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RESEARCH ARTICLE

Perceived Influence of Proenvironmental Testimonials

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ABSTRACT

Recommendations for communicators to make environmental issues more concrete in public align with the tenets of exemplification theory. Audiences may also engage with messages that they perceive as influencing them more than others, an outcome that aligns with the third-person effects framework. What is not well known is how these two areas of research intersect, namely, how exemplars about environmental issues may impact perceived message influence on the self-relative to others. This study examines the effects of testimonials on the perceived influence of environmental messages. Two experiments, each conducted simultaneously in Singapore and the Midwestern US, suggest that university students perceive themselves to be more influenced than others by proenvironmental messages. The second experiment shows that this perceptual bias is related to message desirability and individuals' environmental values. Both experiments reveal location-specific effects, which is useful for understanding how to communicate environmental problems to global audiences.

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Characterizations of environmental issues can be abstract and poorly informed by everyday experience (Coeckelbergh, 2015, p. 36). Thus, public understanding of the environment can benefit from communication of research findings, related public discourse, and social learning (Bentley, Garnett, O'Brien, Brock, & Lehmann, 2012; Nisbet & Kotcher, 2009). Although proenvironmental messages are often intended to influence audiences directly, audiences may also react based on how they think such messages will influence others. This secondary reaction could benefit the original intent of the communicator if audience members promote the message through their social networks.

Third-person perception—the belief that media influence others more than self—is a robust finding in mass communication research, and offers a theoretical account of public support for media content restrictions (Davison, 1983; Perloff, 1999; Sun, Pan, & Shen, 2008). According to this framework, the belief that a particular media product has harmful influence can amplify the belief that others are particularly susceptible to its influence. Conversely, messages with desirable influence can invert this perceptual bias in what is known as *first-person perception* (Gunther & Thorson, 1992). When individuals have first-person perception of message influence, they believe they are more influenced than others and are consequently more likely to promote the message (Sun, Shen, & Pan, 2008).

Not only do individuals perceive greater influence on the self when a message is desirable, but also when it has personal relevance (Schweisberger, Billinson, & Chock, 2014), and environmental communicators and advocates have recently been calling for more messages to embody this goal. Some suggestions have been to include specific examples of how environmental problems affect people or

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places, which may emphasize local impacts or health frames, because they are thought to be more personally relevant (Center for Research on Environmental Decisions [CRED], 2009; ecoAmerica, 2013; Maibach, Nisbet, & Weathers, 2011). These suggestions assume that portraying environmental issues using concrete and specific cases will lead to greater influence than when using generalized facts or abstractions, an assumption that is well supported in the literature of exemplification theory (Gibson & Zillmann, 1994; Zillmann, 1999, 2002).

What is not well known is how these two areas of research intersect, namely how the inclusion of environmental exemplars in a message may impact perceived influence on the self and on others. That is, exemplars may influence not only what individuals believe about the message contents, but also *perceptions* of message influence on the self in relation to others, which can affect subsequent attitudes and behaviours regarding the message.

The current research effort uses two between-subjects experiments to examine this potential effect of exemplars. In the first experiment, participants evaluate different versions of a persuasive message for energy conservation. Analyses establish a baseline model of the third-person effect, the exemplification effect, and their interaction. The second experiment replicates the first using multiple proenvironmental messages, and accounts for individual differences that may further characterize the effects under study. In particular, the second experiment considers the effects of message desirability and individuals' environmental values on first-person perception. Both experiments are replicated simultaneously in Singapore and the Midwestern US, whose comparison may benefit efforts to communicate about the environment to global audiences. In sum, this research effort can clarify how exemplars affect presumed media influence about abstract environmental phenomena, how personal values and beliefs may actuate this perceived influence, and ultimately what kinds of messages may gain the most traction in public discourse.

Study 1

Third- and first-person perception

One of the most studied perceptual biases in communication research arises in the third-person effect. According to this framework, individuals regard themselves as being less susceptible than others to the influences of media messages—particularly when the kind of influence is undesirable—and may support media content restriction as a result (Sun, Shen, et al., 2008; Xu & Gonzenbach, 2008). Various accounts of this asymmetrical perception relate it to unrealistic optimism (Hoorens & Ruiter, 1996), ego enhancement (Boyle, McLeod, & Rojas, 2008), and other motivational factors. There are also parallel cognitive processes that result in asymmetric self-other perceptions: Whereas introspection may inform beliefs about media influence on the self, individuals rely on intuitive psychology in order to form beliefs about media influence on other people (Eveland, Nathanson, Detenber, & McLeod, 1999; Meirick, 2006; Perloff, 1993). As a result, lay theories about powerful media effects may promote third-person perception because individuals believe that media effects occur, only not to them.

Several factors may influence the size of third-person perception. One of the most consistent findings is that third-person perception is larger when media influence is more undesirable, as in the contexts of violent video games (Boyle et al., 2008), sexual content in films (Rosenthal, Detenber, & Rojas, 2015), and alcohol product placement (Shin & Kim, 2011).

