Light of Political Insufficiency

While the Paris Agreement of 2015 aims to limit global temperatures "well below" 2 °C above pre-industrial levels, bearing in mind the ultimate objective of stopping at 1.5 °C [18], the probability that we will collectively fail to achieve these goals is very high [10,19,20]. One cause is the slow attainment of low-carbon emissions–reductions technologies [5].

Germany is a stark example of climate–policy failure, as its current carbon–reduction path is still too low to meet both the Paris Agreement and even its own 2020 climate goals [19,21]. This means the Greenhouse Gas (GHG) reduction will be only 27.6%, instead of 40%. Even the medium-term climate target for the year 2030, namely to cut GHG in Germany by at least 55% by 2030 compared to 1990 levels, will not be achieved [22]. The German government has abandoned its 2020 target [23]. Germany's coal production has increased in recent years by 11% (2009–2014). Its government continues to offer avoidable subsidies both to coal extraction and to coal-fired power [19] (p. 21), [24]. This failure is buttressed by "lock-in" effects from existing energy and transport infrastructure and supportive economic and trades union interests, tightly integrated as a "dark force" in business, government, and political lobbying, often shamelessly promoted through scientific skeptics funded by industry [19,25–29].

All of this sets the scene for assessing the scope of shifting human behavior towards GHG mitigation outcomes. Future GHG emission spikes will be connected to the activities of individuals, households, and communities [30] (p. 11), [28,31–34]. Axon argues that individuals can substantially contribute towards a lower-carbon future through reducing their carbon footprints [30,31]. Behavioral patterns influence energy and material consumptions, leading to 45–55% of total energy use. The most effective behavioral shifts can arise from driving less; stopping flying; changing diets to cut out animal-based products, in particular meat and cheese; using renewable energy for mobility; cutting down wasteful heating and with green energy only; supporting "green" politicians; and campaigning for massive reductions in emissions [33,35].

Dealing with individual behavior is not easy because people usually have multiple conflicting values and motivations. These include hedonic ones, which lead individuals to seek ways to improve their feelings; balancing mechanisms, which sensitize individuals to gains or losses in changes in their financial or other resources; and normative ones, which are concerned with the social correctness of their behavior [36]. Concerning the first ("hedonic"), there is the so-called "Consumption–Happiness Myth", which explains how we are locked into specific patterns of consumption, e.g., via affect regulation, habit formation, conscious and unconscious input into decision making, and psychological development [37]. Furthermore, individual lifestyle changes are significantly influenced by cultural and social factors that operate beyond the control of the individual [38,39].

Markowitz and Shariff remark that climate change confuses information processing [9] (p. 243), making it difficult to appreciate. They point to the "blamelessness of unintentional action", where the prospect of damaging outcomes is played down just because they are too unsettling to contemplate, and are judged less harshly than equally severe but intentionally caused ones [9] (p. 244).

This is less excusable if individuals believe they are responsible for pathways of connected harm but regard their specific actions as overall morally acceptable (Parfit [40] in [41] (p.76)). In this context, it is useful to distinguish between subsistence emissions and luxury emissions [41] (p. 427), [42,43]. Individuals—of course—should not be blamed for their emissions meeting basic needs, or which are tied in with lumpy infrastructure (see also [43] (p. 451)). They are, however, accountable for their profligate emissions because they have the freedom to decide to reduce "unnecessary" greenhouse gas emissions, for example by decreasing their consumption of animal products or by flying less [44] (p. 427) (see also [45–47]). It would be preferable for individuals not have to carry a greater "burden" for taking the "right" decisions in order not to harm others in a world where politicians and the economy fail common welfare and limit incentives for individuals to contribute to this common welfare. Instead, the individual is challenged by continuous temptations to continue on a high emissions path, and feel that they have little choice other than to face this uncomfortable responsibility on their own moral accord.

1.2. Present and Past Research: The Psychology of Denial as Moral Disengagement

In our previous paper [1], we showed the relevance of social–psychological theories for explaining people's subdued climate-related behavior, such as Festinger's theory of cognitive dissonance [48] where individuals experiencing dissonance seek resolution, denial, or displacement. In that study, most individuals continued to be personally in dissonance over the contradictions between overall belief and actual deeds when it comes to climate change mitigation behaviors. Furthermore, these mechanisms acted powerfully in maintaining the gap between attitude and behavior with regard to climate-change norms.

Four "interpretations" of perceived barriers to action were detected. (1) The tragedy-of-the-commons interpretation is the belief that any personal costs are greater than any benefits to others [38,49,50]. (2) The comfort interpretation reveals the reluctance to abandon habits and preferred lifestyles associated with self-identity. (3) The governance–distrust interpretation summarizes the observation that economic interests are predominant and powerful, accompanied by a feeling that government fails to deliver supportive politics and actions. (4) The managerial-fix interpretation describes the belief in technological solutions and regulatory innovation [1].

