

## Feel good, stay green: Positive affect promotes pro-environmental behaviors and mitigates compensatory “mental bookkeeping” effects

Gilles Chatelain <sup>a,\*</sup>, Stefanie Lena Hille <sup>b</sup>, David Sander <sup>a</sup>, Martin Patel <sup>a</sup>, Ulf Joachim Jonas Hahnel <sup>a</sup>, Tobias Brosch <sup>a</sup>

<sup>a</sup> University of Geneva, 40 Boulevard du Pont d'Arve, 1205, Geneva, Switzerland

<sup>b</sup> University of St.Gallen, 2 Tigerbergstrasse, 9000, St.Gallen, Switzerland



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### ABSTRACT

To counteract climate change people should adopt lifestyles consisting of numerous pro-environmental actions, across different domains, sustained over long time periods. Thus, it is important to understand how initial pro-environmental behaviors can impact the likelihood of subsequent behaviors. We tested the hypothesis that people use mental bookkeeping of past behaviors, allowing them to limit pro-environmental behaviors after having performed similar ones, and investigated the role of affect in this context. Participants read campaign messages framed affectively neutral (Experiment 1) or positive/negative (Experiment 2), followed by fictitious scenarios in which they could perform a second pro-environmental behavior after having shown a first one. Participants indicated a smaller willingness to act pro-environmentally if the behaviors were similar. Positive affect increased the likelihood of showing subsequent behaviors and mitigated negative spillover driven by behavioral similarity. However, the observed effect sizes are too small to be of practical relevance for developing efficient intervention strategies.

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### 1. Introduction

Campaigns and interventions aiming at the promotion of environmentally friendly behavior are present in many situations in our daily life. While many campaigns target changes regarding one specific behavior, an effective reduction of CO<sub>2</sub> emissions requires people to switch to an overall sustainable lifestyle. More precisely, individuals will have to change their behavior not only in one single domain, but act pro-environmentally over a longer time period and across different domains (IPCC, 2014). To develop and evaluate efficient intervention strategies, it is thus important to consider sequences of behavior, taking into account the sequential consequences that the performance of one pro-environmental behavior (hereafter “PEB”) can have on the performance of subsequent PEBs.

While environmental campaigns can indeed succeed in motivating people to perform a targeted PEB (Abrahamse, Steg, Vlek, &

Rothengatter, 2005), it is often not taken into account that performing an initial PEB can increase or decrease the likelihood of showing subsequent PEBs (Thøgersen & Ölander, 2003; Truelove, Carrico, Weber, Raimi, & Vandenberghe, 2014). These effects are referred to as behavioral spillovers and comprise several related phenomena such as consistency and licensing effects (Lanzini & Thøgersen, 2014; Mullen & Monin, 2016). At best, performing an initial PEB can induce consistency effects that increase the likelihood of performing a second PEB, referred to as positive spillover (Lanzini & Thøgersen, 2014). At worst, an initial PEB is (mis)used to justify a later ecologically harmful behavior or the omission of a second PEB, which is considered as negative spillover (Truelove et al., 2014). Negative spillover effects relate at the psychological level to rebound effects observed at the macroeconomic level, in which improved energy efficiency, for instance, can lead to enhanced energy consumption, reducing the size of potential energy savings (Herring & Sorrell, 2008).

Social-psychological research suggests that behavioral spillovers may be the result of people's regulation of their moral self-image, which they try to balance at a certain level in order to be able to perceive themselves as a moral person (Zhong, Liljenquist, & Cain, 2009). People experience a heightened moral self-image after

\* Corresponding author. Department of Psychology, University of Geneva, 40 Boulevard du Pont d'Arve, 1205, Geneva, Switzerland.

E-mail addresses: [gilles.chatelain@unige.ch](mailto:gilles.chatelain@unige.ch) (G. Chatelain), [stefanie.hille@unisg.ch](mailto:stefanie.hille@unisg.ch) (S.L. Hille), [david.sander@unige.ch](mailto:david.sander@unige.ch) (D. Sander), [martin.patel@unige.ch](mailto:martin.patel@unige.ch) (M. Patel), [ulf.hahnel@unige.ch](mailto:ulf.hahnel@unige.ch) (U.J.J. Hahnel), [tobias.brosch@unige.ch](mailto:tobias.brosch@unige.ch) (T. Brosch).

performing a moral behavior, and a reduced moral image after engaging in a non-moral behavior (e.g. Sachdeva, Iliev, & Medin, 2009). Based on this perception, they may feel obliged to perform a subsequent moral behavior after an immoral deed or, in contrast, feel entitled to forgo a subsequent moral behavior or even act immorally after a moral virtue (Higgins, 1996; Zhong et al., 2009). Empirical evidence supports the notion that performing an initial PEB can reduce willingness to engage in subsequent PEBs (Miller & Effron, 2010; Sachdeva et al., 2009). PEBs thus seem to be subject to some form of bookkeeping, in which individuals deposit and withdraw moral credits linked to specific behaviors on a “mental bank account”. This assumption invites comparisons with the behavioral economics literature on mental accounting, which provides strong evidence for mental bookkeeping processes in the finance domain (Thaler, 1980; 2008).

One aim of the present contribution is to develop conceptual links between this body of literature and the literature on behavioral spillover and moral licensing. As we will outline in the next section, while the literature on moral self-regulation does not put much emphasis on the characteristics of a certain behavior (other than that it is perceived as moral or immoral by the actor), the literature on mental accounting is more action-focused. It addresses the important role played by different mental accounts to which transactions (i.e., actions) are booked based on their characteristic and their consequences for decisions and behaviors (Soman & Ahn, 2011). Integrating insights from behavioral economics on mental accounting into the conceptualization of spillover effects may thus be a promising approach to better understand how the characteristics of a sequence of PEBs may contribute to different spillover effects.

