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# Persuasive Trash Cans

## Activation of Littering Norms by Design

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Two studies tested littering norm activation by trash can design. The first was a scenario study using a 4 (norm type: social injunctive vs. social descriptive vs. personal vs. control)  $\times$  2 (activation type: explicit vs. implicit activation) between-group design, with judgments of a litterer as the dependent variable. Explicit norm activation was more effective than implicit activation. A field study subsequently tested the effect of personal norm activation on actual littering behavior, following a 2 (explicit activation: no vs. yes)  $\times$  2 (Implicit activation: no vs. yes) between-group design. Here, both explicit activation through a verbal prompt and implicit activation through design had significant effects, reducing the amount of litter by 50%. A post hoc survey revealed significant effects of age and gender on the personal norm against littering. These findings helped explain the absence of norm activation effects in the youngest age group as found in the field study.

**Keywords:** *littering; environmental behavior; norm activation; persuasive design*

Littering is generally considered antisocial, unhealthy, and visually distasteful. It is also harmful to the environment and uses up a substantial part of community funds for cleaning. Yet litter is ubiquitous and, as experience

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teaches us, difficult to prevent. In the service of prevention, education programs and better parenting are generally advocated (e.g., Beverage Industry Environment Council, 1997) based on the assumption that if people are littering they were not raised to have the proper norm. Unfortunately, the benefits of education programs cannot be evaluated for many years after their inception and remain, at this time, expensive and uncertain.

Earlier studies, such as that of Burgess, Clark, and Hendee (1971), have shown that giving incentives is an effective means to reduce littering, however, incentives are costly and the desired behavior stops when the incentives stop. Therefore, Geller, Witmer, and Tusso (1977) state that the most economical procedure for stimulating ecology-constructive behaviors on a large scale is to provide response-priming instructions at appropriate times. But in fact very few studies have directly compared strategies for litter control (Dwyer, Leeming, Cobern, Porter, & Jackson, 1993). Those studies that did were not always able to establish differences in effectiveness between treatment conditions, even when they were as diverse as reinforcement and prompting (e.g., Baltes & Haywood, 1976; Cope & Geller, 1984). Nonetheless, Dwyer et al. concluded that, in general, antecedent strategies (i.e., strategies that prevent the occurrence of littering behavior) appear more cost-effective than consequence strategies (i.e., strategies that come after the fact, such as rewards or punishment).

In the present research, different types of norm activation are compared to change littering behavior. Moreover, these norm activations were all implemented via persuasive trash can design.

## **Persuasive Design**

There is a growing body of work on persuasive technologies—those intentionally designed to change a person's behavior or attitude (Fogg, 2003). Although interactive (i.e., computer) technologies are presently recognized as particularly suited to the task of persuasion (e.g., IJsselsteijn, de Kort, Midden, Eggen, & van den Hoven 2006; McCalley & Midden, 2002), noninteractive environments and objects (through their physical form) also influence the way we think and act. In this sense, design is inherently persuasive, but the field is witnessing the emergence of a design emphasis on more deliberately persuasive objects (Redström, 2006).

At present, numerous examples of such persuasive designs exist and are being developed. Yet instead of having to rely solely on the instincts and insights of designers, psychology is contributing to this domain based on a vast body of theory and research on persuasion and behavior change. The

present research represents an effort to test the efficacy of psychological insights in norm activation for designing persuasive trash cans.

## The Activation of Norms

Recent research on littering has concentrated on the activation of norms, both social and personal, as a means to change behavior. The focus theory of normative conduct (Cialdini, Reno, & Kallgren, 1990; Kallgren, Reno, & Cialdini, 2000) posits that norms affect human behavior systematically and significantly but only in situations where the norm is salient (focal) for the individual. In other words, this theory suggests that individuals may well have internalized an antilittering norm, but without activation through attention-focus procedures, it will not necessarily guide behavior in a prosocial direction. A series of studies performed by Cialdini et al. (1990) demonstrated this mechanism for various types of norms.

Originally, Cialdini et al. (1990) focused on two types of norms, descriptive and injunctive, each reflecting a separate source of human motivation. According to Reno, Cialdini, and Kallgren (1993), a *descriptive norm* refers to what most people do in a particular situation, or what *is*, and motivation for action comes from seeing what other people do. An *injunctive norm* is defined as what the particular culture approves or disapproves of and can be described as an *ought* norm. An injunctive norm motivates action through the threat or promise of social sanction.