On the other hand, when media messages promote desirable attitudes or behaviours, the effect may shrink or reverse. Reverse third-person perception, or first-person perception, occurs when individuals rate themselves as being more susceptible than others to the influence of media (Gunther & Thorson, 1992). Although this effect tends to be less pronounced than third-person perception, it has appeared in the contexts of public service announcements (Hoorens & Ruiter, 1996; Innes & Zeitz, 1988; Sun, Shen, et al., 2008; White & Dillon, 2000), emotional advertisements (Gunther & Thorson, 1992), and environmental documentaries (Lin, 2013). Especially relevant to the current

research effort, Lin found that Taiwanese university students rated themselves as more influenced than others by the climate change documentary, *An inconvenient truth*. We expect to find a similar effect in the context of persuasive proenvironmental messages.

Hypothesis 1: University students will have first-person perception of persuasive proenvironmental messages.

Exemplification

Exemplification theory explores how beliefs and attitudes about abstract objects and issues are influenced by specific, case-based exemplars (Gibson & Zillmann, 1994; Zillmann, 1999, 2002). In the current context, exemplification theory can explain how concrete cases of individuals interacting with environmental issues may influence an audience's beliefs, attitudes, and behaviours toward those issues.

Various processing heuristics bias the influence of concrete exemplars over general truths about the same phenomenon. Because exemplars represent specific cases, they require less cognitive processing for both integration into and retrieval from memory as compared to abstract generalities. Such efficient processing amplifies the influence of exemplars over belief formation due to their increased availability in memory (Zillmann, 2006). Furthermore, individuals assume their collection of exemplars accurately represent the phenomenon, which they may use to make generalizations about the larger issue (Zillmann, 2006). These heuristics create an environment where exemplars dominate the formation of perceptions without a need to check the validity of those perceptions relative to other evidence about the phenomenon.

A large body of empirical research supports these predictions, finding that exemplars play a significant role in belief formation, even when contrasting expository or statistical information is present in the same message. This bias for exemplars has been found in many contexts, including smoking behaviours (Kim, Bigman, Leader, Lerman, & Cappella, 2012), weight management (Sarge & Knobloch-Westerwick, 2013), and vaccines (Dixon, McKeever, Holton, Clarke, & Eosco, 2015). While most exemplification studies have focused on risks or health-related topics (Zillmann, 2006), there is nothing to suggest that exemplars would behave differently in an environmental context.

Synthesis of theoretical frameworks

Although both third-person perception and exemplification theory are long-standing streams of research within mass communication, only a few studies have combined the two theoretical areas to explore audience responses to media messages. Schmierbach, Xu, and Boyle (2012) presented participants either with base-rate statistics or exemplars about the effects of heavy video game playing as being either harmful or harmless, and then asked them to rate how much they and others are negatively influenced by video games. Results showed that the exemplar condition was related to increased perceived influence on others but not on the self. Assuming that participants viewed such influence as undesirable, one explanation for the observed effect is that the presence of the exemplar was insufficiently persuasive to overcome participants' sense of immunity to influence. A complementary explanation is that the exemplar more convincingly portrayed video games as having strong effects, which may have primed an intuitive theory of "powerful effects" among participants.

Schmierbach et al. (2012) were also interested in the effects of exemplars on third-person perception, which they documented inconclusively. If anything, their findings suggest that the presence of an exemplar is related to larger third-person perception, perhaps because it amplifies perceived harm of influence.

In a related study, Scherr, Muller, and Fast (2013) examined perceived effects of online ratings of university professors in which a written review (exemplar) of a new hire either agreed or conflicted with an aggregate rating (base-rate statistic). Participants' gave their own opinion of the professor and also estimated how others would rate the professor, both of which aligned with the written

review whether or not the aggregate rating was in agreement. As this effect was stronger on estimates of others' ratings, the researchers concluded that third-person perception amplified the exemplification effect. It is also possible that the latter amplified the former.

Both prior studies suggest that exemplification provides a heuristic for evaluating media influence. Given an undesirable message, exemplification should result in larger third-person perception. In the context of desirable media content, exemplification may lead to larger first-person perception, which would arise from both motivational and cognitive processes: It is rather self-serving to be influenced by positive messages, and more so by positive exemplars. While introspection may suggest influence on the self, individuals may be less certain about how exemplars influence other people. We expect to find a similar exemplification effect on first-person perception of desirable media messages.

Hypothesis 2: University students will rate proenvironmental messages containing exemplars as having more influence on them than messages containing only expository text.

Hypothesis 3: University students will have larger first-person perception of proenvironmental messages containing exemplars than messages containing only expository text.

Local context

Public discourse about the environment may reflect local beliefs, social customs, and media environments. Public opinion of environmental issues may reveal how individuals in one location think about the environment and also how they may respond to environmental communication. The current study analyses data from university students in Singapore and in the Midwestern US in order to document location-specific effects. Prior research shows not only that public opinion of climate change differs between Singapore and the US (Rosenthal, Ho, Detenber, & Lee, 2013), but that public opinion differs across regions of the US (Howe, Mildenberger, Marlon, & Leiserowitz, 2015). While extant literature does not predicate a hypothesis as to location-specific effects, it may be informative to document potential dependency of the exemplification effect on the location of study.

Research question 1: Does the magnitude of first-person perception differ between university students in Singapore and the Midwestern US?

Research question 2: Does the effect of exemplars differ between university students in Singapore and the Midwestern US?

In order to evaluate the three hypotheses and two research questions, we conducted a between-subjects experiment.