Recent research by Norgaard [51,52] identified feelings of helplessness and guilt as reasons for climate-change denial. Norgaard highlights the role of emotions because they affect cognition, while playing down the roles of knowledge and caring.

In our new survey we sought to enrich Festinger's theory of cognitive dissonance with Bandura's psychosocial mechanisms of selective moral disengagement [27]. Bandura himself describes selective disengagement of moral self-sanctions as an impediment to individual and collective action designed to reduce global warming and other moral problems [10,11,13,27,41,44].

Selective moral disengagement adopts a form of moral action framed as "the product of the reciprocal interplay of cognitive, affective and social influences" and "personal agency operates within a broad network of socio-structural influences" [50] (p. 102). This convinces people that ethical standards do not apply in a particular context by means of separating moral reactions from inhumane conduct and cutting out self-condemnation [50,53–55]. Thus, it involves a process of re-interpreting damaging behavior as becoming morally acceptable [41,54,55].

Eight psychosocial mechanisms operate here at both the individual and social-systems level (see Figure 1). The first three operate where people translate harmful practices into worthy ones through social and moral justification; exonerative social comparison (also called advantageous comparison); and euphemistic language. Through two further mechanisms, called displacement and diffusion of responsibility, people are released from their personal accountability by shifting the responsibility to others. By diffusion of responsibility, moral control can be suspended by subdividing activities that seem harmless in themselves. The final two mechanisms are responsible for marginalizing and blaming the victims, e.g., for worsening ecological conditions [27].

Figure 1. Psychosocial mechanisms through which moral self-sanctions are selectively disengaged from detrimental practices at different points in the exercise of moral agency [27].

Empirical research over moral disengagement has been undertaken in areas such as terrorism, military commitment, and juvenile delinquency, while research on climate change and moral disengagement is confined more to conceptual theory (e.g., [10,13,27,41,44]). It is important to expand this body of evidence to demonstrate that moral disengagement is widespread and requires more empirical evidence over triggers to activate climate-safeguarding actions. Here we feel we have made a start. We have by no means heard the last of moral disengagement and that lack of self confidence in hindering the undertaking of effective actions.

2. Materials and Methods

Our recent case study is based mainly on a qualitative analysis to provide a comparison with our 2001 study, which was also based on a qualitative approach. Although we conducted an online survey of people living in Germany which is nearly representative in terms of gender, age, federal state, and educational level, we sought the subjective assessments and views on the climate crisis, on whose shoulders were seen to be the responsibilities for causing it and for mitigating it, and barriers of overcoming it (see Box 1). A high proportion of the content-based items were formulated as open questions to gain deeper insight into the respondents' opinions [56]. A nationwide sample of 1032 respondents in Germany was collected in November 2017 through an online survey distributed by a professional panel provider, following the International Chamber of Commerce/European Society for Opinion and Market Research (ICC/ESOMAR) International Code [57]. The main socio-demographic characteristics of the participants compared to the German population are listed in Table A1 of the Appendix A [58]. The closed questions were regarded more as an introduction to open questions and to get at least some sense of the conceptions underlying respondents' assessments. These were neither designed nor used as the basis for formal statistical analysis. We used various Likert scales, as well as nominally scaled response options. Statistical analysis was limited to a simple descriptive analysis based on the use of Microsoft Excel 2007. The frequency tables of socio-demographic and content-based closed questions were transferred from Statistical Package for the Social Sciences (SPSS) (version 25, IBM, Armonk, NY, USA) to Excel for better visualization [58]. In Box 1, the content-based questions are presented.

Box 1: The content-based questions (translated from German)

1. Have you ever considered the topic of climate change? (Closed question; scale from 1 "not at all" to 6 "very intensively")
2. Please describe in your own words and as detailed as possible what you think and feel while reading this text. (Open question after an introductory text about impacts on and consequences about climate change)

3. Do you think you are currently affected by climate change or that you will be affected in the future? (Closed question; nominal scale). Please explain your answer. (Open question)
4. Do you think that other people are already being affected by climate change? (Closed question; nominal scale)
5. Who is responsible for climate change in your opinion? (Closed question; nominal scale) Please explain your answer. (Open question)
6. Do you think enough is being done against climate change? (Closed question; scale from 1 "enough is being done against climate change" to 3 "too much is being done against climate change") Please explain your answer. (Open question)
7. Do you approve or disapprove of this? (Closed question; nominal scale) Please explain your answer. (Open question)
8. If, in your opinion, something definitely has to be done to combat climate change, or more than what has been done so far, who, ideally, should do it? Please describe in your own words and as detailed as possible who, realistically, will do something to counteract climate change. (Open question)
9. Can you imagine reducing or abandoning certain climate-damaging activities yourself? (Closed question; nominal scale)
10. If yes, which climate-damaging activities can you imagine reducing or to abandoning? (Closed question; nominal scale) If not, why not? (Open question)
11. What do you think are obstacles to tackling climate change? (Open question)