Later, a third type of norm, the *personal norm*, was incorporated in the studies (Kallgren et al., 2000). Personal or internalized norms differ from social norms in that sanctions attached to them are tied to the self-concept (Schwartz, 1975). In this respect, Grasmick, Bursik, and Kinsey (1991) refer to threats of embarrassment when violating a social norm, in contrast to threats of shame that result from noncompliance with one's personal norm. As was found for social norms, persons having strong personal antilittering norms do not necessarily behave accordingly if their attention is not focused on the litter (Kallgren et al., 2000).

## Which Norm to Activate: Efficacy of Different Types of Norms

Cialdini et al. (1990) compared the utility of descriptive and injunctive littering norms. Their first study showed that littering was reduced only

when the descriptive norm (what is typically done in a given setting) was activated in a clean environment. If it was activated in a littered environment, littering increased. This led to the conclusion that activating a descriptive littering norm only encourages prosocial behavior in already clean environments. However, activating an injunctive norm should shift attention away from the antisocial littering behavior exemplified by the littered environment and direct attention to the social consequences of actions, thus motivating prosocial behavior.

A subsequent experiment by this group of researchers (Reno et al., 1993) showed that the activation of the descriptive norm was situation specific, not carrying over into another environment. Consequently, it was suggested that there is a practical advantage in activating the injunctive norm rather than the descriptive norm.

Activation of the personal norm has also been demonstrated to influence littering behavior (e.g., Kallgren et al., 2000) and behavior in other social dilemmas (e.g., Nordlund & Garvill, 2003). However, no comparison of effectiveness has been made between the activation of social norms and personal norms. Both types have demonstrated strong effects, but it was never investigated whether one would be more efficacious than the other.

One could argue that because social norms motivate action through the threat or promise of social sanctions, activating these might only result in positive effects in situations where these social sanctions are expected, such as in situations where behavior is visible to others. Personal norms motivate action through sanctions tied to the self-concept (e.g., feelings of guilt, loss of self-esteem) and via this mechanism might have different effects on behavior, but statements with regard to the relative effectiveness of activation of the personal norm versus the social norm remain speculative.

## **How to Activate: Explicit Versus Implicit Activation**

An issue that has received very little attention in the literature is whether it is more efficacious to activate norms in a direct and explicit way, for instance, via verbal statements or in an indirect or implicit way, for instance, through modeling, cleanliness of the environment or, as in the present case, through trash can design.

Most areas of psychology—including domains of attitudes and persuasion, social perception and judgment, and goal pursuit—recognize the unconscious activation of mental representations (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). Aarts and Dijksterhuis (2003) have

demonstrated how norms can be activated automatically, for example, speaking softer on being primed with a picture of a library.

Cialdini et al. (1990), Kallgren et al. (2000), and Reno et al. (1993) have in fact mainly used implicit norm activation in their experiments and have demonstrated strong effects, as have Krauss, Freedman, and Whitcup (1978) and Reiter and Samuel (1980). Yet explicit norm activation may be more direct and, therefore, stronger than implicit activation, because it is harder to miss and states very clearly what is expected. Earlier experiments with written prompts, on or near trash cans, have never compared the efficacy of explicit versus implicit statements (e.g., Finnie, 1973; Geller, Brasted, & Mann, 1980; Geller, Winett, & Everett, 1982; Huffman, 1995).

The present research studied the efficacy of different types of norms and different types of norm activation implemented through persuasive designs of trash cans. Specifically, we sought to investigate which type of norm—social injunctive, social descriptive, or personal—had the strongest effects on perceptions of littering behavior and actual littering behavior. In addition, the effects of explicit versus implicit activation on perceptions and behavior were tested. Two studies—one scenario study and one field study—were performed to test the efficacy of these different types of norm activation to affect reduction of litter. In both studies, norm activation was implemented via trash can design. A third study (post hoc survey) investigated the effects of age and gender on having a well-developed personal norm against littering.

## Study 1: Scenario Study

In the first study, the effects of three types of norms (plus a control condition) and two types of activation on social perceptions were compared. Using a scenario format, the expectation was that judgments on acts of littering would be harsher when antilittering norms were activated. Although social perceptions are not the same as actual behavior, they reflect similar psychological mechanisms and hence suggest similar patterns in the experimental manipulations. Social perceptions were thus considered valid approximations of actual behavior. Taking into account the literature to date and the design of the scenario (described below), the following hypotheses were tested:

*Hypothesis 1:* Explicit norm activation will show stronger effects than implicit norm activation.

*Hypothesis 2:* The activation of a social descriptive norm in the (slightly) littered scenario will yield less disapproval of a litterer than no norm activation (control condition).

