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# Category-bounded emotional enhancement: Spillover effects in the valuation of public goods

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# Category-bounded emotional enhancement: Spillover effects in the valuation of public goods

We examined whether enhancing (vs. not enhancing) the emotionality of a referent public good influences the subsequent valuation of a target public good. We predicted that it would, and that the directionality of its impact would depend on a fundamental cognitive process—categorization. If the target and referent goods belong to the same domain, we expected that the effect on the target would be in the same direction as the emotional enhancement of the referent (assimilation effect). However, if the target and referent goods belong to different domains, we expected that the effect on the target would be either negligible or in the opposite direction to that of the emotional enhancement of the referent (null or contrast effect). In Experiment 1 we examined the impact of emotionally enhancing a referent public good on feelings towards a target public good, whereas in Experiment 2 on willingness to contribute towards a target public good. The results support the predicted interaction, which was driven by an assimilation effect for same-domain goods and a null effect for different-domain goods. In doing so, the present findings highlight the interplay between cognition and emotion in the valuation of public goods. We discuss theoretical and practical implications.

Keywords: emotional spillover effect; willingness to contribute; categorization; assimilation effect; contrast effect; contingent valuation method.

## Introduction

In this article we focus on the valuation of interventions related to public goods such as protecting an endangered bird species or increasing the visibility in a specific national park. Although estimating the costs of such public interventions is straightforward, it is harder to estimate the benefits people would derive from them. This process can be complex because people derive different kinds of value from public interventions including use value (e.g., from bird watching) and nonuse value (e.g., from knowing of the mere existence of the endangered bird species). Without the value side of the equation, one cannot perform a cost-benefit analysis to examine whether the benefits justify the public expenditure. The main technique used to estimate the economic value of such interventions is the contingent valuation method, which involves asking a sample of concerned citizens to indicate their willingness to pay (WTP) for a change in the provision of the public good (Venkatachalam, 2004). The higher the WTP judgments, the more important the public good is deemed to be. Estimates derived from the contingent valuation method are consequential because they can steer public policy.

Psychological studies have questioned the usefulness of this method by showing that WTP for a public good varies as a function of the evaluation context (e.g., Bonini, Biel, Gärling, & Karlsson, 2002; Kahneman & Ritov, 1994; Kahneman, Ritov, & Schade, 1999; for a review, see Bonini, Hadjichristidis, & Graffeo, 2018). For example, Kahneman and Ritov (1994) asked participants to evaluate several public goods either in isolation (separate valuation condition) or jointly (joint valuation condition). Preferences for the public goods derived from the separate and joint valuation conditions were frequently at odds with one another (see also, Bazerman, Moore, Tenbrunsel, Wade-Benzoni, & Blount, 1999). For example, while in the separate valuation condition an intervention aimed at saving dolphins from pollution received higher WTP judgments than an intervention aimed at preventing farmers from getting skin cancer, in the joint evaluation condition where participants had to choose between the two interventions, the majority chose to support the intervention on farmers.

Psychologists argue that the cause of these and other apparent inconsistencies is that people do not have economic preferences—i.e., pre-existing and stable preferences that they express when asked—but rather preferences are constructed in the process of elicitation (Kahneman et al., 1999; see also Fischoff, 1991; Slovic, 1995). Namely, people judge based on a mental representation of the problem that they construct, which is influenced by contextual factors. For example, when individuals are presented with the dolphin intervention in isolation, they may value it by comparing it to other similar interventions (e.g., interventions regarding other endangered animals) that they spontaneously evoke. In contrast, when they are asked to choose between the dolphin and the farmer intervention, the comparison context changes. Now individuals may base their choice on some prominent difference between these two types of problems, such as that the farmer intervention concerns human lives whereas the dolphin intervention concerns animal lives (see also reason based choice, Shafir, Simonson, & Tversky, 1993).[1]

More generally, psychologists have argued that judgments elicited from separate valuations are best understood as expressions of attitudes or affective valuations towards the target intervention (Kahneman et al., 1999). Specifically, WTP judgments are thought to be driven by the relative affect or warm-glow people feel about contributing towards the target intervention as compared to other interventions that they spontaneously evoke (Andreoni, 1990; see also affect heuristic, Slovic, Finucane, Peters, & MacGregor, 2002; Kahneman & Frederick, 2000). The higher the positive affect or warm-glow people feel towards contributing for the target cause, the higher the WTP for that intervention. Therefore, in such cases, WTP depends on the interplay between emotion and cognition: WTP judgments are based on an affective valuation process, which is influenced by categorization (categorization constrains the comparison context).

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[1] Research suggests that the joint evaluation of same-domain goods (e.g., two endangered species) is different and that it resembles more separate valuation (see Bonini, Ritov, & Graffeo, 2008). We return to this point in the General discussion.

In the present study, we investigate whether emotion and cognition also interact to influence the joint valuation of public goods. Specifically, we asked participants to evaluate a pair of public interventions sequentially; first a referent public good intervention and then a target public good intervention. We investigated whether the willingness to contribute towards the target intervention is affected by whether it is preceded by an emotionally enhanced (vs. a not emotionally-enhanced) referent.

