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RESEARCH ARTICLE

Sophisticated by Design: the Nonconscious Influence of Primed Concepts and Atmospheric Variables on Consumer Preferences

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Abstract Four studies sought to bridge the gap between the consumer literature on atmospheric effects on shopping and research on prime-to-behavior effects. Studies 1–3 found that nonconsciously priming sophistication influenced consumer preferences, lending credence to the hypothesis that the accessibility of concepts related to sophistication is sufficient to produce the effects of some atmospheric variables. Unobtrusively priming sophistication led participants to prefer an upscale candy bar rather than a plain candy bar (study 1), to select a high-brow movie rather than a low-brow movie as a raffle prize (study 2), and to order more expensive items at a real-life restaurant (study 3). The effects of sophistication primes were strongest among individuals who had positive automatic associations with sophistication (study 2). Study 4 directly linked primed concepts to an atmospheric variable, demonstrating that music played over headphones influenced both the automatic accessibility of words related to sophistication and corresponding consumer preferences.

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A quick walk down Broadway in New York City's SoHo district instantly reveals myriad retail stores for consumers to enter. Even though these shops are geographically very close to one another, upon entrance, the consumer's experience of each store can be tremendously different. A quick stop into Sephora, Ann Taylor Loft, or the Levi's Store offers an experience for the consumer almost wholly different than one that can be had merely one door down. This difference in the consumer's experience of the store; the flooring, the music, and the scent—the atmospheric elements of the store—can vary wildly and provoke very different consumer behaviors. These differences not only project disparate brand positioning—Ann Taylor Loft is sophisticated, Sephora is austere and futuristic, and the Levi's Store is young and vibrant—the cues contained in these store atmospherics can also lead to different consumer behaviors.

Over the past 30 years, there has been a considerable amount of empirical research trying to determine how such "atmospheric" variables influence consumers' perceptions of the store and consumer behavior (see [68] for a review). For example, fast music leads consumers to shop more quickly [48], classical music causes restaurant patrons to choose foods more styled to upscale tastes [53], and playing American pop music leads consumers to choose cheaper options [54].

While some effect of the store's atmosphere on behavior is clear, logically it seems there must be some more atomic variable that can allow us to understand the ways in which the store's atmosphere influence product choices and consumer behavior. There are, indeed, a host of potential explanations and underlying processes; however, we posit that the heightened accessibility of relevant concepts (e.g., the concept of sophistication in the case of classical music) is sufficient to

produce some of these effects. The goal of the current research is to delve deeper into atmospheric effects and understand them by breaking them down into a core psychological process, that of priming effects, which have been demonstrated widely throughout both the social psychological and consumer literature in the past few decades (see [12], as well as [42] for a review). While prime-to-behavior effects have been demonstrated in the realm of consumer behavior and atmospheric effects are likewise well-documented, there has, heretofore, never been an explicit, concerted attempt to link these phenomena and by doing so give us a richer understanding of both.

The concept of sophistication is of particular interest because sophistication is relatively easy to manipulate using atmospheric variables and holds important implications for marketing. Starbucks is able to charge $4 for a cup of coffee due in part to subtle sophistication cues in its coffee shops [2]. For example, serving sizes are referred to as Short, Tall, Grande, and Venti rather than small, medium, or large. The present studies push this idea further by examining whether increasing the automatic accessibility of concepts related to sophistication using word puzzles and atmospheric variables can unconsciously influence consumers to choose upscale products.

1 Theoretical Background

The present research is an effort to draw theoretical and empirical connections between two previously independent lines of research, store atmospherics and prime-to-behavior effects on consumer choice. While potentially theoretically rich, up to this point, the psychological processes underlying atmospheric effects have received relatively little empirical investigation, and theoretical interpretations have remained largely speculative. We emphasize the concept of sophistication because of its strong links to consumer choice [2] and relevance to the atmospheric effects that inspired the present investigation [53, 54].

1.1 Notable Effects of Consumer Atmospherics

A great deal of empirical evidence has been provided that unobtrusive atmospheric variables influence consumer behavior [46, 68], and recently, there has been interest in cataloging, categorizing, and analyzing the multisensory nature of these effects [64]. These variables have been shown to influence behavior across a strikingly wide array of domains. In their review, Turley and Milliman [68] broke down the known atmospheric effects on consumer behavior into five categories: (1) external variables (e.g., building shape, color, and exposed signage), (2) general interior variables (e.g., scents, lighting, music), (3) layout and design variables (e.g., traffic flow and furniture), (4) point-of-purchase decoration variables (e.g., artwork, product displays), and (5) human variables (e.g., employee characteristics, crowding [16]).

The second category (general interior variables) includes effects very close in kind to widely researched priming effects (e.g., [29, 58, 63]). In one particularly striking example, North et al. [54] found that upmarket restaurant patrons spent more on their meal if classical music, as opposed to pop music, was playing in the background. However, while the spending was increased overall, it was particularly the purchase of wine and appetizers (two purchases associated with sophistication) that accounted for the difference in spending. The process underlying this effect was not empirically examined, and the link between the stimulus (classical music) and the behavior (increased purchase of appetizers) seems worth investigating further.

Notably, none of the above findings included a direct empirical treatment of the potential processes through which the effects were produced (e.g., changes in mood, the salience of product attributes, retrieval cues, construct accessibility). In the current work, our hypothesized explanation is that the effects of atmospheric variables on behavior often reflect relatively nonconscious influences of the consumer environment [12]. For example, in the North et al. [54] work, hearing classical music may have increased the automatic accessibility [28] of concepts related to sophistication, which in turn primed consumers to prefer more upscale and expensive meals. The nonconscious nature of such influences may be critical, as consumers can resist explicit attempts at persuasion [22].

