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Using Visual Impact Metaphors to Stimulate Environmentally Friendly Behavior: The Roles of Response Efficacy and Evaluative Persuasion Knowledge

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ABSTRACT

Although people often are aware of the importance of adopting environmentally friendly lifestyles, they might be reluctant to do so as they believe that their actions do not make a difference (i.e. low response efficacy). Furthermore, they might experience reactance (e.g. negative attitudes) towards environmental messages that encourage them to adopt an environmentally friendly lifestyle. Therefore we experimentally tested whether it is possible to stimulate people to adopt an environmentally friendly lifestyle (i.e. recycle more clothing) by using visual impact metaphors that convey the message that old clothes deserve a new life. The findings show that a message in the form of a visual impact metaphor (vs. no visual impact metaphor) results in more positive attitudes towards recycling and stronger recycling intentions. This effect was mediated by two different underlying mechanisms: Response efficacy and more positive attitudes towards the persuasive attempt (i.e. positive evaluative persuasion knowledge).

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Introduction

Climate change and environmental friendliness have become important topics over the past years. Companies, governmental institutions, and consumers alike are becoming more and more willing to act in an environmentally friendly way. Clothing company Patagonia, for example, uses recycled materials for their clothing line and H&M stimulates their consumers to recycle textile. However, each year, high volumes of textiles are still dropped in landfill sites, producing high levels of pollution and increasing chemical exposure, while these textiles could often be reused (Domina & Koch, 2002; Weber, Watson, Forter, & Oliaei, 2011). Since both the environment and public health are brought in jeopardy by this behavior, it is important to encourage consumers to engage in clothing recycling.

Although consumers are often aware of the importance of environmentally friendly behavior such as recycling, they have difficulties to actually adapt their lifestyles and perform such behaviors (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). One of the reasons for this inaction concerning environmentally friendly behavior, such as clothing recycling, is that people do not believe that their individual effort makes a difference. Since the effects of environmentally friendly behaviors are often only visible in the long run and when many people join, people may believe that their individual action alone cannot contribute when considering the complete picture, in other words, their

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response efficacy is low (i.e. the belief that an individual's behavior can make a difference in the solution to a problem Kinnear, Taylor, & Ahmed, 1974). Previous studies suggest that once consumers have the belief that their individual environmental actions do matter, they are more likely to take action and perform environmentally friendly behaviors (Izagirre-Olaizola, Fernández-Sainz, & Vicente-Molina, 2015). However, whereas there is quite some cross-sectional research showing that response efficacy is an important determinant of environmental behavior, it is largely understudied *how* to increase response efficacy beliefs.

In this paper, we posit that one possible way to increase response efficacy beliefs is by implementing a visual impact metaphor to deliver a campaign message. We define a visual impact metaphor as an object that comprises a visual implicit comparison to another object so to visualize the impact of one's behaviors by using a feedback feature. For example, a paper dispenser with a see-through silhouette featuring South America (a reference to the Amazon rainforest), which illustrates that by using paper towels, one is using up the rainforest (Saatchi & Saatchi, 2007, see Figure 1). By using a visual impact metaphor, it can be demonstrated that individual behaviors can make a difference by visualizing the impact of these behaviors. Previous research showed that such visualizations can help in instigating response efficacy beliefs (Ahn, Fox, Dale, & Avant, 2015). As such, we posit that a visual impact metaphor increases response efficacy beliefs and subsequently increases recycling attitudes and intentions.

An additional advantage of using a visual impact metaphor to deliver the message is that, even though metaphors are generally more persuasive than literal arguments (Sopory & Dillard, 2002), they are less likely to activate persuasion knowledge than a regular message. People are therefore less likely to be skeptical towards the campaign and evaluate the persuasive attempt more positively (i.e. evaluative persuasion knowledge, Boerman, Van Reijmersdal, & Neijens, 2012). We expect that this positive evaluative persuasion knowledge will in turn increase recycling attitudes and intentions.

In sum, the contribution of our paper is fourfold. First, we introduce the novel concept of visual impact metaphors. Second, this paper shows how a visual impact metaphor can enhance recycling attitudes and intentions. Most studies on environmental metaphors focused on verbal metaphors and on the portrayal of such metaphors (Nerlich, Koteyko, & Brown, 2010; Thibodeau, Frantz, & Berretta, 2017). By studying visual metaphors and the effects this has on environmental behaviors, the current study adds to research on environmental metaphors. Third, the paper shows that this positive effect is driven by two underlying mechanisms: response efficacy and evaluative persuasion



Figure 1. An example of a visual impact metaphor. A WWF campaign by Saatchi & Saatchi Copenhagen designed by Cliff Kagawa Holm and Silas Jansson. Reprinted with permission. All rights reserved.

knowledge and that response efficacy is the underlying mechanism with the largest effect. Many studies showed that response efficacy affects environmental behaviors (Ellen, Wiener, & Cobb-Walgreen, 1991; Izagirre-Olaizola et al., 2015; Kang, Liu, & Kim, 2013), but how response efficacy beliefs may be stimulated was largely understudied. Lastly, by relating visual impact metaphors to the stimulation of recycling behavior, this study may help policymakers to reach the public when developing campaigns to increase environmentally friendly (i.e. recycling) behavior.