Consumer research provides some relevant evidence. Studies suggest that when consumers' emotional reactions towards a product or brand become more negative (e.g., as a result of a scandal), other products or brands may also be affected. In some cases, the impact on other brands is in the same direction to that of the affected brand (assimilation effect), while in other cases the impact on other brands is in the opposite direction to that of the affected brand (contrast effect). For example, following a recall of a particular model of a Japanese manufacturer (e.g., Toyota), models of other Japanese manufacturers (e.g., Honda, Nissan) were negatively affected (Borah & Tellis, 2016). Specifically, the product recall prompted negative online chatter for these innocent competitors and a decrease in their sales (assimilation effect). However, the same study found that for car manufacturers from a different country (e.g., Chrysler, an American firm) the product recall had a positive impact on social media and sales (contrast effect).

But what determines the directionality of spillover effects? According to one theory (Schwarz & Bless, 1992) a decisive role in determining whether assimilation or contrast effects will occur depends on a fundamental cognitive process, categorization—Do the referent and target goods belong to the same or to different categories? If consumers perceive the target and referent goods as belonging to the same category, as being similar in terms of features cued by the new information, then an assimilation effect is likely to occur. Alternatively, if consumers perceive the goods as belonging to different categories, then a contrast effect might occur. In relation to the aforementioned example, the critical dimension that determined whether assimilation or contrast

occurred was the nationality of the car manufacturer: Japanese versus American. The scandal had a negative impact on Japanese manufacturers but a positive impact on American manufacturers.

In similar lines, an experimental marketing study (Roehm & Tybout, 2006) showed that a hypothetical scandal involving one company (e.g., Burger King; Dairy Queen) spilled over to a competitor company (e.g., Hardee's) but only when the scandalized company (referent) and the competitor companies (targets) were perceived to be similar in terms of the scandalized attribute (e.g., hamburger meat; tainted ice-cream). When this condition was met, then assimilation occurred. When it was not, then there was no spillover effect.

In summary, the directionality of emotional spillover effects depends, in part, on whether individuals perceive the referent and target goods as being similar in terms of some pertinent dimension. If they do, then assimilation is likely to occur. If they do not, then no spillover effects or contrast effects arise. More broadly, the impact of emotional enhancement is category bounded.

**Present research**

In the present research, we investigated whether this conceptual framework also applies to the valuation of public interventions such as interventions aiming to reduce groundwater pollution or promote education. Specifically, we hypothesized that when the referent and target public goods belong to the same category (e.g., both have the goal of reducing groundwater pollution), then emotionally enhancing the referent good (e.g., by providing vivid details of the negative consequences of groundwater pollution) would result in assimilation effects for the target good. Through either shared categorical or feature links (see General Discussion), some of the emotionality of the referent would spread to the target. As a result, the perceived importance of the target would increase leading to higher WTP (see, e.g., Kahneman, Ritov, Jacowitz, & Grant, 1993; Kahneman, Ritov, & Schade, 1999). However, when the referent and target goods belong to distinct categories (e.g., one concerns reducing groundwater pollution while the other improving education),

then emotionally enhancing the referent might result in either a contrast effect or a null effect.

A reason to expect a contrast effect is that emotionally enhancing the referent might either leave unaffected or reduce the perceived emotionality of the target, which will now be compared to a referent whose perceived importance has increased. This prediction assumes that WTP judgments depend on a comparative affective valuation process between the target and referent goods. However, previous research has shown that in the case of joint valuation of goods from different domains, WTP judgments do not depend on an affective valuation process (e.g., Kahneman & Ritov, 1994). Rather, they depend on how the two goods compare on some prominent feature in which the goods differ (e.g., one is an environmental while the other an educational issue). If this is true, then we should expect a null effect because the prominent feature should remain constant irrespective of whether or not the referent category has been emotionally enhanced.

In contrast to the aforementioned consumer studies that involved negative information about the referent (e.g., a scandal or product recall), in the present research the end consequence of the emotional enhancement was positive (it highlighted the need for the suggested intervention). In particular, we searched for evidence of category-bounded assimilation and contrast effects on two dependent variables: emotional reactions (Experiment 1) and behavioral intent as gauged by willingness to contribute (WTC) judgments (Experiment 2).

In the current experiments, we focused on the sequential evaluation of two public goods: a referent good that was always presented first and a target good that was presented second. We manipulated two factors in a 2 × 2 full factorial design. The first factor, Emotional enhancement, concerned whether or not the referent was emotionally enhanced (by providing additional vivid information). The second factor, Category, concerned whether or not the referent and target goods belonged to the same or different domains. Based on the theoretical framework outlined above, we predicted an interaction. Namely, we expected that emotionally enhancing the referent would increase the emotional salience/value of the target when the referent and target goods belong to the

same domain (e.g., education), but diminish or leave them unaffected when the goods belong to different domains (education; environment).

