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Individual differences in values determine the relative persuasiveness of biospheric, economic and combined appeals

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ABSTRACT

Many environmental campaigns highlight both the environmental and financial benefits of behaviour change, in the hope of motivating a broad audience. But are such mixed appeals more persuasive than separate appeals? We argue that messages tailored to match recipient's prioritised values are more persuasive than combined appeals. We conducted a questionnaire study to assess the persuasiveness of economic, environmental, and mixed appeals ($N = 210$). As expected, individual differences in values moderated the persuasive power of the different appeals. Importantly, we found that appeals that matched the recipients' values were more persuasive than the combined appeal. Interestingly, personal norms also acted as a moderator. These findings suggest that environmental campaigns aimed to induce behavioural change can benefit from tailoring persuasive messages to idiosyncratic characteristics of their target group, rather than employing a one-size-fits-all message.

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1. Introduction

Many environmental problems, including waste problems, littering, air pollution, and climate change are of anthropogenic nature (Solomon et al., 2007). To counter these environmental problems, behavioural changes are therefore indispensable. In order to encourage such behaviour changes, many governmental and non-governmental organizations design and implement campaigns to promote pro-environmental behaviour. It is of great importance that the persuasive power of the messages used in these campaigns is carefully evaluated considering that ill constructed campaigns not only waste resources but may even have adverse consequences (Hunt & Shehryar, 2011; Witte & Allen, 2000).

1.1. Environmental versus economic appeals

Many contemporary campaigns rely on economic arguments, which emphasise the financial benefits of pro-environmental behaviour. Such economic appeals assume that monetary savings are a key motivator for pro-environmental behaviour. The Dutch

government, for instance, attempts to persuade its citizens to insulate their homes by highlighting the financial savings with the “Meer met minder energie” (more whilst using less energy) campaign (Rijksoverheid, 2009).

However, economic appeals may not always be effective to encourage pro-environmental behaviour for various reasons (Bolderdijk & Steg, 2015; Bolderdijk, Lehman, & Geller, 2012; Evans et al., 2012; Schwartz, Bruine de Bruin, Fischhoff, & Lave, 2015). For instance, economic appeals may elicit a cost-benefit type of reasoning (Tenbrunsel & Messick, 1999), in which consumers will only engage in environmentally-friendly behaviour if they feel the effort involved is outbalanced by the financial payment (Dogan, Bolderdijk, & Steg, 2014). Given that many environmental behaviours involve little, if any, financial benefits, but are often costly in terms of time or effort, economic appeals may ironically discourage the very behaviours they were meant to encourage (Asensio & Delmas, 2015; Bolderdijk et al., 2012; McClelland & Cook, 1980). For example, an economic appeal to enrol in an energy saving programme resulted in reduced willingness compared to appeals emphasising environmental reasons to enrol (Schwartz et al., 2015).

Similarly, incentivising behaviour (rather than emphasising existing financial rewards for the behaviour) can backfire for individuals with strong biospheric values (i.e. those who strongly value nature and the environment), as the incentives may

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undermine their intrinsic environmental motivation (Deci, Ryan, & Koestner, 1999; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014). When individuals are already motivated to act for environmental conservation reasons, introducing external rewards for the behaviour can result in a reduced willingness to engage in the behaviour (Frey & Oberholzer-gee, 1997; Gneezy & Rustichini, 2000; Handgraaf, de Jeude, & Appelt, 2013, for an overview of the literature on the use of financial incentives to stimulate sustainable consumption see; Bolderdijk & Steg, 2015). We argue that this is because the incentive is incongruent with the recipients biospheric values.

Appeals that address this intrinsic motivation, so-called *environmental appeals*, stress the environmental benefits of sustainable behaviour. This type of appeal is for example employed in a television advert by the Victorian government of Australia (2008) that aimed to persuade consumers to reduce their household energy consumption, in which the carbon emissions of energy consumption are visualised to illustrate the impact of energy consumption on climate change.

Although research suggests these environmental appeals may sometimes be effective (Bolderdijk, Gorsira, Keizer, & Steg, 2013), and result in positive spill-overs into other environmental behaviours (Steinhorst, Klöckner, & Matthies, 2015), these types of appeals may not inspire all consumers. For example, climate change deniers have been found to be less responsive to environmental appeals compared to appeals that frame pro-environmental behaviour as consideration for each other, or improving economic or technological development (Bain, Hornsey, Bongiorno, & Jeffries, 2012).

1.2. The risk of using combined appeals

Considering the limiting impact of both the environmental and economic appeals, an intuitive approach might be to include both arguments in order to appeal to the population at large. Appeals could for example include both an environmental as well as an economic appeal (*combined appeals*), assuming that this message will appeal to all recipients as it includes several arguments for the behaviour. Indeed, various campaigns designed to encourage consumers to conserve energy employ combined appeals. For example, the “Save money, Save energy” campaign initiated by DEFRA (Department for Environment Food and Rural Affairs, 2008) emphasises both environmental and financial benefits of household energy savings.

Would such combined appeals indeed be more effective than single appeals? The arguments that make up the combined appeal are likely to differ in their persuasiveness, meaning that a combined appeal always includes a weaker argument. Therefore, combined appeal could be subject to the *presenters paradox*, meaning that presenters, on the one hand, assume that the accumulation of arguments (regardless of their attractiveness) increases persuasion, while receivers, on the other hand, average the favourability of the different arguments provided (Weaver, Garcia, & Schwarz, 2012). This implies that the addition of arguments that does not persuade the recipient will decrease the overall persuasive impact by diluting it (Weaver et al., 2012). Although the presenter's paradox has been found to apply to a range of different types of messages, no research has examined this concept in relation to messages that combine environmental and economic appeals to engage in pro-environmental behaviour despite the prevalence of these combined appeals in environmental campaigns.