The main part of the study—the qualitative analysis—encompasses the answers to the open-ended questions and was conducted using the comprehensive software ATLAS.ti 8 (ATLAS.ti, Berlin, Germany) because it supports an interpretive research approach. By analyzing and describing general phenomena, the purpose is to develop a concept that reflects complex issues in a general manner [59]. For analyzing large bodies of textual data, a code system according to Friese et al. was generated [60]. Strauss and Corbindefine coding as "the process of data analysis" [61] (p. 43). Coding in this sense means "delineating concepts to stand for interpreted meaning of data" [62] (p. 220). In terms of functionality, the software ATLAS.ti provides a margin area as an essential function when using an interpretative approach. Throughout the analyzing process, the software gives feedback as to how a segment is coded and whether it is connected to other segments and shows comments and memos that have been written during the coding process [63]. For the process of "open coding" following Friese [63], various barriers to and suggestions for solutions to the climate crisis were detected and coded, as were replies to the questions on who is responsible for climate change and who should and will take action to reduce it. The list of codes was inductively created, constantly adapted, and supplemented during the analysis process (e.g., [64]). In addition, on the basis of an intense systematic literature analysis and own empirical studies it has become apparent—as explained above—that reducing cognitive dissonance via particular selective moral disengagement mechanisms is a core concept for explaining climate action denial. We included eight codes related to Bandura's psychosocial mechanisms of moral disengagement (see above). At the end, the list of codes includes the eight psychosocial mechanisms of moral disengagement as well as barriers to appropriate low carbon behavior.

3. Results

3.1. Acknowledgement or Denial of Climate Change?

The survey data shows that the majority of respondents (74.4%) have already been engaged, very strongly (9.7%), strongly (30.6%), or relatively strongly (34.1%), with the issue of climate change (n = 1032). In line with these results, 93.9% think that people are or will be notably affected by climate change. Nearly half of the interviewees (47.9%) feel they are already being affected by climate change, and only 6.1% think climate change has no effect either on them or anyone else (see Figure 2). The

concern about climate change and its consequences is expressed with statements like "It is at least five minutes to twelve" (P842-1); and "Climate change is homemade, and the leading industrialized countries are significantly involved" (P850). Furthermore, respondents commented on the degree to which they are already affected by climate change: "One recognizes climate change already due to the many storms and the rise of sea level of the Baltic Sea" (P338).

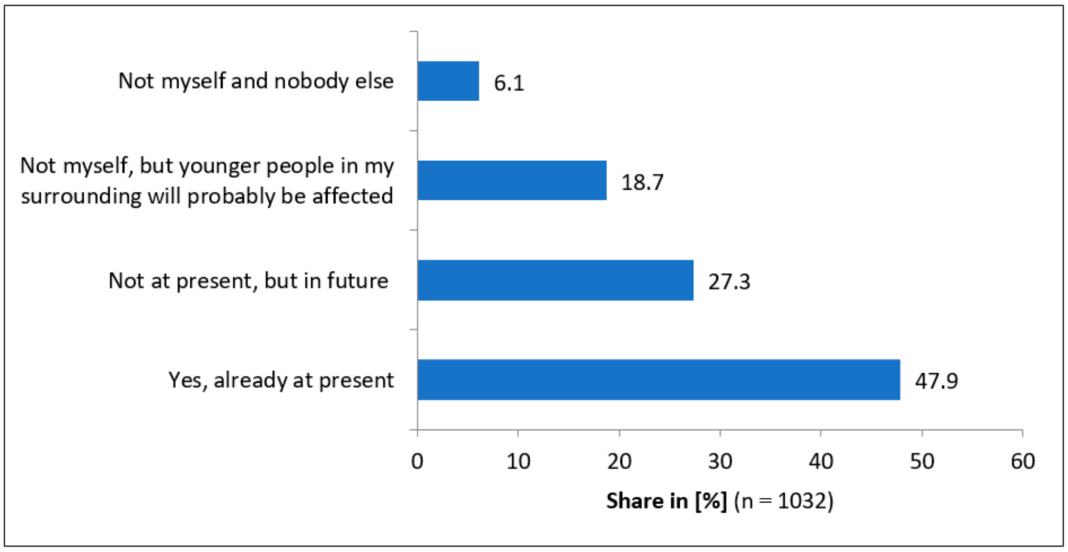

Figure 2. Answers to the question "Do you think you are personally affected by climate change at present or that you will be affected in future?".