**Pilot Study: Selection of referent and target goods**

We first ran a pilot study to identify suitable referent and target public goods for the main experiments. Specifically, we aimed to identify two referent public problems (R1, R2) and two target problems (T1, T2) with the following characteristics. First, in pairs, the two referent problems and the two target problems are rated about equal in terms of perceived importance. The reason behind matching the target problems in terms of perceived importance is because perceived importance influences WTP ratings (e.g., Kahneman et al., 1999). The reason for also matching the referent problems in perceived importance is because the rated importance of a referent may influence the evaluation of a target (e.g., Bonini, Ritov, & Graffeo, 2008). Second, we aimed to select referent and target problems such as the referent problems are rated as more important than the target problems as we thought that this would increase our chances of finding emotional spillover effects. Third, out of the four possible referent-target pair combinations, we wanted two pairs that involve public problems from the same domain (R1-T1; R2-T2) and two that involve problems from different domains (R1-T2; R2-T1).

**Method and Results**

Thirty-nine participants evaluated the importance of 23 public problems, on a 7-point scale ranging from 1 (not important at all) to 7 (very important). Based on the mean ratings, we selected two pairs of referent-target public problems (see Appendix for the complete text of the chosen scenarios). In line with our first specification, the two referent problems received similar ratings in terms of importance (R1, groundwater pollution problem from oil contamination, $M = 6.26$, $SD = .78$; R2, education problem concerning children of immigrants, $M = 6.03$, $SD = .93$), paired-sample t-test $t(38) = 1.24$, $p = .221$, $d = .27$, and the same was true for the two target problems (T1, groundwater

pollution problem from use of detergents, M = 5.51, SD = 1.05; T2, public education problem concerning poor children, M = 5.31, SD = 1.08), paired-sample t-test t(38) = 1.07, p = .291, d = .19). In line with our second specification, two of the four possible referent-target problems belonged to the same domain (either groundwater pollution or public education), whereas the other two belonged to different domains (one concerned groundwater pollution while the other public education).

## Experiment 1: Emotional reactions

In Experiment 1 we crossed emotional enhancement (the referent was either emotionally enhanced or not enhanced) with categorical similarity (the referent and target were either from the same domain or from different domains), in a 2 × 2 full factorial design. The dependent measure of interest was emotion ratings towards the public problems. The first objective of Experiment 1 was to check the efficacy of our emotional manipulation, which we examined by comparing participants' emotional reactions to the enhanced and non-enhanced referents. We expected that overall participants would report higher emotional reactions towards the emotionally enhanced referents. The second objective of Experiment 1 was to examine the predicted interaction. Specifically, we expected that emotionally enhancing a referent good would heighten the emotional reaction toward a target good when the two goods came from the same domain, but weaken it or leave it unaffected when the two goods belong to distinct domains.

### Method

#### Participants

The participants were 119 volunteers[2] recruited at the campus of the Hebrew University of

[2] We conducted an a-priori power analysis using G*power (Faul, Erdfelder, Lang, & Buchner, 2007) for "ANOVA: Fixed effects, special, main effects and interaction" with the following settings: effect size f =

Jerusalem (mean age = 24.6, range = 20-37).

## Materials and Design

Participants were invited in a laboratory room that was equipped with PCs, where they completed a computer-based questionnaire. Each questionnaire featured one referent and one target scenario from the pilot study. The referent scenario was presented in either a basic or an emotionally enhanced form. The basic form described a public good problem (risk of environmental damage due to gas leakage; difficulties that immigrant students face at school). The emotionally enhanced versions, in addition to this information, included a concrete example with affective details (see Appendix). We reasoned that these more vivid descriptions of the referents should enhance their emotional impact.

Following the referent scenario, participants received a target scenario either from the same domain as the referent scenario or from a different domain. One target scenario concerned water pollution due to the use of detergents, while the other the difficulty of children from low-income families to acquire computer skills (see Appendix) Thus, the complete design of Experiment 1 involved a 2 (Emotional enhancement: basic referent vs. enhanced referent) × 2 (Category: same vs. different) × 2 (Target: environmental problem vs. educational problem) between subjects design. Each participant received one of the 8 possible versions of the questionnaire.

In terms of dependent measure, following each scenario, participants had to respond to three questions, each assessing a specific negative emotional reaction to the scenario. Specifically, participants were asked: “When you think of the problem of contamination of underground water by the salt deposits from detergents [the problem of children whose parents cannot afford to buy a

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0.30 (medium effect, estimated), alpha level = .05, power = .90, numerator df = 1, number of groups = 4 (two factors, two levels each). The calculation indicated a minimum sample size of 119 participants. No interim analyses or stopping rules were applied.

computer for them]: How angry do you feel? How sad do you feel? How frustrated do you feel?" Participants had to respond to each question on an analogue response scale that ranged from 0 ("not at all") to 100 ("to a large extent").

