

The Role of Habitual and Occasional Actions in Green Practices: Manipulating Ease of Retrieval towards Environmental Self-Identity and Pro-Environmental Behaviour

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Abstract

Responding to the dire need of more sustainable living, a multitude of studies have investigated what factors determine individual's sustainable practices and how they may be facilitated. Research suggests identity priming as a potent lever towards green behaviour, however the few studies that assess this use self-reported rather than behaviour as outcome variables and yield diverging results. The aim of this study was to investigate the causal link between ease of retrieval and environmental self-identity and subsequent pro-environmental behaviour, as well as the role that habit plays in this relation. It was hypothesised firstly that Ease of Retrieval positively predicts Environmental Self-Identity, secondly that this relation is moderated by the extent to which the retrieved behaviours are habitual, and lastly that Environmental Self-Identity in turn positively predicts Pro-Environmental Behaviour. Data was obtained via an online questionnaire, where participants were allocated to conditions with either an easy or a difficult task of recollecting past environmental practices as an identity prime. No support was found for these hypotheses, however the manipulation check Perceived Ease of Retrieval did positively correlate with Environmental Self-Identity, and additional analyses suggested that PEOr instead mediates the relation between Habit and ESI. Further research is needed to gain better understanding of this link, and of the mechanisms that determine whether green identity actually translates into green behaviour.

Keywords: Ease of retrieval, habit, environmental self-identity, pro-environmental behaviour.

The Role of Habitual and Occasional Actions in Green Practices: Manipulating Ease of Retrieval towards Environmental Self-Identity and Pro-Environmental Behaviour

The 2021 United Nations Climate Change Conference marked a milestone in the acknowledgement of the urgency of the advancing climate crisis (Wyns & Beagley, 2012). Although the detrimental effects of greenhouse gas emissions on global warming are scientifically established since the 1950s, societies' advance on a path of irreversible damage to the natural environment is yet accelerating (Böhm & Sullivan, 2021; Weart, 1997). For some species and habitats, this process is already beyond possible repair, with the last decade marking the highest temperatures globally on record (Böhm & Sullivan, 2021; World Meteorological Organisation, 2021-a). Global warming causes rising temperatures, natural disasters, rising sea levels and temperature, melting ice and acid oceans, endangering the life of humans, fauna and flora (World Meteorological Organisation, 2021-a). That humans are the driving force behind the climate crisis has been acknowledged virtually unanimously by the scientific community, urging for a sharp turn in society's interaction with the natural environment, most significantly in areas of consumption, mobility and other lifestyle factors (Powell, 2015; World Meteorological Organisation, 2021-b).

Nevertheless, there is a large discrepancy between the public awareness of how individual behaviour affects the environment and the resulting actual engagement in pro-environmental behaviour (PEB), with greenhouse gas emissions rising steadily still to this day (World Meteorological Organisation, 2021-b). Addressing this urgent need for behavioural change, a growing body of research is investigating how PEB may be facilitated (Lange & Brick, 2021). Recent studies suggest that interventions may leverage individuals' memory of past behaviour to facilitate an environmental self-identity (ESI) and in turn behaviour, however only

few studies with such manipulations exist, and the results they yield vary (Gkargkavouzi et al., 2019; Van der Werff et al., 2013; Zeiske et al., 2021). To shed further light on the facilitation of PEB through ESI, and give implications for green interventions, this study investigates how the recall of past actions affect ESI and in turn PEB.

Pro-Environmental Behaviour

PEB relates to any behaviour that is aimed at preserving or reinstating natural resources and habitats (Lange & Dewitte, 2019). Kaiser et al. (2007) established six broader categories of PEB, namely consumption of goods, recycling, waste behaviours, energy consumption, transportation, and social activism. Researchers have deduced a range of factors that drive and influence these behaviours, many of which interact with each other (Blankenberg & Alhusen, 2019). Stern (2000) was the first to conceptualise these along the four dimensions socio-demographic variables such as age, gender, education, or socio-economic standing; habits or routines; context-dependent factors such as laws, social expectations or personality traits; and attitudinal determinants such as beliefs, awareness and norms (Blankenberg & Alhusen, 2019).

Environmental Self-Identity

Of the final category of Stern (2000), two factors have been crystallised as highly important determinants of green practices (Van der Werff et al., 2013-b). Firstly, Van der Werff et al. (2013-b) name biospheric values, which relate to individuals' guiding principles stable over time, and secondly ESI, which is described as holding a concept of oneself that closely incorporates environmentally friendly beliefs, intentions and actions (Zeiske et al., 2021). Multiple authors suggest that in their relation to PEB, self-identity seems to fully mediate the effect of biospheric values on PEB (see for example Gkargkavouzi et al., 2019; Van der Werff et al., 2013-b; Zeiske et al., 2021).

Although biospheric values precede ESI, holding such values does not automatically mean also having a higher ESI - only few of those people who uphold biospheric values also endorse these as an important part of their identity, possibly because they feel that they are less responsible for environmental damage or its mitigation than others, or because they do not think that their personal behaviour has the power to have any impact towards preserving the environment (Biel et al., 2005; Van der Werff et al., 2013-b). In terms of behavioural interventions, these findings suggest that self-identity offers a promising lever to manipulate PEB than pro-environmental values, as such values do not necessarily translate into ESI, whereas ESI is more reliably linked to sustainable practices (Biel et al., 2005; Van der Werff et al., 2013-b). Thus, interventions targeting biospheric values may not translate into identity and thus behaviour, while targeting identity may provide a more immediate influence on actual behaviour.