Method

Participants

Undergraduate communication students at universities in Singapore and the Midwestern US received partial course credit for participating in an online survey during one week in December 2013. Participants in Singapore ($n = 98$) were predominantly female (77.6%), with a median age of 20 years. Participants in the US ($n = 139$) were also predominantly female (70.5%), with a median age of 19 years. Random assignment distributed participants between two experimental conditions.

Stimulus

The experimental stimulus was a typed message advocating energy conservation at home, which a headline and brief lead paragraph introduced. The message body contained descriptive and statistical information to establish the relationship between electricity use and climate change. The text concluded with a rational appeal for readers to conserve energy at home in order to reduce negative impacts of climate change.

Independent variables

Treatment

There were two versions of the stimulus. The expository version (coded 0; 331 words) was as described above. The exemplar version (coded 1; 481 words) added a testimonial from an individual expressing positive aspects of conserving energy at home, for example, that "It was nice to find out that there's something I can control in my own house to help [people in other parts of the world]." Given the disparate word counts of the two conditions, we controlled for reading time in subsequent analyses of treatment effects. The average reading times were 57.43 seconds (SD = 54.61) for the expository condition and 71.25 seconds (SD = 58.13) for the exemplar condition, a difference that we will treat conservatively as being significant, $t(235) = 1.89$, $p = .06$.

Location

A single variable indicated whether participation was in Singapore (coded 0) or the US (coded 1). This variable served as an additional fixed factor in the statistical analysis.

Dependent variables

Participants indicated on three items their belief that the message influences their own thoughts, feelings, and behaviours. Response options ranged from 1 (*Not at All*) to 7 (*Very Much*). We averaged the items to form an index ($M = 4.06$, SD = 1.28), which had good reliability (Cronbach's $\alpha = .88$). Participants also appraised message influence on the thoughts, feelings, and behaviours of the "average [Singaporean/American]" ($M = 3.73$, SD = 1.26; $\alpha = .90$). We analysed first-person perception using the diamond method that Schmierbach, Boyle, and McLeod (2008) advocate. This method evaluates the raw self-other difference (self minus other; $M = 0.33$, SD = 1.02) controlling for total influence (self plus other; $M = 7.79$, SD = 2.32). Thus, the magnitude of self-other asymmetry is independent of perceived media power.

Results

A paired sample *t*-test evaluated hypothesis 1, which predicted that university students would have first-person perception of persuasive proenvironmental messages. Perceived influence on the self ($M = 4.06$, SD = 1.28) was larger than perceived influence on others ($M = 3.73$, SD = 1.26; $\Delta M = 0.33 \pm 0.13$), $t(236) = 4.92$, $p < .001$.[1] These results support hypothesis 1.

Hierarchical ordinary least squares regression analysis tested hypotheses 2 and 3 and the two research questions. Separate models predicted perceived influence on the self, perceived influence on others, and first-person perception. The analysis of perceived influence on others serves for reference purposes, as it does not directly evaluate hypotheses or research questions. Control variables were reading time, age, and sex (block 1). Focal predictor variables were treatment and location (block 2) and the treatment × location interaction (block 3). Table 1 shows the results of these analyses. Figures 1 and 2 show the estimated marginal means and 95% confidence intervals for the treatment × location interaction effects.

Hypothesis 2 predicted that perceived influence on self would be larger when a persuasive proenvironmental message contains an exemplar than when it does not. There was a positive main effect of treatment on perceived influence on self ($B = 0.39 \pm 0.33$, $\beta = .15$, $p = .022$, $\eta_p^2 = .03$), which supports hypothesis 2.

Hypothesis 3 predicted that first-person perception would be larger when a persuasive proenvironmental message contains an exemplar than when it does not. The main effect of treatment did not significantly predict first-person perception ($B = -0.14 \pm 0.27$, $p = .32$), which fails to support hypothesis 3.

Table 1. Regression of first-person perception on treatment and location.

	Self			Other			Self – Other		
Predictors	*B*	SE	*β*	*B*	SE	*β*	*B*	SE	*β*
Intercept	2.23	1.49		2.05	1.48		0.15	1.20	
Block 1									
Total influence							0.01	0.03	.01
Reading time	0.00	0.00	.05	0.00	0.00	−.08	0.00	0.00	.16*
Age	0.05	0.07	.05	0.06	0.07	.06	−0.01	0.06	−.01
Sex	0.49	0.20	.17*	0.42	0.19	.15*	0.07	0.16	.03
ΔR^2			.03			.02			.02
Block 2 (main effects)									
Treatment	0.39	0.17	.15*	0.51	0.16	.20**	−0.14	0.14	−.07
Location	0.03	0.18	.01	0.37	0.18	.15*	−0.35	0.15	−.17*
ΔR^2			.02			.05**			.03*
Block 2 (simple effects)									
Treatment	0.78	0.26	.31**	0.38	0.26	.15	0.40	0.21	.19
Location	0.36	0.24	.14	0.26	0.24	.10	0.09	0.20	.04
Block 3									
Treatment × Location	−0.68	0.34	−.23*	0.24	0.33	.08	−0.91	0.27	−.39***
ΔR^2			.02*			.00			.04***
Final R^2			.07			.07			.09

Note: Estimates of slopes and errors for blocks 1, 2 (simple effects), and 3 show the final model. Block 2 (main effects) shows estimates prior to entering the interaction term. The reference category (=0) for dichotomous variables were male for gender, expository message for treatment, and Singapore for location.

*$p < .05$.