**Results**

We first analyzed the degree of reliability of the three emotional scales (anger, sadness, and frustration). We expected good reliability as all scales measure negative emotional reactions to the scenario. The scores of the three scales showed a good reliability (for the referent scenarios: Cronbach's alpha = .77; for the target scenarios: Cronbach's alpha = .76), and all pairwise correlations between emotional scales were sufficiently high (for the referent scenarios: lower $r = .50$, $p < .001$; for the target scenarios: lower $r = .40$, $p < .001$). Because of this, and in order to simplify subsequent analyses, we used the mean value across the three scales as a general index of negative emotional reaction.

We next examined the efficacy of our emotional enhancement manipulation. Specifically, we analyzed the emotional reactions towards the referent scenarios via a 2 (Emotional enhancement) × 2 (Referent) ANOVA. The emotionally enhancing manipulation worked: the mean emotional reaction was higher for the emotionally enhanced referents ($M = 69.41$, $SD = 21.71$) than for their not emotionally-enhanced counterparts ($M = 61.38$, $SD = 24.57$), $F(1, 115) = 3.91$, $p = .05$, $\eta_p^2 = .033$. There was a marginal effect of Referent, $F(1, 115) = 3.49$, $p = .064$, $\eta_p^2 = .029$, such that the mean emotional reaction was higher for the referent scenario concerning education ($M = 69.55$, $SD = 19.85$) than for the one concerning pollution ($M = 62.03$, $SD = 25.84$). The Emotional enhancement × Referent interaction was not significant, $F(1, 115) = .006$, $p = .938$, $\eta_p^2 < .001$, which indicates that emotional enhancement had a comparable effect for the two referent scenarios.

We then turned to the target scenarios and examined whether the emotional enhancement manipulation of the referents had the predicted effect on them. Specifically, we analyzed the

emotional reactions toward the target scenarios via a 2 (Emotional enhancement) × 2 (Category) × 2 (Target) ANOVA. The results are summarized in Figure 1.

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INSERT FIGURE 1 ABOUT HERE

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We found the predicted Emotional enhancement × Category interaction, $F(1, 111) = 4.79$, $p = .031$, $\eta_p^2 = .041$. As expected, when the referent and target problems belonged to the same domain, emotionally enhancing the referent heightened the emotional reaction to the target (from 44.9 to 55.7), whereas when the referent and target problems belonged to different domains, emotionally enhancing the referent reduced the emotional reaction to the target (from 61.2 to 52.5). Separate analyses revealed that the effect of Emotional enhancement for problems from the same domain was marginally significant, $F(1, 111) = 3.21$, $p = .076$, $\eta_p^2 = .028$, whereas the effect for problems from different domains did not reach a significant level, $F(1, 111) = 1.77$, $p = .19$, $\eta_p^2 = .016$. The three-way interaction was not significant, $F(1, 111) = 0.68$, $p = .795$, $\eta_p^2 = .001$, which indicates that the Emotional enhancement × Category interaction was comparable across the two target scenarios.

The only other significant effect was a main effect of Target, $F(1, 111) = 4.39$, $p = .038$, $\eta_p^2 = .038$. Overall, the education problem promoted higher emotional reaction ($M = 58.25$, $SD = 23.74$) than the pollution problem ($M = 49.42$, $SD = 24.31$). No other effect was statistically significant: Emotional enhancement, $F(1, 111) = .05$, $p = .826$, $\eta_p^2 < .001$; Category, $F(1, 111) = 2.17$, $p = .144$, $\eta_p^2 = .019$; Emotional enhancement × Target, $F(1, 111) = .57$, $p = .451$, $\eta_p^2 = .005$; Category × Target, $F(1, 111) = .84$, $p = .361$, $\eta_p^2 = .008$.

**Discussion**

The results of Experiment 1 indicate that our emotional enhancement manipulation worked:

participants assigned higher emotion ratings to the emotionally enhanced referents than to their non-enhanced counterparts. Importantly, the results also indicate that the emotional reactions generated by a first scenario (referent) can influence the emotional reactions to a subsequently presented second scenario (target). In particular, we found the predicted interaction. Enhancing the emotional salience of the referent increased the rated emotionality of the target when the referent and target problems belonged to the same domain (assimilation effect), but it decreased it when the referent and target problems belonged to different domains (contrast effect). Separate analyses showed that the interaction was mainly driven by an assimilation effect for referent-target pairs from the same domain.

**Experiment 2: Willingness-to-Contribute**

The goal of Experiment 2 was to investigate whether the category-bound emotion spillover effect found in Experiment 1 extends to willingness to contribute (WTC) towards a public good in terms of money and/or effort. Based on our theoretical framework, and the results of Experiment 1, we expected to find an interaction. Specifically, we expected that emotionally enhancing a referent problem would increase participants' WTC judgments for the target problem when the two problems belong to the same domain, but decrease or leave unaffected WTC judgments when the two problems belong to different domains. The underlying idea is that an emotionally enhanced referent transmits emotionality to other problems from the same category, but not to problems from different categories. Therefore, when the target problem belongs to the same domain as the referent, the increased emotional salience of the referent directly translates into higher WTC for the target. However, when the target problem belongs to a different domain, then its relative status with respect to the referent may diminish, and so also individuals' WTC. But, as stated previously, studies suggest that the joint valuation of goods from different domains depends on how the goods compare in terms of a prominent feature that differentiates between the two goods (e.g., educational

versus environmental issue). If this is the case, then we should observe a null effect because the emotional enhancement of the referent would leave unaffected the valuation process.