### 1.1. Mental accounting of pro-environmental behavior

In the behavioral economics literature, *mental accounting* refers to the fact that people create symbolic mental linkages between specific acts of consumptions and specific payments, which can have large impacts on consumer decisions. Expenditures are grouped into budgets (e.g., food, housing, entertainment), income is divided into categories (e.g., regular, windfall), and wealth is allocated into accounts (e.g., checking, saving, pension fund; see Thaler, 1999). Research has demonstrated how slight variations in the naming, allocation or organization of mental accounts can influence decisions. The influence of mental accounting on decisions was illustrated for the first time in Tversky and Kahneman's (1981) theatre ticket experiment. They asked half of the participants whether they would be willing to purchase an additional theatre ticket worth \$10 after they had lost an already bought ticket. The other half of participants was asked whether they would be willing to purchase a ticket worth \$10 after they had lost a \$10 bill. Willingness to buy the ticket was higher when participants envisaged having lost the \$10 bill as compared to the loss of an already bought ticket. This finding was interpreted as illustrating that participants who had lost the theatre ticket placed those costs in a mental “theatre ticket account”. In this group, purchasing the theatre ticket again increased the costs of visiting the theatre from previously \$10 to \$20, while participants from the other group placed the two expenses in separate mental accounts.

One important observation from the domain of financial decision-making is that mental accounting mechanisms lead to a violation of the classic economic notion of fungibility of money. That is, according to mental accounting theory, a credit allocated to one mental account is not a perfect substitute for a credit in another account (Tversky & Kahneman, 1981). For instance, money won in a football bet is more likely to be spent on a dinner in a restaurant, whereas a tax refund is more likely to be used to settle an invoice.

This illustrates that people have a tendency to match the source of a credit with the domain in which it will be spent again (O'Curry, 1997). Moreover, people strive to keep an account balanced in the plus zone. In a financial context, this strategy reduces the risk of exceeding an implicit or explicit budget (Soman & Ahn, 2011; Thaler, 1999). However, it can lead to negative consequences, for instance when investors in the stock market are reluctant to sell losing stocks, because it would result in negative closing results for the respective mental account (Odean, 1998).

If similar mental bookkeeping mechanisms exist for the mental organization of moral – including pro-environmental – behaviors, moral credits should be booked on different mental accounts depending on the characteristics of previously shown actions. In line with this idea, Girod and de Haan (2009, p. 34) suggested that individuals use separate accounts for keeping track of different environmental behaviors, such as the number of flights per journey and the purchase of organic food. Similarly, Schütte and Gregory-Smith (2015) suggested separate mental accounts for holiday-related and sustainable behaviors at home. Such a mental bookkeeping of PEBs would suggest that similar PEBs that are booked to the same account are morally fungible, whereas PEBs that are booked to different accounts are not. For instance, moral credit related to performing a first specific PEB, such as recycling a plastic bottle on the way home, may be deposited on a specific account. If afterwards the occasion arises to show a highly similar PEB, such as recycling a plastic bottle at the workplace, moral licensing should arise, given that moral credit has already been booked to this account. However, if the occasion arises to show a different PEB, which would be booked on a different account (e.g., using a lid when cooking to save energy), no licensing should be observed.

The potential role of similarity on behavioral spillovers has been examined by Bratt (1999) as well as by Thøgersen (2004). Results of both studies show higher positive correlations between the likelihood of showing similar PEBs (e.g., *limiting residential heating* and *limiting residential use of warm water*) than between less similar PEBs (e.g., *limiting residential heating* and *attention given to environmental information on everyday items*). While at first sight this seems to contradict our hypothesis that an initial PEB should lead to a lower probability of showing a similar subsequent PEB, note that both studies focus on the likelihood of performing certain PEBs in general, rather than in a sequence of conducted behaviors. Based on the motivation to avoid cognitive dissonance (Festinger, 1954), people agreeing to the item “Would you recycle a plastic bottle at your workplace?” are likely to also agree to the item “Would you recycle a plastic bottle on your way home?”, as they try to avoid appearing inconsistent in their general behavior. Thus, a positive correlation between the two items would be expected, given that both represent a general tendency to act. However, when the items are put into a behavioral sequence, “Would you recycle a plastic bottle on your way home after having done so at your workplace?”, balancing effects might occur. Thus, we assume that behaviors occurring over a relatively short-time period are more likely to be linked to each other. This is similar to the payment depreciation effect observed in the financial domain, which describes the observation that the mental linkage between specific costs and benefits gets stronger with increased temporal proximity (Soman & Ahn, 2011).

Based on this reasoning, in the first experiment reported here, we tested the hypothesis that individuals are less likely to show a second PEB after having performed a first PEB if the two behaviors are similar, compared to when the behaviors are different. A further objective of the research presented here was to investigate how a reduction in PEBs due to mental accounting mechanisms can be mitigated. To this end, in the second experiment, we examined the impact of affect on the willingness to act pro-environmentally and

the extent to which affect-inducing environmental campaigns can diminish mental bookkeeping effects. In their theoretical framework of spillover effects, Truelove et al. (2014) refer to the notion of decision modes, arguing that affect-based decisions on whether or not to perform a behavior would be especially prone to negative spillover. They argue that inducing a negative emotion in order to promote a first PEB can result in a lower likelihood to engage in a second PEB. In this view, participants perform the first PEB in order to reduce a negative emotion such as fear or guilt. Once the aversive emotional state is reduced, the motivation to show subsequent PEBs is equally reduced. Based on this reasoning, the authors discourage the use of emotional appeals focused on fear and guilt which are often used in mass media environmental campaigns (Banerjee, Gulas, & Iyer, 2013; Brennan & Binney, 2010; Huhmann & Brotherton, 2013; Mair, 2011). In the current work, we investigate the impact of both positive and negative affect induced by the framing of campaign messages, in order to evaluate to what extent different affect inductions strategies can influence behavioral spillover.

