

## Short Article

## The workings and limits of subliminal advertising: The role of habits

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**Abstract**

Despite years of controversy, recent research demonstrated that, if goal-relevant, subliminal advertising can be feasible. To further elucidate the workings and limits of subliminal advertising, the present study examined the role of habits. Participants chose between two brands, one of which was subliminally primed. If neither brand was habitually consumed more frequently than the other, results from previous research were replicated. However, subliminally priming the more habitual brand did not increase brand choice. Remarkably, when the advertised brand was competing with a more habitual brand, priming increased choice for the primed brand at even the expense of the habitual choice.

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**Keywords:** Subliminal advertising; Habits; Consumer choice

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**Introduction**

Ever since the marketer Vicary claimed to have influenced consumer choices by subliminally flashing brand names in a movie theater in the 1950s, subliminal advertising has been a controversial topic. Vicary's claim was revealed as a hoax, and experimental research mostly failed to replicate Vicary's results (for an overview, see Moore, 1988; Pratkanis & Greenwald, 1988). For example, although subliminal presentations of the brand name "Coca Cola" increased overall consumption, it did not increase choice for that brand over alternatives (Cooper & Cooper, 2002; Dijksterhuis, Wegner, & Aarts, 2001, in Dijksterhuis, Aarts, & Smith, 2005; Hawkins, 1970). Nevertheless, a meta-analysis of 33 studies yielded a significant effect of subliminal brand presentation on choice for that brand, even though most individual studies in the analysis did not find significant support for such an effect (Trappey, 1996).

These results suggest the possibility that subliminal priming influences product choice only under very specific conditions, which have to be met for subliminal advertisements to be

effective. Karremans, Stroebe, and Claus (2006) argued that goal relevance of the subliminal ad might be a necessary condition for subliminal advertising to work. This argument was based on the more general idea that subliminal *priming* may be especially effective when the prime is goal-relevant, that is, when people are motivated to pursue a goal to which the prime is relevant (Strahan, Spencer, & Zanna, 2002; Velkamp, Aarts, & Custers, 2007; Winkielman, Berridge, & Wilbarger, 2005). In the case of subliminal advertising, Karremans et al. (2006) demonstrated that subliminal priming of a brand of beverage increases choice for that beverage, but only when participants were thirsty. For participants who were not thirsty, subliminal priming did not affect choice. Recently, Bermeitinger et al. (2009) conceptually replicated these findings in another domain, demonstrating that people can be subliminally stimulated to choose a particular brand of energy pills, but only if they are tired and motivated to concentrate. These findings indicate that especially when people are motivated to make a choice between products, subliminal priming of the name or logo of a brand can influence brand choice.

More generally, these findings suggest that previous attempts to find subliminal advertising effects may often have failed because they did not take theoretical developments on the effectiveness of subliminal *priming* in general into account. The

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goal of the present research is to further elucidate the conditions under which subliminal advertising will be effective. Specifically, in the present study, we will examine the role of consumption habits, and how they restrict the effectiveness of subliminal advertising. We argue that strong pre-existing habits towards an *advertised* brand are likely to restrict the workings of subliminal ads. Another interesting and related issue is whether pre-existing habits can be overridden by a subliminal ad of an *alternative* brand. For example, if a thirsty person has always bought a can of Perrier in the past, can subliminal ads of a different brand of beverage (e.g., Lipton Ice tea) influence choice when standing in front of the vending machine? These questions will be addressed in the current research.

### The role of habits

A habit is often conceptualized as a learned response pattern that has become automatic through repetition of the habitual behavior (e.g., Aarts, Verplanken, & van Knippenberg, 1998; Fishbein & Ajzen, 1975; Triandis, 1980). In recent theorizing, habits are described as direct associations between a context and a response pattern (Wood & Neal, 2007). According to these authors, when a goal in a specific context is typically and repeatedly solved with a specific means, a direct association between the performance context and the means is formed. In future situations, this direct association between context and behavior ensures that, if this association is primed by the context, the behavior is performed automatically, without any mediation of the relevant goal. For example, applied to consumer choices, if a choice is prompted between several brands, and one of the brands has been chosen habitually in past choices, then this brand will be automatically chosen this time as well, without any interference of goals or conscious decision-making.

We argue that, for this reason, subliminal ads of a habitually consumed brand are unlikely to affect choice for that brand. In the case of beverages, when given a choice between two brands of beverages, we expect that regardless of prime or goal relevance of the brand, the brand that is habitually chosen (at least more so than the other brand) will be chosen anyway. Thus, in this manner, habitual choices should constrain the working of subliminal advertising. Interestingly, this simple logic seems to have been largely overlooked in previous research on subliminal advertising, and may directly explain why several previous studies failed to find subliminal advertising effects when priming participants with Coca-Cola (Cooper & Cooper, 2002; Dijksterhuis et al., 2001; Hawkins, 1970). After all, Coca-Cola is often people's (and students' in particular) habitual choice when choosing a soft drink, and subliminal ads are thus unlikely to affect choice for Coca-Cola.