Metaphors

The human-environment relation is quite complex, making it difficult for people to understand. Previous research showed that using metaphors might make this complex relation more insightful (Nerlich et al., 2010; Thibodeau et al., 2017). When using metaphors, two dissimilar objects are implicitly compared. As a result, people apply familiar and accessible knowledge structures to better understand the target concept and aspects belonging to one object are transferred to the other (Sopory & Dillard, 2002; Thibodeau et al., 2017). Furthermore, metaphors can change the way people think about a certain concept and may even influence people's behaviors or policy making (Flusberg, Matlock, & Thibodeau, 2017; Matlock, Coe, & Westerling, 2017; Moore & Moore, 2013). For example, research showed that describing wildfire metaphorically as a "monster wildfire" rather than non-metaphorically as a "major wildfire", led to enhanced risk perceptions concerning the wildfire, higher estimates in acres and houses burnt, and reporting a higher willingness to be evacuated (Matlock et al., 2017).

In an environmental context, research discussed how metaphors might insinuate different situations when it comes to the effects of people on the environment; whereas the metaphor of people leaving footprints on the earth sketches a static situation, the metaphor of sustainability technologies taking off like a rocket sketches a more dynamic situation (Karlsson, 2016). Furthermore, research showed that by referring to the earth as people's home (rather than a bank or park), the complexity of the relationship becomes more apparent and induces positive affect (Thibodeau et al., 2017). Varying metaphors might thus differentially impact people's understanding of the human-environment relationship (Karlsson, 2016; Princen, 2010; Thibodeau et al., 2017).

Whereas the usage of environmental metaphors, for example in newspapers, is relatively well studied (e.g. Karlsson, 2016; Moore & Moore, 2013; Nerlich et al., 2010; Princen, 2010; Renzi, Cotton, Napolitano, & Barkemeyer, 2017; Thibodeau et al., 2017), the effects of such metaphors on environmentally friendly behaviors is less well investigated. A notable exception is a study showing that reading a newspaper article using a "war" metaphor (fighting a war against climate change) led to a higher willingness to change behaviors in order to mitigate climate change effects than an article without a metaphor (Flusberg et al., 2017 – although the "climate change as a 'race' metaphor" had no effect). Research on how metaphors influence environmentally friendly behaviors is thus scarce. Furthermore, to our knowledge, research on the use of environmental metaphors so far focused on *verbal* metaphors whereas in environmental campaigns and advertising *visual* metaphors prevail.

Visual metaphors in messages

When using a visual metaphor, two dissimilar objects are implicitly compared *visually*. As inherent to all metaphors (both verbal and visual), aspects belonging to one object are transferred to the other (Sopory & Dillard, 2002). Furthermore, visual metaphors make use of visual argumentation and thus rely on visual persuasion, making them more indirect and open for interpretation (McQuarrie & Phillips, 2005; Phillips & McQuarrie, 2004).

Messages encompassing visual metaphors have been found to be more persuasive than messages without these visual metaphors, because they encourage elaboration as they are deviant from expectations (McQuarrie & Mick, 1996). In addition, such messages might lead to positive surprise and increase message effectiveness once people "solve the puzzle" and understand the message (e.g.

higher recall, more favorable attitudes towards the ad and brand, and stronger purchase intentions, Chang & Yen, 2013; Hutter & Hoffmann, 2014; Jeong, 2008). It is therefore not surprising that visual metaphors are often used in campaigns and advertising (McQuarrie & Phillips, 2005). Examples are a Tide ad with a measuring cup filled with the sky to draw parallels between the freshness, softness, and brightness of the sky and the washing detergent (Phillips & McQuarrie, 2004) and a WWF campaign showing a tropical rain forest in the shape of lungs, drawing parallels between deforestation and the lungs of the earth (TBWA, 2008). These are examples of visual metaphors being communicated via traditional media like print and TV, but there are also visual metaphors that are being communicated via nontraditional media (Dahlén, 2005). Typically, an object is used that is normally not considered a medium and at the same time constitutes a part of the message. For example, a beach towel in the shape of a coffin illustrating that sunbathing can be perilous (JWT, 2009).