## 2. Experiment 1

The objective of Experiment 1 was to examine to what extent mental bookkeeping mechanisms may be linked to behavioral spillover effects and whether this concept can improve predictions of when individuals consistently show a subsequent PEB or, in contrast, forgo a second PEB after having shown a first PEB. As argued above, we expected the likelihood to show a second PEB to be lower if the two PEBs are similar as compared to when they are dissimilar. To test our hypothesis, participants were presented with a fictitious scenario in which they encountered a campaign message related to environmental protection. This campaign message provided some information about the extent to which plastic bottles are being recycled in Germany.<sup>1</sup> Participants were informed that, after encountering this message, they showed a first PEB related to the recycling of plastic bottles. Participants' task was to rate the extent to which it was likely that they would subsequently show a second PEB. The second PEB was either similar to the first one (i.e., also related to the recycling of plastic bottles) or dissimilar (environmentally friendly, but from a different behavioral domain). We hypothesized that participants indicate a smaller willingness to show a second PEB when the second behavior is similar to a first behavior as compared to the condition in which the two behaviors are dissimilar.

A recent meta-analysis of the moral licensing literature has concluded that moral licensing effects are relatively small (average  $d = 0.31$ ). The authors thus recommend that future research interested in the mechanisms underlying spillover effects needs to increase statistical power by using sufficiently large sample sizes (Blanken, van de Ven, & Zeelenberg, 2015). In the present research we take these recommendations into account by using large-scale samples.

### 2.1. Methods

#### 2.1.1. Participants

A total of 709 individuals (52% females,  $M_{Age} = 48.76$ ,  $SD_{Age} = 15.20$ ) between 19 and 86 years took part in the experiment, which was conducted online as part of a series of several experiments. Participants from the general population of Germany were recruited via a panel provider and were paid approximately

50 eurocents for their participation. Sample size was determined using G\*Power 3.1 (Paul, Erdfelder, Lang, & Buchner, 2007). Based on an  $\alpha$ -error probability of 0.05, a power ( $1-\beta$ ) of 0.8 and an expected small effect size ( $\rho = 0.1$ , based on the meta-analysis of Blanken et al., 2015), a sample size of about 750 participants was suggested as being appropriate.

#### 2.1.2. Materials and experimental design

Experiment 1 was part of a series of four independent experiments. Including declaration of consent, introduction and personal questions it took around seven minutes ( $Mdn_{Duration} = 6.97$ ) to complete the entire questionnaire. To ensure high data quality, two quality check items related to an experiment not reported here were included in the first half of the questionnaire (i.e., "What were the costs of the product seen?"). 12.25% of people were excluded from all analyses because they answered at least one of the two quality check items incorrectly.

Participants read a short story telling them that on their way to work they caught sight of a campaign message concerning the recycling of plastic bottles in Germany ("Imagine that on your way to work you catch sight of the following advertisement:"). We then showed them a fictitious advertisement including the following text: "Recycling plastic bottles in Germany: Every year, more than 90% of plastic bottles are recycled in Germany. 25'000 tons of plastic bottles are disposed in the household waste." Participants learned that after reading the campaign message they performed a first PEB related to the recycling of plastic bottles (e.g., "On your way home, you picked up a discarded plastic bottle and recycled it"). The scenario continued by telling the participants that a few days later they had the opportunity to show a second PEB. Varied between participants, the second PEB was either similar to the first behavior (i.e., also related to the recycling of plastic bottles, such as "recycle a plastic bottle at your workplace") or dissimilar (environmentally friendly, but from a different behavioral domain, such as "use the lid while cooking a meal"). Scenarios were adapted from items and behaviors used in previous work on pro-environmental behavior (Attari, DeKay, Davidson, & de Bruin, 2010; Kaiser & Wilson, 2000; Lee, Kim, Kim, & Choi, 2014). The following items were used: "pick up a discarded plastic bottle on your way home and properly recycle it", "clean up the local forest from discarded plastic bottles" as first or second behaviors and "recycle a plastic bottle at your workplace", "organize a recycling station at your company", "buy organic food", "use the lid while cooking a meal" as second behaviors only.

Participants were asked to indicate the likelihood that they would show the second PEB (each participant only saw one second PEB). The response was assessed using a scale from 1 (*very unlikely*) to 7 (*very likely*). At the end of the experiment, participants were additionally asked to indicate the affect triggered by the campaign message on a scale from 1 (*very negative*) to 7 (*very positive*), ("What feeling has the advertising triggered in you?").

We conducted a pretest to ensure that the similarity of the behaviors was perceived as intended. Fifty-one individuals who did not participate in the main experiment ( $M_{Age} = 32.47$ ,  $SD_{Age} = 8.87$ , 59% female) rated all pairs of behaviors regarding their similarity ("How similar do you rate the following two behaviors?") on a scale from 1 (*very different*) to 7 (*very similar*). As expected, behaviors classified as similar were perceived to be more similar ( $M = 4.93$ ,  $SD = 1.24$ , 95% CI [4.58, 5.28]) than dissimilar behaviors ( $M = 3.31$ ,  $SD = 1.47$ , CI [2.90, 3.73],  $t(50) = 8.748$ ,  $p < .001$ ,  $d = 1.23$ , CI [.86, 1.59]).

### 2.2. Results

To assess the influence of the similarity of the two behaviors on

<sup>1</sup> In Germany plastic bottles are collected and recycled, for example, by bringing them back to their selling point.

the willingness to show the second PEB, we conducted an independent samples *t*-test comparing the two experimental conditions (similarity of behaviors: similar/dissimilar). Confirming our hypothesis, people were somewhat less willing to show a similar subsequent PEB ( $M = 4.64$ ,  $SD = 1.81$ , 95% CI [4.45, 4.83]) compared to a dissimilar one ( $M = 4.92$ ,  $SD = 1.82$ , CI [4.73, 5.11]),  $t(707) = 2.043$ ,  $p = .042$ ,  $d = .15$ , CI [.01, .30] (see Fig. 1).