1.3. Tailored appeals

Given the fact that neither environmental nor economic appeals seem to be able to motivate the entire population, and the dilution effect that may occur with combined appeals, alternative

approaches have been considered. A tailored approach may enhance the persuasive power of these appeals. That is, messages that are tailored to align with recipients' motivations are more likely to persuade. Tailored messages have greater self-relevance to recipients (Dijkstra, 2008) which enhances involvement and elaboration with the message, thereby increasing levels of persuasion (Nelson & Garst, 2005; Updegraff, Sherman, Luyster, & Mann, 2007).

Messages can be tailored to fit different types of motivational factors. This paper will focus on tailoring messages to fit the recipients' values. Values reflect a desirable, *trans*-situational objective that serves as a guiding principle in life and can be ordered in terms of relative importance (De Groot & Steg, 2008). Value-congruent messages have been found to enhance involvement in the message's information, called *value-relevant involvement* (Johnson & Eagly, 1989; Maio & Olson, 1995). This suggests that tailored messages will be more persuasive as this is likely to result in higher levels of elaboration on the message.

There is some initial evidence that tailoring to important values can enhance persuasion. For example, migrants have been found to value financial success more than non-migrants (Bashir, Lockwood, Dolderman, Sarkissian, & Quick, 2011). After reading a message about the financial costs of environmental problems migrants were more motivated to engage in pro-environmental behaviour while this was not the case for non-migrants (Bashir et al., 2011). Furthermore, a study that informed participants about the detrimental environmental consequences of using bottled water did not find an overall effect on intentions to avoid using bottled water or support for policies aimed to reduce the use of bottled water. The information only motivated individuals who strongly endorsed biospheric values to change their intentions and policy support (Bolderdijk et al., 2013). Moreover, appeals that match the recipient's political ideology were more successful in persuading individuals to adopt sustainable behaviour than messages which are incongruent with the recipient's political ideology (Kidwell, Farmer, & Hardesty, 2013). Similarly, conservatives in the United States are less willing to invest in energy-efficient technology when these are labelled with a sticker with an environmental argument (“protect the environment”) compared to an unlabelled control product with a blank sticker (Gromet, Kunreuther, & Larrick, 2013). In contrast, liberals, who are more likely to be concerned about environmental issues, were found to be more persuaded by the environmental argument than the blank label. Since political ideology is closely related to one's values (Jost, Federico, & Napier, 2009; Schwartz, 1994) these studies suggest that matching a message to the recipient's prioritised values can successfully stimulate pro-environmental intentions and behaviour.

1.4. Overview of the present research and hypotheses

In this paper, we will investigate whether the extent to which individuals prioritise egoistic and biospheric values affects the persuasiveness of appeals that address these values: economic, environmental appeals, and combined appeals. Egoistic values reflect a key concern for the self, whereas biospheric values reflect a key concern for nature and the environment (De Groot & Steg, 2007, 2008; Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). We hypothesise that the persuasiveness of the appeals will depend on the recipient's value prioritisation of these two values (H1). That is, appeals tailored to match the recipient's prioritised values will be more persuasive than messages that do not align with the recipient's values prioritisation. Because economic appeals stress individual monetary benefits they are expected to particularly persuade individuals prioritising egoistic values over biospheric values (as opposed to individuals prioritising biospheric

over egoistic values). On the other hand, we hypothesise that environmental appeals are more persuasive if individuals prioritise biospheric values over egoistic values compared to individuals who prioritise egoistic over biospheric values because these messages emphasise the benefits for the environment, which aligns with what they find important (H2).

It is not clear whether tailoring messages to people's prioritised values would enhance the persuasion of the economic and environmental appeals, and whether these tailored messages are more persuasive than a combination of both appeals. Combined appeals are not tailored to the recipient's prioritised values and are therefore susceptible to the diluting effect. One could argue that the combined appeal may be persuasive when individuals adhere both types of values equally and do not prioritise one value over the other. Nevertheless, research has shown that self-transcendence versus self-enhancement (which relate to biospheric versus egoistic values respectively) are typically weakly correlated (Nordlund & Garvill, 2003), meaning that people do prioritise one value over the other. This makes this research especially relevant as it implies that combined appeals would be less persuasive than previously thought. Hence, combined appeals that address both values are expected to be less persuasive than appeals that are tailored to the recipients' values (H3), due to a process of dilution of the persuasive impact of the message because of the inclusion of a less favourable argument (Weaver et al., 2012).

Although we are primarily interested in the moderating effects of values, we also examined whether the persuasiveness of different appeals depends on individual differences in personal norms. Personal norms represent an individual's feelings of moral obligations to engage in particular pro-environmental actions (Schwartz, 1970). The value belief norm theory proposes that values influence one's personal norms through a person's beliefs (Stern et al., 1999). Indeed, personal norms and values are correlated with each other (Nordlund & Garvill, 2002), and personal norms are therefore also likely to moderate the effect of persuasive appeals. However, personal norms differ from values in that it does not reflect what individuals find important, but rather how obligated they feel to engage in a particular pro-environmental behaviour. As these beliefs strongly relate to intentions to engage in pro-environmental behaviour (Bamberg & Möser, 2007), it is likely that personal norms could be relevant for the persuasiveness of the environmental and economic messages. Therefore, we will take an exploratory approach by also assessing whether personal norms moderate the persuasiveness of the appeals.