Does this imply that habitual choices cannot be influenced by subliminal ads?

If the primed brand *competes* with the habitual brand, the situation is arguably more complex. For example, if an individual, who generally chooses San Pellegrino—the habitual choice—is primed with Perrier, and the person gets the choice between San Pellegrino and Perrier, will the prime overrule his

or her habitual choice, inducing a choice for Perrier? As noted earlier, previous research has demonstrated increased accessibility due to priming of a brand affects choice for that brand, but only if the prime is goal-relevant (Bermeitinger et al., 2009; Karremans et al., 2006). Moreover, research in a different domain has demonstrated that priming a construct increases the use of that construct in person perception, even when it conflicts with a chronically accessibility construct (which would be applied when no priming is present; Bargh, Lombardi, & Higgins, 1988). Similarly, in the current research, when a brand is subliminally primed, the increased accessibility of the brand may influence brand choice even at the expense of the habitual brand, but only if the primed brand is goal-relevant.

It is important to note that a primed alternative brand might only overrule choice for a habitual brand when both brands are similar in their goal-relevant qualities (i.e., instrumentality, attractiveness). In the case of brands of drinks, the primed brand and the habitual brand should be similar in the extent to which they quench thirst and in the extent to which they are liked. In the current research, we therefore chose brands that in a pilot study were rated as equally tasty, and equally thirst-quenching.

### The current research and overview of hypotheses

To examine our research questions, a similar paradigm was used as in the Karremans et al. (2006). Participants were subliminally primed with a target brand of a beverage (Lipton Ice), and were asked immediately thereafter to choose between that brand and one alternative, comparable brand (Spa Rood, a well-known brand of mineral water in the Netherlands).

Our predictions can be summarized as follows: For participants with no habitual preference for either brand, we expected to replicate previous results (Karremans et al., 2006): The prime should positively influence choice for Lipton Ice, but *only* for thirsty participants<sup>1</sup> (Hypothesis 1). However, we did not expect to find this effect for people who habitually drink the primed brand more than the alternative. In this case we expected participants to choose that brand, regardless of priming or thirst (Hypothesis 2). For participants with a stronger habit towards the alternative (i.e., non-primed brand), it was expected that the primed brand would be chosen over the habitual brand, but, again, only if participants were thirsty (Hypothesis 3). In the control condition, in which participants receive no prime, we simply expected choice for the habitual brand, regardless of thirst.

Finally, it is important to note that in the current study we examined, and measured, the moderating role of *relative* habit strength. When given a choice between two brands of beverages, say brand A and brand B, an individual is likely to automatically choose brand A if his or her past habit for choosing brand A is stronger than his or her habit for choosing brand B, *irrespective* of the absolute habit strength for brand A. We expected, thus, that priming brand A will not be effective if

<sup>1</sup> For the sake of simplicity, we discuss the hypotheses in terms of thirsty and non-thirsty participants. However, as thirst is a continuous factor in our experiment, we expect thirst to enhance the effect of subliminal advertising: Greater levels of thirst increase the effect of priming.

the habit for brand A is *relatively* stronger than the habit for brand B. In another example, even if an individual has a strong habit for brand A, but at the same time has a strong habit for brand B, when given a choice between A and B this person is unlikely to automatically choose A. In this example, as we hypothesize, priming brand A is likely to affect choice for brand A (for a thirsty person). Hence, in light of these considerations, we measured and examined the role of relative habits in the effectiveness of subliminal advertising.

## Method

### Participants and design

One-hundred-and-forty-six students of the Radboud University Nijmegen participated for either course credit or 10 Euros. Their mean age was 21.4 years. Of the 146 participants, 119 were female. Participants were randomly assigned to either the Lipton Ice prime or the no prime condition.

### Procedure

Upon arrival in the lab, participants were asked to read the instructions and were seated behind a PC to conduct a series of experiments. The current study was the last in a row of several unrelated experiments. The actual experiment started with the subliminal priming manipulation. Immediately after the priming task, product choice was measured. Subsequently, participants reported habitual consumption and level of thirst. At the end of the experiment participants were probed for prime awareness. After participants were finished, they were thanked for their participation and paid in either course credits or coupons.

### Independent variables

#### Prime condition

The priming manipulation followed a similar procedure as used by Karremans et al. (2006). The task was framed as a visual detection task. Participants were shown a string of uppercase B's in every trial, and were instructed to count the trials in which a lowercase b occurred (e.g., BBBbBb). After every five trials they had to report the number of trials containing a lowercase b they had counted. As the actual priming manipulation, before every trial, a prime was presented for 17 ms. To mask the prime it was preceded and followed by a random letter string for 500 ms. After the backwards mask, the string of B's was presented for 2 s. Participants were subjected to 20 trials. As in the studies conducted by Karremans et al., in the experimental condition the prime was the brand Lipton Ice, and in the control condition the prime was a non-word containing the same letters as Lipton Ice (i.e., Nipeic Tol).