1.2 Prime-to-Behavior Effects

In the last two decades, laboratory investigations have demonstrated that subliminally or otherwise unobtrusively priming concepts can have dramatic effects on subsequent judgments and behaviors [7]. A variety of now classic studies have shown various effects like priming words related to politeness (using an ostensibly unrelated sentence-unscrambling task) leading participants to wait longer before interrupting an experimenter [3], or that priming words related to cooperation increased cooperation in a commons dilemma [5]. Naturally, findings inspired by these first studies soon followed in consumer behavior and has grown steadily in the last two decades ([13, 20, 19, 21, 18, 45, 56, 61, 71, 73]; for more on the fuzzy and ill-defined nature of preferences, and their susceptibility to subtle influences, see [23]). For example, subliminally flashing brand names led thirsty participants to prefer that brand of drink [31] and nonconsciously activated goals shaped consumer choices [10]. Further, brands themselves prime brand-consistent behaviors, but slogans from those same brands can prime behaviors opposite to the gist of the slogan [37].

While nonconscious priming effects are widely replicated laboratory phenomena, two questions have nagged prime-to-behavior effects in the literature [15]. First, much of the original work on prime-to-behavior effects was conducted in laboratory/artificial contexts, and their generalizability to real-world settings is viewed by some as an open empirical question [6, 7, 62]. Second, the replicability and size of prime-to-behavior effects has received considerable attention by a subset of researchers in recent years [9, 14, 26, 57, 67].

As to the first question, recent research focusing on prime-to-behavior effects in more naturalistic settings has emerged seeking to apply the concepts behind the original effects in the "real-world." In a stark demonstration of the power of environment, Keizer et al. [33] found that watching others violate social norms leads to more public disregard and disorder spreading in a city in the Netherlands. More recently, an experimental manipulation of emotionally contagious information influenced 689,003 Facebook users subsequent emotional states for up to 1 week [35]. Further, work by Latham and Piccolo [38] showed that priming employees with context-specific goals led to increased performance during a corporate fund-raiser. Though these effects are both impressive and promising, work in the field of consumer behavior showing direct, in-field, influence from primes on purchasing behaviors remains limited.

In addition, the replicability and size of prime-to-behavior effects has been so widely debated that journal issues have been dedicated to nailing down a process of replication and understanding what effect sizes should be acceptable as evidence of an effect [40]. Of course, debate about what constitutes a reliable effect and an effect size worth noting is not something that one empirical paper will be able to settle or define. However, given this current debate, evidence of prime-to-behavior effects—and moderators thereof—is notable in any capacity as both the behavioral and consumer literature struggle to understand the nature of these enigmatic effects [50].

1.3 The Present Work

Heightening the accessibility of the concept of sophistication must exert a causal influence on real-world consumer choices if it underlies the effects of real-world atmospheric variables. Therefore, the present research examined the effects of nonconscious sophistication priming not only in the laboratory, but also in an actual eatery. Conducting a priming study in a busy eatery during lunch hour provides a strong test of the hypothesis that primed concepts can influence consumer behavior even when a variety of other sensory information is coming in.

To the extent that primed concepts underlie atmospheric effects, better understanding priming sheds additional light on atmospheric influences as well. To that end, the present research examined potential moderators of prime-to-behavior effects. Of particular interest was whether primes mainly influence the behaviors of individuals who view the primed construct positively—for example, priming sophistication may only increase sophisticated behavior for individuals who are favorably disposed toward sophistication. (For more regarding automatic influences on preferences for product quality vs. price, see [55]).

1.4 Overview of Studies

Four studies aimed to bridge the gap between the consumer literature on atmospheric effects in shopping and research on prime-to-behavior effects. Studies 1 and 2 sought to demonstrate that nonconsciously priming sophistication can shape consumer preferences and further examined whether positive self-reported attitudes toward sophistication moderate the effect. Showing a sophistication prime exerts a causal effect on relevant consumer preferences, which lends credence to the hypothesis that the accessibility of concepts related to sophistication underlies the effects of some atmospheric variables (e.g., classical music playing in a restaurant). Study 2 additionally examined whether the effects of sophistication primes were strongest among individuals who had positive automatic associations with sophistication. Study 3 sought to further heighten the plausibility that primed concepts underlie real-world atmospheric effects by priming sophistication in an actual eatery. Finally, study 4 aimed to demonstrate that an atmospheric variable (i.e., sophisticated music) influenced both the accessibility of concepts related to sophistication and consumer preferences.

In arguing that construct accessibility can underlie atmospheric influences on consumer choice, we adopt the "experimental causal chain" approach advocated by Spencer et al. [65]. They argue persuasively that causal process is typically best demonstrated by showing that experimentally manipulating the independent variable influences scores on both (A) the dependent measure and (B) the hypothesized mediator, and finally that (C) experimentally manipulating the mediator influences responses on the dependent measure. Experimentally manipulating the mediator more effectively demonstrates the causal process underlying the effect than the approach advocated by Baron and Kenny [8], which assesses the correlational relationship between the mediator and dependent measure. The approach advocated by Baron and Kenny [8] cannot speak to whether the mediator plays any *causal* role in the effect and has been debated on conceptual and statistical grounds [34, 43]. Following the logic of Spencer et al. [65], study 4 demonstrates that an atmospheric variable influences both (A) consumer choices and (B) the automatic accessibility of concepts related to sophistication, and (C) studies 1–3 show that priming concepts related to

sophistication influences consumer choices. Taken together, such evidence suggests primed concepts can serve as the intermediate link in the causal chain between atmospheric variables and consumer choices.

2 Study 1

Study 1 sought to establish a causal link between sophistication primes and consumer preferences. We hypothesized that participants nonconsciously primed with sophistication would be more likely to positively evaluate an upscale chocolate bar relative to a more common style chocolate bar when compared with individuals not primed with sophistication. Additionally, this study sought to demonstrate (through the use of an extremely subtle priming manipulation and an awareness probe) that these influences on decision-making can occur outside of conscious awareness.