Individuals with strong personal norms are more likely to be persuaded by environmental appeals than economic appeals as the former emphasise the moral obligation to conserve which matches the individual's beliefs. On the other hand, individuals with weak personal norms do not perceive a personal obligation to engage in conservation behaviour and might therefore be more motivated by messages emphasizing personal drivers to engage in the behaviour (e.g. economic appeals) rather than environmental appeals. As individuals cannot adhere both weak and strong personal norms simultaneously, which would be relevant for combined appeals, these types of appeals are expected to be least effective. Therefore, similar to the hypotheses in relation to value-congruent appeals, it is expected that appeals tailored to the recipients' personal norms will be more effective than combined appeals or appeals that are not tailored to the recipients' personal norms (H4).

2. Method

2.1. Participants

Participants ($N = 210$, age $M = 23.64$, $SD = 5.39$, 55.2% female)

were either students recruited through a research participation scheme who participated in return for course credit (31.4%) or respondents recruited through online social media or internal advertising by contacts at various universities (68.6%). Given that we strived for a sample that included a wide distribution of values, participants were recruited from Europe (65.7%) and India (34.3%), as previous research has suggested that individuals from developing countries tend to more strongly adhere to biospheric values than egoistic values while the reverse might be true for individuals from developed countries (Schultz, 2001). The tailoring effect was expected to be independent of cultural background, as we are not aware of a theoretical framework that would suggest otherwise, and therefore the data of the two countries was analysed together.

2.2. Materials and procedure

An online questionnaire was constructed in English and in Dutch. The Dutch version consisted of two parts, one with the items of this study and one part including items for a different study purpose which will not be further discussed; the order of the two parts was counterbalanced and no order effects were detected. As a case in point, we focus on paper saving behaviour. Persuasiveness will mainly be operationalised as the amount of elaboration on paper-saving tips which were displayed at the end of the survey. We selected paper use as the target behaviour because this behaviour is relevant to students (as students comprise a large part of the sample), and because this behaviour is relevant in various cultures. Moreover, paper saving can be associated with saving money as well as saving the environment.

Participants in the study were exposed to different appeals to save paper. The appeals each consisted of a call to reduce paper use, but differed in the reasons in favour of saving paper: to save money, to save the environment or to save both money and the environment, representing an economic, biospheric and combined appeal respectively. Each appeal included arguments as well as a graphical illustration of the respective adverse consequences of not complying with the appeal (see Appendix A: Paper-saving appeals). Participants were randomly assigned to one of the three conditions, and were presented the corresponding appeal. This means that appeals were not tailored to the recipients' values prior to the presentation of the appeal, but the extent to which they were 'tailor-made' for the recipient naturally differed to allow for the comparison of the impact of value-congruent (tailored) and value-incongruent (not tailored) appeals. The remainder of the questionnaire included questions that measured the persuasiveness of the appeal, value prioritisation and personal norms. Comparing the responses of combined appeal group with the environmental and economic appeal group allowed us to test our question: does the accumulation of arguments increase or decrease the persuasiveness compared to (un)tailored appeals for environmentally-friendly behaviour?

2.2.1. Values

Values were measured using a brief value scale developed and validated by Steg, Perlaviciute, van der Werff, and Lurvink (2012). This scale included items reflecting biospheric, egoistic, altruistic and hedonic values; the latter two dimensions were not relevant for the purpose of our study and are therefore not discussed further. This scale has been validated in the environmental domain across various cultures (De Groot & Steg, 2007). Participants rated the importance of biospheric and egoistic values "as a guiding principle in their lives" on a 9-point scale ranging from -1 , *opposed to my guiding principles*, 0 *not important at all* to 7 *extremely important*. Following De Groot and Steg (2007, 2008), participants were requested to vary their responses and to rate only few values as

extremely important. The scale end-points for these items accidentally differed across questionnaires, in that some questionnaires that were administered in India consistently included the 7-point scale instead of the 9-point scale (excluding -1 and 0 from the 9-point scale). We observed no difference in answering patterns across the scales (participants never filled out a -1 or 0) and therefore collapsed the data.

Biospheric values were measured with four items (respecting earth, unity with nature, protecting the environment, preventing pollution; $\alpha = 0.94$) and egoistic values were measures with another five items (social power, wealth, authority, influential, ambition; $\alpha = 0.83$). Mean scores were computed for items included in each value scale (biospheric values: $M = 5.64$, $SD = 1.66$, egoistic values: $M = 4.71$, $SD = 1.36$). The two items correlated moderately with each other ($r = 0.45$, $p < 0.001$), which was likely due the tendency of Indian participants to rate both scales higher than European participants, causing two clusters. When the correlations were assessed for both countries separately, the correlations were reduced ($r_{\text{Europe}} = 0.11$, $p = 0.20$, $r_{\text{India}} = 0.35$, $p < 0.01$). As we were interested in the prioritisation of the two value types, we computed the relative endorsement of both value types. Because the scales of the items varied across questionnaires, both variables were first standardised. Next, the difference score was computed from these standardised variables by subtracting the mean egoistic value score from the mean biospheric value score. This variable served as a measure of the relative strength of biospheric values compared to the strength of egoistic values, with negative values reflecting a prioritisation of egoistic values and positive values reflecting prioritisation of biospheric values ($M = 0.00$, $SD = 1.05$). There was a significant difference in the prioritisation of these values across countries ($t(208) = -1.97$, $p = 0.05$), where European participants tended to prioritise egoistic values ($M = -0.10$, $SD = 1.06$) while the Indian participants tended to prioritise biospheric values ($M = 0.20$, $SD = 1.01$), confirming that the inclusion of the two country samples ensured a diverse distribution of values.