### 2.3. Discussion

Consistent with our hypothesis, participants reported that they would be less willing to show a second PEB after having fictitiously performed a first PEB if the two behaviors were similar, compared to when the behaviors were not similar to each other. This pattern of results is consistent with the notion that people perform a mental bookkeeping of their behavior, similar to mental accounting processes observed in the financial domain (Thaler, 1980; 2008): they mentally keep track of their PEBs so that performing an initial PEB can influence the willingness of showing a future PEB. Importantly, this process is influenced by the similarity of the items in the sequence of PEBs.

These results suggest that when the behaviors were similar, the respective mental account was already "full" after the first PEB, and participants consequently allowed themselves not to show a second PEB. This process was not possible when the two behaviors were dissimilar. Thus, similar behaviors may have been *morally fungible*, in contrast to dissimilar behaviors, consistent with the notion that people use different mental accounts to keep track of their PEBs. Even though the result supports our hypothesis, it is important to mention that the effect size is too small to be practically meaningful. We treat this issue in-depth in the general discussion.

While this experiment explores conditions under which an initial PEB results in a reduction of the willingness to show further PEBs, the necessity to promote more sustainable lifestyles (IPCC, 2014) calls for the development of interventions which may reduce such negative spillover effects. In the second experiment, we addressed this issue. Built on the argument that decisions based on negative affect are especially prone to negative spillover (Truelove et al., 2014), we investigated the impact of affect on the willingness to show a second PEB. Furthermore, we examined whether (i) campaign messages framed to elicit negative affect are especially likely to stimulate mental bookkeeping and thus result in

negative spillover across similar PEBs, and (ii) campaign messages framed to elicit positive affect may be a means to avoid negative spillover across similar PEBs.

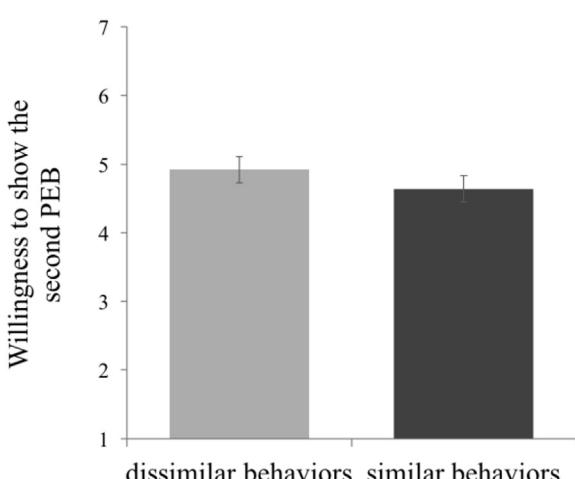
### 3. Experiment 2

The relevance of affect and emotion as determinants of environmentally relevant behavior has been gaining more attention in recent years (Brosch, Patel, & Sander, 2014). Research has shown that individuals feeling more worried about the environment (Lee & Holden, 1999) or more guilty about a lack of action (Bamberg & Möser, 2007; Homburg, Stolberg, & Wagner, 2007; Kals & Maes, 2002; Thøgersen, 2006) are more likely to show PEBs. These observations are consistent with emotion regulation theories positing that people have a tendency to avoid negative feelings (e.g., regret and sadness) and increase positive ones (e.g., happiness and joy). People experiencing negative feelings are motivated to reduce this affective deficit through mood-elevating actions such as pro-social behaviors (Cialdini et al., 1987). Interestingly, individuals experiencing a negative affective state followed by affective relief have been shown to be less likely to show a subsequent altruistic behavior than individuals not experiencing affective relief (Cialdini, Darby, & Vincent, 1973). This finding is consistent with the notion that negative affect can motivate moral behavior in the short run, but can reduce long-term moral behavior, thus finally boosting negative spillover (Truelove et al., 2014).

Positive affective states have been shown to enhance the probability of acting pro-socially (Manucia, Baumann, & Cialdini, 1984) or pro-environmentally (Harth, Leach, & Kessler, 2013) as well. These effects have been interpreted in two different theoretical frameworks, suggesting distinct underlying mechanisms (Miller, 2009). According to the mood maintenance theory, positive affect triggers the desire to maintain this positive mood, with pro-social or pro-environmental behaviors being one option to maintain this state (Miller, 2009; Schaller & Cialdini, 1990). A second perspective does not consider the maintenance of a positive mood as the primarily goal of acting pro-socially, but rather conceptualizes pro-social actions as concomitants of the positive state (Cialdini, Kenrick, & Baumann, 1982; Manucia et al., 1984). That is, positive affect leads to cognitive changes such as an increased optimism about the future (Masters & Furman, 1976) or a recall of rewards of past good deeds (Isen, Shalker, Clark, & Karp, 1978), which in turn promote pro-social behavior. A subsequent PEB can therefore be seen as a causal byproduct of positive affect, rather than an immediate consequence. Both theoretical perspectives are consistent with the expectation that positive affect would motivate moral behavior both in the short and in the long run, thus potentially reducing negative behavioral spillover.

In Experiment 2, participants were again presented with a scenario in which they encountered a campaign message related to environmental protection. They were then informed that after encountering this message, they performed a first PEB related to the recycling of plastic bottles, and were asked to rate to what extent it was likely that they would later show a second PEB. Identical to Experiment 1, the second PEB was either similar or dissimilar to the first one. In contrast to Experiment 1, we experimentally varied whether the campaign message was framed to elicit negative or positive affect.