Of additional interest were potential moderators of the effects of sophistication primes on consumer choices. Previous studies showing individual differences variables sometimes moderate the influence of nonconscious priming. For instance, only competitive individuals behaved competitively in response to subliminal competition primes [49] and only individuals who associated the elderly with forgetfulness exhibited memory deficits in response to elderly primes [11]. Study 1 therefore examined whether sophistication primes were more likely to influence the consumer preferences of individuals who viewed sophistication positively.

3 Method

3.1 Participants

One hundred and five students (28 males) at a northeastern university took part in the study.

3.2 Materials and Procedure

Participants were presented with two ostensibly unrelated tasks. In the experimental condition, the first task was a 12-sentence-long sentence-unscrambling task [66] with 8 of the sentences including words related to sophistication (i.e., *sophisticated, poetry*, *opera*, and *champagne*; see Appendix 1). Participants were presented with five words, four of which comprised a viable sentence, in a nonsense order and instructed to unscramble these words to make a viable sentence (while ignoring the one word that did not belong). Participants in the control condition received a similar sentence-unscrambling task with no sentences related to sophistication. In a pre-test, 51 independent raters (students at a northeastern university) rated both sets of sentences as to how "sophisticated" they were (1=Not at all sophisticated, 7=Very sophisticated). Sentences used for sophistication primes were rated as more sophisticated than control sentences, $t(49)=6.16$, $p=10^{-7}$.

Upon completion of the sentence-unscrambling task, participants read an ostensibly unrelated page informing them that the purpose of the next questionnaire was to assess the candy bar preferences of college-age people. This research was purportedly being conducted on behalf of the Candies and Chocolate Corporatzions of America (CCCA), a fictitious candy and chocolate research organization employing MBA students. The descriptions and prices of two types of chocolate bars, one common (Aero, $1.09 per bar; a chocolate bar common in Canada but not available in the USA) and one more premium (Valrhona, $1.69 per bar; see Appendix 2) followed the instructions. Presentation order of the bars was counterbalanced. Following the descriptions, participants rated their likelihood of purchasing either type of chocolate bar on a 1–6 point Likert-type scale. The scale anchors were 1="*Significantly more likely to purchase Aero*" and 6="*Significantly more likely to purchase Valrhona.*"

In addition, self-report variables that seemed like plausible moderators of sophistication priming were assessed (see Appendix C). Questions assessed liking and frequency of buying chocolate (two items), importance of quality over price (two items), importance of convenience (one item) and a self-sophistication rating (one item). Participants responded to these questions on Likert scales. The specific items were: "How much do you like chocolate?" (1=*Not at all*, 7=*I love it*), "How frequently do you buy chocolate?" (1=*Never*, 7=*Very Frequently*), "Paying the lowest price possible for products is very important to me" (1=*Strongly Disagree*, 7=*Strongly Agree*), "When purchasing, buying a product of outstanding quality is the most important factor in my decision" (1=*Strongly Disagree*, 7=*Strongly Agree*), "Convenience is the most important factor in deciding where to shop" (1=*Strongly Disagree*, 7=*Strongly Agree*), and "How sophisticated a person would you say you are?" (1=Not at all sophisticated, 7=Very sophisticated). The order in which the chocolate bar preference measure and questionnaire assessing potential mediators/moderators were administered was counterbalanced between subjects.

Study 1 utilized a funneled debriefing procedure [4] to probe for awareness of priming effects. Participants were asked "Did the sentence-unscrambling task you completed influence the chocolate bar you preferred in any way?" (1=*Definitely Not*, 5=*Not Sure*, 9=*Definitely Yes*). They were further asked to describe the influence of the prime if they had answered yes. Finally, demographic information was collected on ethnicity, gender, employment status and age. None of these demographic variables interacted with the reported effects in any of the studies presented here, and will not be further discussed.

4 Results

Seven participants (five in the experimental condition and two in the control condition) indicated that their responses may have been influenced by the sentence-unscrambling task (i.e., rated the influence on a 1–9 scale as 6 or above). Though none of these participants correctly identified the potential influence in the subsequent question on the nature of the influence, their data were nevertheless excluded to help assure the nonconscious influence of the prime.

Consumer Choices Participants in the sophistication prime condition were more likely to prefer purchasing the Valrhona chocolate bar than were participants in the control condition (M=4.64 and 2.58, respectively), $t(96)=7.94$, $p=10^{-11}$. In fact, sophistication primes exerted a large effect (Cohen's d=1.63) on chocolate bar preference accounting for a considerable portion of the variance (η^2=.40), such that 80 % of participants in the sophistication prime condition (40 of 50) rated themselves as more likely to purchase the Valrhona bar, compared with 27 % (13 of 48) in the control condition (see Fig. 1).[1] This effect on simple choice (i.e., ratings 4 and above were coded as "chose Valrhona," ratings 3 and below were coded as "chose Aero") was highly significant, $t(96)=5.84$, $p=10^{-7}$.

Self-Reported Attitudes In contrast, sophistication primes did not exert a significant influence on any of the self-reported attitude questions (chocolate liking, p=.19, price importance, p=.38, quality importance, p=.50, convenience importance, p=.98, chocolate buying frequency, p=.40, self-sophistication rating, p=.99). Moreover, when entered into a regression with prime condition and an interaction term of prime and self-report variable, only "price importance" and "quality importance" evidenced a main effect on chocolate bar choice (β=.23, p=.01 and β=−.19, p=.03, respectively). Importantly, however, neither variable interacted with prime condition (t<1, p>.35), suggesting a lack of moderation for either variable [8]. No other item from the self-reported attitudes questionnaire exerted a significant influence on chocolate bar preference in regression analyses (all p>.10). Because no self-report variable significantly interacted with prime condition to predict chocolate bar choice or substantially attenuated the correlation between the prime condition and chocolate bar preference, further mediational analyses were not relevant [8].

Order of Measures Another potential point of interest was the extent to which the order of measures (consumer choice and self-reported attitudes) affected the influence of the prime on the dependent variable of chocolate choice. However, there were no main effects of questionnaire/choice order on either the questionnaire items or the choice itself. In addition, no interactions between prime condition and order were observed (all p>.50).