2.2.2. Personal norms

Four items measuring personal norms to engage in general pro-environmental behaviour were included (e.g. “*I feel a strong personal obligation to preserve the environment*”; “*I see it as my personal moral obligation to adjust my behaviour to reduce my impact on environmental problems*”), based on previous studies (Nordlund & Garvill, 2003; Vining & Ebreo, 1992). Respondents indicated to what extent they agreed with the statements (1: *strongly disagree*, 5: *strongly agree*). Mean scores were computed on these four items ($M = 4.07$, $SD = 1.09$, $\alpha = 0.88$) suggesting strong personal norms among the sample. This variable correlated moderately with the value-prioritisation variable ($r = 0.34$, $p < 0.001$), confirming that the constructs are related, but measure distinct characteristics.

2.2.3. Persuasiveness of the appeals

The effect of the appeals was measured using explicit as well as implicit measures of persuasion. First, to assess the persuasiveness of the appeals implicitly, paper-saving tips were offered at the end of the survey, which participants could consult to enhance their paper-saving behaviour. The extent to which participants elaborated on these tips, is used as an indicator of the persuasiveness: this reflects the interest in the paper-saving tips and is thereby likely to reflect the intention to increase paper-saving behaviour as a result of the persuasiveness of the appeal.

Two different indicators of the elaboration on the tips were measured to get a more comprehensive account of the persuasiveness of the appeal. After the display of each tip, participants could choose whether to view another tip or to end the survey. This was repeated until a maximum of 10 tips had been displayed. The

number of tips that the participants requested to view was measured without the awareness of the participants, and the total number of paper-saving tips served as the first implicit measure of elaboration on the tips, where higher scores reflected more elaboration on the paper saving tips. This variable might reflect a cursory measure of elaboration on the tips because it does not reflect how long the tips have been viewed, meaning that high scores can be obtained when many tips have been requested even when the respondent has browsed through the tips quickly without (carefully) reading the tips. Participants might score high on this when they feel obligated to view the tips but perhaps have no genuine interest in them.

Moreover, the amount of time participants spent to view the paper-saving tips was measured. The mean time spent on viewing each tip was computed by dividing the total time that participants viewed all the tips by the number of tips that were viewed and served as the second implicit measure of elaboration. This variable therefore does not reflect the number of tips that the participants viewed but solely the time spent on each tip on average. This measure could be suggested to reflect more ‘genuine’ interest in the paper-saving tips compared to the number of tips viewed, because high scores can be obtained when participants have only viewed a few tips as long as they have viewed these tips elaborately, which suggests that the participant has adequately read and considered the tips. A weak correlation between the two indicators of persuasion ($r_t = 0.31$, $p < 0.001$) suggests that these two dependent variables measure different aspects of the elaboration on the tips.

The tips were displayed in order of unfamiliarity (as assessed in a pilot study), starting with the most novel tips to keep the participants’ interest, and prevent them from dropping out because they were already familiar with the first few tips. Each tip was accompanied with a short description, which included a more specific explanation of the tip. The paper saving tips were accessed from various online sources, covered a range of different types of paper-saving behaviour (e.g. reducing unwanted mail, more efficient print settings and more use of electronic alternatives to paper) and were of similar length (see Appendix B: Paper saving tips).

Furthermore, explicit self-report measures were included to assess the persuasiveness of the appeal. First, motivation to save paper after the exposure to the appeal was measured using four items (e.g. “*How much effort are you willing to exert at this moment to save paper?*”) that were rated on a 7-point Likert scale (1: *not motivated at all*, 7: *very motivated*) and means were computed for each participant ($\alpha = 0.83$, $M = 4.48$, $SD = 1.22$). Each displayed tip was accompanied with an item measuring the intention to use the respective paper saving tip (e.g. “*How likely do you think it is that you will use more digital documents instead of printed paper in the future?*”). Participants rated their intentions to use the tip on a 7-point Likert scale (ranging from 1: *very unlikely* to 7: *very likely*) and the mean of the total items was taken to reflect intention to use the tips ($\alpha = 0.90$, $M = 3.50$, $SD = 1.59$). Finally, one item was included that assessed participants’ willingness to sign a paper-conservation petition which appealed to their local government to reduce their paper use. Their responses (no/yes) were coded in to 0 and 1 respectively ($M = 0.83$, $SD = 0.38$).

3. Results

We conducted separate regression analyses for each dependent variable (number of tips, mean tip viewing time, motivation to save paper, intention to use paper saving tips, willingness to sign a paper-saving petition). The predictors in the analyses included value prioritisation and a categorical variable for appeal-type. Furthermore, a country variable was included as a blocking factor to account for possible cultural differences. To assess the moderating role of value

prioritisation, an interaction between value prioritisation and appeal-type was included. In the following section, the effects of the appeals and value prioritisation on each dependent variable will be assessed by inspecting the interaction and the respective parameter estimates. The results of the full models (including all main effects) are reported in the respective tables.