**$p < .01$.

***$p < .001$.

The first research question asked if the magnitude of first-person perception differs between the two study locations. Albeit small, the main effect of location was significant ($B = -0.35 \pm 0.29$, $\beta = -.17$, $p = .018$, $\eta_p^2 = .02$). Estimated marginal means suggest that first-person perception was larger among university students in Singapore ($M = 0.53 \pm 0.21$, SD = 0.92) than among university students in the US ($M = 0.18 \pm 0.17$, SD = 0.76).

The second research question asked if the exemplification effect—on self and first-person perception—differs between the two study locations. Analysis of perceived influence on self showed a significant treatment × location interaction ($B = -0.68 \pm 0.67$, $\beta = -.23$, $p = .047$, $\eta_p^2 = .02$). Figure 1, panel A, shows the estimated marginal means and their 95% confidence intervals (panel B provides additional reference). Similarly, analysis of first-person perception also showed a significant treatment × location interaction ($B = -0.91 \pm 0.53$, $\beta = -.39$, $p < .001$, $\eta_p^2 = .05$). Figure 2 shows the

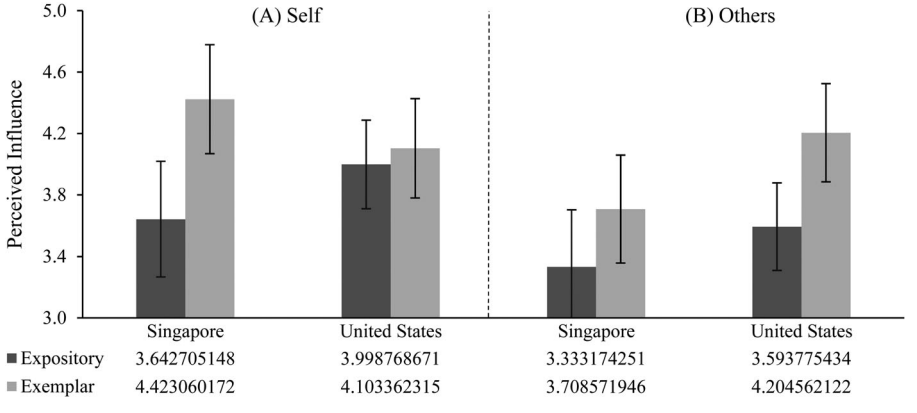

Figure 1. Perceived influence on self and others – Study 1.

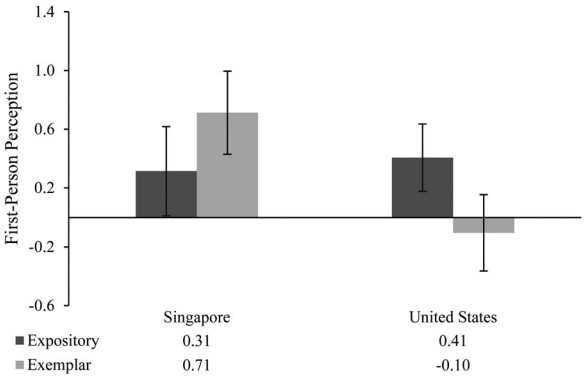

Figure 2. First-person perception – Study 1.

estimated marginal means and their 95% confidence intervals. Both interactions suggest there was a stronger exemplification effect in Singapore than in the US.

Discussion

As predicted, university students had first-person perception of proenvironmental messages, which is consistent with the results of Lin (2013). Also, university students regarded proenvironmental exemplars as influencing them more than expository messages. This finding is complementary to the findings of Schmierbach et al. (2012) and Scherr et al. (2013) by showing a unique effect of exemplars. Findings from those two studies and from the current study suggest that the use of exemplars can increase self-other perceptual asymmetries.

One way of explaining this exemplification effect is by looking at perceived influence of exemplars on the self. The patterns of perceived influence on the self (Figure 1, panel A) correspond with those of first-person perception (Figure 2) among university students in Singapore. Yet these patterns diverge among students in the US, which may be related to their belief that exemplars especially influence others. Although visual analysis of Figure 1, panel B, supports this explanation, the treatment × location interaction did not significantly predict perceived influence on others ($B = 0.24 \pm 0.66$, $p = .48$). An alternative explanation requires further research.

Limitations

This study had several limitations. First, by focusing on a single environmental issue, it is unclear if the results would explain exemplification effects in other environmental contexts. Second, the manipulation created two confounds: (1) the exemplar condition implied personal benefits of proenvironmental behaviour, while the expository condition did not and (2) the exemplar condition was longer than the expository condition. Our statistical control of reading time assumes that individuals read and process exemplars at the same rate as expository texts, which may be an unreliable assumption. Third, we took the manipulation on its face validity without a formal manipulation check. Finally, the small sample size limits statistical power.

Study 2

Message desirability

An additional limitation, Study 1 assumed that university students regard proenvironmental messages as having positive influence. Research that specifically accounts for message desirability can better articulate the source of first-person perception. As noted earlier in this manuscript, research

suggests that the more desirable the message, the greater the first-person perception (Gunther & Thorson, 1992; Lin, 2013), which leads to additional predictions.

Hypothesis 4: University students will rate proenvironmental messages as having desirable influence.

Hypothesis 5: The greater the perceived desirability of proenvironmental messages, the greater the first-person perception.