We hypothesized that the campaign inducing positive affect will result in a higher willingness to show a second PEB. In particular, we expected this effect to be mediated by the level of affect perceived by the participant. Finally, we wanted to explore whether the affect-inducing environmental campaigns would influence the impact of behavioral similarity and thus modulate mental bookkeeping effects.



**Fig. 1.** Willingness to show a second PEB after having performed a first PEB. The indicated willingness to show a second, similar PEB was smaller than the willingness to show a second, dissimilar behavior. Vertical bars represent 95% confidence intervals.

Previous research on determinants of behavioral consistency and spillover in the environmental domain has pointed out an important role of people's environmental self-identity (Van der Werff, Steg, & Keizer, 2014). It was shown that reminding people of past good deeds strengthens their environmental self-identity and encourages further PEBs. Affect and self-identity are conceptually and empirically strongly interlinked (Brown & Taylor, 1986; McConnell, Rydell, & Brown, 2009). In our task, we additionally assessed peoples' environmental self-identity, in order to evaluate whether the effects of our affect manipulation (positive/negative campaign) can be explained by changes in peoples' self-identity only.

### 3.1. Methods

#### 3.1.1. Participants

In total 1418 people (54% females,  $M_{Age} = 48.93$ ,  $SD_{Age} = 15.23$ ) between 19 and 92 years of age took part in the experiment, which was conducted online. Participants from the general population of Germany were recruited via a panel provider and were paid for their participation. Determination of sample size was calculated as in Experiment 1.

#### 3.1.2. Materials and experimental design

Structure, including duration ( $Mdn_{Duration} = 6.84$ ), remuneration and quality check items were identical to Experiment 1. Similar to Experiment 1, participants read a short story telling them that on their way to work they caught sight of a campaign message concerning the recycling of plastic bottles in Germany. In the positive condition, the message displayed in the fictitious advertisement was framed with the intention to induce a positive affect ("You are a world champion! Thanks to you, more than 90% of all plastic bottles are recycled in Germany, more than in any other country. Thank you very much!"). In the negative condition, the message was framed with the objective to induce negative affect ("Your behavior harms the environment! Every year, 25'000 tons of plastic bottles are disposed in the household waste and cannot be recycled properly this way."). Both messages were supplemented by matching pictures. For the positive campaign, pictures showed a butterfly sitting on someone's hand, four people's hands with their thumb up and a cartoon of a smiling earth. In the negative condition, participants saw a turtle eating a piece of plastic, a bunch of plastic waste on a beach and a cartoon of an ailing earth. Afterwards, the procedure was identical to Experiment 1: Participants learned that, after reading the campaign message they performed a first PEB related to the recycling of plastic bottles. In a final step, participants were presented with a second PEB which was either similar or dissimilar to the first behavior. Identical to Experiment 1, the similarity of the behaviors (similar/dissimilar) was varied between participants. Participants were asked to indicate the likelihood that they would show the second PEB. The response was assessed using a scale from 1 (*very unlikely*) to 7 (*very likely*). At the end of the experiment, participants were asked to indicate the affect triggered by the campaign message on a scale from 1 (*very negative*) to 7 (*very positive*), ("What feeling has the advertising triggered in you?"). Environmental self-identity was measured using three items ("Acting environmentally-friendly is an important part of who I am", "I am the type of person who acts environmentally-friendly", "I see myself as an environmentally-friendly person") developed by Van der Werff, Steg, and Keizer (2013). Participants rated each item on a scale, ranging from 1 (*totally disagree*) to 7 (*totally agree*). Table 1 provides an overview of the correlations between the different variables for Experiment 1 and Experiment 2.

## 3.2. Results

### 3.2.1. Manipulation check: self-reported affect and environmental self-identity

The campaign message had the desired effect on participants' self-reported affect, as revealed by an independent sample  $t$ -test,  $t(1416) = 19.47$ ,  $p < .001$ ,  $d = 1.03$ , 95% CI [.92, 1.14]. As expected, people who saw the positive message rated their affect as more positive ( $M = 5.14$ ,  $SD = 1.11$ , CI [5.06, 5.22]) than people who saw the negative message ( $M = 3.84$ ,  $SD = 1.39$ , CI [3.74, 3.94]). To test that both campaign messages changed participants' affect in the desired direction, we compared mean values of Experiment 2 with the neutral campaign from Experiment 1. As expected, the negative message led to a more negative affect ( $p < .001$ ) as compared to the neutral campaign ( $M = 4.29$ ,  $SD = 1.21$ ),  $F(2, 2124) = 200.73$ ,  $p < .001$ ,  $d = .87$ , CI [.77, .96]. Importantly, participants' environmental self-identity was not influenced by the campaign messages; no difference in reported environmental self-identity between the positive ( $M = 5.41$ ,  $SD = .99$ , CI [5.34, 5.48]) and the negative ( $M = 5.38$ ,  $SD = .94$ , CI [5.31, 5.45]) campaign conditions was observed ( $t(1405) = .684$ ,  $p = .494$ ,  $d = 0.04$ , CI [-.07, .14]).

### 3.2.2. The impact of self-reported affect on the willingness to show a second PEB

We calculated a mediation analysis in order to assess the extent to which self-reported affect acted as a link between the campaign message and the willingness to show a subsequent PEB. Most importantly, the relationship between campaign message and willingness to show a second behavior was mediated by the self-reported affect, as revealed by a significant indirect effect of campaign message on the willingness to show a second PEB via self-reported affect ( $\beta_2\beta_3 = .20$ ,  $p < .001$ , 95% CI [.15, .25]). Moreover, as Fig. 2 illustrates, the campaign message had a strong influence on the self-reported affect ( $\beta_1 = .65$ ,  $p < .001$ , CI [.59, .72]), in that self-reported affect was more positive in the positive campaign condition as compared to the negative campaign (see also manipulation check). Furthermore, more positive affect was related to a higher willingness to show a second PEB ( $\beta_2 = .30$ ,  $p < .001$ , CI [.23, .37]). Overall, these findings suggest that a positive campaign message induced a more positive affect, which enhanced people's willingness to show the second behavior. The campaign message had a negative direct effect on the willingness to show a second PEB when self-reported affect was included in the model ( $\beta_3 = -.17$ ,  $p = .002$ , CI [-.27, -.06]). However, no direct effect of campaign ( $\beta_3 = .03$ ,  $p = .533$ , CI [-.06, .12]) was found when self-reported affect was excluded from the model, which suggests that there was no impact of the campaign message per se on behavior change. Instead, these results support the assumption that self-reported affect acts as the key mediator between the environmental campaign and the reported behavior.