3.1. Implicit measures of the persuasiveness of the appeals

Two implicit measures were taken to assess the persuasiveness of the appeals: the number of paper saving tips that were requested and the amount of time participants took to inspect the tips.

3.1.1. Number of paper saving tips requested

For this variable, participants indicated whether they would like to view another paper-saving tip, continuing until a maximum of 10 tips were displayed. Therefore, the data of this dependent variable consisted of grouped binary data, meaning that the variable reflects the number of successes with a maximum of 10 trials (Agresti, 2007). Because the data followed a binominal distribution, a logistic regression was carried out on the number of tips that were requested by the participants to test the tailoring hypotheses (Agresti, 2007). Appeal type, country and the value prioritisation variables were tested using likelihood ratio tests (chi-square tests). Accompanying beta's reflect the log odds ratio to request another tip (the chance to request another tips/(1-the chance to request another tip)).

In line with the first hypothesis, the interaction between value prioritisation and appeal-type was found significant ($\chi^2(2, N = 210) = 23.17, p < 0.001$; see Table 1). Because of this significant interaction, the value prioritisation variable was nested within the type of appeal variable (Wickens & Keppel, 2004). Therefore, in order to inspect the effect of value prioritisation for each appeal specifically, the regression was repeated without the main-effect of value prioritisation (Wickens & Keppel, 2004). The beta-estimates of this analysis represent the simple effects for each appeal and serve an illustrative purpose.

The results show that individuals who prioritised biospheric values requested more paper-saving tips in response to the environmental appeal in comparison to individuals whom prioritised egoistic values ($\beta = 0.20, \chi^2(1, N = 210) = 7.82, p < 0.01$; see Table 2). On the other hand, following the presentation of an economic appeal, individuals who prioritised egoistic values requested more paper-saving tips compared to individuals who prioritised biospheric values ($\beta = -0.23, \chi^2(1, N = 210) = 11.55, p = 0.001$), confirming the second hypothesis. When the combined appeal was presented, participants who prioritised biospheric values tended to request more tips compared to participants who prioritised egoistic values although this effect was just significant ($\beta = 0.17, \chi^2(1, N = 210) = 4.00, p = 0.05$).

With respect to the third hypothesis, the significant interaction between value prioritisation and type of appeal implies that the effect of the combined appeal on the number of tips that were requested in comparison to the other two appeals depended on the value prioritisation of the recipient. More tips were requested when the combined appeal was displayed in comparison with appeals that were incongruent with the recipient's value-orientation, yet the reverse was true for tailored-appeals: these resulted in a larger number of requested tips than combined appeals. For example, the lower beta-value for value prioritisation in the combined appeal condition ($\beta = 0.17$) compared to the environmental appeal condition ($\beta = 0.20$), indicated that more tips were requested in the environmental appeal condition than the combined appeal condition by individuals who prioritised biospheric values. Furthermore, the negative beta-value for value

prioritisation ($\beta = -0.23$) in the economic appeal condition shows that the same individuals requested fewer tips in response to the economic appeal compared to the combined appeal ($\beta = 0.017$). In other words, these data suggest that accumulation of argument decreased the persuasiveness of appeals compared to value-congruent arguments, confirming the third hypothesis.

3.1.2. Time spent to inspect paper-saving tips

Because the data of the variable mean tip viewing time did not follow a normal distribution, the variable was transformed using a natural logarithm. After the transformation, the data followed a normal distribution and assumptions of homoscedasticity seemed to hold.

The regression analysis revealed a significant interaction between value prioritisation and appeal type. Specifically, the effect of the appeal type on the amount of time that participants spent to inspect the tips was moderated by the extent to which participants prioritised biospheric versus egoistic values ($F(2,203) = 4.02, p = 0.02$; see Table 3) confirming the first hypothesis.

Similar to the analysis on the number of tips, this significant interaction implies that the value prioritisation variable is nested within the type of appeal variable. Therefore, to assess the simple effects of value prioritisation for each appeal, the regression was again repeated without the main effect of value prioritisation. In line with the second hypothesis, results showed that participants who prioritised biospheric over egoistic values spent more time inspecting the tips in the condition including the environmental appeal than participants who prioritised egoistic values ($\beta = 0.19, t(203) = 3.24, p < 0.01$; see Table 4). However, in the economic appeal condition, no relationship was found between the prioritisation of biospheric versus egoistic values and the amount of time they spent looking at the tips ($\beta = -0.04, t(203) = -0.71, p = 0.48$). As expected, people's value prioritisation did not influence the tip inspecting time in the condition which included the combined appeal ($\beta = 0.08, t(203) = 1.17, p = 0.24$).

With respect to the third hypothesis, the significant interaction between value prioritisation and type of appeal implies that how the impact of the combined appeal on the time spend inspecting the tips compared to the impact of the other two appeals depended on the value prioritisation of the recipient, similar to the previous section. That is, when participants strongly prioritised one value over the other, more time was spent on inspecting the tips when the combined appeal was displayed in comparison with appeals that were incongruent with the recipient's value-orientation, yet the reverse was true for tailored-appeals: these resulted in longer tip viewing times than combined appeals. For example, the lower-beta value for value-prioritisation in the combined appeal condition ($\beta = 0.08$) compared to the beta-value in the environmental appeal condition ($\beta = 0.19$) showed that participants who prioritised biospheric values spent more time reviewing the tips after seeing the environmental appeal in comparison to the combined appeal. In other words, these data suggest that accumulation of

Table 1
Results of logistic regression on the number of tips requested.