Environmental values

An additional conceptual development focuses on environmental values. The rationale for this focus is that first-person perception might be explained not only by perceived message desirability, but also how well the message aligns with individuals' preferences. One way to conceptualize these preferences is as *values*, which according to Rokeach (1968, p. 16) are enduring standards by which individuals evaluate the acceptability of behaviours and states of being. Values are similar to attitudes in that they reflect beliefs. However, whereas attitudes are predispositions to respond favourably or unfavourably to an object or situation, values correspond to core beliefs that transcend context. Values can be thought of as predispositions to respond in certain ways to experiences, and individuals are generally motivated to respond in manners congruent with their values.

The observation that thoughts and actions about the environment are different among individuals suggests the presence of varying environmental values (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000), for which the study of environmental communication may profitably account. A common indicator of environmental values is agreement with the new ecological paradigm (NEP), which as both a concept and measurement instrument may reflect a range of beliefs about the balance of nature, imminent eco-crises, human exceptionalism, the limits of human growth, and humanity's dominion over nature (Amburgey & Thoman, 2012).

Not only do environmental values help explain attitudes and behaviours about the environment, but some research findings suggest that they promote engagement with environmental information (Hart, Nisbet, & Shanahan, 2011; Trumbo & O'Keefe, 2005) and may amplify the effects of environmental risk messages (Kuhn, 2000). These studies do not elucidate the cognitive mechanism at play, but a reasonable suggestion is that individuals with stronger environmental values find environmental messages more involving. Although this prior research does not draw a link between environmental values and first-person perception, an assertion that they are positively related is consistent with a motivational explanation of first-person perception.

Hypothesis 6: The stronger university students' environmental values, the more they perceive proenvironmental messages to influence them.

Hypothesis 7: The stronger university students' environmental values, the more they have first-person perception of proenvironmental messages.

In order to address these four additional hypotheses, we conducted a second between-subjects experiment, which again we replicated simultaneously in Singapore and the Midwestern US. In addition to testing the new predictions, this experiment replicates the earlier statistical tests and addresses specific limitations of Study 1.

Method

Participants

We repeated the earlier sampling procedure, collecting data in December 2015 (US) and January 2016 (Singapore). Participants in Singapore ($n = 203$) were predominantly female (80.3%), with a median age of 20 years. Participants in the US ($n = 229$) were also predominantly female (77.7%),

with a median age of 19 years. Random assignment distributed participants between two experimental conditions.

Stimulus

To reduce confounding the treatment effect with the message topic, we created four different messages, each advocating a different environmental behaviour: switching off unnecessary lighting at home, taking shorter showers, using reusable grocery bags, and asking for local food at restaurants. We selected these behaviours to reflect different dimensions of the act itself (e.g. using less of something versus using an alternative), as well as motivations (e.g. saving money versus being a green consumer). The composition of the messages included a headline and introduction, base-rate information about a limited resource, a rational argument for resource conservation, an appeal for individual action, a rational argument to engage in the specific behaviour, and a conclusion. Participants saw only one of the four message topics.

Independent variables

Treatment

As in Study 1, the manipulation involved creating two versions of each message: one with expository text only and one that included a testimonial. We applied the manipulation to the rational arguments for resource conservation and to engage in the specific behaviour. In order to further balance the conditions, the text of the expository version made equivalent arguments, but without the use of testimonial. All other portions of each message remained identical between the two versions. The exemplar versions ($M = 433$ words, SD = 14.05) were slightly longer than the expository versions ($M = 393$ words, SD = 12.75).

Message desirability

Participants rated their agreement with two statements: "These kinds of messages have a positive influence" and "People benefit from messages like this." Response options ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The composite index (item average) had acceptable reliability ($M = 3.77$, SD = 0.68; Spearman–Brown $\rho = .80$).

NEP

Participants rated on the same 5-point scale their agreement with 15 statements of the revised new ecological paradigm scale (Dunlap et al., 2000). The composite index (item average) had acceptable reliability ($M = 3.53$, SD = 0.49; $\alpha = .81$).

Location

The data set included a variable to indicate whether participation was in Singapore (coded 0) or the US (coded 1).

Dependent variables

Participants indicated on six items their agreement that "message like this" influence their own knowledge, beliefs, attitudes, feelings, awareness, and behaviour. The composite index (item average) again used 5-point Likert scaling and had acceptable reliability ($M = 3.64$, SD = 0.68; $\alpha = .86$). Participants responded to six equivalent items to appraise message influence on the "average [Singaporean/American]" ($M = 3.23$, SD = 0.64; $\alpha = .82$). As in Study 1, first-person perception was the raw self-other difference ($M = 0.42$, SD = 0.74) controlling for total influence ($M = 6.88$, SD = 1.10).

Results

Stimulus

Effects of message topic. Prior to evaluating treatment effects, we conducted univariate ANOVAs to test if message topic interacted with any of the independent variables in predicting the dependent variables. These analyses modelled effects of NEP, study location, treatment, message topic, and all two-way interactions with message topic. Significant interactions would suggest that main effects are conditional on the message topic. Results showed no significant interaction effects (all p-values >.25), which supports straightforward analysis of the multiple message design.