Although the literature on such interventions on ESI is still in its infancy, several authors have already shown that ESI is malleable, and thus provides leverage for interventions towards more sustainable behaviour (Gkargkavouzi et al., 2019; Van der Werff et al., 2013-b; Whitmarsh & O'Neill; Zeiske et al., 2021). Apart from biospheric values, a second important antecedent of ESI was found to be past behaviour (Gkargkavouzi et al., 2019; Van der Werff et al., 2013-b; Zeiske et al., 2021). Past behaviour is reflected in self-identity through the process by which individuals make sense of themselves by perceiving their own actions, where past PEB would be inferred as an indicator of having an environmentally-friendly identity (Fanghella et al., 2019). It is individuals' perception of their own past behaviour that determines their self-identity, and this perception can be targeted in behavioural interventions.

Past Behaviour

A multitude of studies show how the perception of individuals' own past actions is impacted by the ease with which they can retrieve instances of such behaviour (Lauren et al., 2019). Successful retrieval of past behaviour therefore facilitates the respective self-concept that is related to the retrieved behaviour, and in turn facilitates engagement in the respective behaviour. Although a number of studies show that reminding individuals of past PEB strengthens their ESI, the literature on experimentally manipulating the perception of own past behaviour is scarce, and usually assesses outcomes of pro-environmental intentions or self-reported behaviour, which, Lange (2022) makes the case, has repeatedly proven to be an unreliable indicator of actual observable behaviour (Cornelissen et al., 2008; Fanghella et al., 2019; Gkargkavouzi et al., 2019; Lauren et al., 2019; Van der Werff et al., 2013a; Van der Werff et al., 2014).

Experimental manipulation of recalled past behaviour can be conducted via so-called Ease of Retrieval (EoR) manipulation. Schwartz et al. (1991) were the first to show how present perceptions of past experience could be influenced by manipulating the level of difficulty with which it could be recalled, for example by asking participants to recall things that lie far in the past or that they encountered only seldomly. Relying on the availability heuristic, the subsequent perception of the recalled object is then dominated by that which comes to mind most readily (Tversky & Kahnemann, 1973). Schwartz et al. (1991) successfully manipulated participants' perceptions of past behaviour by either instructing them to list a high number of behaviours for difficult, or a low number of behaviours for easy retrieval. Applying these findings to environmental behaviour, individuals would be predicted to have an enhanced sense of ESI if

they were asked to retrieve instances of past PEB that came to mind easily, for example if they were asked to retrieve only a small as compared to a high number of behaviours.

Habit

There is little research that utilises EoR manipulations in an attempt to facilitate ESI and PEB. The few studies that do relate to this seldomly differentiate between the types of behaviours that are recalled, although Fanghella et al. (2019) suggest that the relation between past environmental behaviours and ESI is positively affected by the extent to which the recalled behaviours are habits - behaviours that require little effort, are relatively automatic and enacted frequently, which in literature are most often measured simply via behavioural frequency (Wood & R nger, 2016). They report that recall of past behaviour facilitates ESI only for individuals who enact it habitually, but not those who do so occasionally.

This finding corresponds with the exhaustive body of literature on the important role that habits play for individuals' PEBs (see for example Ajzen & Fishbein, 2018; Armitage, 2007; Gkargkavouzi, 2009; Verplanken & Roy, 2016). On the other hand, Whitmarsh and O'Neill (2010) raise from their literature search the idea that behaviour forms identity only so long as it is occasional and thus subject to conscious decision-making, but loses impact once it becomes routine and automatic and does not require conscious attention anymore. Converging these different findings, Cornelissen et al. (2008) propose that although people would normally not attribute common sustainable practices to their identity as they tend to be taken for granted, they would do so as soon as such behaviours are cued as being enacted for environmental purposes.

Thus, the difference in the findings of Fanghella et al. (2019) and Whitmarsh and O'Neill (2010) may lie in the act of actively recalling the behaviour, as Fanghella et al. (2019) primed identity with recall of behaviour while Whitmarsh and O'Neill (2010) instead asked participants

about their ESI and then about PEBs that they enact. It may be that generally, behaviour informs identity less when it becomes habitual and shifts from attention and consciousness, however once it is recalled and brought back to attention, increasingly weights in on self-identity again. In that case, individuals who engage habitually in PEBs would normally lose sight of them and thus endorse them only weakly as part of their ESI, but upon recalling and bringing them back to consciousness would endorse them strongly as part of their self-identity as they are frequent and make up an important part of their everyday activities. Non-habitual behaviours, on the other hand, would have only a weak link to environmental self-identity, whether in everyday life or under conscious recall.