## Method

### Participants

The participants were 272 volunteers[3] recruited at the campus of the Hebrew University of Jerusalem (mean age = 24.6, age range = 19-48).

### Materials and Design

In Experiment 2 we used similar materials and design as in Experiment 1. The main difference was that we used a different dependent measure. Specifically, after presenting the targets, we asked participants to respond to the following question: "To what extent would you be willing to contribute your time and/or money for this cause?", on a scale ranging from 1 ("not at all") to 7 ("to a large extent"). In Experiment 2, after presenting the referents, we also asked participants to rate to what extent they were aware about the problems depicted on a scale ranging from 1 ("not at all") to 7 ("to a large extent"). We reasoned that prior knowledge about the referents might influence the evaluation of the targets, and therefore decided to test whether such differences existed.

## Results

We first compared participants' level of awareness of the two referent problems. Participants reported that they were more aware about the education problem, than about the pollution problem, $t(270) = 10.58$, $p < .001$, $d = 1.29$ (Ms: education problem = 4.57; pollution problem = 2.30). As level of awareness could potentially influence the evaluation of the targets, we decided to include

[3] We conducted an a-priori power analysis similar to that of Experiment 1. In light of the results of Experiment 1, we adjusted the effect size to $f = .20$. The calculation indicated a minimum sample size of 265 participants. No interim analyses or stopping rules were applied.

awareness as a covariate in the WTC analysis.

Subsequently, we conducted an ANCOVA with WTC as the dependent variable, Emotional enhancement (basic referent vs. enhanced referent), Category (same vs. different), and Target (environmental vs. education problem) as independent variables, and Awareness as a covariate. The results are summarized in Figure 2.

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INSERT FIGURE 2 ABOUT HERE

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We observed the predicted Emotional enhancement × Category interaction, $F(1, 263) = 6.58$, $p = .011$, $\eta_p^2 = .024$. As expected, in comparison to the not emotionally-enhanced referents, the emotionally-enhanced referents increased WTC ratings for referent-target pairs from the same domain (from 3.09 to 3.79) but decreased WTC ratings for referent-target pairs from different domains (from 3.41 to 3.19). Separate analyses revealed that the effect of Emotional enhancement for referent-target pairs from the same domain was highly significant, $F(1, 263) = 7.53$, $p = .007$, $\eta_p^2 = .028$, whereas the effect for referent-target pairs from different domains did not reach a significant level, $F(1, 263) = 0.78$, $p = .38$, $\eta_p^2 = .003$. The three-way interaction was not significant, $F(1, 263) = .93$, $p = .335$, $\eta_p^2 = .004$, which indicates that the Emotional enhancement × Category interaction was comparable across the two target problems.

As was the case in Experiment 1, the only other significant effect was a main effect of Target, $F(1, 263) = 10.80$, $p = .001$, $\eta_p^2 < .039$. Overall, participants were more WTC for the education problem ($M = 3.65$, $SD = 1.61$) than for the pollution problem ($M = 3.06$, $SD = 1.39$). No other effect was statistically significant: Emotional enhancement, $F(1, 263) = 1.69$, $p = .194$, $\eta_p^2 = .006$; Category $F(1, 263) = .58$, $p = .446$, $\eta_p^2 = .002$; Emotional enhancement × Target, $F(1, 263) = .03$, $p = .871$, $\eta_p^2 < .001$; Category × Target, $F(1, 263) = .74$, $p = .391$, $\eta_p^2 = .003$. Finally,

Awareness was not a significant covariate, $F(1, 263) = 1.58$, $p = .210$, $\eta_p^2 = .006$.

## Discussion

Experiment 2 successfully extended the results of Experiment 1 to WTC ratings. In particular, we found the predicted interaction. The presence of an emotionally enhanced referent increased the WTC towards a target public problem when the referent and target problems belonged to the same domain (assimilation effect), but did not significantly affect the WTC towards a target public good when the goods belonged to different domains (no contrast effect).

## General Discussion

The general aim of the present research was to investigate the joint role of cognitive and emotional factors in determining the joint valuation of target public goods. Based on previous research, we predicted that an emotionally enhanced referent problem would influence the evaluation of a target problem in the same direction to that of the emotional enhancement of the referent when the two problems belong to the same domain (assimilation effect), while it would have no effect or the opposite effect when the problems belong to different domains (null or contrast effect). In two experiments we manipulated whether a referent public problem was emotionally enhanced or not, and whether the referent and target problems concerned issues from the same or different domains. We found the anticipated interaction on both emotion ratings (Experiment 1) and WTC judgments (Experiment 2). In both cases, the interaction was driven by a significant assimilation effect, more than by a contrast effect.