#### Thirst

Participants reported their current level of thirst on four items (e.g., "I am thirsty"; "At the moment, I want something to drink") on a 7-point scale ranging from 1—*not at all*—to 7—*very much*. Cronbach's alpha for these questions was .90.

**Habit.** Participants' consumption habits were measured in one question for either brand (Lipton Ice, Spa Rood; e.g., "When you drink a soft drink, how often do you normally drink Lipton Ice (Spa Rood)?"), on a 6-point scale ranging from *Never* to *Always*.<sup>2</sup> To distinguish participants with stronger habits towards the primed brand, participants with stronger habits towards the alternative, and participants with equal habits, the difference between the habitual consumptions of the primed brand and the alternative brand was computed. In this manner, we created an index of participants' relative habit strength, with a higher score indicating relatively stronger habits towards the primed brand (i.e. Lipton Ice) as compared to the alternative brand (i.e., Spa Rood). This measure was scaled so that 1 point is equal to 1 standard deviation, but it was not centered around the mean, as the absolute zero point is more informative (i.e., indicating equal habits).<sup>3</sup>

### Dependent measure

#### Product choice

Participants were presented with a choice between Lipton Ice and Spa Rood. Spa Rood is a common, well known brand of bottled sparkling water in the Netherlands. This brand was selected from a range of 20 brands that are typically sold in Dutch supermarkets. These 20 brands were compared in a pre-test (N=15) on three features: consumption habits (on a 9-point categorical scale ranging from 1 = never to 9 = always), their ability to quench thirst (on a 9-point scale ranging from 1 = not at all to 9 = very much), and their overall evaluation (on a 9-point scale ranging from 1 = negative to 9 = positive). The selected brands, Lipton Ice and Spa Rood, scored similar on consumption habits,  $t(15) = -.85$ ,  $p = .41$ ,  $M_{\text{Lipton Ice}} = 1.93$ ,  $M_{\text{Spa Rood}} = 2.20$ , on thirst quenchiness,  $t(15) = .46$ ,  $p = .65$ ,  $M_{\text{Lipton Ice}} = 6.20$ ,  $M_{\text{Spa Rood}} = 5.87$ , and overall evaluation,  $t(15) = 1.48$ ,  $p = .16$ ,  $M_{\text{Lipton Ice}} = 6.20$ ,  $M_{\text{Spa Rood}} = 5.20$ .

To make a choice, participants were presented with both brands. One was presented on the left and the other on the right of the screen. Participants could then choose which beverage they would like to drink at that moment by pressing either a left button (Q) or a right button (P). The positions of the brands were counterbalanced.

<sup>2</sup> Measuring habits through frequency of behavior has a long tradition in social psychology that dates back to Triandis (e.g., 1980). As Landis, Triandis, and Adamopoulos (1978) stated in commenting on a study of voluntary blood donation, "Obviously the frequency of previous voluntary participation is the most relevant question, and was in fact used as the measure of the habit component" (p. 229). Interest in the habit concept was revitalized by Bentler and Speckart's (1979) demonstration that past behavior was an excellent predictor of future behavior. Although following Ouellette and Wood (1998) it has recently been suggested that a measure of habit should incorporate information about the stability of context as well as self-reported frequency (e.g., Danner et al., 2008), stability of context is less relevant in our study, since we compare the identical behavior (drinking) performed towards two different brands of soft drink.

<sup>3</sup> In addition to the theoretical reason for examining relative habit strength, as outlined in the Introduction, results showed that the difference score explained more variance in choice, and was better normally distributed than the combination of both habits separately.

### Prime awareness

Participants were subjected to a funneled debriefing procedure (Bargh & Chartrand, 2000). More specifically, they were asked if they noticed something peculiar about the priming task. Also, they were informed that a word was primed, and were asked to write down what they thought the word was. In addition, they could choose from three possible brands the one that they thought was primed (i.e., Lipton Ice, Spa Rood, and, another well known Dutch brand, Dubbel Friss). None of the participants noted any peculiarities that were associated with the priming. Also, when asked which word was primed, no one reported Lipton Ice (or Nipeic Tol in the control group). On the multiple choice question, participants reported each brand an equal number of times, and this was not affected by condition.