*Hypothesis 3:* The activation of a personal norm or a social injunctive (ought) norm will yield stronger disapproval of a litterer than the other situations.

Based on the literature, no hypothesis could be formulated regarding the relative effectiveness of personal versus social injunctive norm activation.

## Method

*Design.* The scenario study followed a 4 (norm type: social injunctive vs. social descriptive vs. personal vs. control)  $\times$  2 (activation type: explicit vs. implicit activation) between-group design. Age was explored as a covariate.

*Participants.* A total of 315 persons participated (68% female, 32% male), ranging in age from 17 to 60 years (mean = 31.2 years). Participants were recruited at random in a shopping center in Eindhoven, and they volunteered when asked to participate in a short survey regarding assessments of other people. Respondents were randomly assigned to experimental conditions and filled out a questionnaire (Table 1). They received a piece of pastry for their participation.

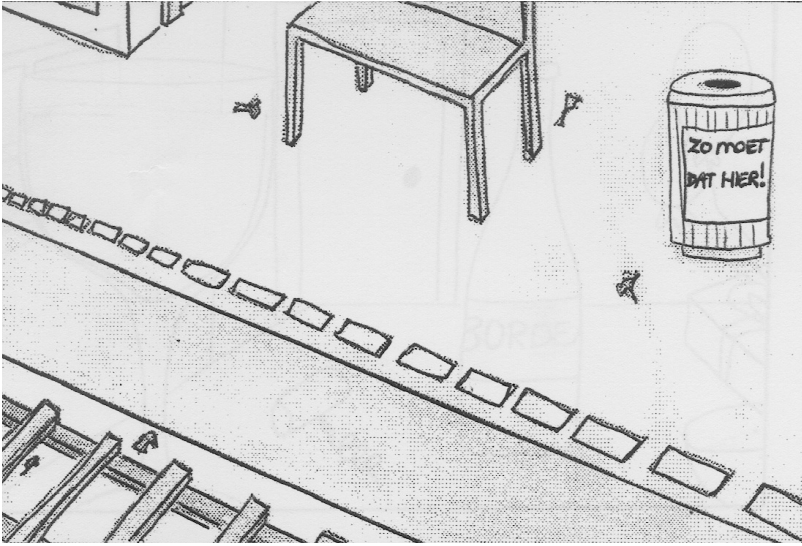
*Materials.* A scenario design was chosen to investigate different types of norm activation. The scenario portrayed a person littering in a slightly littered, and thus somewhat ambiguous, setting:

John (35 years old) is a team manager in a large firm. He has to attend a meeting in Utrecht. From his company he received a season ticket for public transport, which is why he is going by train. Unfortunately, his earlier meeting ran a bit late, and he is in a hurry to catch his train. At the office he was just able to take along a quick cup of coffee, which he drank along the way. Running to the platform, John notices his train is ready to leave. Accidentally, he drops his paper cup, but he does manage to jump into the train.

A second, unrelated scenario (about drinking and driving) was added to camouflage the purpose of the study.

Two factors were manipulated: type of norm and type of activation. Both were implemented via trash can design, which was presented in a picture

**Figure 1**  
**Picture Accompanying the Scenario**



Note: The trash can differs for every experimental condition, the present one is the social injunctive version.

above the scenario. Each trash can was pasted into this picture of a train platform, as shown in Figure 1. In the explicit conditions, norm activation was carried out by placing a text message directly on the trash can. The various explicit norm activations are presented below:

- Control: No message placed on the trash can.
- Personal: "Do you leave your litter lying around?"
- Social injunctive: "This is how it should be done here!"
- Social descriptive: "Eindhoven keeps it clean."

For all statements, positive wording was preferred over negative wording, as this is sometimes reported to be an important determinant of prompt effectiveness (e.g., Durdan, Reeder, & Hecht, 1985). Second, trash cans were designed to implicitly activate the same norms as the explicit statements, preferably in similar ways to keep conspicuity and attractiveness constant. For this a pilot study was performed. The pilot involved 45 students from the Eindhoven area. Eight trash cans were designed with

**Table 1**  
**Judgment of John as a Function of Norm Type and Activation Type**

Norm Type	Activation Type					
	Explicit			Implicit		
	<i>M</i>	<i>n</i>	<i>SD</i>	<i>M</i>	<i>n</i>	<i>SD</i>
Control (no norm)	4.07	39	0.97	3.87	42	1.06
Personal norm	4.12	39	0.86	3.87	41	0.99
Social descriptive norm	3.88	41	0.91	3.64	39	1.05
Social injunctive norm	4.33	39	1.20	3.97	35	1.19
Total	4.10	158	0.99	3.84	157	1.07

Note: Scores run from 1 to 7.

different arm gestures that could implicitly communicate antilitter norms. For each trash can, participants indicated to what degree they thought the trash can referred to each of the four experimental conditions listed above. The four designs judged to typically refer to one type of norm and not, or hardly, to the other types were selected. Figure 2 presents all 8 trash cans used in the experiment, both the explicit ones with the written statements on it and the corresponding implicit ones with the arm gestures.