	Chi-square value	DF	P
Intercept	0.48	1	0.49
Appeal type	1.96	2	0.38
Country ^a	7.58	1	0.01**
Value prioritisation	1.08	1	0.30
Appeal type*Value prioritisation	23.17	2	0.00***

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.

^a European participants requested fewer tips compared to Indian participants ($\beta = -0.26, \chi^2(1, N = 210) = 7.56, p < .01$).

Table 2
Parameter estimates of logistic regression on the number of tips requested.

	β	Wald chi-square	DF	p	95% CI
Intercept	0.23	5.29	1	0.02	[0.04, 0.43]
Appeal type (0 = combined, 1 = biospheric)	−0.06	0.31	1	0.58	[−0.27, 0.15]
Appeal type (0 = combined, 1 = economic)	−0.15	1.93	1	0.17	[−0.37, 0.06]
Country (0 = India, 1 = Europe)	−0.26	7.58	1	0.01*	[−0.49, −0.08]
Biospheric appeal*value prioritisation	0.20	7.82	1	0.00**	[0.06, 0.34]
Economic appeal*value prioritisation	−0.23	11.55	1	0.00**	[−0.37, −0.10]
Combined*value prioritisation	0.17	4.00	1	0.05*	[0.00, 0.34]

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3
Results of linear regression on the time spent to inspect the tips.

	SS	df	MS	F	p	R ²
Intercept	1760.99	1	1760.99	6466.60	0.00***	0.36
Appeal type	2.00	2	1.00	3.67	0.03*	
Country	22.58	1	22.58	82.92	0.00***	
Value prioritisation	1.25	1	1.25	4.60	0.03*	
Appeal type*Value prioritisation	2.19	2	1.09	4.02	0.02*	
Error	55.28	203	0.27			
Total	1939.37	210				

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.

argument decreased the persuasiveness of appeals compared to appeals in line with the recipient's prioritised values.

3.2. Explicit measures of the persuasiveness of the appeals

Three types of explicit measures were included to assess the persuasiveness of the appeals: motivation to save paper, intention to use the paper saving tips and willingness to sign a paper-saving petition. A general linear regression was conducted on the motivation to save paper. The interaction between type of appeal and value prioritisation was not found to be statistically significant ($F(2,203) = 2.67$, $p = 0.07$) (see Table 5). This means that no evidence was found that the effect of the appeal on the motivation to save paper was different for participants with different value prioritisation and therefore no support was found for our hypotheses for this variable.

Another general linear regression was fitted on the intention to use the paper-saving tips and residual plots were checked for extreme values. Again, value prioritisation did not moderate the effect of the type of appeal on the intention to use the tips ($F(2,203) = 0.67$, $p = 0.51$) (see Table 6) meaning that the hypotheses were not supported. However, it needs to be noted that this measure, as well as the measure of motivation, were ordinal which means that strictly speaking, not all assumptions for this analysis were met.

Participants indicated whether they wanted to sign a petition to appeal to their local government to reduce their paper use,

meaning that this dependent variable was a binary response variable, which followed a binominal distribution. Therefore, a logistic regression was performed which resulted in a non-significant interaction between value prioritisation and appeal type ($\chi^2(2, N = 210) = 0.40$, $p = 0.82$) (see Table 7), meaning that the effect of the appeal on the willingness to sign the petition did not depend on the participants' value prioritisation.

3.3. An exploratory analysis to assess the moderating role of personal norms

Similar analyses on the same dependent variables were conducted including personal norms as potential moderator instead of value prioritisation. Results (see Tables 8 and 9) show that personal norms also moderated the effect of the appeal type on the amount of time participants spent to inspect the tips ($F(2,203) = 5.41$, $p < 0.01$). When an environmental appeal was shown, participants with stronger personal norms spent more time to inspect the tips compared to individuals with weaker personal norms ($\beta = 0.11$, $t(203) = 2.15$, $p = 0.03$). Furthermore, an economic appeal resulted in longer tip viewing times amongst participants with weaker personal norms compared to those with stronger personal norms ($\beta = -0.18$, $t(203) = -2.48$, $p = 0.01$). No relationship was found between personal norms and the time participants took to inspect the tips in the condition including the combined appeal ($\beta = 0.04$, $t(203) = 0.64$, $p = 0.52$). These results show that combined appeals were less effective than appeals tailored to the recipients' personal norms. However, the combined appeals were still more persuasive than messages that were incongruent with their personal norms. In short, the findings here are similar to the ones reported in section 3.1.1 and 3.1.2 in regards to value prioritisation, confirming the fourth hypothesis for time spent inspecting paper saving tips.

Personal norms was not found to moderate the effect of the appeal on the number of tips that were requested ($\chi^2(2, N = 210) = 4.24$, $p = 0.12$), the motivation to save paper ($F(2,303) = 0.312$, $p = 0.73$), the intention to use the paper saving tips ($F(2,303) = 0.19$, $p = 0.83$), and willingness to sign a paper-saving petition ($\chi^2(2, N = 210) = 0.97$, $p = 0.62$).

Table 4
Parameter estimates from linear regression on time spent to inspect tips.