A prime recognition task, which consisted of ten trials of the priming manipulation, functioned as a second probing measure. Participants were informed that a word would be primed between the two random letter strings, and were instructed to guess which word it was. Half of the participants were primed with Lipton Ice, the other half with the control prime. Again, they were asked to write down what the prime was, and were given a choice between three brands. Some people reported Lipton Ice as the prime on the open-ended question. However, there was no difference in recognition between people in the prime condition and the control condition, indicating that people made an educated guess based on the options that were presented in the funneled debriefing task. This conclusion is further verified by the same amount of occurrences of the other multiple choice options in the open-ended question.

### Results

Overall, Lipton Ice was preferred over Spa Rood. 71% of the participants chose Lipton Ice, which differs from chance,  $t(1, 145)=5.73$ ,  $p<.001$ . This did not differ between primed participants and controls (resp. 73% and 71%,  $F<1$ ). Table 1 presents the mean values and standard deviations of the assumed determinants of choice of soft drink. Simple correlations between these determinants and choice are presented in Table 2. Furthermore, as the independent variables, thirst and habit, were measured after the priming procedure, it is necessary to exclude any effects of priming. ANOVA's with priming as independent variable and respectively thirst and habit as dependent variables revealed no significant effects ( $F$ 's  $<1$ ).

To examine whether the effect of subliminal priming on choice is moderated by thirst and habits, a logistic regression analysis was conducted on choice for Lipton Ice, with prime

Table 2

Simple correlations of soft drink choice and its assumed determinants.

|                   | Thirst | Lipton Ice habit | Spa Rood habit | Relative habit | Choice Lipton Ice |
|-------------------|--------|------------------|----------------|----------------|-------------------|
| Thirst            | 1.00   |                  |                |                |                   |
| Lipton Ice habit  | .15    | 1.00             |                |                |                   |
| Spa Rood habit    | .15    | .01              | 1.00           |                |                   |
| Relative habit    | -.01   | .66 *            | -.75 *         | 1.00           |                   |
| Choice Lipton Ice | .10    | .38 *            | -.40 *         | .55 *          | 1.00              |

\*  $p<.001$ .

condition, thirst, relative habit, and their interactions as predictors. First of all, the main effect of habit was significant,  $B=2.64$ ,  $Wald(1, 145)=10.88$ ,  $p<.005$ . When habit increased (i.e., people had stronger Lipton Ice habits than Spa Rood habits), the odds for choosing Lipton Ice over Spa Rood also increased. This strong main effect of habit indicates not only the external validity of the difference score, but also shows that the concept of habit can be captured in one item.

More importantly, the analysis yielded the expected marginal significant three-way interaction between habit, thirst and priming,  $B=-1.45$ ,  $Wald(1, 145)=3.32$ ,  $p=.07$ . To examine the interaction between priming and thirst at different levels of habit, the simple slope method was applied (Aiken & West, 1991). In our study, this meant estimating different slopes of the two-way interaction between thirst and priming on different levels of habit. As habit is the difference between Lipton Ice and Spa Rood consumption, it is informative to calculate significance levels when habitual consumption is equal (habit=0), when Lipton Ice is habitually consumed more than Spa Rood on one standard deviation from zero (habit=1), and when Spa Rood is consumed more than Lipton Ice (habit=-1). It is important to note that, by using this method, we did not divide participants in different groups, based on their habit score. Instead, the slope was calculated on different levels of habit, taking the data of all participants into account.

When regressed on the zero-point of habit (i.e., people with equal Lipton Ice and Spa Rood habits) the interaction between priming and thirst was significant,  $B=1.15$ ,  $Wald(1, 145)=3.92$ ,  $p=.05$ ; as in previous research, thirst was positively associated with choice for Lipton Ice when participants were primed,  $B=.61$ ,  $Wald(1, 145)=4.84$ ,  $p=.03$ , but not when participants were not primed,  $B=-.53$ ,  $Wald(1, 145)=1.11$ ,  $p=.29$  (see Fig. 1).<sup>4</sup> This finding supports Hypothesis 1, in that, for participants with no habitual preference for either the primed or the alternative non-primed brand, especially thirsty participants chose the primed brand. Thus, we replicated the findings of Karremans et al. (2006) for participants with no habitual preference.

Table 1

Means, standard deviations, and range of the assumed determinants of soft drink choice.

|                  | Mean (SD)   | Min | Max  |
|------------------|-------------|-----|------|
| Thirst           | 4.02 (1.30) | 1   | 6.75 |
| Lipton Ice habit | 2.77 (1.31) | 1   | 6    |
| Spa Rood habit   | 2.17 (1.49) | 1   | 6    |
| Relative habit   | .60 (1.98)  | -5  | 5    |

<sup>4</sup> Although a pilot study revealed that Lipton Ice and Spa Rood were evaluated as equally thirst-quenching, the data suggest that at higher levels of thirst, participants favored Spa Rood over Lipton Ice. Although these results were non-significant (neither for participants with no habit for one of the two brands, nor for participants with a relative habit for Spa Rood), we speculate that when actually being thirsty, Spa Rood might be seen as a better thirst-quencher than Lipton Ice. This (non-significant) finding does not undermine any of the other reported results supporting our hypotheses.