*Measurements.* After reading the scenario, participants were asked to answer three questions on a 7-point scale.

1. What do you think of John? (*very sympathetic*–*very uncongenial*)
2. What do you think of John’s behavior? (*very good*–*very bad*)
3. Do you think his behavior is understandable? (*very*–*not at all*)


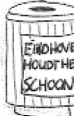






Factor analysis revealed one factor with an internal consistency (Cronbach’s  $\alpha$ ) of .72. The average score on the three items (“judgment of John”) was calculated and used in subsequent analyses. Participants answered the same questions for the second scenario. The questionnaire ended with questions about participants’ gender and age.

## Results

The scores on the variable “judgment of John” for the various experimental conditions are given in Table 1. We tested the effects of norm type



**Figure 2**  
**Trash Can Design for Every Experimental Condition**

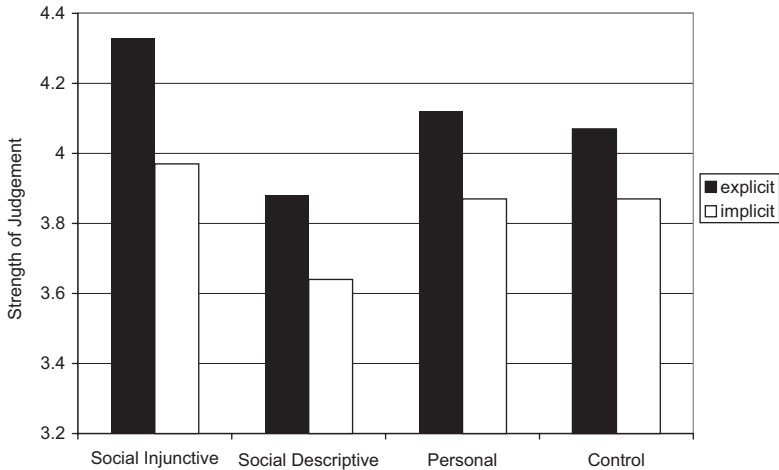
Type of Activation	Type of Norm			
	Social Injunctive	Social Descriptive	Personal	Control
Explicit				
Implicit	 C	 E	 A	 B

(social injunctive vs. social descriptive vs. personal vs. control) and activation type (explicit vs. implicit) employing ANOVA with “judgment of John” as the dependent variable and age as a covariate. Significant main effects emerged for activation type,  $F(1, 304) = 4.69, p = .03$ , and age,  $F(1, 304) = 9.54, p < .01$ . Explicit norm activation resulted in harsher judgments of John than implicit activation (Figure 3), confirming Hypothesis 1. Age was positively correlated to judgment,  $r = .16, p = .004$ , indicating harsher judgments from older participants. The effect of norm type was only marginally significant,  $F(1, 304) = 2.29, p = .08$ . The social descriptive norm resulted in the mildest judgments, confirming Hypothesis 2. The social injunctive and personal norm had the strongest effects, though not significantly different from each other or the control condition, in contrast to Hypothesis 3. There were no significant interactions.

## Discussion

The scenario study tested how various types of norms and two types of activation influence social judgments of a person littering. The results showed that explicit activation was more effective than implicit activation, as predicted. The effects of the various norm types were similar for both activation types, although these effects were only marginally significant. The significant effect of the covariate age is in accordance with other findings that suggest that younger people, especially teenagers, are more likely to litter (Finnie, 1973; Krauss et al., 1978).

**Figure 3**  
**Judgment of John as a Function of Norm Type and Activation Type**



The question remains whether the strong effects of explicit norm activation would generalize to actual littering behavior. The field study was designed to test this by employing explicit and implicit norm activations in a real-life setting using observations of actual behavior.