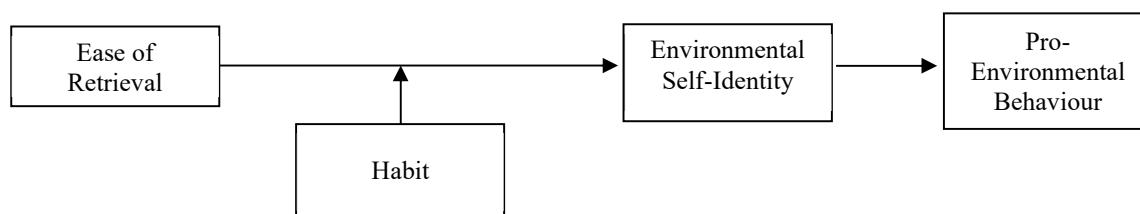
To address the lack of research on the effect of EoR on environmental self-identity, as well as the lack of subsequent assessment of actual behaviour, this study poses the question how EoR influences ESI and PEB, and to what extent this relation is moderated by Habit.

The Present Study

This research was part of a broader cross-national survey on PEB, data was collected via an online survey. Aim of the study was to investigate the relation between EoR of past PEB on ESI and subsequent PEB, with the moderator variable Habit. EoR was manipulated towards different outcomes of the dependent variables of ESI and PEB.

Figure 1

Conceptual Framework



Hypotheses

1. EoR positively affects ESI; Participants in the High EoR condition score higher on Environmental Self-Identity than participants in the Low EoR condition.
2. The effect of EoR on ESI is moderated by Habit; Participants that engage more in habitual behaviours experience a more pronounced effect of the Ease of Retrieval task on their Environmental Self-Identity and vice versa.
3. ESI is positively correlated with PEB.

Methods

Study Design & Participants

The present report focussed on the relationship between the independent variable EoR, the moderator variable Habit, and the main dependent variable ESI as well as the additional dependent variable PEB. In a between-participants (low vs high EoR) design, participants were randomly allocated to one of two behaviour recall conditions, which assessed behavioural recall in a low and in a high demand condition. Habit and ESI were assessed via scales, PEB via a fluke donation opportunity. Additionally, demographic variables such as age, gender, and nationality were collected. Ethical approval was granted by the BMS Ethics Committee on April 5th, 2022.

Participants were recruited via convenience and specifically snowball sampling on social media such as Instagram, Facebook, or WhatsApp, as well as through the University-owned Test Subject Pool Sona-System. Participation was on voluntary basis, with no compensation or a small compensation in the form of 0.25 student credits for students of the University of Twente that participated via Sona. Individuals were included if they were above the age of 18, sufficient at the English language, and had access to internet and an e-mail address. Exclusion criteria were

unserious answering, trolling, and denied consent. Of the initial subject pool of 194 participants, 78 were excluded for not fully completing the questionnaire, and further 18 were excluded due to not passing the attention measure. No further participants had to be excluded under the criteria of deviating execution times on the EoR task or falling under the age cut-off of 16 years.

The resulting subject pool consisted of 98 participants between the ages of 17 and 71 ($M = 25.79$, $SD = 9.84$). The male-female ratio was relatively even, with very few diverse (table 1). The sample was predominantly of German nationality, with 82 German participants, 6 Dutch, and 10 of other nationalities. The majority of the participants completed Secondary Education or a bachelor's degree, where most participants indicated that they are students or working. After random distribution across the two experimental condition, the low EoR sample consisted of 39, and the high EoR group of 59 subjects. The attrition rate for the low EoR condition was 30.36%, and for the high EoR condition 25.32%. Of all participants, 50.52% completed the entire survey. Personal identifies such as names were not recorded in the conductors' dataset to ensure anonymity of the participants.

Table 1

Demographic Characteristics

Characteristics	High EoR		Low EoR		Total Sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	25	25.5	16	16.3	41	41.8
Female	32	32.7	23	23.5	55	56.1
Diverse	2	2	0	0	2	2

Nationality						
German	48	49	34	34.7	82	83.7
Dutch	5	5.1	1	1	6	6.1
Other	6	6.1	4	4.1	10	10.2
Education						
Secondary education	27	27.6	15	15.3	42	42.9
Vocational training	7	7.1	1	1	8	8.2
Bachelor's degree	16	16.3	17	17.3	33	33.7
Master's degree	5	5.1	4	4.1	9	9.2
Doctor's degree	1	1	1	1	2	2
Other	3	3.1	1	1	4	4.1
Occupation						
Student	44	44.9	27	27.6	71	72.4
Trainee	1	1	2	2	3	3.1
Working	12	12.2	9	9.2	21	21.4
Unemployed	1	1	0	0	1	1
Retired	0	0	1	1	1	1
Other	1	1	0	0	1	1

Procedure

The time period of the data collection was from 16th of April until 6th of May 2022. Within the online portal Qualtrics, participants received information about the purpose of the study as well as the conditions of their participation and usage of their data (Appendix A). After giving informed consent, demographical information about age, gender, nationality, education and occupation was collected from the participants (Table 1).