5 Discussion

Study 1 revealed a large (d=1.63, η^2=.40) effect of priming condition on chocolate bar preference, such that participants in the sophistication prime condition rated themselves as more likely to purchase the Valrhona bar than those in the control condition. Specifically, 80 % of participants in the sophistication prime condition preferred the Valrhona bar, whereas 77 % of participants in the control condition preferred the Aero bar. Establishing a causal link between sophistication primes and consumer preferences is a necessary first step in our argument that the accessibility of concepts related to sophistication underlies some atmospheric effects.

While a careful debriefing suggested that participants were unaware of the influence of the sophistication primes on their choices, such evidence is of course imperfect. For example, participants might have been aware of such an influence but forgotten it. In this particular case, because the debriefing occurred less than a minute after participants rated the chocolate bars, forgetfulness seems a relatively less likely alternative hypothesis. However, it should be emphasized that the consciousness vs. unconsciousness of a given influence is difficult to determine conclusively. At the very least, the present results do converge with studies using a variety of experimental paradigms that suggest that nonconscious influences play an important role in feeling, judgments, and behaviors [12, 52].

Several additional questions remained unanswered. Most importantly, no notable effects were found using self-report measures of variables that seemed likely to moderate the priming effect. Because self-report measures can be limited by factors such as impression management and inaccurate

[1] Because the even point scale used in Study 1 forced participants to choose between either the sophisticated candy bar (Valrhona) or the common bar (Aero), in a separate data collection we used a 1–7 scale of preference so a no-preference option could be provided (1=*Strongly prefer Aero*, 4=*Prefer neither Aero nor Valrhona*, 7=*Strongly prefer Valrhona*). Participants in the sophistication condition were more likely to prefer purchasing the Valrhona chocolate bar than were participants in the control condition (Ms=4.02 and 3.31, respectively), $t(87)=2.39$, p=.02. To evaluate the effect of the sophistication prime on raw choice, responses were re-coded to either represent a preference for purchasing the Aero bar, the Valrhona bar, or preference for neither. In the sophistication condition, the portion of Valrhona preference and no-preference reports were increased relative to the control condition (33.3 vs. 23.4 % and 31.7 vs. 29.8 % respectively). However, preference for the Aero bar attenuated in the sophistication condition relative to the control condition (46.8 vs. 35.0 %, respectively).

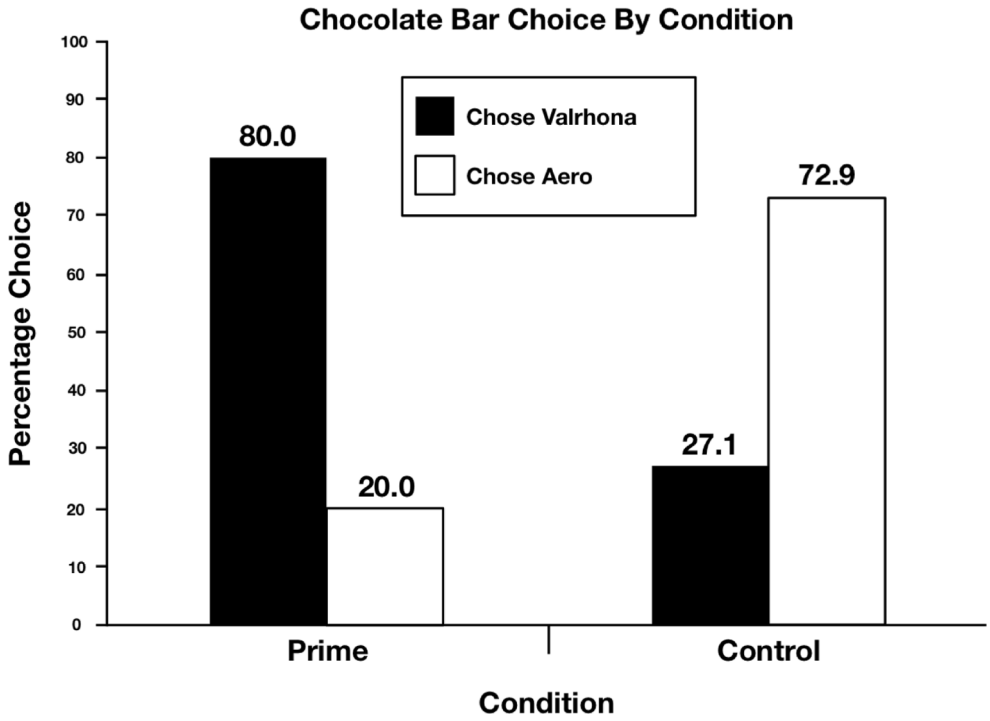


Fig. 1 Study 1: Percentage preference for Aero or Valrhona bar by priming condition

introspection [25], study 2 relied on implicit measures of attitude.

6 Study 2

People possess automatic associations with social targets than can differ considerably from their self-reported attitudes and beliefs [25], and implicit measures that rely on reaction time provide valid indices of such associations [17]. Study 2 examined the extent to which implicit (i.e., indirect) and explicit (i.e., directly self-reported) assessments of attitudes toward sophistication moderated the effects of the priming manipulation.

To the extent that primed concepts underlie atmospheric effects, these issues apply to atmospheric effects as well. For example, the effects of the sophisticated music in North et al. [54] may have been moderated by whether consumers had positive associations with sophistication.

In study 2, participants were asked to select either a high- or a low-brow movie as a potential raffle prize. One notable difference between this design and that from study 1 is that none of the movies' ostensible prices were displayed or implied (they were all offered as a raffle prize). Because the effects in study 1 were obtained when price was salient for the subject, it is possible that changes in sensitivity to price can partially account for the effect. However, in study 2, price was neither made salient nor available as a point of comparison, such that any differences in choice between conditions are not attributable to changes in price sensitivity.