A large majority (77%) expressed the opinion that not enough is being done to reduce climate change, whereas 7.4% concluded that enough is being done, and 5.5% think that current efforts are doing more than what is actually necessary (n = 1032). This is in line with a survey by the World Wide Views Alliance, which shows that 88% of Germans and 90% of the worldwide population are very or fairly concerned about climate change [65]. Additionally, climate change appears to be the issue Germans are most worried about, compared to other environmental issues: 65% of the Germans interviewed indicate climate change as one of five most worrying environmental issues—more than water and air pollution [66]. In Germany, "concern about future climate impacts on personal living conditions already affects life satisfaction by a non-negligible amount", predominately in the form of heat waves [67] (p. 18).

3.2. Who is Responsible for Climate Change; Who Should Ideally and Who Will Realistically Take Action?

Questions about responsibilities for the climate crisis as well as about the demand for action show that many respondents chose a range of blame agents (see Figure 3). About 70% of the respondents blame advanced developed countries, business and industry, and society as a whole. About 60% think that politicians are responsible, and half (52%) regard each individual person as being responsible (see Figure 3). The argument for their choice becomes apparent through the open question asking the reason for their decision: "Policy decisions depend on business and industry, whose representatives take part in committees and determine what is decided" (P426); "Probably nobody, as nobody wants to forego the luxury that is part of everyday life" (P365). The answers to the question "Who should ideally do something against climate change?" are, analogous to the question about responsibilities, distributed fairly evenly, with 63% for "each individual person" and 61.5% "the transition countries". This clearly is an indicator that respondents have recognized climate change truly as a collective action problem (see also Figure 3). Answers to the question "Who will realistically do something against climate change?" show a high level of despair as it becomes obvious in the following statement "Who will realistically do something against climate change? Nobody. Everybody is talking about it, but the

goals will not be achieved and are actually a joke. I think that if not all countries change their thinking and really cooperate, climate change cannot be curtailed anymore“ (P392).

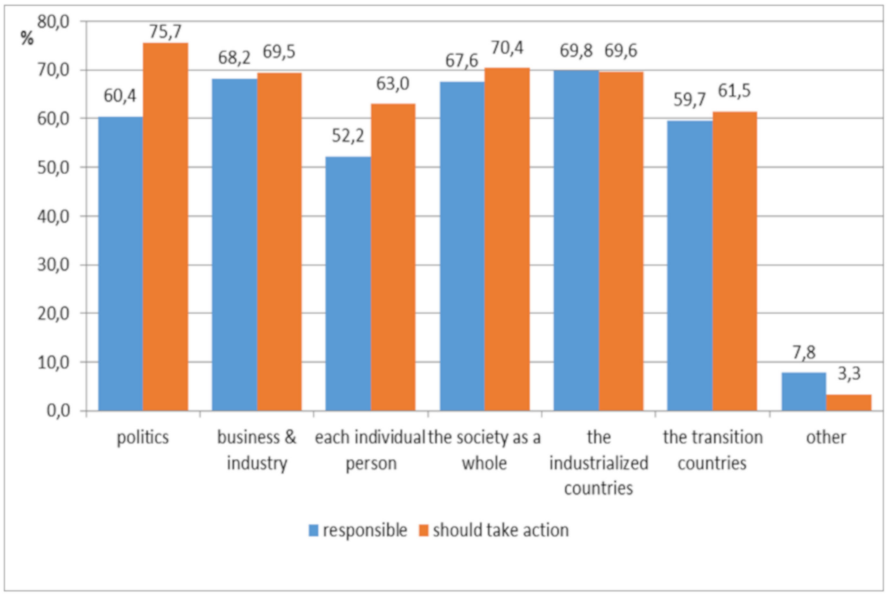

Figure 3. Answers to the questions “Who is responsible for climate change?“ (n = 1029) and “Who should ideally do something against climate change?” (n = 794).

These findings are presented against the background of the responses to the closed question about the climate-damaging activities respondents can imagine reducing or abandoning. These are depicted in Figure A1of the Appendix A. It can be seen that nearly all of the respondents are willing to do something to help curtail climate change and seem willing to adopt one or more activities from the list. Nearly every respondent is willing to take on low-cost behavior changes [41] such as turning off the light (91.3%) when not needed, recycling glass and plastic bottles (87.9%), and using energy-efficient light bulbs (83.5%). This is not surprising, as widespread recycling became part of the German culture a while ago. Turning off unnecessary lights and buying energy-efficient bulbs save money and are simple to conduct. Concerning the distinction between high and low-cost behavior change we follow Diekmann and Preisendörfer [68]. They used German samples, which are culturally comparable, but of course there still remains a subjective personal interpretation of what low or high cost is. Of course, items such as “avoiding the purchase of high consuming cars” are ambivalent because financial reasons can also play an important role. The high number people willing to buy regionally produced food is backed by the annual survey of the German Nature Awareness Study (BfN 2019), and by evidence of higher consumer trust in regionally produced food.