Ease of Retrieval. In advance to the EoR manipulation, participants received identical instructions for the upcoming task: *‘In the following page you are asked to fill out a task that requires you to recall pro-environmental behaviours you have engaged in previously. Additionally, you will be given a definition what pro-environmental behaviours are. It is important that your answers are honest, complete and given without any help from the internet.’*, as well as identical definitions of PEB, reading *‘Pro-environmental behaviours are actions aimed at avoiding harm to and/or safeguarding the environment, either performed in public or private domains. In other words, think of any behaviour, large or small, that you do to protect the environment.’* Randomly allocated to one of two experimental conditions, subjects of the High EoR condition (High Ease corresponding to the easier task and vice versa) were instructed: *‘Please list 6 examples in which you have acted out pro-environmental behaviour’*, and subjects of the Low EoR condition (Low Ease corresponding to the more difficult task) to *‘Please list 12 examples in which you have acted out pro-environmental behaviour’* at any point in the past. They were not given any pointers or ticking options but were instead required to retrieve the examples from memory freely and type them into a response field. The EoR task was followed up by a manipulation check assessing the Perceived Ease of Retrieval (PEoR), where participants were asked to indicate How *‘[They] found the task...’* and *‘How difficult it was for [them] to recall [the] behaviours’* on a scale from (1) *Very Easy* to (7) *Very Difficult* (Appendix A).

Habit. Habit was measured via the Self-Report Index of Habit Strength by Verplanken and Orbell (2003). Twelve items assessed to what extent individuals perceive behaviour as habitual, with response options on a seven-point Likert scale ranging from *totally agree* (7) to *totally disagree* (1). All Items were adjusted from the original formulation *‘X is something ...’* to

'The behaviours that I listed are something ...' to refer to the recalled list instead of single behaviours. Items were for example (1) *The behaviours that I listed are something I do frequently*, (5) *The behaviours that I listed are something I do without thinking*, and (9) *The behaviours that I listed are something I would find hard not to do* (for all items, see Appendix A). A composite score was computed from the average of all items combined. In the present sample, the scale possessed internal consistency of $\alpha = .87$ after Cronbach's Alpha, and of .88 after Guttman's Lambda 2, indicating good internal consistency.

Environmental Self-Identity. ESI was assessed by means of a scale adapted by Van der Werff et al. (2013a) from Fielding et al. (2008), consisting of three items that were answered on a seven-point Likert scale ranging from *totally disagree* (1) to *totally agree* (7). The items were *'Acting environmentally friendly is an important part of who I am'*, *'I am the type of person who acts environmentally friendly'*, and *'I see myself as an environmentally friendly person'*. Index scores were computed of the average scores on the three items. Reliability analyses indicated good internal consistency, with Cronbach's Alpha = .88 and Guttman's Lambda 2 = .88.

Pro-Environmental Behaviour. PEB was tested by use of a deception opportunity for acting pro-environmentally. Participants were presented with a link to the official website of the World Wildlife Fund (WWF) and informed as following: *'You want to do something good for the environment? The researchers of this study have arranged a deal with the WWF. You can click the link up to a 100 times. For each click, the WWF will donate 5 cent to a pro-environmental cause. [...] Note that this is not a mandatory task and can be skipped by clicking on the skip button if you want'*. Action scores ranged from 0 (zero clicks on the link) to 100 (100 clicks on the link).

Attention Check. To measure if participants were paying attention and answering the questions conscientiously, they were asked towards the end of the questionnaire ‘*Still paying attention? Please select "Totally disagree"!*’. Participants who selected any other answer than ‘Totally disagree’ were excluded from analysis.

Lastly, participants were debriefed about the true nature and purpose of the EoR manipulation, as well as the deception measure for PEB. They were asked again to withdraw or give informed consent, and provided with contact information for possible inquiries to the researchers (Appendix A). The survey closed with a message of the researchers’ gratitude for their participation as well as confirmation that their response was recorded.

Data Analysis

Statistical analyses were conducted via the IBM software SPSS 25 and Hayes’ (2017) Process Macro Model extension. An initial overview of the nature of the participant pool was obtained via descriptive analyses, investigating in particular the variables age, gender, nationality, education and occupation per experimental condition and in total (Table 1). The ordinal variables PEO, Habit, ESI and PEB were tested for assumptions of linear regression analysis, and the nominal variable EoR was analysed for inter-group differences. All main variables were assessed for inter-group means and standard deviations, and analysed for inter-variable correlations using Pearson product-moment correlation (Pearson’s r) with a two-tailed significance for bidirectional relations. A Factor Analysis was conducted on the variables PEO, Habit and ESI, and a Pearson Correlation between EoR and PEO was conducted for the manipulation check. H1 and H2 were tested via linear regression analysis with EoR as the independent, Habit as moderating and ESI as dependent variable. H3 was analysed via

correlation analysis on the variables ESI and PEB using Pearson's r . All inferential analyses were conducted with a CI of 95%, which translates into $\alpha = .05$.

Results

Table 2

Means (M), Standard Deviations (SD), and Correlations between the Variables

Scale	<i>M</i>	<i>SD</i>	Correlations						
			EoR	PEoR	Habit	ESI	PEB	Age	Gender
EoR (0, 1)	1.4	.49							
PEoR (1-7)	3.39	1.35	.33**						
Habit (1-7)	4.98	.85	-.16	-.33**					
ESI (1-7)	5.23	1.02	-.05	-.34**	.55**				
PEB (0-100)	63.61	46.27	.06	-.12	.11	.15			
Age	25.79	9.84	.06	-.03	-.03	.12	-.09		
Gender	1.60	.53	-.02	-.05	.20*	.15	.28**	-.06	

** $p < .01$; * $p < .05$ $N = 98$

Manipulation Check

To investigate the EoR manipulation, a simple regression was conducted with the DV PEOER and the IV EoR, yielding significant results at $R^2 = .11$, $F(1, 69) = 11.34$ with $p = .001$. This indicates that as intended, participants that were allocated into the low EoR group perceived the EoR task as more difficult than those allocated to the high EoR group, suggesting that participants' PEOER was manipulated successfully (Table 2).