Most studies so far focus on using visual metaphors in advertising (e.g. Bergkvist, Eiderbäck, & Palombo, 2012; Dahlén, 2005), investigating effects on ad and brand attitudes. The question is, however, whether such visual metaphors might also have the ability to change more complex behaviors such as environmentally friendly behaviors. Recent research in the health domain suggests it might: researchers showed that the use of messages concerning depression with visual and verbal metaphors might lead to higher elaboration than messages concerning depression with only verbal metaphors (Lazard, Bamgbade, Sontag, & Brown, 2016). This study, however, did not find any effects of using visual metaphors on attitudes towards the message nor a decline in stigma (Lazard et al., 2016). Therefore the question is whether visual metaphors could actually positively stimulate environmentally friendly behaviors. This is especially the question since environmentally friendly behavior constitutes often more effort for the self, but profits the collective and has mostly no direct effects, but only in the distant future. Therefore, environmentally friendly behaviors people engage in today will mostly not have immediate visible positive effects on the environment, constituting an important barrier for engaging in environmentally friendly behaviors (Lorenzoni et al., 2007). We, therefore, introduce visual metaphors that make use of feedback such that people can observe the positive effects their behaviors might have immediately: *visual impact metaphors*.

Visual impact metaphors

We define a visual impact metaphor as an object that comprises a visual implicit comparison to another object so to visualize the impact of one's behaviors by using a feedback feature. An example of such a visual impact metaphor is the WWF paper dispenser campaign, see Figure 1. In the WWF paper dispenser campaign, people may draw paper towels from a paper towel dispenser with a see-through silhouette featuring South America (Saatchi & Saatchi, 2007). The combination of the non-traditional medium (paper dispenser) that features a metaphor (South America – a reference to the Amazon rainforest), and the feedback feature (when drawing paper, the Amazon rainforest becomes less green) illustrates that, by using paper towels, one is metaphorically “using up” the rainforest (the environmental impact).

Because of this feedback function, we posit that the use of a visual impact metaphor can reduce the temporal and spatial distance between a person's environmental behavior and its impact on the environment. It has been found repeatedly that environmental problems, such as global climate change, are perceived as abstract and far away by many people – making it difficult to link individual behavior to environmental consequences (Barr, Gilg, & Shaw, 2011; Lorenzoni et al., 2007). Therefore, it has been suggested that techniques should be developed to let people directly experience environmental consequences (Weber, 2006). A visual impact metaphor is such a technique. Since it gives feedback in real time, this enables people to directly experience the impact of their environmental behaviors on the environment – whereas this impact is normally temporal distant.

From studies in the environmental domain, we know that such first-hand, direct experiences, can influence people's environmental beliefs and behaviors (Joireman, Truelove, & Duell, 2010; Li, Johnson, & Zaval, 2011). For example, when it is warmer outside, people are more likely to believe that

climate change exists and are more willing to spend money on countering climate change (Joireman et al., 2010; Li et al., 2011). We posit that a visual impact metaphor might similarly provide people with a direct, experiential situation by giving feedback on the consequences of one's behaviors, elucidating its users that their behavior affects the environment: "If I draw an extra paper from the dispenser to dry my hands, this damages the Amazonian rainforest". Although there is, to our knowledge, no research yet on visual impact metaphors, there are other communication techniques, such as virtual reality, that use visual feedback to show how people's current actions might affect future consequences that we can draw from.

For example, a study in the health domain investigated whether it might have positive effects to "fast-forward" to the future by using virtual reality to provide people with visual feedback showing the impact of their current unhealthy behaviors (Ahn, 2015). That is, the research investigated whether soft drink consumption might decrease over time when participants see in a virtual reality environment in two minutes how the consumption of one soft drink a day for two years leads to gaining weight. The study showed that there were no immediate effects, but there were some effects over time showing that participants in the virtual reality condition consumed less soft drinks, because they elaborated more on the risk that drinking soft drinks might pose to them (Ahn, 2015). Visual feedback can thus increase desired behaviors. In line with this, a study in the environmental domain suggests that virtual reality might be able to reduce the temporal distance between a person's environmental behavior and the possible (negative) impact on the environment, because virtual reality enables people to experience these future negative impacts as occurring here and now (Ahn, Bailenson, & Park, 2014). Specifically, participants were instructed to cut down a tree in a virtual reality environment (after reading that it costs half a tree every 20 years to supply people with toilet paper) or simply read about a tree being cut down. The results suggested that visual feedback via virtual reality increased environmental intentions (Ahn et al., 2014). Based on these previous studies, we posit that visual impact metaphors may enhance message and campaign effectiveness.

On the one hand, we propose that this is due to visual impact metaphors increasing response efficacy, because visual impact metaphors demonstrate how individual actions *can* make a difference (i.e. have an impact) by visualizing how individual recycling efforts can contribute to the whole and subsequently increase recycling attitudes and intentions (Ahn et al., 2014; Ahn et al., 2015). On the other hand, we propose that this is also due to visual impact metaphors being more likely to activate positive evaluative persuasion knowledge (Dahlén & Edenius, 2007). Below, we will discuss these two paths.