Manipulation check. Two separate questions checked the manipulation. First, participants indicated on a scale of 1 (*Completely* Statistics) to 5 (*Completely Examples*) the type of information the message used to communicate. Mean score was significantly higher in the exemplar condition ($M = 3.17$, SD = 0.61) than in the expository condition ($M = 2.97$, SD = 0.66; $\Delta M = -0.20 \pm 0.12$), $t(430) = -3.28$, $p = .0011$). A more direct test asked participants to indicate if the message included quotes from someone who was interviewed, with response options ranging from 1 (*Definitely Not*) to 5 (*Definitely Yes*). Mean score was significantly higher in the exemplar condition ($M = 4.05$, SD = 0.97) than in the expository condition ($M = 2.39$, SD = 0.96; $\Delta M = -1.66 \pm 0.18$), $t(430) = -17.90$, $p < .001$). Both tests suggest a successful manipulation.

Main results

Hierarchical ordinary least squares regression predicted perceived influence on self, perceived influence on others, and first-person perception (Table 2). Control variables were age and sex (block 1). Focal predictor variables were message desirability and NEP (block 2), treatment and location (block 3), and the treatment × location interaction (block 4). Figures 3 and 4 show the estimated marginal means and 95% confidence intervals for the treatment × location interaction effects.

Table 2. Regression of first-person perception on desirability, NEP, treatment, and location.

	Self			Other			Self – Other		
Predictors	*B*	SE	*β*	*B*	SE	*β*	*B*	SE	*β*
Intercept	0.69	0.45		2.20	0.49		−1.30	0.57	
Block 1									
Total influence							−0.12	0.07	−.09
Age	0.01	0.02	.03	0.03	0.02	.07	−0.01	0.02	−.03
Sex	0.18	0.07	.11*	0.09	0.08	.06	0.10	0.09	.05
ΔR^2			.01			.00			.01
Block 2									
Desirability	0.50	0.04	.50***	0.30	0.04	.32***	0.25	0.06	.23***
NEP	0.15	0.06	.11**	−0.19	0.06	−.15**	0.34	0.07	.23***
ΔR^2			.30***			.11***			.11***
Block 3 (main effects)									
Treatment	−0.02	0.05	−.01	0.02	0.06	.02	−0.04	0.07	−.03
Location	0.23	0.06	.17***	0.08	0.06	.07	0.16	0.07	.11*
ΔR^2			.03***			.00			.01
Block 3 (simple effects)									
Treatment	0.04	0.08	.03	−0.11	0.08	−.09	0.15	0.10	.10
Location	0.28	0.08	.21***	−0.04	0.08	−.03	0.34	0.10	.23***
Block 4									
Treatment × Location	−0.11	0.11	−.07	0.25	0.12	.17*	−0.35	0.13	−.21**
ΔR^2			.00			.01*			.01**
Final R^2			.33			.12			.14

Note: Estimates of slopes and errors for blocks 1, 2, 3 (simple effects), and 4 show the final model. Block 3 (main effects) shows estimates prior to entering the interaction term. The reference category (=0) for dichotomous variables were male for gender, expository message for treatment, and Singapore for location.

*$p < .05$.
**$p < .01$.
***$p < .001$.

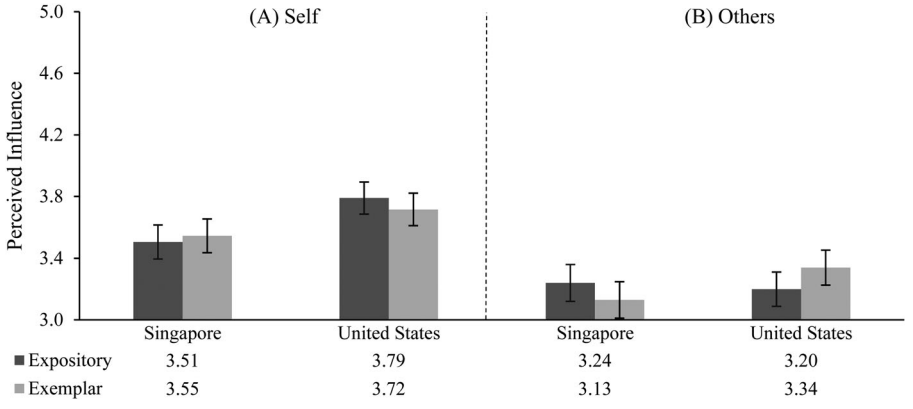

Figure 3. Perceived influence on self and others – Study 2.

Hypothesis 4 predicted that students would perceive proenvironmental messages as having desirable influence. One-sample *t*-test compared the mean score of message desirability with the middle response value of 3. As predicted, participants tended to agree that the message has desirable influence ($\Delta M = 0.77$), $t(431) = 23.79$, $p < .001$.

Hypothesis 5 predicted that the greater the message desirability, the greater the first-person perception. Supporting this prediction, results show a positive relationship between message desirability and first-person perception ($B = 0.25 \pm 0.11$, $\beta = .23$, $p < .001$, $\eta_p^2 = .04$).

Hypotheses 6 and 7 predicted that the greater the environmental values, the greater the perceived influence on self and the greater the first-person perception. Supporting both predictions, results show a positive relationship between agreement with the NEP scale and perceived influence on self ($B = 0.15 \pm 0.11$, $\beta = .11$, $p < .009$, $\eta_p^2 = .02$) and first-person perception ($B = 0.34 \pm 0.14$, $\beta = .23$, $p < .001$, $\eta_p^2 = .04$).