Table 3*Main Variable Statistics per Experimental Group*

Scale	EoR Condition			
	High Ease of Retrieval		Low Ease of Retrieval	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
PEoR (1-7) ^a	3.03	1.31	3.92	1.23
Habit (1-7)	5.09	.85	4.82	.83
ESI (1-7)	5.27	.96	5.17	1.12
PEB (1-100)	61.29	47.14	67.13	45.30

^a Higher Scores on the PEoR scale indicate higher experienced Difficulty.

Assumption Testing

Analysis variables were tested for general assumptions of multilinear regression. The Assumption of Normality was violated for the Variable PEB, but was met by all other variables. Further investigation indicates strong ceiling and floor effects for the PEB variable, with 27.6% of the participants scoring 0, and 60.2% scoring 100 on the task. This deviation from Normality does not impede with Bootstrapping and Regression analyses, which were conducted as planned. All variables met the Assumptions of Linearity, Homoscedasticity, and Absence of Multicollinearity.

Moderation Analysis

To investigate H1 '*EoR positively affects ESI*' and H2 '*The effect of ease of retrieval on ESI is stronger for habitual behaviour and weaker for occasional behaviour*', a moderator

analysis was conducted via PROCESS macro, with the DV ESI, the IV EoR, and the moderator variable Habit. The direct effect of EoR on ESI was not statistically significant at $B = -0.82$ with $p = .445$ and $t(97) = -0.77$, as was the interaction effect between EoR and Habit, with $B = 0.18$ at $p = .394$ and $t(97) = 0.85$, as well as the main effect of Habit on ESI ($B = 0.42$; $p = .184$; $t(97) = 1.34$). These results indicate that although the sum moderation model shows statistical significance, this sample shows neither internal effects of either the predictor or the moderator variable on the dependent variable, nor an interaction effect between the two of statistical significance, meaning that for both H1 and H2, the Null-Hypothesis cannot be rejected.

Regression Analysis

To test for H3 '*High ESI positively correlates with high PEB*', correlation analysis suggests no statistically significant relation between ESI and PEB, with $r(96) = .15$ at $p = .128$. This indicates for H3 that the Null-Hypothesis cannot be rejected, meaning that ESI does not have a significant effect on PEB.

Additional Analyses

To assess the validity of the measures for PEO, Habit, and ESI, a factor analysis was conducted. Principal Component Analysis indicated sufficient correlation of the data for factor analysis, with a Kaiser-Meyer-Olkin value of sampling adequacy of .83, and Bartlett's test of sphericity at $p < .001$. Results indicated a three-factor solution accounting for 57.84% of the total variance of the variables. Investigation of the factor loadings using Oblimin rotation with Kaiser normalisation indicate that the three factors correspond with the three variables PEO, Habit and ESI, where all items of PEO and ESI load most heavily onto the respective factors, although four items of the Habit scale load stronger onto the ESI component than Habit (see Appendix B for the Pattern Matrix). Under exclusion of these found items, Habit_reduced is computed and a

new moderation analysis run. Moderation analysis with PEO_R as independent, Habit_reduced as moderating and ESI as dependent variable indicate marginal statistical significance for the effect of PEO_R on ESI at $B = -.78$ and $p = .054$, and no statistical significance for the effect of Habit_reduced on ESI at $B = .04$ with $p = .901$, as well as for the interaction effect of Habit_reduced at $B = .12$ and $p = .116$.

Correlation analyses yielded statistically significant results for the link between PEO_R and Habit with $r(96) = -.33$ at $p = .001$, suggesting that participants that experienced the EoR task as difficult scored lower on the Habit scale. Similarly, PEO_R and ESI showed a statistically significant correlation at $r(96) = -.34$, with $p = .001$, which indicates that participants who experienced the EoR task as difficult also scored lower on the ESI scale. Lastly, the Habit variable was significantly correlated with ESI, at $r(96) = .55$ with $p < .001$, which suggests that participants with higher scores on the Habit scale also reported higher levels of ESI.

Motivated by the observation that not EoR, but its manipulation check PEO_R correlates with Habit and ESI, another moderation analysis was conducted with PEO_R as independent, Habit as moderator, and ESI as dependent variable. The moderation model showed statistically significant, at $F(3, 94) = 16.88$ with $p < .001$. The direct effect of PEO_R on ESI was marginally significant at $B = -0.64$ with $p = .06$ and $t(97) = -1.90$. The interaction between PEO_R and Habit was not statistically significant, with $B = 0.10$ at $p = .126$ and $t(97) = 1.54$, as was the main effect of Habit on ESI ($B = 0.24$; $p = .354$; $t(97) = .93$). Again, these results indicate that although the sum moderation model shows statistical significance, this sample shows neither internal effects of either the predictor or the moderator variable on the dependent variable, nor an interaction effect between the two of statistical significance.