Response efficacy

Even though many people care for the environment, they often find it difficult to make more environmentally friendly choices (Lorenzoni et al., 2007; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014). Environmentally friendly behaviors often cost more effort (in terms of physical effort, money, and time) and even when taking this effort, the behavior does not immediately lead to environmental improvements (Lorenzoni et al., 2007). In order to see significant changes, many people and organizations need to make environmentally friendly choices over a long period of time. Making more environmentally friendly choices and seeing a contribution to a better environment is thus not a one-to-one relationship. Because of this, people's response efficacy¹ (i.e. the belief that an individual's behavior can make a difference in the solution to a problem; Kinnear et al., 1974), is often low. Research, however, shows that consumers' attitudes and intentions towards environmental behavior at large, and recycling specifically, are likely to increase when consumers believe they can make a substantial individual difference, in other words, when people's response efficacy is high (Ellen et al., 1991; Izagirre-Olaizola et al., 2015; Kinnear et al., 1974).

We posit that a visual impact metaphor may have the ability to increase people's response efficacy. That is, by using a visual metaphor the abstraction of the environmental problem can become more concrete, as it makes the problem more tangible. This is due to metaphors having the ability to make

abstract information more concrete and, as such, make complex problems simpler (Burgers, Konijn, Steen, & Iepsema, 2015). The abstract relation between recycling clothing, saving energy, or using less plastic now and the effect on the environment it might have later, is simplified and becomes psychologically closer. Furthermore, because it constitutes a visual rather than a verbal metaphor, the problem becomes extra salient and tangible, as visual information is generally more vivid and is also processed more rapidly and in-depth compared to textual information (Messaris, 1997).

At the same time, the use of a visual impact metaphor can reduce the temporal and spatial distance between a person's environmental behavior and its impact on the environment. As a visual impact metaphor gives feedback in real time, people are enabled to experience the impact of their environmental behaviors on the environment, that are normally temporal distant, in the here and now (Ahn et al., 2015). Therefore, we expect that the use of a visual impact metaphor may enhance response efficacy beliefs. Think, for example, once more of the WWF paper disposal campaign. The feedback feature illustrates that by taking a paper towel from the paper dispenser, the rainforest is disappearing; every time a bit more with every paper that is drawn. We assume that visual impact metaphors can make the link between one's environmentally responsible behaviors and the solution to the problem clearer. By demonstrating that people's environmental behavior can make a difference, people's response efficacy may increase.

Based on previous research showing a positive effect of response efficacy on environmentally friendly behaviors in general and clothing recycling specifically (Izagirre-Olaizola et al., 2015; Kang et al., 2013), we expect that this increase in response efficacy subsequently leads to more positive environmentally friendly attitudes and intentions, therefore, the following hypothesis is proposed:

H1. A message in the form of a visual impact metaphor (vs. no visual impact metaphor) results in stronger response efficacy beliefs and subsequently increases a.) recycling attitudes and b.) recycling intentions.

Persuasion knowledge

A second underlying process that is likely to explain the positive effects of visual impact metaphors on recycling attitudes and intentions is the activation of positive evaluative persuasion knowledge. Persuasion knowledge comprises people's understanding and attitudes concerning persuasive attempts (Friestad & Wright, 1994). The Persuasion Knowledge Model (Friestad & Wright, 1994) explains how people develop knowledge concerning persuasion and how the activation of this knowledge enables people to recognize, interpret, and evaluate persuasive attempts. The activation of persuasion knowledge may thus help people to identify a persuasive attempt and to adaptively respond to this attempt (Friestad & Wright, 1994).

Persuasion knowledge firstly comprises a cognitive aspect (i.e. conceptual persuasion knowledge) which encompasses, for example, recognizing and understanding the attempt. Secondly, it comprises an evaluative aspect (i.e. evaluative persuasion knowledge) which encompasses evaluative mechanisms that help people cope with a persuasive attempt, such as critical or positive feelings towards the attempt (Boerman et al., 2012; Rozendaal, Lapierre, Van Reijmersdal, & Buijzen, 2011). The activation of conceptual persuasion knowledge (i.e. recognizing a persuasive attempt) often results in negative attitudes and skepticism (i.e. activating negative evaluative persuasion knowledge Speck & Elliott, 1997). We posit that visual impact metaphors are less likely to spark negative evaluative persuasion knowledge for two reasons. First, visual impact metaphors will be less likely to be categorized as a persuasive attempt and, second, if they do, it is more likely to spark *positive* evaluative persuasion knowledge (Dahlén & Edenius, 2007; Rosengren, Modig, & Dahlén, 2015).

That visual impact metaphors are less likely to be classified as a persuasive attempt, can be explained by schema theory, which states that people's knowledge is stored in different, connected schemas (John & Whitney, 1986). All ideas, opinions, and thoughts that people have about campaigns and persuasive attempts are stored in a schema: the advertising schema (Dahlén, 2005).