### 3.2.3. The impact of campaign message and PEB similarity on willingness to show second PEB

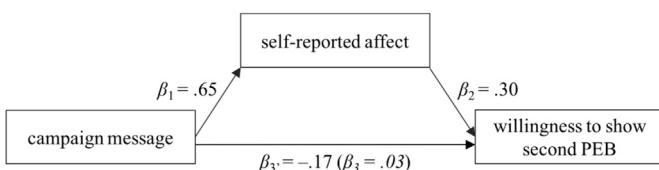
After confirming the important role of affect on participants' willingness to show a second PEB, we aimed to examine whether the affect-inducing campaigns influenced the mental bookkeeping processes observed in Experiment 1. We conducted a  $2 \times 2$  (campaign message [negative vs. positive]  $\times$  similarity of the first and second PEB [similar vs. dissimilar]) ANOVA in order to assess the influence of message framing and PEB similarity on participants' reported willingness to show a second PEB. That is, we tested whether a positively framed campaign message may act as an intervention to promote a subsequent pro-environmental behavior. Replicating the findings of Experiment 1, participants indicated a

**Table 1**

Zero-order correlations of the variables examined in Experiments 1–2.

| Study variables                 | 1                    | 2                    | 3                    | 4                    | 5           |
|---------------------------------|----------------------|----------------------|----------------------|----------------------|-------------|
| <b>Experiment 1</b>             |                      |                      |                      |                      |             |
| 1 willingness to show 2nd PEB   |                      |                      |                      |                      |             |
| 2 similarity                    | −.077 ( $p = .041$ ) |                      |                      |                      |             |
| Mean (SD)                       | 4.78 (1.82)          |                      |                      |                      |             |
| <b>Experiment 2</b>             |                      |                      |                      |                      |             |
| 2 similarity                    | −.056 ( $p = .034$ ) |                      |                      |                      |             |
| 3 campaign message              | .017 ( $p = .533$ )  | .000 ( $p = 1.000$ ) |                      |                      |             |
| 4 similarity × campaign message | −.072 ( $p = .007$ ) | .949 ( $p < .001$ )  | .000 ( $p = 1.000$ ) |                      |             |
| 5 self-reported affect          | .194 ( $p < .001$ )  | −.033 ( $p = .216$ ) | .460 ( $p < .001$ )  | −.040 ( $p = .129$ ) |             |
| Mean (SD)                       | 4.83 (1.80)          | —                    | —                    | —                    | 4.49 (1.42) |

Mean and standard deviations for non-categorical variables only. Similarity: −1 = dissimilar, 1 = similar; Campaign message: −1 = negative, 1 = positive; Willingness to show 2nd PEB: 1 (very unlikely) to 7 (very positive); Self-reported affect: 1 (very negative) to 7 (very positive).



**Fig. 2.** Self-reported affect mediates the relationship between campaign framing and willingness to show a second PEB.

smaller willingness to show a similar second PEB ( $M = 4.73$ ,  $SD = 1.76$ , 95% CI [4.60, 4.86]) than a dissimilar one ( $M = 4.93$ ,  $SD = 1.84$ , CI [4.79, 5.07]), as illustrated by a main effect of *similarity*,  $F(1, 1414) = 4.53$ ,  $p = .033$ ,  $d = .11$ , CI [.09, .22]. Most importantly, a statistically significant interaction of *similarity* and *campaign message*,  $F(1, 1414) = 4.92$ ,  $p = .027$ ,  $\eta^2 = .004$ , CI [.00, .01], revealed that this effect was driven by participants exposed to the negative message, but was not observed in participants exposed to the positive message (see Fig. 3).

Simple effects showed that, while participants exposed to the negative campaign message indicated a smaller willingness to show a second, similar PEB ( $M = 4.59$ ,  $SD = 1.82$ , CI [4.40, 4.78]) as compared to a second, dissimilar PEB ( $M = 5.01$ ,  $SD = 1.78$ , CI [4.82, 5.19];  $F(1, 1414) = 9.44$ ,  $p = .002$ ,  $d = .01$ , CI [.00, .02]), the

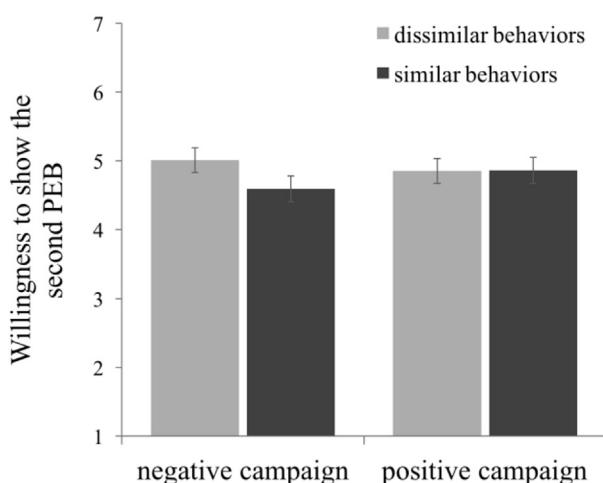
willingness to show these two PEB types did not differ for participants exposed to the positive campaign ( $M_{similar} = 4.86$ ,  $SD_{similar} = 1.68$ , CI [4.68, 5.05];  $M_{dissimilar} = 4.85$ ,  $SD_{dissimilar} = 1.91$ , CI [4.67, 5.04];  $F(1, 1414) = .004$ ,  $p = .950$ ,  $d = .00$ , CI [.00, .00]). These results support the assumption that positively framed campaign messages can prevent negative behavioral spillover in a sequence of similar PEBs.