7 Method

7.1 Participants

Twenty-four students at a northeastern university agreed to take part in the study in return for partial course credit.

7.2 Materials and Procedure

Primes Participants were primed with sophistication or neutral concepts using the same sentence-unscrambling task as in the prior study.

Movie Choice Participants were entered in a (real) raffle to win a movie as reward for their participation and chose which movie they would like to win from a list of six. Following the method employed by [59], three movies were relatively low-brow (The Bourne Supremacy; Love Actually; Old School) and three were high-brow (Lost in Translation; Spring, Summer, Fall, Winter … and Spring; The Station Agent). As a pretest of attractiveness, these movies were verified as having similar ratings (around 7 out of 10) on imdb.com as of 18 May 2005. In addition, high- and low-brow movies were rated in groups by 26 independent raters on a scale of 1–7 as to their sophistication level (1=Not at all sophisticated, 7=Very sophisticated; raters were students at a northeastern university).

High-brow movies were rated as more sophisticated than low-brow movies, $t(24)=2.52$, $p=.02$.

Automatic Associations A version of Markus' [47] self-schema task was employed to measure automatic associations with sophistication (see [70] for another recent adaptation of this task). Participants were asked to categorize words representative of sophistication (along with control words) as either positive or negative by pressing either the "d" or "k" key on a computer keyboard. When the key was pressed, the computer recorded both the key press (either d or k) and the millisecond latency (from onset) the key press occurred at. Faster key presses when making categorizations are suggestive of a stronger association between the word and positivity vs. negativity (e.g., a close association between "sophistication" and "positive").

Self-Reported Attitudes In addition, explicit attitudes that seemed like potential moderators of sophistication priming were assessed. Questions assessed frequency of visits to upmarket stores (1=*Never*, 7=*Very Frequently*), frequency of purchase and rental of movies (1=*Never*, 7=*Very Frequently*), importance of quality over price (*1=Price much more important 7=Quality much more important*), a self-thriftiness rating ("how thrifty a person would you say you are?"; 1=*Not at all*, 7=*Extremely*) and a self-sophistication rating ("how sophisticated a person would you say you are?"; 1=*Not at all*, 7=*Extremely*). The presentation order of these questions was fully randomized.

Debriefing As in study 1, a question was included asking, "Did the sentence-unscrambling task you completed influence the movie you preferred in any way?" Responses were again given on a scale of 1–9 with anchors, 1=*No*, 5=*Not Sure*, and 9=*Yes*. After this response, participants were encouraged to explain the influence of the prime if they had answered yes.

8 Results and Discussion

No participant indicated that their responses may have been influenced by the sentence-unscrambling task (i.e., rated its influence on a 1–9 scale as 6 or above); as a result no participants' data were excluded for suspicion or consciousness of the manipulation. Perhaps due to the small sample size, the effect for sophistication priming was not statistically significant but in the direction suggested by study 1. When coding low-brow movie choice as 0 and high-brow movie choice as 1, the means evidenced the pattern in the previous study (0.49 vs. 0.29 for the two conditions respectively, one-tailed $p=.09$). Importantly, however, the goal of the study was to identify whether automatic associations moderate prime-to-behavior effects.

To score the automatic associations task, response latencies to concept relevant words ($M=1056$ ms) were subtracted from response latencies to control words ($M=1030$ ms) to form a difference in responding index (DRI). Priming condition did not exert any significant main effects on automatic associations or self-reported attitudes (all $p>.35$).

To test moderation by associations with sophistication, regression analyses were employed to assess the effects of sophistication priming on the movie choices of individuals both high and low in positive associations with sophistication. The regression included sophistication prime condition (sophistication primed=+1, control=−1), the DRI for the implicit schema task (centered on 0), and the interaction between them. While there was no main effect of sophistication priming on movie choice (i.e., whether the chosen movie was high-brow or low-brow), $\beta(23)=.31$, $p=.12$, there was a main effect of the DRI, $\beta(23)=.68$, $p=.05$), and a significant interaction between sophistication priming and associations with sophistication, $\beta(23)=-.70$, $p=.04$ (see Fig. 2). For individuals with positive automatic associations with sophistication, sophistication priming led to increased preference for high-brow movies, $\beta(10)=.68$, $p=.05$. But for individuals whose associations with sophistication were less positive, the priming had no significant effect on movie choice $\beta(13)=-.40$, $p=.29$. Notably, similar moderating effects were not observed with any of the self-reported attitude items (all $p>.50$).

In sum, automatically associating sophistication with positive concepts moderated the relationship between sophistication primes and consumer choices. Whereas individuals with positive associations with sophistication responded to such priming by selecting a high-brow movie, individuals without these positive associations showed no effects of the priming manipulation. Of course, that positively evaluating the primed concept facilitates prime-to-behavior effect does not mean that a positive view of the primed concept is *necessary* for such effects to occur. Indeed, a number of investigations have found that priming negative concepts like hostility influences subsequent judgments [66] and behaviors [3]. Additional studies are needed comparing the effects of priming positive and negative concepts, and further investigating the role of participants' automatic associations with the primes.