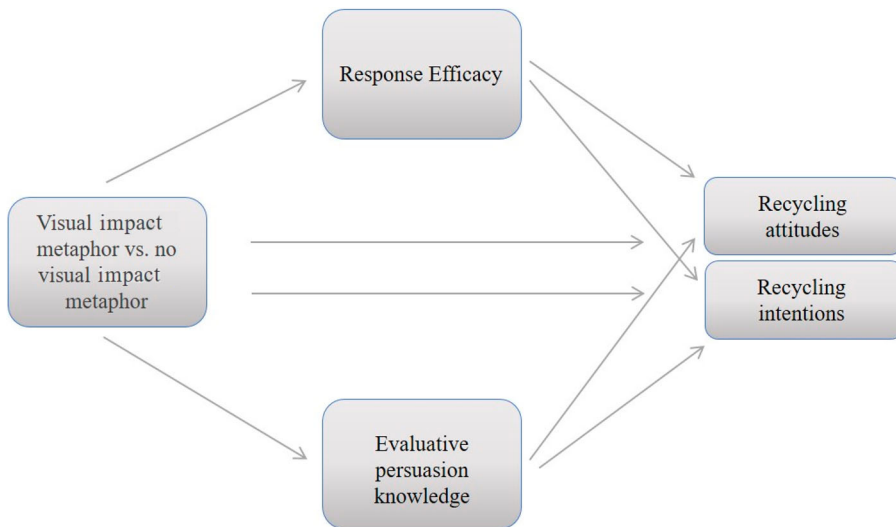


Figure 2. Conceptual model.

This schema is activated whenever people encounter campaigns in media that are known for its persuasion attempts, such as billboards and television (Dahlén, 2005). However, we expect that when a campaign is visualized in the form of a visual impact metaphor, people do not immediately recognize the campaign as a persuasive attempt, since it does not fit with the advertising scheme. Particularly, the use of a nontraditional medium in addition to a contextual setting where campaign exposure is not expected, may render one's advertising schema (and thus conceptual persuasion knowledge) inactive (Dahlén & Edenius, 2007).

Secondly, conceptual persuasion knowledge activation not always needs to spark negative evaluative persuasion knowledge, people may also choose to be persuaded by the attempt rather than to resist it (Friestad & Wright, 1994). Research using nontraditional media showed that visual metaphors are evaluated more positively than more traditional ways of advertising and that people value such persuasive attempts positively (Rosengren et al., 2015). Visual metaphors are thus more likely to activate positive evaluative persuasion knowledge, and are as a result less likely to spark resistance and ultimately will be more persuasive (McQuarrie & Phillips, 2005). As a result, we expect that visual impact metaphors will be more persuasive as they evoke positive evaluative persuasion knowledge:

H2. A message in the form of a visual impact metaphor (vs. no visual impact metaphor) results in positive evaluative persuasion knowledge and subsequently increases a.) recycling attitudes and b.) recycling intentions.

Our theoretical assumptions are summarized by the conceptual model in Figure 2. We conducted an experimental study to test this model. Furthermore, we test which of the two underlying mechanisms (response efficacy and evaluative persuasion knowledge) accounts for the effects the most.

Method

Participants and design

Participants were randomly assigned to one of two conditions (campaign type: visual impact metaphor versus no visual impact metaphor) of a between-subjects design. Participants were approached via mail and social media to participate in an online study concerning campaigns in the Netherlands. In total, a convenience sample of 175 participants took part voluntarily in the online experiment. One of the participants indicated not seeing the manipulation as it did not load on the computer,

leaving a total of 174 participants (67.8% female, 31.6% male, 0.6% neutral gender, $M_{\text{age}} = 32.57$, $SD = 15.61$ –1 missing).

Procedure

After participants provided their consent for participating in the experiment, participants were randomly exposed to one of the two campaigns. The campaigns were visualized by a series of photos. After seeing the manipulation, participants filled in a questionnaire measuring the mediator response efficacy, the dependent variables recycling attitudes and intentions and then the mediator evaluative persuasion knowledge. We measured evaluative persuasion knowledge after the dependent variables to be sure that the effects were due to the stimuli and not due to the questions on evaluative persuasion knowledge. Lastly, participants' demographics were asked. After completing the questionnaire, participants were thanked for their participation and debriefed.

Stimulus material

In both conditions participants were exposed to a series of five photos. The five photos were placed after each other, so that the photos reflected an ongoing story. The first photo showed four different recycle bins. The second photo showed an individual walking towards the bin with a full bag of clothes. The third photo showed the same individual standing in front of the recycling bin, where the individual opens the lid of the bin and starts disposing of clothes. The fourth photo showed how the individual continues disposing of the clothes in the bin. The last photo showed a stimulating slogan "Give your old clothes a new life. Dispose of them in the recycle bin."

There was one difference between the two conditions, that is, on the clothing recycle bin in the visual impact metaphor condition a translucent screen was featured shaped as the silhouette of a person. When the individual disposed of the clothing, the silhouette was attired with new clothes as the bin filled up with clothes. In this way the recycle bin implicitly communicated the message by visualizing how one may give one's old clothes a new life through metaphorically dressing another person when disposing of clothes in the recycle bin by giving feedback in real-time (i.e. disposing of the clothing immediately led to the person being attired).