### 3.3. Discussion

In Experiment 2, we investigated the role of affectively framed campaign messages in the context of sequences of PEBs. First, we showed that self-reported affect mediated the relationship between campaign message and willingness to show a fictitious second PEB. Participants experiencing more positive affect after reading an affect-based campaign message reported a higher willingness to show a second PEB after having performed a first one, indicating that positive affect may play an important role in promoting long-term eco-friendliness.

Interestingly, the mediation model showed that the affective campaign message had a positive indirect effect on the willingness to show the second behavior via experienced affect. In contrast, the direct effect of campaign on willingness to perform a second PEB was non-significant and turned to a significant negative effect when experienced affect was included in the model. Taking into account the strong correlation between campaign message and self-reported affect, this pattern speaks for a possible suppressor effect (MacKinnon, Krull, & Lockwood, 2000; Paulhus, Robins, Trzesniewski, & Tracy, 2004).

Second, replicating the results from Experiment 1, participants reported that they would be less likely to show a second PEB after having performed a first PEB if the two behaviors were perceived as similar, compared to when behaviors were not similar to each other. Extending these findings, results indicate that an affective campaign message framing can moderate this effect: While a negative message framing led to a negative spillover effect similar to the one observed in Experiment 1, a positive message framing reduced this effect. Participants were equally likely to show the second PEB independent of the two behaviors' similarity. Thus, results suggest that a positively framed campaign message may help mitigating the adverse effects of mental bookkeeping mechanisms and thus reinforcing more enduring pro-environmental behavior. While research previously provided evidence for the general effects of positive affect on PEB (Harth et al., 2013), the present research may serve as a starting point for future research investigating the processes underlying the influence of affect on behavioral spillover. Similar to Experiment 1, the practical relevance of the findings is severely restricted due to the small effect sizes.



**Fig. 3.** Willingness to show a second PEB after having performed a first one for the experimentally varied negative and positive framed campaign message conditions. For the negatively framed campaign message, the indicated willingness to show a second, similar PEB was smaller than the willingness to show a second, dissimilar behavior. No such difference was detected for the positive framed campaign message. Vertical bars represent 95% confidence intervals.

#### 4. General discussion

Even though people are being more educated and sensitized concerning climate change and related issues (Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015), there is still substantial need to develop more eco-friendly lifestyles in order to effectively counter climate change (IPCC, 2014). To ensure that individuals act environmentally friendly in the long-term, it is important to take into account sequential effects concerning the interdependency of consecutive pro-environmental behaviors. Behavioral spillovers take place when performing an initial behavior either boosts or inhibits the likelihood of showing a subsequent one. In this manuscript, we investigated the influence of a mental bookkeeping of past behaviors on the willingness of showing future behaviors. This approach is based on an integration of the social-psychological literature of moral self-regulation and insights from behavioral economics concerning mental accounting mechanisms. In two experiments, findings indicate that once individuals have performed a first PEB, they are less willing to show a second one if it is similar to the first one as compared to when it is less similar. While this finding is in line with previous studies on moral licensing, which show that an initial moral behavior can be used as an excuse to act less morally in the aftermath (Blanken, van de Ven, Zeelenberg, & Meijers, 2014; Girod & de Haan, 2009, p. 34; Maimaran & Goldsmith, 2011; Margetts & Kashima, 2016; Schütte & Gregory-Smith, 2015), it additionally points out the importance of the characteristics of the types of behaviors in the sequence.

Similar to financial deposits on mental accounts (Thaler, 2008), deposits of moral credit may have been fungible for similar behaviors (credited to the same moral account), while not fungible for dissimilar behaviors (credited to different moral accounts). Together, these results point to the usefulness of integrating concepts from the mental accounting literature into moral self-regulation theory: In itself, latter would not have expected differences as a function of the similarity of the behaviors, given that participants from both experimental groups would have experienced a positive change in their self-concept.

A second issue addressed in the present work was the role of affect in behavioral spillover effects. Many campaigns using affect and emotions are focusing on negative emotional appeals, trying to induce fear or guilt (Banerjee et al., 2013; Brennan & Binney, 2010; Huhmann & Brotherton, 2013; Mair, 2011). In their theoretical framework of spillover effects, Truelove et al. (2014) emphasize that negative affect may be especially likely to induce negative spillover, as people may show an initial PEB in order to reduce the negative affect, but then afterwards not feel motivated any more to show subsequent behaviors. Here we present first evidence indicating that also positive affect may play a role in determining whether one shows a subsequent PEB. More positive affect – induced through a positively framed campaign message – was related to a higher willingness to show a second PEB than negative affect induced by a negatively framed campaign message.

Comparing the impact of neutrally, negatively and positively framed campaign messages on subsequent PEBs indicates that the affective content of an environmental campaign may influence behavioral spillover. While under the negatively and neutrally framed message similarity-based negative spillover was observed, this effect was not found under the positive message framing, supporting the notion that positive affect may motivate moral behavior both in the short and in the long run.