	β	t	p	95% CI
Intercept	3.41	40.91	0.00***	[3.24, 3.57]
Appeal type (0 = combined, 1 = biospheric)	0.16	1.86	0.06	[−0.10, 0.34]
Appeal type (0 = combined, 1 = economic)	−0.07	−0.72	0.47	[−0.24, 0.11]
Country (0 = India, 1 = Europe)	−0.71	−9.11	0.00***	[−0.86, −0.56]
Biospheric appeal*value prioritisation	0.19	3.24	0.00**	[0.72, 0.30]
Economic appeal*value prioritisation	−0.04	−0.71	0.48	[−0.15, 0.07]
Combined*value prioritisation	0.08	1.17	0.24	[−0.06, 0.22]

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5

Results general linear regression on the motivation to save paper.

	SS	Df	MS	F	P	R ²
Intercept	82.10	1	82.10	70.85	0.00***	0.25
Appeal type	0.79	2	0.39	0.34	0.71	
Country	56.85	1	56.85	49.06	0.00***	
Value prioritisation	12.30	1	12.30	10.61	0.00**	
Appeal type*Value prioritisation	6.20	2	3.10	2.68	0.07	
Error	235.22	203	1.16			
Total	361.28	210				

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.**Table 6**

Results general linear regression on the intention to use the paper saving tips.

	SS	Df	MS	F	p	R ²
Intercept	2493.20	1	13.07	70.85	0.00***	0.13
Appeal type	4.41	2	2.20	0.97	0.38	
Country	52.23	1	52.23	22.99	0.00***	
Value prioritisation	1.19	1	1.19	0.52	0.47	
Appeal type*Value prioritisation	3.04	2	1.52	0.67	0.51	
Error	461.21	203	2.27			
Total	3099.20	210				

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.**Table 7**

Results of logistic regression on willingness to sign a paper-saving petition.

	Chi-square value	DF	p
Intercept	39.56	1	0.00***
Appeal type	0.29	2	0.86
Country	9.53	1	0.00**
Value prioritisation	2.77	1	0.10
Appeal type*Value prioritisation	0.40	2	0.82

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.**Table 8**

Results general linear regression on time spent to inspect tips, with personal norms as moderator.

	SS	df	MS	F	p	R ²
Intercept	123.19	1	123.19	19.04	0.00***	0.36
Appeal type	1.87	2	0.94	3.42	0.03*	
Country	24.72	1	24.72	90.26	0.00***	
Personal norms	0.02	1	0.02	0.08	0.78	
Appeal type*Personal norms	2.96	2	1.48	5.41	0.00**	
Error	55.59	203	0.27			
Total	1939.38	210				

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.

4. Discussion

This study examined whether the persuasiveness of economic, environmental and combined appeals depends on the recipients' value prioritisation, measured with implicit and explicit measures of persuasion. Notably, we have investigated whether tailored appeals are more persuasive compared to combined appeals.

No tailoring effects were found on the self-reported dependent variables, which included motivation to save paper, intention to use the paper saving tips and willingness to sign a paper-saving petition. This is likely due to the overt nature of these measures which may have revealed the aim of the study and resulted in reactivity. In other words, participants may not have been willing to admit that the appeal had influenced them. This issue of reactivity is less likely to have been a problem for tip viewing time and number of requested tips as this variable was measured without the participants' knowledge.

Tailoring effects were confirmed for the implicit measures. Value prioritisation was found to moderate the effect of the appeal on the number of tips that participants requested as well as the amount of time that participants took to inspect the tips. First, the effect of the paper-saving appeal on the elaboration on the paper saving tips depended on the values that the participants prioritised: participants viewed more paper saving tips and spent more time to read the tips when the message of the appeal was congruent with their prioritised values. More specifically, when presented with an environmental appeal, participants who prioritised biospheric over egoistic values requested more tips and spent more time reading the tips compared to participants that prioritised egoistic over biospheric values. The reverse was true for the number of tips that were requested when an economic appeal to save paper was presented. This is in line with previous research which suggested that value-congruent messages tend to be more effective than value-incongruent messages (Bashir et al., 2011; Bolderdijk et al., 2013; Gromet et al., 2013; Johnson & Eagly, 1989; Jost et al., 2009; Kidwell et al., 2013; Maio & Olson, 1995; Schwartz, 1994). However, this previous research was limited in that it only compared responses of individuals who differed in their values to one type of appeal (economic or biospheric). The current study is the first that has directly compared responses to economic, biospheric and combined appeals, and the moderating role of values in the persuasiveness of these appeals.

Interestingly, as expected, the combined appeal did not necessarily result in higher levels of persuasion compared to separate appeals. In fact, the combined appeal resulted in fewer paper-saving tips that were requested and shorter tip viewing times than single appeals that were congruent with the recipients' value prioritisation. However, combined appeals do seem more persuasive than non-tailored appeals: participants spent more time to inspect the tips and requested more tips in response to the combined appeal in comparison to appeals that were incongruent with their value prioritisation (e.g. an environmental appeal for participants who prioritise egoistic values over biospheric values). No previous research has compared the persuasiveness of combined appeals with tailored and non-tailored appeals and this study is therefore the first to report this interesting and relevant finding.

Furthermore, personal norms were found to moderate the effect of the type of appeal on the time that participants took to inspect the paper-saving tips. More specifically, when an economic appeal was presented, individuals with weaker personal norms spent more time to inspect the paper-saving tips compared to participants with stronger personal norms while the opposite was found when an environmental appeal was presented. This finding has also not yet been reported in previous research and therefore represents a unique contribution to existing literature.