9 Study 3

Although studies 1–2 demonstrated that sophistication priming influences consumer choice and further identified an important moderator, the question of the generalizability of such effects to real-world consumption contexts remained unanswered. This is particularly important for the present research, since our theoretical focus is on explaining atmospheric

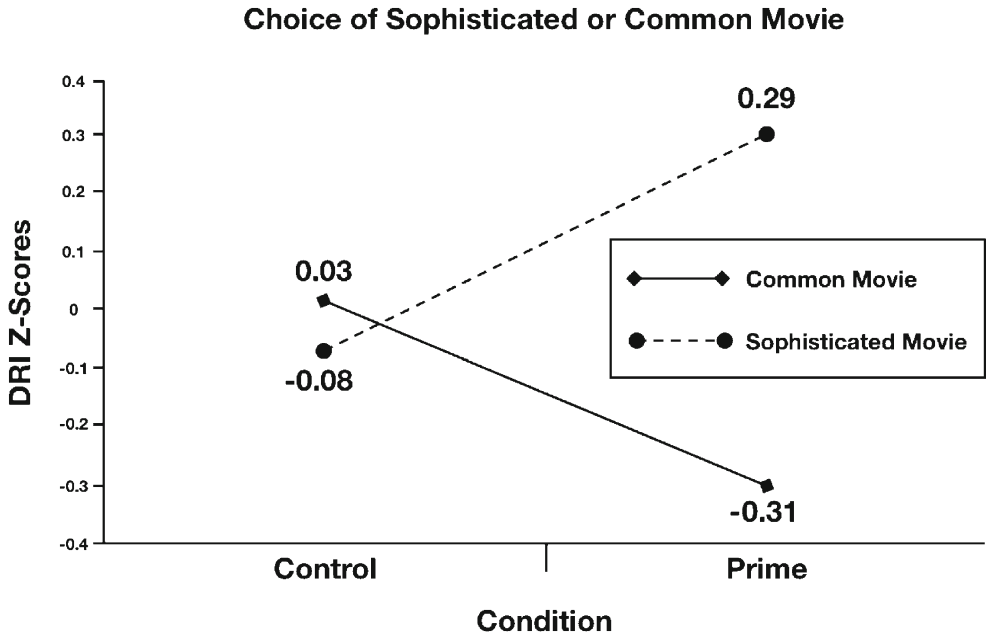


Fig. 2 Study 2: Automatic associational strength among those who chose a sophisticated or common movie. *DRI* difference in responding index. *Lower numbers* represent faster responses to sophisticated words than to nonsophisticated words

effects. If the activation of concepts related to sophistication is to account for some real-world atmospheric effects, then it must be shown to shape real-world consumer choices. In order to address this issue, study 3 administered the sophistication priming manipulation in a busy restaurant. Participants were told they would receive one dollar off their meal for doing the sentence-unscrambling task. After completing the priming manipulation, the total dollar amount of participants' bills was recorded. Though price and sophistication are admittedly imperfectly correlated, in absence of being able to examine purchase choices for sophistication, price seemed a reasonable proxy.

10 Method

10.1 Participants

Twenty-one patrons at a restaurant in the northeastern USA agreed to participate in the current study for $1.00 off their check.

10.2 Materials and Procedure

Upon entering the table service area of the restaurant, patrons were asked by one of two female confederates (both of whom were undergraduates) if they were willing to do a sentence-unscrambling task to help out with a research project. If the patron agreed to participate in the study (four did not), they were given the same sentence-unscrambling task described in the previous studies and instructed to finish it before they ordered their food (anyone who had already ordered anything other than water was excluded from being asked to participate). In order to receive their payment, participants were asked to bring their receipt over to a table where two other confederates (both male graduate students) were sitting. While one confederate paid the subject, the other quickly wrote down the total amount of the bill.

11 Results and Discussion

Consistent with the research hypothesis, for participants in the sophistication prime condition, the average bill total was higher (M=$7.98) than in the neutral prime condition (M=$6.11). This difference was significant in a Mann–Whitney U test, z=1.72, p=.04 (1-tailed). A one-tailed test seemed justified based on the theoretical a priori basis for directional prediction provided by prior work on assimilation to primes. Such a test was further empirically justified based on the results of the prior two studies. Thus, the results of study 3 indicate that nonconscious priming can have a meaningful effect on consumer behavior carried out in real-world contexts. As such, they increase the plausibility that prime-to-behavior effects can account for the influence of some real-world atmospheric variables.

12 Study 4

Up to this point the present research has demonstrated that nonconsciously priming words related to sophistication consistently influences consumer choices in both laboratory (studies 1 and 2) and real-world (study 3) environments. Atmospheric effects have been explained in terms of many possible processes. However, we demonstrate that merely priming

sophistication is sufficient to influence real-world consumer preferences. This raises the possibility that the activation of concepts related to sophistication underlies some atmospheric effects.

Study 4 attempted to more directly tie the priming effects observed in studies 1–3 to a traditionally used atmospheric variable (music). Participants listened to either classical music or pop music while responding to a consumer survey. We hypothesized that listening to classical music would automatically activate words related to sophistication [28], and that the accessibility of sophistication related words would predict consumer choices. We further expected that participants would report no conscious awareness of the influence of the music. Such a result would further suggest that relatively automatic, nonconscious influences underlie some atmospheric effects.

Study 4 therefore blended aspects of a typical atmospheric effect paradigm and a prime-to-behavior paradigm. However, unlike some atmospheric effect studies, the aspect of the environment that was experimentally manipulated was logically irrelevant to the consumer choice being made. That is, while the sophistication of the music played in restaurant is a useful cue as to the appropriate situational norm, the music played over one's headphones while reporting hypothetical consumer choices is not a relevant piece of information. Indeed, participants would likely reject any influence of the music were they aware of it [52, 51]. Another key difference was that in study 4, participants were carefully probed for awareness of the influence of the music [4], which was not the case in atmospheric studies that examined consumer choices in everyday environments. Finally, as previously mentioned, an implicit measure of construct accessibility [28] was included in order to provide some additional evidence of the process underlying the effects of the music on consumer choices.

13 Method

13.1 Participants

Eighty-nine participants (48 females) were recruited in a public part of a moderately sized city in the Northeastern USA. Participants agreed to take part in the study in return for a beverage valued around $1.00.

13.2 Materials and Procedure

Participants were asked to complete a "word puzzle" and an ostensibly unrelated product choice task. After agreeing to take part, participants were told that because this public space was very noisy (construction was going on nearby), they would wear headphones and listen to incidental music while they filled out the consumer survey.