Importantly, while the results statistically support the concept

of a mental bookkeeping of PEBs and the idea of affect as a mediator in terms of null hypothesis significance testing (NHST), the effect sizes can be considered as too small to be of practical relevance in the context of intervention development (for a discussion of the drawbacks of NHST see: Cumming, 2013). This is in particular true in light of opportunity costs that need to be taken into account when developing interventions in practice. That is, the practical implementation of a positively framed campaign message as examined here is accompanied by forgoing potentially more effective strategies, such as social norm-based strategies, which have been shown to be effective in changing behavior (Alló & Loureiro, 2014; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Nevertheless, it is possible that replications using more robust measures such as multi-item instead of single-item measures (see discussion below) or examining actual behavior in more realistic settings might reveal larger effects. Further, the influence of affective campaigning may potentially cumulate over time (Prentice & Miller, 1992), which could be tested in an experimental setting incorporating extended sequences of behaviors. Thus, we highly encourage researchers to advance the present findings by means of future studies.

Beside the small effect sizes, the results observed across the two experiments are somewhat qualified by the hypothetical character of the task and the fact that in everyday life behaviors are probably often not as clearly related to each other as in the scenarios used in our task. Based on this reasoning, the ecological validity of our findings may be questioned. However, the novelty of our approach in the context of spillover effects justifies to a certain degree the use of highly controllable online experiments addressing hypothetical behaviors. Speaking in favor of the validity of our findings, in their meta-analysis Blanken et al. (2015) report no difference between studies including actual or hypothetical behaviors. However, given the role of the intention-behavior gap frequently observed with regards to PEBs (Kollmuss & Agyeman, 2010), it would be important to replicate the experiment in the field in future research, with real behaviors instead of reported likelihoods and intentions.

Additionally, single-item measures as used here can be considered as less reliable than multi-item measures. Even though single-item measures have been shown to be appropriate measures in different fields such as clinical studies (Hoeppner, Kelly, Urbanoski, & Slaymaker, 2011), research on marketing (Ang & Eisend, 2017; Bergkvist & Rossiter, 2007), and personality (Spörrle & Bekk, 2014), other studies report weak reliabilities for single-item measures of about .60 (e.g., Wanous, Reichers, & Hudy, 1997). Additionally, using single-items measures can weaken construct validity, given that the examined variance could be specific to the behavior at hand rather than the domain of PEBs. That is, some people might not consider cleaning up a local forest, because they live in an urban area without immediate access to a forest. Similarly, some behaviors may have been perceived as easier or more attractive than others. Under these conditions, the specific characteristics of the given behavior may have potentially influenced the willingness to perform the action. Future studies using multi-item measures (e.g., the scales developed by Kaiser & Wilson, 2000 or McConaughay, 2014) can address this issue.

Concerning the results on affect and PEBs, two other alternative explanations need to be addressed more specifically. First, psychological reactance seems like a potential explanation for the reported findings. People may have been more willing to perform a dissimilar behavior after being “forced” to show the first behavior. However, experiencing psychological reactance is strongly

connected to perceiving negative affect (Dillard & Shen, 2005), while we did find no evidence for increased negative affect in the “similar” conditions.<sup>2</sup> Moreover, psychological reactance is linked to the cognitive process of counterarguing (Rains, 2012). A measure of this could be included in future studies for a more differentiated analysis of the role of reactance in this process. Second, it is possible that the positive campaign message in Experiment 2 may have been interpreted as a descriptive norm, as relative outcome information is given (“90% of all plastic bottles are recycled” in the positive condition versus “25'000 tons of plastic bottles are disposed in the household waste” in the negative condition). However, given the successful manipulation of people's affect, and the result of the mediation analysis showing the link between experienced affect and reported behavioral intentions, it is unlikely that norms account for all of the explained variance. We rather assume that norms, as well as psychological reactance processes, may interact with affect and highly encourage further studies tackling this issue.

Previous research has shown that activating people's environmental self-identity by reminding them of past environmental behaviors can increase the likelihood to show future PEBs (Van der Werff et al., 2014). It is unlikely that this can account for the findings reported here, as our analysis shows that environmental self-identity was not affected by the affective framing of the campaign messages. Our findings do however raise the possibility that the effects linked to strengthening one's environmental self-identity observed in the study by Van der Werff et al. (2014) may (at least partly) be attributed to increases in positive affect related to the activation of positive aspects of one's self-identity. Future empirical research should investigate this possibility. Future research could furthermore include behaviors with a negative environmental impact, testing the hypothesis that a first behavior may not only reduce the likelihood of showing a second PEB, but also encourage subsequent environmentally harmful behavior. In addition, it would be desirable to consider individual factors as potential moderators in more detail. Even though individual differences are to a certain degree addressed by controlling for environmental self-identity, more detailed analyses are necessary.

Taken together, our results indicate that behavioral similarity may play a role in spillover effects. People may be more willing to use an initial PEB to omit a second, similar PEB, as compared with a second, dissimilar PEB. This is consistent with the notion of a mental bookkeeping of past pro-environmental behaviors similar to mental accounting in the behavioral economics literature (Thaler, 1980; 2008). This effect was offset by a positively framed campaign message. Our results point out a possible psychological mechanism regulating behavioral spillover. Regarding the significance of our results in the context of practical applications, the small size of the effects obtained here suggests that findings are rather negligible with no meaningful impact for intervention design in practice. This is relevant since opting for a specific intervention strategy in practice is potentially accompanied by the opportunity costs of forgoing more efficient ones. Given the small effect sizes obtained here and in other studies of this kind, replication studies are strongly encouraged.

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<sup>2</sup> An independent samples *t*-test assessing the influence of the similarity of the two behaviors (similar/dissimilar) on self-reported affect showed no difference between the two experimental conditions: similar behaviors:  $M = 4.44$ ,  $SD = 1.41$ , 95% CI [4.34, 4.54]; dissimilar behaviors  $M = 4.54$ ,  $SD = 1.43$ , CI [4.43, 4.65];  $t(1416) = 1.237$ ,  $p = .216$ ,  $d = .07$ , CI [-.04, .17].

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