Why did we find assimilation but no contrast effects in WTC towards public interventions? As mentioned in the introduction, assimilation effects are direct. When the referent and target categories come from the same domain, the referent-target similarity acts as a gate that constraints the extent to which affect is passed from referent to target. The more positive affect spills over to the target, the higher the WTC for that target. However, when the referent and target pairs come

from different domains, studies show that their valuation depends on a prominent feature that the juxtaposition of the public goods brings into focus (e.g., educational versus environmental issue). In that case, the emotional enhancement of the referent leaves WTC judgments unaffected because the judgment is based on something other than an affective valuation of the target.

**Theoretical contribution**

As it was mentioned in the introduction, prior research has shown that categorization processes influence the separate evaluation of public goods (e.g., Kahneman & Ritov, 1994). Prior research has also shown that categorization processes also influence the joint evaluation of public goods (e.g., Bonini et al., 2002; Irwin, Slovic, Lichtenstein, & McClelland, 1993; Kahneman & Ritov, 1994). Specifically, when the target and referent goods belong to different categories, pairing a target good with a less important referent good increases people's WTP, whereas pairing it with a more important referent good diminishes people's WTP. Interestingly, however, when the target and referent goods belong to the same category, the relative importance of the referent leaves the evaluation of the target good unaffected (see Bonini et al., 2008). Presumably, this occurs because such referent goods would naturally be considered during the evaluation of the target good even when the referent goods are not explicitly stated (see evoked set theory, Kahneman & Miller, 1986; see also Garner, 1974).

The present article contributes to previous research by identifying another way in which categorization processes may impact the joint evaluation of public goods. Specifically, its findings support the hypothesis that categorical similarity between a referent and a target public good acts as a gate for the transmission of emotionality from referent to target, which, in turn, can impact WTC judgments. When a referent good is emotionally enhanced, and the referent and target goods come from the same domain, the relative emotionality of the target increases, and so also people's WTC for it. However, when the referent and target problems belong to different domains, then emotionally enhancing the referent might leave WTC towards the target unaffected because in this

case WTC depends on how the target scores in terms of some prominent attribute that the juxtaposition of the goods from the different domains brings into focus. The present findings support a category-bounded emotional spillover effect in the valuation of public goods, and namely an assimilation effect for same-domain goods and a null effect for different-domain goods.

The current findings can be contrasted with the effects of mood on prosocial behavior. Studies have shown that inducing (incidental) good mood increases willingness to help (e.g. Isen, Clark & Schwartz, 1976). Moods are presumed to be non-specific, and to indiscriminately impact a wide range of judgments and behaviors (but see Bonini, Graffeo, Hadjichristidis & Perrotta, 2015). Unlike moods, the emotional enhancement effects demonstrated here are specific, and clearly affected by a fundamental cognitive process—categorization. The present category-bounded spillover effects reflect the impact of cognition on emotion, supporting the view of a bi-directional influence of the two systems.

The present findings also have interesting parallels to results in the field of evaluative conditioning.[4] Evaluative conditioning refers to the process of changing the attitude towards an initially neutral stimulus (CS) by virtue of pairing it with another stimulus (US) that has either a positive or a negative valence (e.g., De Houwer, 2007). Studies have shown that evaluative conditioning works: after a conditioning phase, people's attitudes toward the CS change in correspondence to the valence of the US (see Hoffman, De Houwer, Perugini, Baeyens, & Crombez, 2010). Related to the present research, studies have also shown that the attitude change due the evaluative conditioning generalizes to other stimuli that are similar to the CS (similar to the current assimilation effects), but also to the whole category in which the CS belongs (Glaser & Kuchenbrandt, 2017). However, most of these studies have used relatively simple stimuli such as single words ("Denmark") or schematic representations of imaginary creatures. The present study adds that assimilation effects can also occur with richer verbal descriptions.

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[4] We thank Prof. Dr. Spruyt for pointing our attention to this link.

**Practical implications**

The present findings potentially carry significant practical implications. Consider, for instance, the task of promoting a public intervention. The present results suggest that a way to increase support for an intervention is by using emotional advertisement linking the intervention to a positive emotional experience (e.g., by providing vivid details). Specifically, the findings suggest that the emotional enhancement of a particular intervention can garner support for related interventions (for related suggestions concerning consumer products, see Erdem & Sun, 2002). However, the current results also suggest cases where such a practice will not have the desirable effect. This would happen when the target intervention is perceived to be dissimilar to the intervention that has been emotionally enhanced. Because advertisements are costly, this knowledge might prove useful when developing strategies to gain public support for interventions.