To further investigate the relation between the three correlating variables, exploratory analyses with different regression models were tried. A mediation model with Habit as independent, PEOB as mediating, and ESI as dependent variable yielded results of statistical significance, with the direct effect of Habit on ESI indicating marginal statistical significance at $B = .6$ with $p < .001$ and $t(95) = 5.6$, whereas the model suggested a significant indirect effect of Habit on ESI with $B = .07$ at CI [.00, .17]. The main effect of Habit on PEOB showed statistical significance with $B = -.52$ with $p < .001$ and $t(96) = -3.43$, and marginal significance for the main effect of PEOB on ESI with $B = -.13$ at $p < .001$ and $t(96) = -1.95$. This mediation analysis is also run with Habit_reduced as independent, PEOB as mediating and ESI as dependent variable. The mediation analysis yields statistically significant results with a direct effect of Habit_reduced on ESI at $B = .46$ with $p < .001$, as well as the indirect effect of Habit_reduced on ESI at $B = .09$ with CI [.01, .20]. The main effect of Habit_reduced on PEOB is statistically significant at $B = -.55$ and $p < .001$, as well as the effect of PEOB on ESI with $B = -.16$ at $p = .033$. These results indicate that PEOB acts as a partial mediator between Habit and ESI.

Discussion

The aim of this study was to complement the existing literature on sustainability by assessing the effect of Habit on the relation between EoR and ESI, as well as the subsequent effect on PEB.

Ease of Retrieval, Habit, Environmental Self-Identity and Pro-Environmental Behaviour

Ease of Retrieval and Environmental Self-Identity. Firstly, it was hypothesised that high EoR would positively, and low EoR would negatively affect ESI. The findings of this study do not support this hypothesis, which runs contrary to previous studies of Cornelissen et al. (2008), Fanghella et al. (2019), Lacasse (2016) and Lauren et al. (2019), who report increases in

measures of ESI after manipulating perceived past behaviour. Although there was no direct effect of EoR condition on ESI, results instead showed an effect of the manipulation check PEOr on ESI, as well as a significant effect of EoR on PEOr, suggesting that although the experimental manipulation was successful in altering participants' PEOr, this effect did not suffice to carry over to their ESI as it did in studies of other authors.

Although Cornelissen et al. (2008), Fanghella et al. (2019), Lacasse (2016) and Lauren et al. (2019) used an ESI scale identical to this study, they utilised different manipulations for EoR, where participants either had to indicate how often they performed a list of predetermined behaviours (experimental conditions differing in how common the behaviours are on average), or list an equal amount of behaviours but either under the condition that they perform them often or occasionally. Thus, one possible reason for the deviating outcomes may lie in the differences between the experimental manipulation designs. The instruction of this study's manipulation read '*Please give twelve [or six] examples in which you have acted out pro-environmental behaviour!*', and closer inspection of the individual responses shows that almost all participants interpreted this as having to list different types of behaviours, rather than different situations of possibly similar behaviours as was intended.

For example, Schwartz et al. (1991) specifically instructed participants to describe 'examples of situations', instead of examples of actions, where participants may list similar behaviours in different contexts, which they did not do in this study. Thus, some participants of this study may have perceived the task as excessive and attributed their experience at retrieving behaviours more to the task than to their own performance at sustainable behaviours. For example, they may have reasoned that the task feels so demanding not because they are not sustainable but simply because the task itself is impossibly difficult, which may have impeded

with the power of the manipulation. This observation is in line with feedback that the researchers received from multiple participants who found the task (of the low EoR condition) excessively difficult and questioned whether any one person could come up with that many different behaviours.

Possibly connected to this may be the finding that the two experimental conditions had different attrition rates. Slightly more people dropped out from the low EoR (difficult task) condition than did from the high EoR (easy task) condition, which could imply that some people dropped out due to the difficulty of the task, however this interpretation is only hypothetical as it cannot be drawn from the data what motivated people to exit the survey at which point. Further research is required to shed more light on the varying mechanisms and outcomes of different EoR manipulations, specifically for informing robust interventions towards sustainable behaviour as well as better understanding people's real-life pro-environmental practices.

PEoR as a mediator. Secondly, it was hypothesised that retrieving habitual rather than occasional behaviours would enhance the effect of the EoR manipulation on participants' ESI. Analyses yielded no significant moderation effects, leading to the rejection of H2. However, significant correlations were found between all three of the variables PEO, Habit and ESI, and exploratory analyses suggested a partially mediating effect of PEO between the variables Habit and ESI, where participants that experienced the EoR task as easier were more likely to describe these behaviours as habitual and reported a stronger sense of ESI than those who found it difficult to list behaviours. This observed mediation seems contradictory to the moderation found by Fanghella et al. (2019), who suggested that recall of past PEB only translates into higher ESI for individuals who report that they enact the recalled behaviours frequently, however they

manipulated perceived past behaviour via recall of PEB versus random behaviours, rather than easy versus difficult recall like this study.