Measures

Response efficacy

We measured the mediator response efficacy with six items like: *There is not much that any one individual can do about the environment, like recycling clothing (reversed)*, *As long as other people do not recycle clothing, my efforts to recycle clothing are useless (reversed)*, and *I can make a positive impact on the environment and society by recycling clothing* on a scale from 1 (*completely disagree*) to 7 (*completely agree*), (based on Ellen et al., 1991). Cronbach's alpha of the six items was = .60, deleting the item *When I recycle, this does not affect the environment and society (reversed)* increased the Cronbach's alpha to .66. The Cronbach's alpha could not be enhanced any further, therefore we used the five items as a measure for response efficacy. The higher the score, the higher the participants' response efficacy beliefs ($M = 5.29$, $SD = 0.98$).

Evaluative persuasion knowledge

Evaluative persuasion knowledge was measured with four items like *I believe the campaign is sincere* and *The campaign is honest* on a scale from 1 (*completely disagree*) to 7 (*completely agree*) (based on Boerman et al., 2012; Dahlén & Edenius, 2007; Cronbach's alpha = .68). The higher the score, the more positive the evaluative persuasion knowledge ($M = 4.91$, $SD = 0.96$).

Recycling attitudes

The dependent variable attitude towards recycling was measured on a scale from 1 (*completely disagree*) to 7 (*completely agree*) with four items like: *I find the idea of recycling pleasing* and *My feelings concerning recycling are positive* (based on Knussen, Yule, Mackenzie, & Wells, 2004; Cronbach's alpha = .81). Higher scores reflected more positive recycling attitudes ($M = 5.65$, $SD = 1.04$).

Recycling intentions

We measured the dependent variable recycling intentions on a scale from 1 (*completely disagree*) to 7 (*completely agree*) with four items like: *I intend to recycle some of my clothes during the next month* and *I am convinced I will recycle my old clothes* (based on Knussen et al., 2004; Cronbach's alpha = .75). Higher scores reflected stronger recycling intentions ($M = 5.22$, $SD = 1.16$).

Analysis plan

As a first step, we checked whether the randomization was successful. Then, we tested the direct effects of using a visual impact metaphor on the dependent variables by means of independent samples t-tests. The hypothesized mediating effects of, first, response efficacy and, second, evaluative persuasion knowledge were tested using Model 4 of the PROCESS package (Hayes, 2013). Lastly, both underlying effects were included in the model at the same time. All reported indirect effects were estimated by bootstrapping analysis with 5000 samples.

Results

Randomization check

To check whether the participants were randomly distributed over the two conditions, we performed a randomization check. Participants in the visual impact metaphor ($M_{\text{age}} = 32.60$, $SD = 16.03$; 31.5% male, 67.4% female, 1.1% neutral), and no visual impact metaphor condition ($M_{\text{age}} = 32.54$, $SD = 15.26$; 31.8% male, 68.2% female) did not differ with respect to age $t(171) = -0.03$, $p = .980$ or gender $\chi^2(2) = 0.96$, $p = .619$. The randomization thus succeeded.

Direct effects

First, we tested whether there were direct positive effects of using a visual impact metaphor versus no metaphor on attitudes towards recycling and recycling intentions. Participants in the visual impact metaphor condition had marginally significant more positive attitudes towards recycling ($M = 5.79$, $SD = 0.90$) than participants in the no visual impact metaphor condition ($M = 5.51$, $SD = 1.15$), $t(172) = -1.81$, $p = .072$, Cohen's $d = .27$. In line with this, participants in the visual impact metaphor condition reported marginally significant more recycling intentions ($M = 5.37$, $SD = 1.23$) than participants in the no visual impact metaphor condition ($M = 5.06$, $SD = 1.08$), $t(172) = -1.76$, $p = .079$, Cohen's $d = .35$.

The mediating role of response efficacy

In the first hypothesis, we proposed that response efficacy mediates the positive effect of campaign type on attitudes towards recycling and recycling intentions. In line with H1a, mediation of a visual impact metaphor versus no visual impact metaphor through increased response efficacy on recycling attitudes was confirmed (indirect effect = 0.14, SE = 0.09, 95% CI [0.0085; 0.3601]). The results showed that the campaign using a visual impact metaphor versus no visual metaphor led to an increase in response efficacy beliefs, $b = 0.28$, SE = .15, $t = 1.91$, $p = .058$, consequently leading to more positive recycling attitudes, $b = 0.48$, SE = .07, $t = 6.69$, $p < .001$. The effect of campaign type

on recycling attitudes was no longer significant after controlling for the mediator, $b = 0.15$, $SE = .14$, $t = 1.04$, $p = .298$.