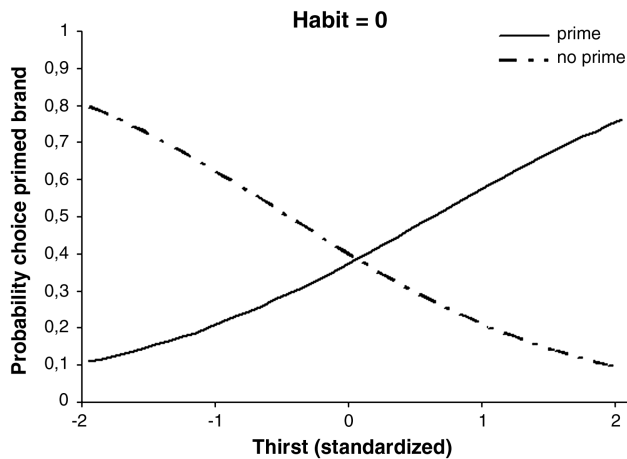


Fig. 1. The influence of priming on the probability of choosing the primed brand as a function of thirst for participants with no habitual preference.

When participants indicated that they drank more Lipton Ice than Spa Rood (habit=1), thirst and priming did not interact,  $B = -1.16$ ,  $\text{Wald}(1, 145) = .72$ ,  $p = .76$  (see Fig. 2a). In fact, the probability of choosing Lipton Ice was almost equal to 1, regardless of level of thirst or priming or thirst. This finding supports Hypothesis 2: priming a habitual brand does not increase choice for the brand, as the brand presumably is already chosen automatically.

Perhaps most interestingly, when participants indicated that they habitually drank more Spa Rood than Lipton Ice (habit=-1), thirst and priming did interact,  $B = 1.73$ ,  $\text{Wald}(1, 145) = 6.50$ ,  $p = .01$ . Thirst was positively associated with choice for Lipton Ice only when Lipton Ice was primed,  $B = .82$ ,  $\text{Wald}(1, 145) = 5.65$ ,  $p = .03$ , and not when Lipton Ice was not primed,  $B = -.91$ ,  $\text{Wald}(1, 145) = 2.43$ ,  $p = .09$  (see Fig. 2b). In other words, even for habitual Spa Rood drinkers, priming Lipton Ice positively affected choice for Lipton Ice to the extent that people were thirstier. These findings are in line with Hypothesis 3, indicating that priming an alternative drink can actually overrule choice for the habitual brand.

Additional analyses, using both habits separately (i.e., consumption habit of Spa Rood and Lipton Ice both entered in the logistic regression model) yielded similar results.<sup>5</sup>

In sum, these results generally confirmed our hypotheses. Subliminal priming of a brand positively affected choice for that brand to the extent that people were thirstier, but *only* when people had a relatively weak habit to drink Lipton Ice over Spa Rood. Participants, who had a strong habit to drink Lipton Ice over Spa Rood, chose Lipton Ice anyway. People who had no habitual preference or even people who had a stronger habit towards Spa Rood were influenced by brand priming if they were thirsty.

<sup>5</sup> The four-way interaction between priming, thirst, Lipton Ice habit, and Spa Rood habit was marginally significant,  $B = 3.57$ ,  $\text{Wald}(1, 145) = 3.43$ ,  $p = .06$ . Thirst is only associated with choice for the primed brand, if participants have low habits towards the primed brand, and high habits toward the alternative brand.