## Study 2: Field Study

The second study compared the differential effects of explicit and implicit norm activations on actual behavior. Kallgren et al. (2000) found that both social injunctive and personal norms can stimulate prosocial conduct as was also suggested by the results of Study 1. In this study, personal norm activation was chosen as the target norm. It was activated explicitly, implicitly, or both and compared with a control condition. People receiving a flyer were observed; littering behavior was operationalized as dropping the flyer on the ground.

The personal norm was activated via increased self-focus, instigated by a mirror over the trash can. Individuals who see themselves in mirrors experience increased self-awareness, which is characterized by greater attention

to one's inner states and traits (Carver & Scheier, 1978). This leads individuals to examine their personal norms regarding the relevant actions or behavior (Duval & Wicklund, 1972). A similar method, employing closed-circuit TV monitor pictures, was used by Kallgren et al. (2000) to create internal focus in a littering experiment.

We hypothesized that both types of norm activation (i.e., explicit and implicit) would reduce littering. In line with the first study, we expected explicit activation to have somewhat stronger effects than implicit activation.

## Method

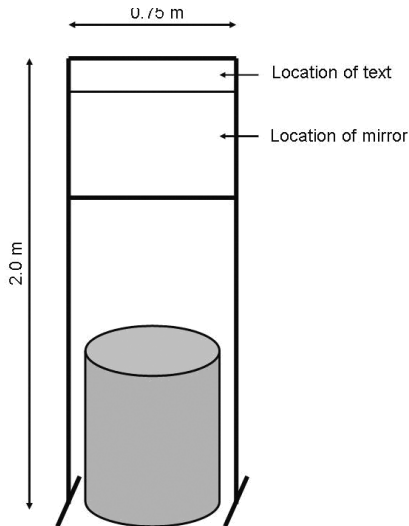
*Design.* The field study followed a 2 (explicit activation: no vs. yes)  $\times$  2 (implicit activation: no vs. yes) between-group design. Age and gender were controlled.

*Participants.* The behavior of 1,755 persons was observed (54% female, 46% male). Their ages were estimated as follows: 23% categorized as younger than 20 years, 48% as between 20 and 40 years, and 23% as 40 years or older. A research confederate distributed flyers to passersby while observers coded their behavior. At slow times flyers were offered to all passers-by, while at busy times they were offered at random.

*Environment.* The observations took place in a well-visited pedestrian shopping area in the center of Eindhoven. A straight piece of street was chosen, approximately 8 m wide, in which one standard trash can stood. Other than this one, no trash cans were available within 75 m. A research confederate distributed flyers to passersby walking in the direction of the trash can. The distance was such that participants could easily read the flyer before passing the can.

*Materials.* In all the experimental conditions, a sign was placed over the trash can. This was a large, bright red, wooden sign, 2 m high and 75 cm wide (see Figure 4). In explicit norm activation conditions, a written statement was placed on the sign, "Laat jij je afval slingeren?" (Do you leave your litter lying around?). This was the same statement used in Study 1 to activate the personal norm. In the implicit norm activation (self-focus) conditions, a mirror (50  $\times$  70 cm) was mounted on the sign. In the combined condition, both statement and mirror were visible; in the control condition, the sign was empty. Prior to the study, the visibility of a person's reflection was checked and found to be recognizable from 50 m with (corrected to)

**Figure 4**  
**Sign That Was Placed Over the Trash Can**



normal vision. The sign was not removed in the control condition to keep conspicuity of the trash can equal to the experimental conditions.

The distributed flyers were printed on colored paper (A6, approximately  $100 \times 150$  mm). The information on it was meager, noninformative, and not relevant to the majority of people,<sup>1</sup> so most would want to dispose of it as soon as they got it.

*Measurements.* After receiving a flyer, individuals were observed unobtrusively by three observers standing by the side of the street. Every individual was observed by one of the observers. The observers scored gender, estimated age, and one of the following categories of behavior:

1. Flyer is dropped on the street.
2. Flyer is taken along.
3. Flyer is thrown in trash can.
4. Person disappears from sight prematurely.

**Table 2**  
**Littering Behavior as a Function of Explicit and Implicit Norm Activations**

	No Explicit Norm			Explicit Norm		
	Littered	Taken	In Can	Littered	Taken	In Can
No implicit norm	66 19% 3.9	109 31% -1.6	172 50% -1.1	36 11% -1.3	102 31% -1.7	191 58% 2.5
Implicit norm	33 10% -2.0	146 43% 3.7	158 47% 2.2	41 12% -0.6	115 34% -0.4	183 54% 0.8

Note: Count, percentage, and adjusted residuals. Number of valid observations = 1,352.

