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The Smell of Virtue: Clean Scents Promote Reciprocity and Charity

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> The smell and taste of things remain poised a long time . . . and bear unfaltering, in the tiny and almost impalpable drop of their essence, the vast structure of recollection. (Proust, 1913/1928, p. 65)

As Proust's words so eloquently express, a familiar smell can transport one to an exact time and place in one's past. Indeed, psychologists have found that scents can retrieve images and feelings from the deepest recesses of the mind (Chu & Downes, 2000; Doop, Mohr, Folley, Brewer, & Park, 2006). Smells can also influence judgment (Schnall, Haidt, Clore, & Jordan, 2008) and regulate behavior: For example, Holland, Hendriks, and Aarts (2005) found that exposure to citrus cleaning scents enhanced the mental accessibility of cleaning-related constructs and led participants to maintain a cleaner environment while eating.

Given the symbolic association between physical and moral purity, we considered a provocative possibility: In addition to regulating physical cleanliness, clean smells might also motivate virtuous behavior. Indeed, moral transgressions can engender literal feelings of dirtiness (Zhong & Liljenquist, 2006). Just as many symbolic associations, such as coldness and loneliness (Zhong & Leonardelli, 2008) or darkness and depravity (Frank & Gilovich, 1988), are reciprocally related (Lakoff, 1987), morality and cleanliness may also be reciprocally linked. We investigated whether clean scents could transcend the domain of physical cleanliness and promote virtuous behavior.

Experiment 1: Promoting Reciprocity

Experiment 1 tested the impact of clean scents on reciprocation of trust. We chose this behavior because Aristotle advocated justice in exchange as a primary "moral virtue" (Aristotle, trans. 1999) and because studies have indentified traits such as fairness and generosity as central to moral identity (Aquino & Reed, 2002).

Twenty-eight participants (16 male, 12 female) were individually assigned to either a clean-scented room or a baseline room. The only difference between these rooms was a spray of citrus-scented Windex in the clean-scented rooms.

In both conditions, participants engaged in a one-shot anonymous trust game (Berg, Dickaut, & McCabe, 1995) involving two parties: a sender and a receiver. In a typical trust game, the sender is given money that he or she can either keep or "invest" with an anonymous receiver. Any money sent is tripled, and the receiver then decides how to split the tripled money. For example, if the sender invests all of the money and the receiver reciprocates this trust by returning half of the tripled amount, both parties would be better off. However, sending money can be risky if the receiver chooses to exploit the sender and keep all the invested money (Camerer, 2003).

All participants in Experiment 1 were told that they had been randomly assigned to play the role of the receiver and that their ostensible counterpart had decided to send them the full amount ($4), which was tripled to $12. They had to decide how much money to return to the sender. Participants could exploit the sender by keeping all the money, or they could honor the trust by returning some portion to the sender. After the exchange, participants were asked for demographic information and for the reasons for their decision.

As predicted, participants in a clean-scented room returned significantly more money than those in a baseline room, $t(26) = 2.64$, $p = .01$, $d = 1.03$ (see Table 1). A clean-scented room led participants to resist exploiting the sender and to reciprocate his or her trusting behavior.

Experiment 2: Promoting Charity

Experiment 2 replicated the conceptual pattern of Experiment 1 by exploring whether clean scents would motivate another aspect of moral virtue: charity (Aristotle, trans. 1999; Machan, 1998). Ninety-nine undergraduate students (72 male, 25 female, 2 unspecified) were individually assigned to either a clean-scented room (sprayed with Windex) or a baseline, no-scent room and were asked to work on a packet of unrelated tasks. Included in the packet was a flyer requesting volunteers for Habitat for Humanity, a charitable nonprofit organization.

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Table 1. Reciprocation of Trusting Behavior in Experiment 1 and Charitable Intentions in Experiment 2

Room condition	Experiment 1: mean amount of money returned	Experiment 2: mean interest in volunteering (scale: 1–7)	Experiment 2: percentage of participants willing to donate
Clean-scented	$5.33 (2.01)	4.21 (1.86)	22%
Baseline (no scent)	$2.81 (2.81)	3.29 (2.04)	6%

Note: Standard deviations are given in parentheses.

Participants reported their interest in volunteering for future Habitat efforts (on a Likert-type scale, 1 = *low*, 7 = *high*), specified the activities they would like to assist with, and indicated whether they wanted to donate funds to the cause (yes/no). To rule out mood as a driver of the effects of clean scents, we asked participants to complete a shortened version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988). At the end of the study, participants provided demographic information, rated the cleanliness of the room, and answered questions about factors that might have influenced their responses in the study.

As predicted, participants in the clean-scented rooms expressed greater interest in volunteering than control participants did, $t(97) = 2.33$, $p = .02$, $d = 0.47$. In addition, a greater proportion of participants in the clean-scented rooms indicated a willingness to donate money, $\chi^2(1, N = 99) = 4.78$, $p = .03$ (see Table 1). Room scent had no impact on either positive or negative affect (ps > .20), and in analyses controlling for affect, room scent continued to have a significant effect on volunteerism and donation rate (ps < .05).

Discussion

The current experiments demonstrate that clean scents not only motivate clean behavior, but also promote virtuous behavior by increasing the tendency to reciprocate trust and to offer charitable help. Building off the observation that abstract concepts are often symbolically derived from the concrete environment (Emerson, 1836/1994), our results suggest that olfactory cues can trigger virtuous behaviors that are typically thought to be related to cleanliness at only a symbolic level. The link from cleanliness to virtuous behavior appears to be a nonconscious one: In neither experiment did participants report (in postexperimental questions) any influence of scent on their behaviors or intentions, and in Experiment 2, perceived cleanliness did not differ by condition or correlate with the effects.

It is possible that visual cleanliness can also influence morality (Liljenquist, Zhong, & Galinsky, 2008); this would be consistent with the "broken windows" theory of crime, according to which damage and disrepair in the environment promote lawless behavior (Wilson & Kelling, 1982). It should be noted, too, that because our charity measures captured participants' intentions, rather than their actual actions, future research should also measure charitable behavior directly.

Our findings carry important implications for environmental regulation of behavior. Considerable evidence explains how saints become sinners—that is, how people lose their moral footing—but there is much less understanding of how sinners can be led toward the path of virtue. By demonstrating that the association between morality and cleanliness is bidirectional, our research has identified an unobtrusive way—a clean scent—to curb exploitation and promote altruism.

The current findings suggest that there may be some truth to the claim that cleanliness is next to godliness: Clean scents summon virtue, helping reciprocity to prevail over greed and charity over apathy.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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