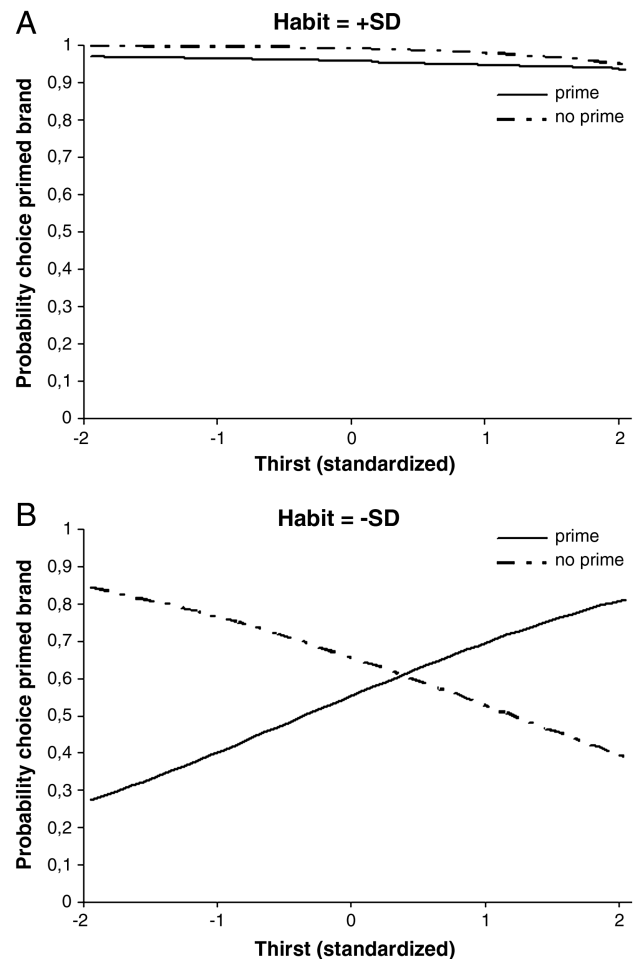


Fig. 2. A. The influence of priming on the probability of choosing the primed brand as a function of thirst for participants with a stronger habit for the primed brand. B. The influence of priming on the probability of choosing the primed brand as a function of thirst for participants with a stronger habit for the alternative brand.

## Discussion

In the present article, the workings—and limits—of subliminal advertising were further explored. Previous work has shown that subliminal priming of a brand name only influences subsequent brand choice when it relates to an active relevant goal (Bermeitinger et al., 2009; Karremans et al., 2006). The present findings build on this notion, and demonstrate that the effect of subliminal advertising is also moderated by existing habits. As to the *limits* of subliminal advertising, for a relatively strong habitually chosen brand, priming of that brand did not influence brand choice—even if the primed brand was goal-relevant. As to the *workings* of subliminal advertising, the findings demonstrate that, remarkably, if people habitually consumed an alternative brand more frequently than the primed brand, participants were actually influenced by brand-priming such that they were more likely to choose the primed brand over the habitual brand.

The finding that priming a habitual brand does not influence brand choice in favor of that brand may seem straightforward: a brand's habitual consumer need not be persuaded. However, as

briefly alluded to in the Introduction, this finding clarifies why previous scientific attempts to influence consumer choices subliminally have often failed. Probably influenced by Vicary's claim to have successfully influenced Coca-Cola sales, researchers often chose "Coca Cola" as the primed brand, and failed to find an effect of priming on brand choice (e.g., Cooper & Cooper, 2002; Dijksterhuis et al., 2001). The reason for their failure, we would suggest, is that, "Coca Cola" is the best known soft drink brand in the world, and is a habitual choice for a lot of people. In a pilot study we conducted, when asked to name six soft drink brands, over 70% of the participants named "Coca Cola" first, showing the chronically high accessibility of the brand. Provided the restricting role of habits, as illustrated here, it seems likely that studies that used "Coca Cola" as the prime did not find results because of the brand being strongly habitual.

Habit—or previous behavior—is often seen as a strong determinant of behavior, needing no mediation of attitudes or intentions (Bentler & Speckart, 1979). It is therefore remarkable that a subliminally primed brand name, which supposedly has only a negligible influence on behavior (Trappey, 1996), overruled the habit for the alternative brand in the present research. However, in line with these results, previous research has shown that priming a trait influenced person perception even when a conflicting chronically accessible trait was present. This effect of priming was, however, relatively short-lived (Bargh et al., 1988). The present findings could thus be resulting from a temporal advantage of the primed brand over the habitual brand, as the moment of choice always immediately followed the priming manipulation. Future research could focus on this possibility by varying the duration between priming manipulation and the moment of choice.

More broadly speaking, the current findings have implications for research on the impact of brand priming on motivation and behavior. For example, recent studies have shown that brand priming (either subliminally or through incidental brand encounters) can affect actual consumer choices (Ferraro, Bettman, & Chartrand, 2008; Chartrand, Huber, Shiv, & Tanner, 2008), or affect behavior that is symbolically associated with the brand (Fitzsimons, Chartrand, & Fitzsimons, 2008). As a specific example, priming participants with the computer brand Apple made them subsequently more creative (Fitzsimons et al., 2008). An interesting question, based on our results, is whether such effects would be moderated by habits of the brand: are habitual Apple users as strongly influenced by an Apple prime as non-habitual users? We suggest that it might be important to take habits into account whenever examining the effects of brand priming.

Although not a central goal of the present research, it is important to note that the influence of habits on consumer choice in our study was not dependent on goal activation. That is, when not being primed, participants chose the habitual brand irrespective of thirst. This finding seems consistent with recent theorizing on the nature of habits, in which habits are seen as automatic behavioral responses in a certain context (Wood & Neal, 2007), whereas others have described habits as automatic associations between goals and means (e.g., Aarts & Dijksterhuis,

2000; Aarts et al., 1998). In the current study, simply giving participants a choice for two brands is sufficient to elicit a habitual response, independent of the participant's current goal state. Thus, this finding is consistent with a goal-independent model of habits, in which the context is sufficient to initiate habitual behavior.