Following North et al.'s [54] manipulation, participants were randomly selected to listen to either classical music (Vivaldi's "The Four Seasons: Summer, Presto") or pop music (Britney Spears' "Oops!… I Did It Again"). As in studies 1–3, one stimulus was selected to prime for sophistication, the other to be relatively unsophisticated or common. Pre-tests on ten participants (recruited in the same way study participants were) for these songs' placement on two different dimensions (Sophistication and Commonness) demonstrated this. The Vivaldi recording was rated on a scale of 1–7 (1=Very unsophisticated, 7=Very sophisticated) to be higher on Sophistication than the Britney Spears song (M=6.3, 3.4, respectively, p=.001) and lower on a 1–7-scale rating Commonness (M= 1.5, 6.1 respectively, $p=10^{-6}$).

After they put on headphones and the experimenter started the music, participants were asked to do a "word puzzle" in which they completed 20 words that were written out with one letter missing. Each of these words could be completed in various ways (e.g., _ I N E could be completed as either "WINE" or "LINE"). For ten of the words stems, a word that was clearly mated with sophistication (e.g., "wine") was an option of completion and for the other ten no such completion was possible. Such word stem completion measures are commonly used to assess construct accessibility [28], and the processes underlying social judgments [24, 27, 36].

Following the word stem completion measure, participants were shown materials that described the movie choice from study 2 (this time they were simply instructed to pick the one they would most like to purchase, there was no raffle). Finally, participants were given the debriefing used to probe for awareness of the influence of the manipulation in studies 1 and 2.

14 Results and Discussion

Atmospheric Prime Effects on Movie Choice As in study 2, movie choice was classified into a binary variable indicating choice of either a sophisticated movie or a common one. The effects of the music condition on the movie choice was significant in the expected direction, such that in the sophisticated music condition 61 % of participants chose a sophisticated movie, and in the common music condition only 44 % of participants made the same type of choice, $t(87)=2.54$, $p=.01$.

Atmospheric Prime Effects on Word Stem Completions The ten critical word stems were coded in a binary fashion as to whether they were completed using a sophisticated word (code=1) or common word (code=0), and then summed and averaged. As expected, in the sophisticated music condition the word stems were completed in a manner more consistent with sophistication than in the common condition (M=.45 and .38, respectively), $t(87)=2.08$, $p=.04$. This effect is of primary importance in showing that the atmospheric manipulation

activated sophisticated concepts. In addition, word stem completions correlated in the expected direction with movie choice, $r(87)=.31$, $p=.005$.

While the automatic accessibility of sophisticated concepts did not meet the Baron and Kenny [8] criteria for statistical mediation, that activation of sophisticated concepts shifted in the expected direction in response to the music, and further correlated in the anticipated direction with consumer choices, does provide some process evidence. Moreover, because the hypothesized mediating variable of sophistication accessibility was experimentally manipulated in studies 1–3, and then assessed as a dependent variable in study 4, together the present studies provide stronger evidence for *causal* process than simply meeting the Baron and Kenny criteria for statistical mediation would (see [65]). That said, more research is needed testing the hypothesis that construct accessibility underlies some atmospheric effects on consumer choices.

In sum, listening to sophisticated (as opposed to relatively unsophisticated) music increased the automatic accessibility of concepts related to sophistication, and further caused participants to indicate a preference for an upscale movie. Participants evidenced no awareness of the influence of the music on their consumer choices. Just as study 3 successfully imported a common laboratory priming procedure into a real-world eatery, study 4 successfully imported a well-known atmospheric effect into the more controlled environs of the typical consumer choice study. Study 4 thus empirically linked research on atmospheric effects and nonconscious priming in a manner complementary to the theoretical links drawn earlier.

15 General Discussion

The current research sought to bridge the gap between the literatures on atmospheric effects on shopping and prime-to-behavior effects. Studies 1–3 established that nonconsciously priming sophistication influences relevant consumer preferences. This is essential first step toward demonstrating that the activation of concepts related to sophistication underlies some atmospheric effects. Unobtrusively priming sophistication led participants to prefer an upscale candy bar rather than a plain candy bar (study 1) and to select a high-brow movie rather than a low-brow movie as a raffle prize (study 2). The effects of sophistication primes were strongest among individuals who had positive automatic associations with sophistication (study 2). Study 3 further demonstrated that nonconscious priming effects can occur in noisy real-world environments, a critical step toward demonstrating that priming effects are relevant to real-world atmospheric effects. Study 4 more directly linked atmospheric and prime-to-behavior effects by demonstrating that an atmospheric variable (music) nonconsciously influenced both the automatic accessibility of words related to sophistication and relevant consumer choices.

15.1 Generalizability of Nonconscious Priming to Naturalistic Consumer Environments

Providing evidence for the practical relevance of prime-to-behavior effects, study 3 found that sophistication primes increased the amount of money spent by consumers at a busy restaurant. As noted, demonstrating an effect of sophistication priming in a real-world context heightens the plausibility that prime-to-behavior effects can account for some of the effects of real-world atmospheric variables.

At the same time, this finding addresses a longstanding issue in the priming literature in consumer behavior: the extent to which priming effects seen in so many studies generalize to real-world contexts. Up to this point, almost all consumer studies of nonconscious priming have been conducted in laboratory situations, where high degrees of experimental control make it possible to verify the nonconscious influence of the effect. One notable exception [56], which found that priming grocery store patrons with health words reduced unhealthy snack purchases, have limited process-related data to accompany their admirable result. For many marketers—both practitioners and acadmics—this has long raised the issue of whether priming manipulations are “hothouse” laboratory phenomena or have real implications for naturally occurring behavior. The present research is the first to demonstrate that the classic priming procedure developed by Srull and Wyer [66] directly influences spending in a real-world setting.