On a related note, categorization is a flexible process (e.g., Barsalou, 1991). Two entities, such as two public problems, can be viewed as similar or different depending on context (see Goodman, 1972). For example, if the presentation of the referent and target problems is preceded by an advertisement that highlights shared features this might increase the likelihood of assimilation, whereas if it is preceded by an advertisement that emphasizes differences this might prompt null effects (see, e.g., Moreau, Markman, & Lehmann, 2001). This knowledge could further help in getting more value from social advertisements.

**Limitations**

The present study has several limitations. One limitation is that we do not specify what makes two public problems to be perceived as similar or dissimilar. Here we selected referent-target pairs by relying on our intuition; the similar category pairs contained either two educational or two environmental problems, while the different category pairs contained one problem from each domain. Informal discussions with the participants and our colleagues confirmed our intuitions.

However, future research may attempt to define categorical similarity in a more precise manner.

A second limitation is that we do not specify how emotions get propagated across mental representations. We identify two possibilities that future research may explore. Emotions may be transmitted either through category links or through shared features. Consider once more an intervention aiming to protect dolphins. The first idea is that emotionally enhancing dolphins would emotionally enhance the whole superordinate category (e.g., endangered animals), and through that other members of that category. The second is that the emotional enhancement of dolphins might become linked to their features. To the extent that other animals share features with dolphins, they would also be emotionally enhanced. For a parallel distinction in inductive inference refer to the category-based induction model of Osherson, Smith, Wilkie, López, and Shafir (1990; fits with the category transmission view) and the feature-based induction model of Sloman (1993; fits with the feature transmission view). It is also noteworthy to mention that a parallel issue has been addressed in studies on evaluative conditioning with mixed results: some findings appear to support a category-based transmission (e.g., Glaser & Kuchenbrandt, 2017), while others have highlighted the importance of shared features (e.g., Spruyt, Klauer, Gast, Schryver, & De Houwer, 2014).

A third limitation of the present research is that the emotional enhancement manipulation emphasized the negative affect of not intervening. Research suggests that enhancing negative rather than positive affect is a more powerful motivator of donations (Sawe & Knutson, 2015). Future studies could examine whether emotional enhancement techniques that stress the positive qualities of a resource/intervention are less influential than the current technique, which involved enhancing negative affect. Finally, future studies could examine whether the current results replicate using other outcome measures such as implicit propositional beliefs (De Hower, Heider, Spruyt, Roets, & Hughes, 2015) or behavioral outcomes in realistic settings. Furthermore, research could also investigate the processes underlying the present findings using neuroimaging techniques (see Sawe, 2017).

## Conclusion

The present experiments provide evidence that the evaluation of a target public problem is influenced by whether it is preceded by the evaluation of an emotionally enhanced versus a not emotionally-enhanced referent problem. The end outcome on the target problem depends on the perceived similarity between the referent and target. If these problems are perceived to be similar, then the effect on the target would be in the same direction as the emotional enhancement of the referent (assimilation effect); if they are perceived to be different, then the effect on the target might be negligible. The present findings underscore the interactive effect of cognition and emotion on judgment and decision-making, and suggest communication strategies for effectively promoting public policies.

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## Appendix

The scenarios used in the present studies and the associated willingness-to-contribute questions. The original materials were in Hebrew, here we present English translations.

### Pollution

Referent scenario (basic). In 45% of the gas stations that were examined until 2005 tests showed leakage from the gas tanks or from the pipes into the soil and the underground water. One liter of oil may contaminate as much as one million liters of water and prevent them from being usable for drinking.

Referent scenario (emotionally-enhanced). In 45% of the gas stations that were examined until 2005 tests showed leakage from the gas tanks or from the pipes into the soil and the underground water. One liter of oil may contaminate as much as one million liters of water and prevent them from being usable for drinking. For example, in recent test-drills that the authorities performed in the area of four gas stations in Tel-Aviv, they found severe contamination with oil floating on top of the underground water under the stations. In one of those cases the oil layer was 70 cm deep. Dangerous substances like Benzen, originating from the gas stations, were found in the underground water in higher concentrations than the standards allow. As a result of this test, pumping water from several wells in the area has been stopped.

Target scenario. Regular washing detergents have high concentration of salts. The overuse of detergents results in deposits of over 200,000 tons of salt in the wastewater. The wastewater is being used for agriculture. The salt severely affects some vegetation, and eventually contaminate the underground water. Imagine you are contacted by an association that works to increase awareness of the problem, educate the public about more efficient ways to use detergents, and promote the development of more eco-friendly detergents in order to decrease the harm caused to the vegetation and the underground water.

To what extent would you be willing to contribute your time and/or money for this cause?

not at all 1 2 3 4 5 6 7 to a large extent

**Education**

Referent scenario (basic). New immigrant students have difficulties adjusting to the school system. A recent survey showed that 46% of the new immigrant children do not graduate from high school.

Referent scenario (emotionally-enhanced). New immigrant students have difficulties adjusting to the school system. A recent survey showed that 46% of the new immigrant children do not graduate from high school. Eli's case is an example of the difficulties that lead to dropout of immigrant children from schools. Eli says that he left school because the teachers were not aware of his tremendous difficulties, and did not really help him. Furthermore the relations with his class mates were such that he did not feel at ease in school. He claims that he prefers to work in the neighborhood bakery and make some money instead of facing the difficulties in school.