Prior to the study, interrater reliability for the age judgment was confirmed using Cohen's  $\kappa$  ( $\kappa = .75$ ;  $n = 120$ ).

*Procedure.* The field study lasted 4 days. On all 4 days, every condition was tested. The order of the conditions was counterbalanced over the 4 days to control for time of day and weather.

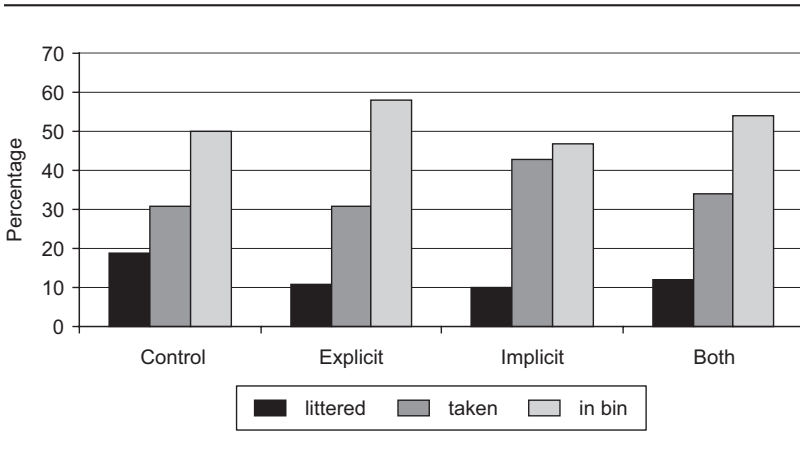
## Results

Of the 1,755 people observed, about 400 disappeared from sight prematurely (behavior category 4). These data were discarded. The remaining 1,352 observations were categorized into three types of behavior. In Table 2 and Figure 5, frequencies and percentages of behaviors are reported.

The data demonstrate powerful effects of all manipulations. In the control condition, 19% of the flyers were littered, whereas the experimental conditions show only 10%, 11%, and 12% of flyers littered. These are reductions of almost 50%. Chi-square analysis shows significant differences between conditions ( $\chi^2 = 27.9$ , 6 degrees of freedom,  $p < .001$ ). Analysis of the adjusted residuals demonstrated a significantly high percentage in the control condition (adjusted residual = 3.9) and a low percentage in the implicit condition (adjusted residual = -2.0).

But interesting differences also occurred between the three experimental conditions. Although littering percentages were low in all three conditions, behavior differed in terms of what was done with the flyer instead of

**Figure 5**  
**Percentage of Littering as a Function of Explicit**  
**and Implicit Norm Activations**



dropping it in the street. Whereas in the explicit norm condition more flyers were dropped in the trash can (58%) than taken along (31%), both behaviors were almost equally likely (47% vs. 43%) in the implicit norm condition. The combined condition shows intermediate percentages for both alternatives.<sup>2</sup>

An analysis of age differences did render significant results. The chi-square of a cross-tabulation with the three age groups and two types of behavior (littering vs. not littering) was highly significant ( $\chi^2 = 54.7, p < .001$ ). Young people were more likely to litter than the people in older age groups (Table 3), and persons of different ages reacted differently to norm activations. The middle group (age 20 to 40 years) responded best to explicit activation of the personal norm, whereas the oldest age group reacted strongest to implicit activation of the norm. However, the youngest age group did not respond to personal norm activation at all.

## Discussion

When activated, positive personal norms should reduce the amount of litter, because people are more likely to act consistent with their norm and hence not drop their flyer on the ground. In the field study, personal norm activation

**Table 3**  
**Littering Behavior as a Function of Age and Norm Activation**

	No Explicit Norm			Explicit Norm		
	<20 Years	20–40 Years	>40 Years	<20 Years	20–40 Years	>40 Years
No implicit norm	16.7	9.7	6.4	16.9	2.0	5.3
Implicit norm	16.4	4.0	1.0	19.7	7.0	0.0

Note: Numbers are percentages of litterers per age group.

was manipulated in two ways: a written statement and a mirror. The significant reduction of littering in the three activation conditions indicates that all changes to the trash can were effective and that both types of activation will lead to reductions in littering behavior. Conspicuity was kept constant over conditions, so this effect cannot be due to the trash can in the control condition attracting less attention. In contrast to the scenario study, the field study showed that implicit norm activation is as effective as explicit norm activation.