Around 52% will seriously consider “reducing long-distance journeys/not flying”. This is a high number compared to the assessment that this is most regarded as a high-cost behavior. The reasons for this high number can of course be social desirability which is difficult to fully exclude, but it does hint at a growing moral sensitivity over avoidable flying. However, fewer than 50% are willing to reduce those activities that have really high climate altering effects, such as eating less meat or none at all; and forsaking driving, which can be classified as personal high-cost behavior changes. “Taking part at environmental/climate campaigns” is the action favored least by respondents. Here we suspect the influence of sample bias as no people below the age of 18 and a high number of people above 60 were interviewed.

3.3. Mechanisms of Moral Disengagement

In the survey data, five out of the eight psychosocial mechanisms described by Bandura (see above) were identified.

The first and most widely used one is displacement of responsibility. This is also the most coded one in our data (397 codings). There is a close link to the results presented in Figure 3, which displays those actors named as responsible for the climate crisis and overcoming it (multiple answers were possible). We find similar but not identical patterns and categorizations in the answers to the open questions, namely that politics and/or business and industry should take action. Not surprisingly politics and business and industry are seen as highly interwoven—almost always in a negative way—and are stated together. "Society as a whole", an important category in the closed question on responsibilities, is less clearly emphasized. Instead the particular group of "the rich" is named through the notion of being too greedy. A final sub-group frequently named are "egoistic people" who enjoy "too high a living standard" and who are seen as not being willing to change their lives because of ignorance and/or comfort requirements.

The following quotations underline these observations: "As long as the government and big companies do not contribute to climate protection or even function as a role model, the sustainability actions of the little person has no big positive impact" (P885); "the politicians couldn't care less" (P45; P90); "The carelessness and greed for profit of the rich (P78; P135; P398). These statements confirm the two results of the 2001 study, namely the governance–distrust interpretation (government fails to deliver supportive politics and actions together with the observation that economic interests are predominant and powerful) and the comfort–interpretation (reluctance to abandon habits and preferred lifestyles). The governance–distrust interpretation is even more pronounced in the repeated fusion of politics, business, and industry acting in a democratically undermining way. Concerning the comfort–interpretation perspective, respondents today state more forcefully than in the 2001 study that it is the other people who are not prepared to change their luxury lifestyles and habits who are a primary cause of emissions increases. In the present study more of a minority assert that they do not want to change anything. That people blame other individual emitters is in line with attribution theory [69]. In particular, the two mechanisms called "fundamental attribution error", which refers to the tendency to over-emphasize the role of personal traits in influencing the behavior of others, and "self-serving bias", where external circumstances, such as lobbying bias, shape behavior justification support these reactions [70].

Overall, it is difficult to draw a line between "displacement of responsibility" and where "proper attribution of responsibility" starts. There are indeed a lot of results from scientists (e.g., [71,72]) as well as from reliable technology writers (e.g., [19]) that the problem of lobbyism is probably the biggest barrier to the successful combating of the climate emergency.

Yet Peeters et al. argue that regardless of official policies, actions are conducted by individuals [44] (p. 435), [73]. In addition, individual emissions reductions may combine to buttress collective environmental policies. Moreover, individuals hold the obligation to vote for parties that seek such policies effectively implemented [13,74].

Social, economic and moral justifications is the second-most coded disengagement mechanism (262 codings). Economic justifications are dominant as a sub-category (see quotes below) but examples for social and moral justifications can also be found but to a lesser degree. Examples for the first sub-category are "There are a lot of things that could be changed, but they are simply too expensive." (P983, P982); "Everyone is responsible for climate change. It starts with the question of how we decide to—or are able to—get our electricity. I would love to use green electricity, but I'm a student and can't afford it" (P459). Another quote still emphasizes an economic justification and in addition pointing out that time matters: "although I know better, I find myself violating my own desires and ideals on a daily basis. I'd really love to keep my personal CO_2 footprint as small and as low as possible, but I actually wind up driving almost 100 km to work because the rents in Munich are so exorbitant. I suppose I could take the train, but it would mean a four-to-five-hour commute every day! This is why I'm a classic environmental polluter. Another reason is that I'm not a vegan: in fact, I usually eat quite a bit of meat!" (P1028). Saving time as an important justification is also evident in this quote, which seeks to justify air travel: "taking the plane is simply a matter of saving time. We can do a lot of things, but we

can't recoup time" (P979). Overall, "people and organizations hoping to block action to reduce carbon emissions simply talk up the deniable benefits of fossil-fuel energy use, while ignoring non-emitting alternatives, overstating their costs, and understating their feasibility" [11] (p. 7). Examples for social and moral justification are displayed in the following quotes: "If—as I do—everyone would generally refrain from long-distance travel, use green electricity, and throw away as little food as possible, there wouldn't even be a need to pose the question. But social norms often cause a person to feel like an outcast—and who wants to be one?" (P953); "Protecting the climate leads to exclusion from your circle of friends" (P129; P861); and "Climate protection threatens too many jobs, like suppliers and in the coal and oil industries." (e.g., P456, P842, P887, P896, P905).