Target scenario. There are thousands of children in Israel whose parents cannot afford to buy a computer for them. These children do no acquire the basic computer skills, and have difficulties coping with the digital gap forming between them and the rest of the students. Imagine you are asked to contribute to the project "computer for every child", working to buy computers and distribute them to needy children, with the aim of opening the window of opportunity for them.

To what extent would you be willing to contribute your time and/or money for this cause?

not at all 1 2 3 4 5 6 7 to a large extent

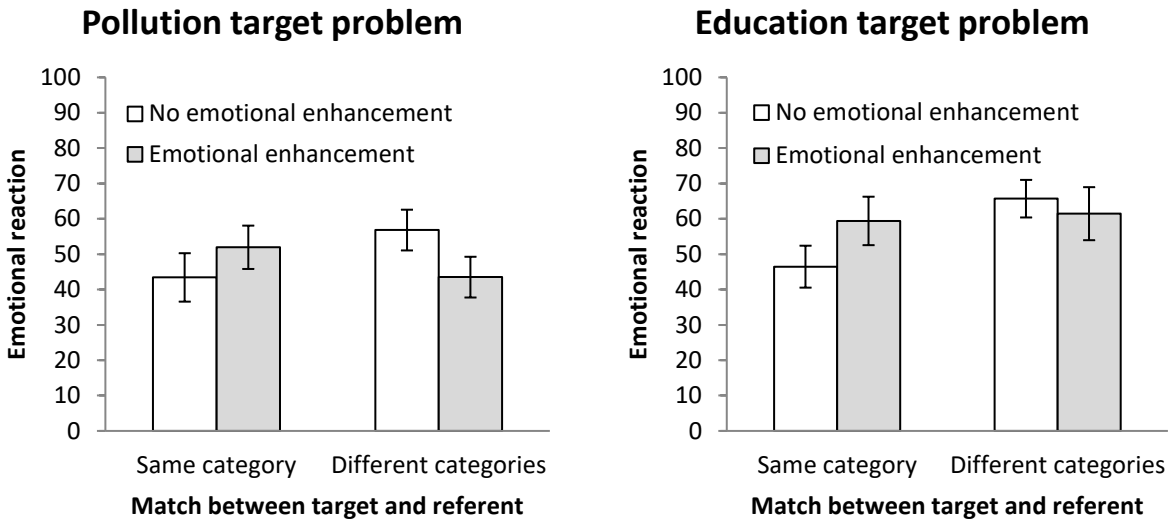


Figure 1. Mean emotional reactions by target problem, emotional enhancement condition, and category match between the target and referent problems (Experiment 1). Error bars represent standard error of the mean.

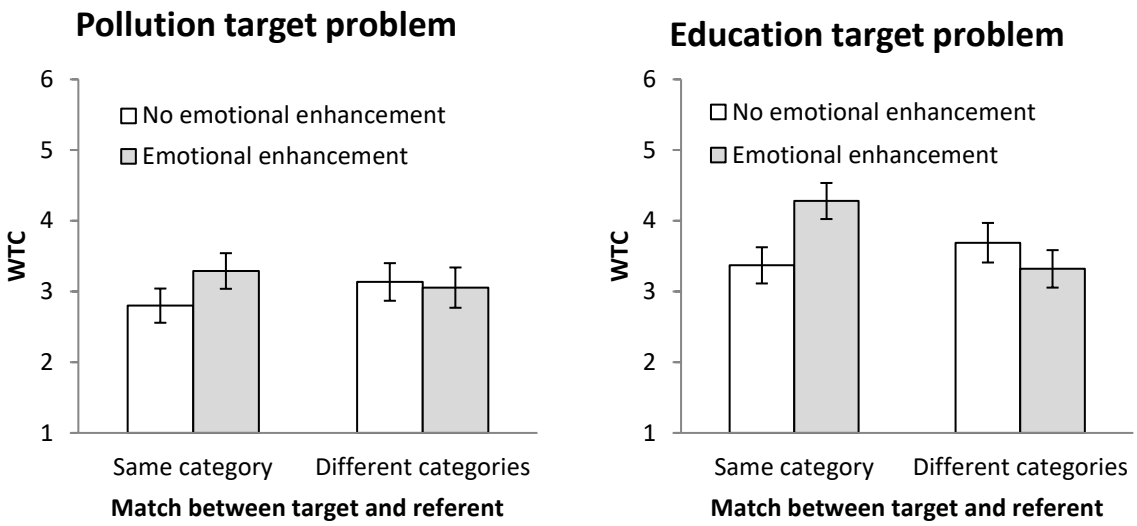


Figure 2. Mean willingness-to-contribute (WTC) ratings by target problem, emotional enhancement condition, and category match between the target and referent problems (Experiment 2). Error bars represent standard error of the mean.