Although both types of norm activation significantly reduced littering, alternative behavior strategies were chosen. Persons in the implicit (mirror) condition took more flyers with them than in any of the other experimental or control conditions. A possible explanation is that the explicit norm activation—through its wording—referred stronger to a “litter here” instruction than did the implicit norm activation, making a more explicit appeal to a specific “correct” behavior. Alternatively, people may have felt uncomfortable approaching the trash can on account of the mirror mounted on top. Unfortunately, data do not allow for more detailed analysis as expected cell counts are low. More research on this matter is needed.

The data showed no additive effects of both manipulations. In other words, a combination of both mirror and written prompt did not result in stronger litter reductions than either of the manipulations separately. It appears both methods were effective by themselves in inducing the maximal reduction possible via personal norm activation.

Significant differences occurred between the three age groups: Persons in the youngest age group were more likely to litter than persons aged between 20 and 40 years, whereas persons in the age group 40 years and older produced the lowest amount of litter. In addition, the findings show that age groups responded differently to norm activation: In the oldest age group, implicit activation (mirror) had the strongest effects, whereas for

persons in the range of 20 to 40 years, explicit norm activation (text message) was most effective. For the youngest age group, none of the norm activations showed any effect. This latter finding is in line with Durdan et al. (1985), who found prompting was more effective for persons older than 25 years than for persons less than 25 years.

We hypothesized that perhaps the personal norms of the youngest group were not as strong as those of the older age groups and that activation did not affect their behavior. To test this, we performed a post hoc survey study aimed at measuring the personal norms with regard to littering behavior.

### Study 3: Survey Study

The results of the survey were intended to shed more light on the age effects found in the field study. Because norm activation is theorized to increase the consistency between norms and behavior, activation of the personal norm should only lead to litter reduction for people with a positive personal norm. We therefore performed a brief post hoc survey. The objective was to measure individuals' personal norm regarding littering.

#### Method

Seventy-one people participated (41 males, 30 females), evenly distributed over the three age groups. Participants were recruited a few meters from the observation site of the field study on the same day. Respondents filled out a 9-item questionnaire with 5-point scales (*totally disagree* to *totally agree*). Items were statements reflecting a person's norm regarding littering (e.g., I become irritated if I see litter on the street; I think all of us are responsible for any litter on the street). After rescaling negative items, factor analysis and reliability analysis were performed. One factor emerged, explaining 43% of variance. Eight items could reliably be combined into a measure for the person's personal norm (Cronbach's  $\alpha = .83$ ).

#### Results

An ANOVA of the scores on the personal norm scale for age groups and gender showed significant results for both gender,  $F(1, 69) = 4.42, p = .04$ , and age,  $F(2, 69) = 16.33, p < .001$ . Men ( $M = 3.79, SD = 0.74$ ) scored somewhat lower than women ( $M = 4.14, SD = 0.59$ ). But, more importantly, participants in the youngest age group ( $M = 3.39, SD = 0.66$ ) scored much



lower than those in the middle ( $M = 3.95$ ,  $SD = 0.70$ ) and oldest age groups ( $M = 4.36$ ,  $SD = 0.37$ ).

## Discussion

The survey suggested that indeed younger persons had less strong personal norms than the older age groups. This could at least partly explain why for them norm activation shows little or no effect, as the manipulations in the present study were not meant to induce a norm but simply to activate it. This type of manipulation will not result in differences in littering behavior when the person's norm is that littering is acceptable.

According to Christensen, Rothgerber, Wood, and Matz (2004), positive emotions are associated with conforming to behavior of the in-group and disassociating one's self with the out-group. It is possible that in the present research context younger people felt the social descriptive norm suggested that littering was socially acceptable, because most of the time litter was present. In their case, littering would place them in the in-group. Literature does not indicate whether young people are more susceptible to descriptive norm activation than older persons. Nonetheless, the conclusion remains clear that, for these groups, different strategies are needed to change littering behavior.

## Overall Discussion and Conclusion

In the first study, explicit activation of norms was stronger than implicit activation. Possibly, the implicit messages were too weak due to their cartoon-like character. A second study was designed to test whether the same effects could be realized in a real-world field setting by directly measuring behavior. Furthermore, the designs of the explicit and implicit means of norm activation were more equal (in terms of conspicuity and realism/feasibility), thereby creating a better comparison. Results of the second study indicated that implicit and explicit tactics were both successful in reducing littering by adults judged to be more than the age of 20 years, but not for younger people. A post hoc survey showed that the two older age groups had stronger personal norms than the younger group that appeared to have not yet developed a personal norm against littering. It thus appears that activation of the personal norm is only effective when that norm is well developed and positive. An alternative explanation is that younger persons were more strongly influenced by the descriptive social norm that may have been activated in the—slightly littered—research site.