This reasoning is hard to change because people like to preserve a sense of self-worth while causing harm by their activities [10]. One example is the (false) claim that eating meat is necessary for a healthy diet and social inclusion [75]. Another is expressed by members of some professional groups, such as scientists, who argue that very high-carbon behavior such as flying is "necessary", e.g., to communicate research results personally at conferences, or that doing research in very distant places is a career-enhancing component of their work. In interviews, they greatly enjoy the privileges linked to their professional activity, including travel to interesting places [76].

Of course, what has been stated for displacement of responsibility is similarly applicable here. While some of the justifications are false or fail to absolve individuals from responsibility (e.g., "green" electricity in Germany is—on average—as cheap as the conventional one) some are indeed appropriate, e.g., that the public transportation system in Germany is neglecting rural areas and that living in big cities is becoming unaffordable for groups on very low incomes. Nevertheless, there are still a lot of possibilities for individual decisions: "People have to be willing to protect our Earth, even if it leads to financial sacrifices or other disadvantages" (P 394).

Disregard, distortion or denial of harmful effects still is an observable mechanism (148 codings). When people act to serve their self-interest but produce damaging outcomes, they turn away from the harm they cause or they minimize it. They may also seek to discredit the scientific evidence of harm (e.g., [19,27,28]). Although not many respondents to our present survey deny climate change as such, there are some who argue that warnings of climate crisis are exaggerated and "scaremongering" (P9). In this context, three example quotes are: "I think the whole discussion about climate change is founded on false assumptions. In the days of the dinosaurs—when there were no cars or factories—the CO2 content of the air was 15% higher than today (scientific basis). It was also much warmer back then than today. I consider climate change to be a completely normal natural phenomenon that doesn't need to be combated any more than the wind" (P807); "over the Earth's lifetime, there has always been climate change, even without humans. Panic is being propagated, and so-called scientists are trying to make themselves look important" (P749); "Climate change has been fabricated by politicians in order to extract even more taxes from the people" (P473; P531; P824). There is also a big awareness about those actors who have an interest in propagating climate denial for their advantage as one respondent observed: "It is discouraging that the big companies even try to downplay obvious research results as exaggeration" (P885).

The mechanism of diffusing responsibility for detrimental behavior such as emitting greenhouse gas emissions is in line with our tragedy-of-the-commons interpretation (see above) from the 2001 study. As diffusion of responsibility is the most-discussed issue in climate ethics (also known as the "individual causal inefficacy") it is not surprising that our respondents from the current study are also aware of climate change being a collective action problem (coded 111 times). Collective action problems are characterized as people regarding their particular contribution to a problem—in this case the climate crisis—as morally irrelevant: "In problems of collective action, an individual's contribution to an aggregate harmful effect seems trivial, and any harm done by a group of people can always largely be ascribed to the behavior of the others in the group" [77] (p. 85). It becomes clearer that in this way, the exercise of moral self-control is undermined by diffusing responsibility for the climate crisis [27] (p. 19), [50]. The widely used argument here is that "the greenhouse gases of any particular

individual make no observable contribution to global warming" (. . .) is "wrong because the expected amount of harm is greater than not emitting"([44] (p. 433); for a detailed constructive discussion and finally a plausible invalidation of the counterarguments see [41,44]).

Examples from our respondents are "I think about what I—as a single person—can change if there are several billion people on the planet who don't want to change anything " (P098), and a very large number of respondents opined, "the individual has no influence" (e.g., P379 and P240).

A large majority of our respondents see the collective tardiness in adopting climate–change–mitigating behavior as something that all people reluctantly share. Yet, the cumulative effects of these actions have resulted in dangerous global climate change.

One important theoretical explanation and also part of a solution is based on Bandura's self-efficacy theory, which he supported as being applicable to the climate crisis [11]. His key is that "people will approach, explore, and try to manage situations within their perceived capabilities, but unless they are externally coerced, they avoid transactions with those aspects of their environment that they perceive exceed their coping abilities"[78] (p. 14). Heald emphasizes that the key word here is "perceived." [11] (p. 5). "It is not just people's abilities that affect their performance in life, but also their perception of their abilities—their belief that addressing an issue is within their individual and collective capabilities". In this sense, self-efficacy theory emphasizes the importance of avoiding hopelessness and despair, which are feelings that are very visible in our data, in particular as part of the diffusing responsibility mechanism.