How do the current results relate to recent developments in other domains of subliminal priming research? Although subliminal advertising and other research lines on subliminal priming are related, subliminal advertising research is conceptually different. Whereas most research on subliminal priming focuses on priming goals or behavioral representations (for a recent overview, see Custers & Aarts, 2010), in the present research participants are primed with the means to attain a goal or enact a behavior. Thus, rather than priming people with a goal (e.g., quenching one's thirst) that should initiate goal pursuit (e.g., drinking), subliminal advertising entails priming of a means (e.g., a brand of a beverage) to accomplish a goal that people already pursue. As an example of goal priming, Sheeran et al. (2005) recently reported that priming socializing (i.e., a goal) increased participants drinking behavior (i.e., a means), but only if they habitually used drinking behavior to socialize. In their study, it is apparent that, although they successfully influenced participants' goal pursuit, their choice of means to attain that goal was directed by their habits, not by subliminal priming, as they did not prime any means. The current results demonstrate that if the means itself is primed, it affects choice of means directly, even overriding conflicting habits.

The present findings indicate when and when not to employ subliminal advertising, and therefore may have important practical implications. For example, our results suggest that it would be ineffective for advertisers of a dominant brand to invest in subliminal advertising. On the other hand, based on the earlier findings regarding the importance of goal relevance (Karremans et al., 2006), a very unknown or novel brand does not benefit from subliminal advertising either, as the brand is not yet associated with a goal. Therefore, the range of brands that could successfully benefit from subliminal advertising should lie in the middle of this spectrum, ideally, being strongly associated with a goal, but not a top-of-the-mind brand. As our results further suggest that subliminal advertising can successfully compete with habitual influences, it could be a useful technique especially when a brand is competing with a very dominant brand.

We should acknowledge some limitations of the present research and suggestions for future research. First, although our research demonstrates that subliminal ads can override other influences of behavior, even habits, we acknowledge that we should be cautious in generalizing our findings to real-life settings. Although we have recently demonstrated subliminal brand priming effects with primes embedded in a movie (Verwijmeren et al., unpublished manuscript), further research is needed to assess the extent to which subliminal advertising is feasible in less controlled settings. Second, a related issue, when considering the applicability of subliminal advertising, is its longevity. Although little is known about the duration of

subliminal advertising effects, the literature on trait priming (e.g., Bargh et al., 1988) would suggest that priming effects on brand accessibility might be short-lived.

Third, another interesting issue for future studies is to examine the exact processes of *how* habits moderate subliminal advertising effects on product choice. For example, as briefly noted in the Introduction, priming the brand may raise accessibility for individuals with no habitual preference for the brand, and in turn affect choice. Although accessibility increases may still occur for individuals with a strong habit, chronic accessibility may already be above a threshold such that it does not further affect choice. Thus, although increased accessibility of the brand may occur among both low and high habit people, accessibility may only be associated with choice among individuals low in habit. Future studies could test this by including accessibility measures of the primed brand.

Fourth, our measure of habits relied on single-item scores asking participants' frequency of past choice for both brands. However, we did this because there can be little doubt that asking people how often they perform a specific behavior is the single best measure of the frequency with which they perform this behavior. More problematic is the related question whether frequency of past behavior is the best indicator of habit, given the recent evidence that the stability of the context in which a specific behavior is performed is a second essential determinant of habit formation (e.g., Danner, Aarts, & de Vries, 2008; Ouellet & Wood, 1998; Wood, Tam, & Querrero Witt, 2005). However, since there was no evidence in our pilot studies that people drink Spa Rood in completely different contexts from Lipton Ice, we assumed that frequency of consumption would be the most valid measure of drinking habit.

Notwithstanding these possible limitations, it is important to emphasize that the current research *does* corroborate with recent research (Bermeitinger et al., 2009; Karremans et al., 2006) that, given the right circumstances, subliminal advertising can be effective, a claim that has been disputed for decades (Dijksterhuis et al., 2001; Hawkins, 1970; Pratkanis & Greenwald, 1988).<sup>6</sup> At the same time, our research provides a plausible explanation for why earlier attempts to demonstrate subliminal advertising effects failed, as researchers often used a top-of-the-mind, habitual brand. Based on recent theoretical developments in the subliminal advertising priming literature (Bermeitinger et al., Karremans et al.), the present research has revealed important new insights into the possibilities and limitations of subliminal advertising. Using theoretical knowledge from cognitive and social psychology, it should be possible to predict when subliminal advertisements will, and when they will not be effective, providing a useful foundation for application. In any case, the present research does add further credence to Vicary's original claim that subliminal

advertising might be feasible—although the effect is not as straightforward as he seemed to think.