4.1. Limitations and future research directions

This research has explored the moderating effect of value prioritisation on the persuasiveness of paper-saving appeals. One potential limitation of this research lies in the order of the tips, which were presented in order of familiarity (starting with the most unfamiliar tips). One could speculate that individuals with stronger biospheric values may have been more familiar with the tips and therefore would have requested less tips. However, no significant difference in the number of tips requested by individuals prioritising biospheric over egoistic values and individuals who prioritise egoistic over biospheric values were found ($t(208) = 0.517$, $p = 0.61$), and therefore this is unlikely to have affected our results.

The participants' elaboration on the paper-saving tips was to indicate the persuasive power of the appeal, yet no actual paper-

Table 9

Parameter estimates from linear regression on time spent to inspect tips, with personal norms as moderator.

	β	t	p	95% CI
Intercept	3.27	13.37	0.00***	[2.78, 3.75]
Appeal type (0 = combined, 1 = biospheric)	−0.11	−0.35	0.73	[−0.74, 0.52]
Appeal type (0 = combined, 1 = economic)	0.83	2.14	0.03	[0.06, 1.60]
Country (0 = India, 1 = Europe)	−0.73	−9.50	0.00***	[−0.89, −0.58]
Biospheric appeal*Personal norms	0.11	2.15	0.03*	[0.01, 0.21]
Economic appeal*Personal norms	−0.18	−2.48	0.01*	[−0.32, −0.04]
Combined*Personal norms	0.04	0.64	0.52	[−0.08, 0.15]

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$.

saving behaviour was measured. We note that it is critical to assess the impact of the appeals on intentions to save paper or better yet, actual conservation behaviour as this is likely to reflect the persuasiveness of the appeals more accurately and we therefore encourage future research to further explore this avenue. Moreover, to extend the generalizability of this study, future research could include other types of pro-environmental behaviour for which both an economic and environmental argument could apply (e.g. energy conservation). It is also important to further our understanding of the underpinning mechanisms of the persuasiveness of tailored appeals and combined appeals. For example, we have suggested that combined appeals are less persuasive than tailored appeals because of the diluting effect, but we recommend that this is to be tested experimentally. Finally, considering that personal norms was also found to moderate the persuasiveness of the appeals, other variables, such as environmental identity, may also be tested for their influence on the response to the appeals. Finally, future research could investigate if different types of appeals (e.g. altruistic appeals) can be tailored to people's values to increase their persuasiveness.

4.2. Implications

Persuasive messages often comprise a central component of environmental campaigns which are aimed to encourage the public to engage in more sustainable behaviour (Bator & Cialdini, 2000; Pelletier & Sharp, 2008). However, these campaigns are not always successful and the findings of this study provide a suggestion as to why this may be. That is, appeals that were incongruent with the participants' values were found to be the less persuasive compared to congruent appeals. More importantly, combined appeals were found to be less effective compared to value-congruent appeals. This is likely to be a result from a dilution effect where the addition of a value-incongruent argument reduces the persuasiveness of the overall message (Weaver et al., 2012).

The tailoring effects found in this study suggest how the persuasive power of these appeals can be enhanced. That is, environmental campaigns may benefit from including an appeal that is

tailored to fit the value prioritisation of the target group. With the use of modern technology, for example smart meters, householders' value-orientation could easily be assessed with a short questionnaire. This technology can then use this information to tailor the persuasive message to the householder's values or other individual difference variables.

However, it may not always be possible to charter the target group in advance. In absence of information about the target group, is there anything to say with respect to what type of appeal would be most appropriate? Our research indicates that, although they may be more effective than value-incongruent appeals, combined appeals may be less effective than uniform appeals that are tailored, so this is not an optimal solution. Instead, one could argue that environmental appeals should be favoured in these situations, despite these appeals being less effective among individuals who prioritise egoistic values. First, research suggest that across many settings and cultures, biospheric values tend to dominate egoistic values (De Groot & Steg, 2007) which was also the case in our sample (see section 2.2.1 Values). Thus, a blind guess would favour a uniform environmental appeal. Second, the alternative – economic appeals – have been associated with negative side-effects: by focusing people on the self-enhancing features of pro-environmental behaviour, economic appeals may demotivate people to engage in other types of environmentally friendly behaviour that are not financially attractive (Evans et al., 2012; Schwartz et al., 2015; Thøgersen & Crompton, 2009; Thøgersen, 2013). Thus, even though they could be effective for specific target groups, the question remains whether economic appeals may do more harm than good in the long run.

In sum, combined appeals may sound like the best option, but this research suggests they may be less effective than previously thought. In fact, tailored appeals have been found to be more promising when it comes to eliciting the necessary behavioural changes to alleviate environmental problems.

Appendix A. Paper-saving appeals

Fig. A1. Environmental appeal to save paper.

Fig. A.2. Economic appeal to save paper.

Fig. A.3. Combined appeal to save paper.

Appendix B. Paper saving tips

Fig. B.1. First paper saving tip presented at the end of the survey.

Fig. B.2. Second paper saving tip presented at the end of the survey.

Fig. B.3. Third paper saving tip presented at the end of the survey.

Fig. B.6. Sixth paper saving tip presented at the end of the survey.

Fig. B.4. Fourth paper saving tip presented at the end of the survey.

Fig. B.7. Seventh paper saving tip presented at the end of the survey.

Fig. B.5. Fifth paper saving tip presented at the end of the survey.

Fig. B.8. Eight paper saving tip presented at the end of the survey.

Fig. B.9. Ninth paper saving tip presented at the end of the survey.

Fig. B.10. Tenth paper saving tip presented at the end of the survey.

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