The mechanism called exonerative (or advantageous) comparison was coded 41 times. We found respondents willing to turn detrimental practices into righteous ones, e.g., by emphasizing the higher GHG emissions of China and/or the U.S., than those of Germany (or Switzerland in the 2001 study), or comparing their behavior to people who practice a more luxury-carbon-intensive lifestyle. Merely pointing the finger at the worst offenders encourages comparison with people who emit more greenhouse gases in order to let the avoider off the hook [44]. Two example quotes from our survey are "... and how does it help the climate if I restrict my own car-based mobility, but an ever-growing number of cars are being built, sold, and driven all over the world?" (P1012); and "as long as there are Formula One races, politicians and others fly around the world in private jets, and big companies like Vattenfall, Amazon, and Ikea don't pay taxes, I'll separate my garbage, but that's all." (P52)

3.4. Summarizing Comparison of the Two Studies

These results show that the majority of contemporary respondents know and care about the climate crisis and its harmful effects compared to the 2001 study, in which some uncertainties were still expressed about the timing and severity of climate change. Another difference is that the managerial-fix interpretation (belief in technological solutions and regulatory innovation) is less pronounced in the current data, while the governance-distrust interpretation is even stronger. Actually, both correspond closely with each other. Respondents recognize that there are technological solutions available (renewable energy and electric cars are mentioned) which the German government doesn't want to support too much because of lobby interests, e.g., of the oil/coal industry or the German car companies which prefer to sell SUVs as high emitting vehicles. Several respondents already have recognized that technology has a lot of negative impacts or at least rebound effects, as is expressed in the following quotes: "even though new technologies are already being used, economic growth means there will ultimately be no reduction in CO_2 emissions" (P363); "Electric cars were already around back in the 1970s, but the oil lobby is simply too strong. The development of more environmentally friendly technologies has been going on for ages, but they're only introduced on a gradual, limited basis by design" (P520; P722).

Overall, current respondents overwhelmingly agree on the necessity to act, emphasizing that "not enough is being done up to now" and that multiple actors are responsible for action, including themselves. However, there is still denial by favoring displacing responsibility or even assigning guilt to others (e.g., government, business and industry, lobbies, "the rich", the "egoistic people"), refusing

to be a first mover and to engage in more than just low-cost behavior. This means, compared to the 2001 study, that denial is not so much observable in terms of pronouncing it with words, but that it continues to be existent in terms of instigating climate-change mitigation action.

4. Discussion

From Moral Disengagement to Employing Emotions, Social Learning and Social Change Towards a Low-Carbon Society

In general, social-psychological theories such as selective moral disengagement look at the various contradictory forces acting in the individual. This is because placing a human meaning on preferred actions can rouse empathy and highlight a strong sense of social obligation [79]. Individuals who are less susceptible to moral disengagement are those with a cooperative (pro-social) orientation and who efficaciously believe they can make a difference [80].

Emotions are important aspects of behavioral decision making because "the stronger a person's emotional reaction, the more likely that person will engage in a new behavior" [9,37,75] [81] (p.254) [82]. Markowitz and Shariff specify that pride, hope, and gratitude as positive reinforcing (moral) emotions help to encourage ameliorative climate change action [9]. A similarly powerful approach is "going green to be seen"; this means an increase in status and reputation by openly pursuing a real green life style [83]. The opposite, namely "shaming", such as "flight shaming", is currently also observable, but is much more disputed as it is connected to guilt-inducing negative feelings.

People alter their behavior through "the power of social modeling" and use what they learn for their improved understanding [10] (p. 416), [84]. Higgs concludes that "humans have a highly developed capacity to learn from the behavior of others and to find the approval of others awarding and disapproval aversive" [85] (p. 42). These insights are well reflected in Bandura's Social Learning Theory, with learning by modeling/observation as core discovery, and which he also applied to environmental sustainability including global warming [10,27]. People learn through watching others' behaviors. This process is simultaneously an opportunity for and a barrier against overcoming the psychology of denial, dependent on the degree of sustainable or unsustainable behavior of the observed others.

Fortunately, there are innovators willing to try out fresh ideas and behaviors [86,87]. It is advantageous that the perception of "sacrificing" something (such as materialistic goods or comfort) can be morphed into a perception of gaining relief from avoidable consumption, backed by social approval. The power of social networks kicks in, and the majority begins to accept these ideas and behaviors as part of the new social conformity [88].

An additional factor is drawn from techniques used in community-based social marketing [82]. Findings from neuroscience and social marketing strategies show their influence over positive climate-change behaviors by confronting the Consumption–Happiness Myth [37]. Noppers et al. found a strong connection between adopting a sustainable innovation and enhancing self-identity and social status [83] (p.60).

Opinion leaders and so-called "connectors" can reach out to many people, affording them with considerable influence [84] (p.152f) [86,88]. Getting opinion leaders to support the idea of low-carbon behavior is a critical step in the diffusion process because of the associated positive publicity [84] (p. 159). The media also play an important role because they convey social norms to a huge audience [84] (p. 166). For example, long-running serial dramas can serve as valuable vehicles for promoting personal and social change because "by dramatizing alternative behaviors and their effects on the characters' lives, the dramas help people make informed choices in their own lives. (. . .) Story lines that dramatize viewers' everyday lives and functional solutions get them deeply involved so that the important emotional component is addressed. Unlike brief exposures to media presentations that typically leave most viewers untouched, ongoing engagement in the evolving lives of models provides numerous opportunities to learn from them" [10] (p. 419f).