Replication

A paired sample *t*-test reevaluated hypothesis 1. Consistent with earlier support for hypothesis 1, perceived influence on the self ($M = 3.65$, SD = 0.68) was larger than perceived influence on others ($M = 3.23$, SD = 0.64; $\Delta M = 0.42 \pm 0.07$), $t(431) = 11.77$, $p < .001$.

In contrast with previous findings, the main effect of treatment did not significantly predict perceived influence on self ($B = -0.02 \pm 0.11$, $p = .71$), which fails to support hypothesis 2. As well, the

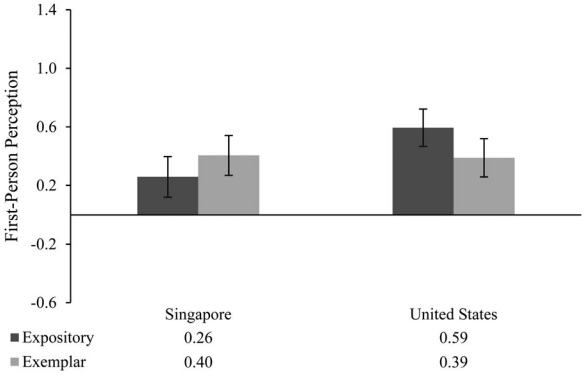

Figure 4. First-person perception – Study 2.

main effect of treatment did not significantly predict first-person perception ($B = -0.04 \pm 0.13$, $p = .56$), which again fails to support hypothesis 3.

Returning to the first research question, results again show a significant main effect of location ($B = 0.16 \pm 0.14$, $\beta = .11$, $p = .025$, $\eta_p^2 = .01$). However, counter to previous findings, the positive sign of the effect and the estimated marginal means suggest that first-person perception was smaller among university students in Singapore ($M = 0.33 \pm 0.10$, SD = 0.72) than among university students in the US ($M = 0.49 \pm 0.09$, SD = 0.72).

Regarding the second research question, results again show a significant treatment × location interaction predicting first-person perception ($B = -0.35 \pm 0.26$, $\beta = -.21$, $p = .009$, $\eta_p^2 = .02$), suggesting further that the exemplification effect was stronger among students in Singapore than among those in the US (Figure 4). Although the patterns were similar in the prediction of perceived influence on self (Figure 3, panel A), the treatment × location interaction was not significant ($B = -0.11 \pm 0.21$, $p = .29$).

In this case, the location-specific exemplification effect on first-person perception seems to be driven by perceived influence on others, whose prediction included a significant treatment × location interaction ($B = 0.25 \pm 0.22$, $\beta = .17$, $p = .032$, $\eta_p^2 = .01$). While this interaction suggests that the exemplification effect on perceived influence on others was stronger among students in the US ($M = 3.34 \pm 0.11$) than among students in Singapore ($M = 3.13 \pm 0.12$; Figure 3, panel B), the 95% confidence intervals overlap slightly.

Discussion

The effect of message desirability on first-person perception is unsurprising, and is consistent with Lin (2013), who found a similar effect of message desirability. This finding supports the argument that the direction of self-other perceptual asymmetry is linked to the perception of message desirability.

The effects of environmental values on perceived influence on the self and first-person perception were also as expected. Individuals who have strong proenvironmental values may perceive greater issue involvement when exposed to proenvironmental messages, and thus be more responsive to such messages (Petty & Cacioppo, 1984). Wei, Lo, Lu, and Hou (2015) used this argument to predict that issue involvement will reduce third-person perception of news about radiation risk, which their results supported. They suggested the gap narrowed because more highly involved participants perceived higher message influence on the self. In the context of desirable media, involvement should result in larger first-person perception, which is an argument consistent with current findings.

Limitations

Although the Study 2 stimuli used multiple proenvironmental message topics, they are not likely representative of the breadth of persuasive messages that appear in the real world. Similarly, the use of only testimonials, to the exclusion of other types of exemplars, limits the external validity of the manipulation.

General discussion

Communicating effectively about environmental issues can be a challenging task, especially if the aim is to convince audiences to adopt certain proenvironmental beliefs, attitudes, or behaviours. The current research effort looked at the intersection of two different communication frameworks —the third-person effect and exemplification—in order to understand not only how individuals think persuasive exemplars influence them, but also how they think others are relatively more or less influenced. When individuals perceive themselves to be more influenced by a message than others, they may be inclined to promote the message, perhaps because they believe that others should be more influenced (Sun, Shen, et al., 2008). Thus, whereas exemplification theory proposes message

characteristics that will lead to greater influence *of* individuals, the third-person effects framework suggests a pathway to greater message promotion *by* individuals. The intersection of these models offers a new means for developing and evaluating effective persuasive communication, which presently focused on proenvironmental messages.

Though some findings were inconsistent between the two studies, one general pattern emerged: Among students in Singapore, there was greater first-person perception of exemplars than of expository text—at least in relation to students in the US, where the effect reversed. Results show that students in Singapore regarded themselves as more influenced by the exemplar than the expository text, while this main effect of message treatment was non-significant among students in the US. This difference appears to be the source of divergent first-person perceptions between the two study locations. However, the second study tells a slightly different story: students in Singapore did not regard themselves as more or less influenced by either messages; perceived influence on others appears to be the source of the treatment-by-location interaction effect.