This suggests that priming ESI by asking participants to indicate to what extent they engage in a predetermined list of PEBs (prime/ no prime) takes a substantially different pathway towards identity than asking participants to list different amounts of behaviours (easy/ difficult), where Habit affects the relation between the act of retrieval and ESI on the one, as well as the perceived ease of this retrieval and in turn ESI on the other hand. In line with brain studies that highlight the importance that frequency plays in storage and recall of behaviour, the present study indicates that people who engage in sustainable practices habitually find it easier to recall such behaviours and also hold these closer to their self-conception (see for example Popov & Reder, 2020). Yet, leaving much open to guesswork, the relation between retrieval of behaviour, habit and identity needs further investigation, specifically investigating differences between diverging identity prime manipulations to inform future interventions that aim to facilitate sustainable practices, as well as replicate the existing studies to address the lack of literature on the matter. Nevertheless, the present findings allow the cautious suggestion that habitual rather than occasional behaviours provide leverage in retrieval manipulations that aim to positively influence green identity.

Environmental Self-Identity and Pro-Environmental Behaviour. Thirdly, it was hypothesised that PEB would be higher for participants with a high ESI. This prediction is not supported by the present study, with analyses indicating no statistically significant link between the two. In contradiction to these findings, a multitude of authors such as Gkargkavouzi et al. (2019), Van der Werff et al. (2013b), and Zeiske et al. (2021), report that ESI positively predicts PEB, however they all measured behaviour via self-report, which does not necessarily reflect

people's actual behaviours, and only few papers that investigate this link do so in connection to Ease of Retrieval.

On the other hand, Fanghella et al. (2019) report that although ESI is positively linked to self-reported behaviour, this effect fails to carry over to measures of actual observed behaviour. They suggest that this may be caused by negative spill-over effects, where EoR translates into moral licensing among individuals who score high on ESI (participants feel that their past contribution relieves them of responsibility for any further contribution) and into low scores on subsequent behaviour measures. Lending even more ambiguity to the literature, Lauren et al. (2019) propose a reverse contribution ethic, where higher ESI translates into a desire to contribute further at least to public behaviours.

This indicates that different factors that play into the relation between identity and behaviour may affect or cancel each other out, where distinction is needed between varying types of behaviours and the personality characteristics that influence them. Considering the lack of research that investigates ESI in relation to actual enacted behaviour rather than only self-reported behaviour, extensive future research is required to account for possible interaction variables such as spill-over effects, as well as valid measures of PEB while clearly distinguishing it from identity or attitude measures. Caution is rendered for future practice such as interventions aiming to manipulate individual's green identity towards green practices, as identity does not hold to be a reliable lever towards facilitating actual environmental practices without deeper understanding of its mechanisms.

Strengths and Limitations

Several limitations are to be taken into consideration when interpreting the findings of this study. With most participants being German, the sample is WEIRD-biased, where most

participants are of white, educated, industrialised, rich and democratic background. As politics, culture, education as well as financial and structural means all play into people's environmental practices, the results of the present study should not be generalised onto other backgrounds, and future research would benefit from a more diverse sample that reflects the fact that the climate crisis knows no borders (for an overview, see Blankenberg & Alhusen, 2019). In regard to the experimental manipulation, it ought to be noted that bias may have been introduced by the nature of the experimental task, which required high English proficiency of participants. As the majority of the sample was German, the condition where participants were instructed to list twelve different behaviours may have been disproportionately more demanding for participants with lower English proficiency.

Furthermore, the deception measure of PEB, where participants were invited to click a link with the promise of money being donated to an environmental cause, may have lacked convincing power as the instruction read that the researchers struck a deal with the WWF to donate this money. As the WWF is already an environmental organisation, this would merely lead to the movement of money that is already assigned to an environmental purpose over to another. This may not only have raised doubt in participants, but also introduced bias, as they may prefer money to be with the WWF, an organisation they are likely familiar with, instead of an unnamed 'pro-environmental cause'. Although it is unclear whether participants made note of this detail or not, future research would benefit from a more fool-proof measure, for example by simply adjusting the message to read that a major company that is not already a sustainability fund. One possibility would be to claim that a food brand will donate money to an environmental cause or fund such as the WWF, to suggest that money that was not already allocated to a sustainable purpose is re-allocated to one.

One factor that may be phrased both as limitation as well as strength is the use of an EoR manipulation that is novel to the context of ESI and PEB. Although the experimental design of Schwartz et al. (1991) that was used for this study has been replicated by many studies, the few papers that manipulated the retrieval of specifically environmental behaviour made use of diverging designs for the experimental manipulation (Cornelissen et al. (2008), Lacasse (2016) and Lauren et al. (2019)). Especially for the purpose of informing future interventions and studies, it is of value to test different designs of experimental manipulation, while at the same time it limits the extent to which results can be compared across the studies. Thus, literature would benefit from repeated replications of the different study designs, or even experiments that incorporate different manipulations to compare them directly with each other and inform environmental interventions.

The present study adds to existing literature as one of the few studies that investigate the effect of EoR on ESI and PEB. Among these few studies, it is the first to introduce a validated Habit measure to distinguish between habitual and occasional practices and the impact that their retrieval has on the subsequent measures of identity and behaviour, as habits have been implicated to play an important role both in the retrieval of past and the enactment of present and future behaviour (see for example Fanghella et al., 2019; Whitmarsh & O'Neill, 2010). Furthermore, it is the first to replicate the EoR manipulation of Schwartz et al. (1991) in the context of PEB, showing that this method can successfully manipulate participants' PEO of PEBs, as has been shown across other contexts already. Finally, this study is novel among others in that it measures pro-environmental behaviour via observation of actual enacted behaviour, whereas the majority of existing studies on pro-environmental behaviour measure behaviour via

self-report, which is no reliable measure of actual behaviour (Fanghella et al., 2019; Lange, 2022).