5. Conclusions

The majority of our respondents express concern over catastrophic climate change and advocate mitigation in the abstract. They use disengagement mechanisms on the one hand but also fully justified request to stop counterproductive action from policy makers, the business world, and other people in general. Although they admit that individuals and society as a whole are also responsible for climate change, they prefer to adopt personal actions that require no significant reductions in their energy and resource use as long as others have not started.

Our second study made more visible that in order to successfully activate low-carbon behavior, moral disengagement may be offset by the encouragement of self and collective efficacy as well as positive emotions such as pride, hope, and gratitude. This process may be buttressed by careful targeting of negative emotions such as shame related to avoidable low-carbon behavior as well, and emotional spreading via the powers of social modeling and social networks. If it were to become the "norm" to go by train instead of flying, or to consume less and more sustainably in general, habits could be readjusted and become embedded in widespread social practices and form a "new conformity". A strong sense of starting together instead of waiting for others to act first will reduce the fear of individual sacrifices. In this way, feelings of a new social identity and more accommodative lifestyles may begin to appear. Small steps, collectively made, build confidence and add to the innate moral sensibilities of many potential mitigators.

However, it has become clear that it is necessary to conduct more detailed empirical research on effective strategies to increase people's motivation to act on climate change and how their transformative actions can be operationalized in daily life.

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Appendix A

Table A1. Main socio-demographic characteristics of the participants in comparison with the German population.

Variable	Levels	Respondents (Absolute)	Respondents (%)	Population in Germany 2011 (%)
Total		1032	100.0	100.0
Gender	Male	516	50.0	48.8
	Female	516	50.0	51.2
Age	18–29	143	13.9	17.0
	30–39	146	14.2	14.1
	40–49	177	17.2	19.9
	50–59	202	19.6	24.4[1]
	>60	364	35.3	24.6[1]
Educational level	Pupil	2	0.2	4.4
	No school-leaving certificate	7	0.7	4.7
	Elementary school certificate	351	34.0	35.6
	Intermediate school certificate	303	29.4	26.9
	Advanced technical college certificate	47	4.6	8.0
	High school certificate	98	9.5	20.4[2]
	Polytechnic certificate	71	6.9	
	University certificate	148	14.3	
	Others	5	0.5	0.0

[1] Levels of the micro census for the population in Germany are "50–64" and "65 and older"; [2] Levels of the micro-census for the population in Germany do not distinguish between degrees after high school graduation.

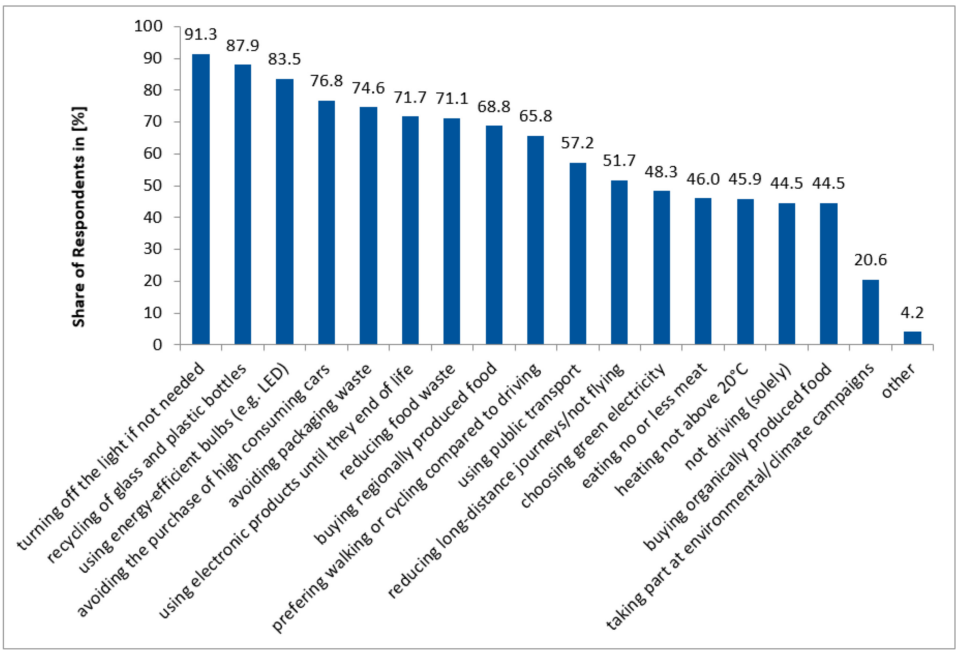

Figure A1. Answers to the question "Which climate-damaging activities can you imagine reducing or abandoning?" (n = 863; multiple answers possible).

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