This inconsistency suggests that students in Singapore responded differently to the exemplar condition between the two studies. One explanation is that the exemplar of Study 1 enhanced the salience of altruistic beliefs (about protecting others), a sense of self-efficacy (to save energy), or a sense of response efficacy (about the positive outcomes of energy saving), which is consistent with recent work on developing effective climate change communication (Bostrom, Bohm, & O'Connor, 2013). Yet, the limitations of Study 1 make this explanation somewhat speculative. In the second study, the divergent first-person perceptions between the two locations seem due to students in Singapore downplaying the influence of exemplars on others. This perception is difficult to explain, but may be due to students in Singapore not having a well-developed mental model (i.e. intuitive theory; see Eveland et al., 1999) about the influence of exemplars; thus, perceived influence on others would tend toward the neutral response option, as results show.

It would be revealing in future work to examine types of environmental messages whose benefit is ambiguous, where some individuals would regard it positively, others negatively, and others with ambivalence. Indeed, each kind of orientation to media messages is associated with different degrees of perceptual asymmetry and different behavioural outcomes (Sun, Shen, et al., 2008). Such research might help resolve specific media schemas at play when individuals estimate the influence of media on themselves and others and respond accordingly.

Some of the more interesting findings appeared in Study 2, which found that both perceived message desirability and agreement with the NEP were positively related to first-person perception. It seems that these effects were partly driven by similar positive relationships with perceived influence on the self. That is, individuals feel most susceptible to messages they regard as desirable and consistent with relevant beliefs they hold. If the only interest of this study were to promote message engagement, then this result would suggest that "preaching to the proenvironmental choir" is the best approach. However, there is little benefit in such communication activity as an end-state; rather, the benefit is in the potential to encourage the choir to preach to the uninitiated. Promotional behaviours are one potential outcome of first-person perception (Golan & Day, 2008; Lin, 2013; Sun, Shen, et al., 2008), and may thus be a potential outcome of environmental messages that resonate with the environmental values of target audiences. An obvious next research step is to test the behavioural component of this model by linking environmental values not only with first-person perception, but also with a range of promotional behaviours, such as talking with friends, sharing or commenting on social media, and creating content.

General limitations

Although Study 2 addressed several limitations of the earlier study, other limitations remain. First, low explained variance (9% and 14%) provides a statistical argument for model expansion. Lin's (2013) modelling of sensation-seeking tendency provides a conceptual argument that sensation-

seekers are more oriented to scientific information; thus, they may also be more involved with environmental messages. If similar additional covariates can explain message involvement, then the model of risk information seeking and processing might bear additional fruit (Griffin, Dunwoody, & Neuwirth, 1999; Kahlor, Dunwoody, Griffin, Neuwirth, & Giese, 2003). A good starting point from this framework might look at environmental concern, which is closely related to environmental values (Stern, Dietz, & Kalof, 1993).

Likewise, exemplification theory predicts that exemplars lead to greater influence, regardless of the audience's awareness of that influence; yet, this study did not examine attitudinal and behavioural outcomes of exemplars. Testing for such actual influence might clarify both the perceptual and behavioural components of the third-person effects model.

Finally, whereas message promotion may result from first-person perception, this study stopped short of documenting such an outcome. Nonetheless, we have a pertinent thought: Whereas social communication processes, such as the two-step flow of influence, tend to occur between socially close nodes (Nisbet & Kotcher, 2009), self-other perceptual asymmetry tends to increase with social distance. If promotion behaviours arise from first-person perception, but first-person perception is largest when others have high social distance, then promotion activities will have to occur over longer social links, and perhaps via multiple nodes. Future research might examine first-person perception among opinion leaders who can promote a message to socially distant others through their social network (Burt, 1999; Valente & Davis, 1999).

Practical recommendations

This discussion suggests three practical recommendations. The first recommendation is for environmental communicators to leverage first-person perception to promote social diffusion. An important source of first-person perception of environmental messages is the belief that others have not been properly influenced by a desirable message. Environmental messages that (1) highlight gaps in public knowledge or engagement with the issue and (2) are easy to share may especially encourage audience members to promote the message in their social networks.

Another important source of first-person perception is the belief that a message strongly influences the self, which is more likely when the message is congruent with the values of audience members. Recent works in Singapore (Detenber, Rosenthal, Liao, & Ho, 2016) and the US (Maibach, Leiserowitz, Roser-Renouf, Merz, & Akerlof, 2011) have segmented publics along climate change beliefs. Such segmentation analyses may help communicators target specific audiences who may serve as environmental ambassadors.

Finally, there was some evidence that Singapore university students perceived messages to influence them more when the messages contained testimonials. Furthermore, there was no evidence of an inverse effect in either location. Thus, we recommend that communication practitioners integrate testimonials into their messaging strategies, as testimonials seem to offer potential gain with little drawback.

Conclusion

The current research effort contributes to the literature on exemplification, first-person perception, and strategic environmental communication. When an environmental message promotes widespread positive change, this outcome can be understood in part by its effect on the primary target audience and also by its effect on a secondary audience via social diffusion. Though, this combined effect of exemplification and promotion may be location-specific, and further research is needed to determine for what segments of the global audience is this effect most likely to emerge. Given these findings, environmental communicators should leverage features of a message that engender first-person perception, with the goal of increasing its reach via audience members who feel inclined by their perceptions to promote it.

Note

1. The plus-minus value for the mean difference indicates the 95% confidence interval. Throughout this manuscript and where appropriate, we report the 95% confidence interval of estimates.

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