Conclusion

This study suggests a positive association between PEO, Habit and ESI, however no direct effect of the EoR manipulation on ESI and no carry-over from ESI to actual PEB. Adding to the scarce literature on the topic by assessing the nature of the retrieved behaviours as well as observing actual subsequent pro-environmental behaviour, these results partly converge with previous studies that measured only self-reported behaviour. Although the exact workings of the relation between past and future behaviour deserve further research, it seems that retrieval of past behaviour and specifically habitual practices offer leverage towards facilitating people's ESI and a more sustainable future.

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Appendix A

Survey Items

Table 4

Information and Form of Consent

Welcome!

The purpose of this research project is to measure and gain insight on the formation of environmental behaviour. This research project is being conducted by third-year students from the University of Twente.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalised and your data will be deleted.

We will do our best to keep your information confidential. All data is stored in a password protected electronic format. To help protect your privacy and personal data, the survey will not contain information that will personally identify you. Your responses will be held confidential and we do not collect identifying information such as your name, email address or IP address.

The results of this study will be used for scholarly purposes only and may be shared with University of Twente representatives.

The procedure involves filling in an online survey that will take approximately 15 minutes.

First you will be asked general demographic questions. Subsequently, you will be given a small task and are asked to fill out a few questions. The topic of the questions pertains to the task and sustainable behaviour.

We ask that you answer the questions truthfully. It is also important that you finish the entire

questionnaire up until you are explicitly informed that you can close the survey. You are, however, free to quit the survey at any point in time by closing the window, in which case your response will not be recorded.

If you have any questions about the research study, please contact:

[Omitted]

This research is reviewed according to University of Twente BMS procedures for research involving human subjects.

ELECTRONIC CONSENT:

Please select your choice below.

Clicking on the "I agree" button below indicates that:

- You have read the information given above
- You voluntarily agree to participate
- You are at least 16 years of age

If you do not wish to participate in the research study, please decline participation by clicking on the "I disagree" button.

Table 5

Experienced Ease of Retrieval Scale

I found the task ...

How difficult was it for you to recall these behaviours?

Note. Items were answered on a 7-point Likert scale with the options ‘*Very Easy*’ (1), ‘*Easy*’ (2), ‘*Somewhat easy*’ (3) ‘*Neither difficult nor easy*’ (4), ‘*Somewhat difficult*’ (5), ‘*Difficult*’ (6), and ‘*Very difficult*’ (7).

Table 6

Habit Scale

The behaviours I listed are things ... ^a

I do frequently.

I do automatically.

I do without having to consciously remember.

that make me feel weird if I do not do them.

I do without thinking.

that would require effort not to do them.

that belong to my routine.

I start doing before I realise I’m doing them.

I would find hard not to do.

I have no need to think about doing.

that are typically ‘me’.

I have been doing for a long time.

Note. Adjusted from Verplanken and Orbell (2003)

^a Items were answered on a 7-point Likert scale with the options ‘*Totally Disagree*’ (1), ‘*Disagree*’ (2), ‘*Somewhat disagree*’ (3) ‘*Neither Agree nor disagree*’ (4), ‘*Somewhat agree*’ (5), ‘*Agree*’ (6), and ‘*Totally Agree*’ (7).

Table 7

Debrief and Consent

At the beginning of the experiment you were randomly assigned to one of two groups that each were asked to recall a different amount of behaviours. Additionally, the link that you were just provided with was used as a measure of Pro-environmental behaviour. No monetary value was donated. It solely served the purpose of recording pro-environmental behaviour in an online setting.

If you do not consent with this, please indicate so below.

If you have any questions about the research study, please contact:

[Omitted]

This research is reviewed according to University of Twente BMS procedures for research involving human subjects.

ELECTRONIC CONSENT:

Please select your choice below.

Clicking on the "I agree" button below indicates that:

- you have read the information given above

- you acknowledge the deception measure and agree to the use of your data in this research study

If you do not wish for your answers and data being used in the research study, please decline participation by clicking on the "I disagree" button.

Appendix B
Factor Analysis

Table 7*Pattern Matrix*

Item	Component		
	A	B	C
I found the task...	-.201		.763
How difficult was it for you to recall these behaviours?			.787
The behaviours I listed are things I do frequently.	.430		
The behaviours I listed are things I do automatically.	.688		
The behaviours I listed are things I do without having to consciously remember.	.933		
The behaviours I listed are things that make me feel weird if I do not do them.	.252	-.499	.298
The behaviours I listed are things I do without thinking.	.847		
The behaviours I listed are things that would require effort not to do them.		-.543	.341
The behaviours I listed are things that belong to my routine.	.651		
The behaviours I listed are things I start doing before I realise I'm doing them.	.573		
The behaviours I listed are things I would find hard not to do.	.223	-.661	
The behaviours I listed are things I have no need to think about doing.	.762		
The behaviours I listed are things that are typically 'me'.	.202	-.630	
The behaviours I listed are things I have been doing for a long time.	.504	-.240	
I am the type of person who acts environmentally friendly.		-.770	-.140

Acting environmentally friendly is an important part of who I am.	-.913	-.229
I see myself as an environmentally friendly person.	-.796	