Next, we performed a mediation analysis with recycling intentions as the dependent variable. In line with H1b, the model confirmed mediation of campaign type through increased response efficacy on recycling intentions (indirect effect = 0.16, $SE = 0.09$, 95% CI [0.0053; 0.3473]). The results showed that the campaign using a visual impact metaphor versus no visual impact metaphor led to an increase in response efficacy beliefs, $b = 0.28$, $SE = .15$, $t = 1.91$, $p = .058$, consequently leading to more positive recycling intentions, $b = 0.56$, $SE = .08$, $t = 7.10$, $p < .001$. The effect of campaign type on recycling attitudes was no longer significant after controlling for the mediator, $b = 0.15$, $SE = .16$, $t = 0.96$, $p = .340$. Campaigns using a visual impact metaphor might thus lead to stronger recycling attitudes and intentions than campaigns without a visual impact metaphor, which is mediated by an increase in response efficacy beliefs. H1a and H1b were thus confirmed.

The mediating role of evaluative persuasion knowledge

In the second hypothesis, we proposed that positive evaluative persuasion knowledge mediates the positive effect of campaign type on attitudes towards recycling and recycling intentions. The mediation analysis confirmed mediation of campaign type through positive evaluative persuasion knowledge on attitudes (indirect effect = 0.07, $SE = 0.04$, 95% CI [0.0101; 0.1875]). The results showed that the campaign using a visual impact metaphor versus no visual impact metaphor led to positive evaluative persuasion knowledge, $b = 0.32$, $SE = .14$, $t = 2.16$, $p = .032$, consequently leading to more positive recycling attitudes, $b = 0.23$, $SE = .08$, $t = 2.84$, $p = .005$. The effect of campaign type on recycling attitudes was no longer significant after controlling for the mediator, $b = 0.21$, $SE = .15$, $t = 1.36$, $p = .174$.

Next, we performed a mediation analysis to test the effects of evaluative persuasion knowledge on consumers' recycling intention. The model confirmed mediation of campaign type through positive evaluative persuasion knowledge on recycling intentions (indirect effect = 0.11, $SE = 0.06$, 95% CI [0.0249; 0.2497]). The results showed that the campaign using a visual impact metaphor led to an increase in positive evaluative persuasion knowledge $b = 0.32$, $SE = .14$, $t = 2.16$, $p = .032$, consequently leading to more positive recycling intentions $b = 0.35$, $SE = .08$, $t = 3.94$, $p < .001$. The effect of campaign type on recycling intentions was no longer significant after controlling for the mediator, $b = 0.19$, $SE = .17$, $t = 1.17$, $p = .243$. Campaigns using a visual impact metaphor may thus lead to more positive recycling attitudes and stronger recycling intentions than campaigns without a metaphor, which was mediated by evaluative persuasion knowledge, supporting H2a and H2b.

Response efficacy versus evaluative persuasion knowledge

Lastly, we tested the model holistically in the sense that both mediators were included in Model 4 so to test which of the two mediators is most important in driving the positive effect of visual impact metaphors on recycling attitudes and intentions. When including both mediators, the indirect effect of response efficacy on recycling attitudes was still significant (indirect effect = 0.13, $SE = 0.08$, 95% CI [0.0085; 0.3493]), however, there no longer was an indirect effect of visual impact metaphors on recycling attitudes via evaluative persuasion knowledge (indirect effect = 0.03, $SE = 0.03$, 95% CI [-0.0083; 0.1147]).

Next, we tested the holistic model for recycling intentions. When including both mediators, both the effect of response efficacy (indirect effect = 0.14, $SE = 0.08$, 95% CI [0.0098; 0.3204]) and the indirect effect of evaluative persuasion knowledge (indirect effect = 0.06, $SE = 0.04$, 95% CI [0.0057; 0.1729]) on recycling intentions were significant, the effect of response efficacy was the

largest. In sum, the indirect effect of response efficacy was stronger than the effect of evaluative persuasion knowledge for both recycling attitudes and recycling intentions.

General discussion

The aim of this study was to examine the effects of visual impact metaphors versus campaigns on consumers' recycling attitudes and intentions. We proposed two underlying processes: response efficacy and evaluative persuasion knowledge. Our results showed that a visual impact metaphor campaign message increased response efficacy, which subsequently resulted in more positive attitudes towards recycling and stronger intentions to recycle. The visual impact metaphor thus gave participants the belief that their recycling actions matter and that their actions actually contribute to a better environment by implicitly communicating and visualizing the message that old clothes deserve a new life and can easily be given a new life. Besides, our results showed that a visual impact metaphor led to more positive evaluative persuasion knowledge, which consequently resulted in more positive attitudes towards recycling and stimulated consumers' intention to recycle. When both underlying processes were included in the model, response efficacy had the strongest effect. Evaluative persuasion knowledge only had a unique effect on recycling intentions, not on recycling attitudes. Visual impact metaphors campaigns might thus be liked better than campaigns without a visual impact metaphor (i.e. evaluative persuasion knowledge), however, visual impact metaphors campaigns mostly enhance recycling attitudes and intentions because they instigate response efficacy beliefs.