15.2 Priming Effect Size and Replicability

While no one set of studies will be more important than any other in the quest to understand phenomena so widely reported and debated as prime-to-behavior effects, it is important that every piece of evidence get consideration. In the current set of studies, the scrambled sentence prime of study 1 led to large ($d=1.63$, $\eta^2=.40$) effects on product choice, and only a moderated effect in Study 2. In Study 3 these sentences again exerted a direct effect on behavior. This pattern corresponds with an empirical (and theoretically based) pattern in the literature on prime-to-behavior effects [9, 37, 61] in that these effects are sensitive to variations in context and application. In fact, study 2, adds additional evidence to findings from many researchers that self-relevant variables like self-consciousness, academic, ethnic, or personal identity can moderate priming effects [30, 39, 69, 70].

The current set of studies serves to add additional evidence for both the veracity of prime-to-behavior effects and the need for understanding contextual influences on them. However, because these studies were not designed with the specific aim of testing the size of prime-to-behavior effects by varying context, this correspondence (both theoretical and empirical) must be taken as anecdotal.

15.3 Reconceptualizing Atmospheric Effects in Terms of an Automatic Prime-to-Behavior Link

The present results suggest that prime-to-behavior effects can account for many of the atmospheric influences on product choice documented in the consumer literature. Such studies find that subtle changes in the environment significantly impact consumer behavior [29, 48, 54, 64, 68]. While every prior atmospheric effect is amenable to a case-by-case, idiosyncratic explanation, an automatic link between environmental stimuli and overt actions has the advantage of parsimoniously explaining many such effects. In light of the results of the present study 4, one explanation of North et al.'s findings is that hearing classical music activates concepts like "sophisticated" and "upscale," leading people to automatically enact behaviors consistent with those concepts.

It is important to note that there is also substantial extant literature on how objects either in the environment [32], on one's person [1], affect behavior without explicit conscious knowledge (for a discussion on different types of conscious knowledge see [60]). Further, there is growing consensus that environmental factors like heat [72], interpersonal crowdedness [44], or even fishy odors [41] can influence subsequent behavior without awareness or endorsement (for a review of metaphorical influences on behavior, see [42]). Yet, direct tests for atmospherics primes remain elusive in consumer research.

Because there is little direct evidence as to whether atmospheric effects in real consumer environments represent conscious or nonconscious influences, this is put forth as a hypothesis and paradigm for future research as opposed to a definitive conclusion about the relevant underlying processes. Before drawing any final conclusions, much more empirical work is needed examining the processes underlying atmospheric effects in naturalistic contexts. For example, researchers could assess the accessibility of sophistication among shoppers in a store and/or probe for awareness of the effects of in-store music as the shoppers are exiting. To the extent that atmospheric effects do turn out to represent nonconscious influences on behavior, this literature will represent additional evidence for the generalizability and real-world relevance of priming effects.

Study 2 revealed that individuals with positive automatic associations with sophistication were significantly more likely to respond to sophistication primes by choosing upscale products. This indicates that priming effects depend to some degree on properties of the individual: not everyone responds to primes in the same way. This holds considerable practical implications, in that marketers should seek to prime a concept primarily among populations and individuals who view the concept positively. For example, an atmospheric variable like sophisticated music may be counterproductive if the clientele regard the idea of sophistication contemptuously.

16 Conclusion

The current research sought to link in-store atmospheric effects with the literature on prime-to-behavior effects. Heightening the plausibility that the activation of constructs related to sophistication underlies some atmospheric effects, nonconsciously priming sophistication led participants to prefer upscale products in both laboratory and real-life consumer situations. The effects of sophistication primes were strongest among individuals who had positive automatic associations with sophistication. Also, evidence was found that an atmospheric variable (music) influenced both the automatic accessibility of words related to sophistication and relevant consumer choices. An automatic prime-to-behavior link can potentially account not only for the present findings, but also for a variety of atmospheric effects on consumer choice documented in prior work. While atmospheric effects can occur for many reasons, the simplest and most basic may be the automatic activation of concepts by the environment.

Appendix 1

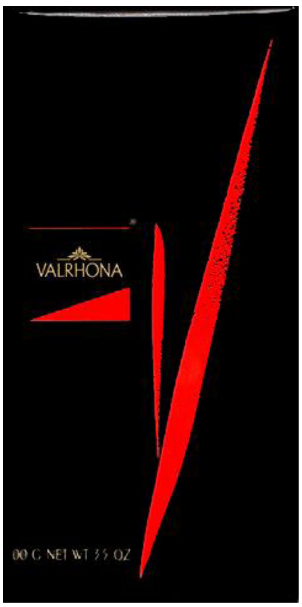
Sophistication sentences for study 1 (Words keying the concept of sophistication are italicized)

1. *Sophisticated* are toast girls ladies
2. Music wrote vacationed timeless *Beethoven*
3. are very cats university lovable
4. *Tie* required restaurant tonight *black*
5. Overwhelming always ribbons is homework
6. Evocative with electorate *poetry* books
7. The gracefully dance antiques *Waltz*
8. Ate house the deteriorating is
9. Gardens with monitor *orchids* filled
10. The blue economics is curtain
11. *Opera* the spirit voluptuous elevates
12. Delightfully the *champagne* lots bubbled

Control Sentences for Study 1

1. World the welcomes is complex
2. Walk please olives dog the
3. Market appreciation the is nearby
4. Drink topography water gallons of
5. The was composition dark forest
6. Are very cats university lovable
7. The brown mother chair is
8. Flower nobody that anymore does
9. Overwhelming always ribbons is homework
10. Build bricks it although with
11. Ate house the deteriorating is
12. The blue economics is curtain

Appendix 2



Appendix C

Please answer these questions about yourself

How much do you like chocolate?

Not at all						I love it
1	2	3	4	5	6	7

Paying the lowest price possible for products is very important to me

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

When purchasing, buying a product of outstanding quality is the most important factor in my decision

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

Convenience is the most important factor in deciding where to shop

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

How sophisticated a person would you say you are?

Not at all sophisticated						Very sophisticated
1	2	3	4	5	6	7

How frequently do you buy chocolate?

Never						Very frequently
1	2	3	4	5	6	7

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