Many studies have been carried out in settings where young people were the target group. Studies that have yielded positive results have predominantly used alternative strategies to reduce litter (e.g., reducing the *costs* of disposing of litter by making trash cans more attractive and placing them nearer to the user, and reinforcement through the use of incentives and feedback). These latter strategies have been shown to be quite effective among children (Burgess et al., 1971; Casy & Lloyd, 1977; Chapman & Risley, 1974; Gendrich, McNees, Schnelle, Beegle, & Clark, 1982), and they do not seem to depend on the existence of a well-developed personal norm. These findings indirectly support our own interpretation of the age effects. However, as previously mentioned, littering by younger people might also be explained by behavioral influence by a desire to identify with a particular group. Indeed, it is possible that many other factors besides personal norm development or peer pressure are involved in determining the littering behavior of younger people, and it remains for further research to identify those factors.

The present studies, as well as those by Cialdini et al. (1990) and Kallgren et al. (2000), have demonstrated that the ability of social norms to direct behavior depends on whether they are focal at the time of the behavioral act. Earlier studies have often used modeling and text prompts on flyers to focus attention on the social norm or video feedback during a bogus task to focus attention on the personal norm. The results of these studies emphasize the importance of giving some sort of prompt at, or near, the littering site, which helps to focus individuals on already existing social and/or personal antilittering norms. Although these strategies have been highly successful, practical implications for litter reduction remained vague.

In the present study, norm focus was induced through trash can design in two fundamentally different ways, showing direct practical applications of theoretical findings and simultaneously optimizing the effect of norm activation by directing attention focus where and when it is most effective: at the litter site. The findings should be considered in future trash can design so that they serve as norm activating prompts to prosocial behavior.

## Limitations

Some limitations of the study should be mentioned. First, in all studies researchers addressed all passing individuals, or at more crowded times at random. Sampling was based on self-selection. Self-selection always implies a risk of sampling bias; however, based on the high response rates, this risk is limited.

In the scenario study, implicit norm activation was introduced via arm gestures. The designs used were selected based on a pilot study among persons living in the same city as the persons in the actual study, yet there may have been a bias toward younger age groups and students in the pilot. This holds a risk, as the interpretation of gestures is probably more ambiguous than that of explicit formulations. Also, there may be cultural differences in the interpretation of certain gestures (see Goffman, 1963), which may add to the ambiguity.

In the field study, three types of behavior were recorded: littering, using the trash can, or taking the flyer along. Of course, as the observers could not track the persons until they were at home or had disposed of the flyer, the possibility exists that some of those persons still littered their flyer once out of sight. Although persons were tracked over quite a distance, the authors do acknowledge a slight risk of overestimating the effect of the experimental manipulations.

## Conclusion

We conclude from these studies that norm activation, especially social injunctive and personal, has a clear and beneficial effect on littering behavior. Moreover, it was demonstrated that norms can be effectively activated via design. Reiter and Samuel (1980) noted that whereas explicit norm activations (e.g., verbal prompts) lose their efficacy on repeated or prolonged exposure, implicit norm activation (e.g., employing modeling or cleanliness of the environment) does not. In line with this argument, we would hypothesize that implicit norm activation through trash can design should not only be equally effective as explicit norm activation, but may well prove more effective over time. Therefore, it would be very interesting for future research to investigate the long-term effects of both types of norm activation.

The idea that design has potential to change behavior is certainly not new and has been a fervent belief of many designers and architects. Most of them have intuitively incorporated psychological principles of persuasion into their designs. However, much potential remains unused and could be stimulated by explicitly bringing together architecture, product design, and environmental and social psychology, thereby engendering more powerful and targeted persuasive effects. Naturally, ethical issues concerning persuasive design for attitude and behavior change should be carefully considered (as advocated in, e.g., Fogg, 2003; IJsselsteijn et al., 2006). Yet in view of current trends in persuasive design and persuasive technology, as witnessed in other domains, it is time for environmental psychology to take up this challenge as well.

## Notes

1. The flyer was an introduction of a student club with the following text: "Knights of the kitchen table. We are a club for and by students, aiming to stimulate role-playing. We provide our members with a network, books, a space and activities." It also had the logo of this club.

2. A comparison of littering behavior between men and women did not render significant differences in frequencies of littering. The data did show that men were more likely to dispose of the flyer in the trash can than to take it with them (60% vs. 32%), whereas women were somewhat more likely to hold on to the flyers (52% vs. 41%).

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