Our research adds to existing research on stimulating environmentally friendly behavior. Whereas ample cross-sectional research points out that response efficacy is an important driver of environmental behavioral change (e.g. Ellen et al., 1991; Izagirre-Olaizola et al., 2015), there are only a few studies that investigate how response efficacy may be increased (Ahn et al., 2015; Antonetti & Maklan, 2014), and virtually none about how response efficacy may be increased by the means of campaigning. The current research fills this gap by providing initial tools on increasing recycling behavior based on response efficacy via campaigning.

In a similar vein, Ahn et al. (2015) have found that virtual reality experiences can increase environmental response efficacy. They showed that sawing down a tree or nurturing a tree in a virtual reality setting affected paper use intentions. Interestingly, this effect was stronger for gain framed as opposed to loss framed experiences. Since the stimulus of the current study can be characterized as a gain frame, we can thus confirm the effectiveness of gain framed experiences. In contrast to virtual reality experiences, the visual impact metaphors studied here represent real-life experiences that can be more easily integrated into everyday life of a broader public (e.g. WWF paper dispenser) while virtual experiences require a willingness to participate and might thus be more suitable to reach people who are already involved or interested in a cause. We have argued that visual impact metaphors provide a means to perceive far away environmental consequences of individual behavior in the here and now. While some research indicates that exposure effects in virtual reality and real life might be comparable (Emmelkamp et al., 2002), a direct comparison of the effects and underlying mechanisms induced by visual impact metaphors in virtual or augmented reality and real-life could be a valuable extension of the current study.

Furthermore, our findings are in line with previous research showing that visual metaphors are effective in getting a message across (Dahlén, 2005; Jeong, 2008). It also fits with research showing that a visual metaphor in the form of a nontraditional media advertisement reduces the activation of conceptual persuasion knowledge (Dahlén & Edenius, 2007), which has a major influence on evaluative persuasion knowledge (Boerman et al., 2012). The finding thus also extends the research of visual metaphors, by showing that visual (impact) metaphors may be effective because they lead to more positive evaluative persuasion knowledge activation.

In addition, our research adds to studies on the use of environmental metaphors. Previous studies mainly investigate the effects of using verbal metaphors on the way people perceive the environment,

climate change, and the human-environment relationship (e.g. Nerlich et al., 2010; Princen, 2010; Thibodeau et al., 2017). How this influences environmental behavior, is rarely investigated (but see Flusberg et al., 2017), leaving a research gap. Similarly, there is a research gap when it comes to the use of visual metaphors to stimulate environmentally friendly behaviors. In the current study, we address these research gaps by combining research on (visual) metaphors and visualization by introducing visual impact metaphors and investigating their effects on environmental behaviors.

Lastly, our research also carries practical implications. Visual impact metaphors are relatively easy to use and to implement. Therefore, they can complement environmental campaigns, specifically, with the aim to increase response efficacy. Importantly, the current research shows that this could translate in environmentally friendly actions. Using a visual impact metaphor may thus be an effective means to overcome a low response efficacy and stimulate environmentally friendly behaviors. Lastly, research suggests that the use of visual impact metaphors might lead to persisting environmentally friendly actions. That is, research showed that when using nontraditional media (e.g. paper dispenser) this might remind people of the message (e.g. save paper) even when the message is no longer featured on it (Dahlén, Friberg, & Nilsson, 2009). This indicates that the effect of a recycling bin with a visual impact metaphor might work as a cue for other recycling bins, something future research could investigate.

Limitations and future research

The current research has some limitations. Firstly, not all Cronbach's alphas are as high as desired. Cronbach's alpha, however, is often lower than the common threshold of .70 when the scale constitutes of less than ten items, as was the case in the current study (Pallant, 2001). The inter-item correlations are, however, as desired (Briggs & Cheek, 1986). Together this implies that our scales are reliable. Furthermore, for future research, it could be interesting to conduct an actual field study, so to replicate our findings in a different setting. In addition, it could be interesting to test whether gain framed visual impact metaphors are more effective than loss framed visual impact metaphors, as suggested by research on gain versus loss framing and the effects on environmental behavior (Ahn et al., 2015; Obermiller, 1995). Finally, other visual impact metaphors targeting different types of environmentally friendly behaviors, such as recycling of paper or plastics or saving of energy or water, should be tested to assess the generalizability of the approach and the underlying mechanisms proposed here. The current study is, however, a first step in investigating ways to stimulate people to make environmentally friendly choices via visual feedback mechanisms and shows that this could be an effective way to do so.

Notes

1. Other terms for response efficacy that are frequently used are perceived consumer effectiveness, perceived efficiency, consumer efficacy, and perceived effectiveness.

Disclosure statement

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