## References

- Aarts, H., & Dijksterhuis, A. (2000). Habits as knowledge structures: Automaticity in goal-directed behavior. *Journal of Personality and Social Psychology*, 78(1), 53–63.
- Aarts, H., Verplanken, B., & van Knippenberg, A. (1998). Predicting behavior from actions in the past: Repeated decision making or a matter of habit? *Journal of Applied Social Psychology*, 28, 1356–1375.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Bargh, J. A., & Chartrand, T. L. (2000). A practical guide to priming and automaticity research. In H. Reis, & C. Judd (Eds.), *Handbook of research methods in social psychology* (pp. 253–285). New York: Cambridge University Press.
- Bargh, J. A., Lombardi, W. J., & Higgins, E. T. (1988). Automaticity of chronically accessible constructs in person x situation effects on person perception: It's just a matter of time. *Journal of Personality and Social Psychology*, 55(4), 599–605.
- Bentler, P. M., & Speckart, G. (1979). Models of attitude–behavior relations. *Psychological Review*, 86(5), 452–464.
- Bermeitinger, C., Goelz, R., Johr, N., Neumann, M., Ecker, U. K. H., & Doerr, R. (2009). The hidden persuaders break into the tired brain. *Journal of Experimental Social Psychology*, 45(2), 320–326.
- Chartrand, T. L., Huber, J., Shiv, B., & Tanner, R. J. (2008). Nonconscious goals and consumer choice. *Journal of Consumer Research*, 35, 189–201.
- Cooper, J., & Cooper, G. (2002). Subliminal motivation: A story revisited. *Journal of Applied Social Psychology*, 32(11), 2213–2227.
- Custers, R., & Aarts, H. (2010). The unconscious will: How the pursuit of goals operates outside of conscious awareness. *Science*, 329, 47–50.
- Danner, U. N., Aarts, H., & de Vries, N. (2008). Habit vs. intention in the prediction of future behaviour: The role of frequency, context stability and mental accessibility of past behaviour. *British Journal of Social Psychology*, 47, 245–265.
- Dijksterhuis, A., Aarts, H., & Smith, P. K. (2005). The power of subliminal persuasion and other potential applications. In R. R., J. S., & J. A. (Eds.), *The new unconscious* (pp. 77–106). New York: Oxford University press.
- Dijksterhuis, A., Wegner, D. M., Aarts, H. (2001). Unpublished data set. (Referred to in Dijksterhuis, Aarts & Smith, 2005).
- Fennis, B. M., & Stroebe, W. (2010). *The psychology of advertising*. Hove, UK: Psychology Press.
- Ferraro, R., Bettman, J. R., & Chartrand, T. L. (2008). The power of strangers: The effect of incidental consumer brand encounters on brand choice. *Journal of Consumer Research*, 35, 729–741.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fitzsimons, G. M., Chartrand, T. L., & Fitzsimons, G. J. (2008). Automatic effects of brand exposure on motivated behaviour: How Apple makes you “think different”. *Journal of Consumer Research*, 35, 21–35.
- Hawkins, D. (1970). The effects of subliminal stimulation on drive level and brand preference. *Journal of Marketing Research*, 8, 322–326.
- Karremans, J. C., Stroebe, W., & Claus, J. (2006). Beyond Vicary's fantasies: The impact of subliminal priming and brand choice. *Journal of Experimental Social Psychology*, 42, 792–798.
- Landis, D., Triandis, H. C., & Adamopoulos, J. (1978). Habit and behavioral intentions as predictors of social behaviour. *Journal of Social Psychology*, 106, 227–237.
- Moore, T. E. (1988). The case against subliminal manipulation. *Psychology & Marketing*, 5(4), 297–316.
- Ouellet, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124, 54–74.
- Pratkanis, A. R., & Greenwald, A. G. (1988). Recent perspectives on unconscious processing: Still no marketing applications. *Psychology & Marketing*, 5(4), 339–355.

<sup>6</sup> By demonstrating the feasibility of subliminal advertising, our findings and those of Karremans et al. (2006) and Bermeitinger et al. (2009) will reopen the ethical debate whether subliminal advertising should be permitted. Even though our findings suggest several limitations of the effects of subliminal advertising, the fact remains that this technique provides a means of influencing consumers without their being aware of this influence. We would like to point out, however, that advertisers already use a whole arsenal of strategies (e.g., banner ads on internet sites) that influence consumers without their awareness (for a review, see Fennis & Stroebe, 2010).

- Sheeran, P., Aarts, H., Custers, C., Rivas, A., Webb, T. L., & Cooke, R. (2005). The goal-dependent automaticity of drinking habits. *British Journal of Social Psychology, 44*, 47–63.
- Strahan, E. J., Spencer, S. J., & Zanna, M. P. (2002). Subliminal priming and persuasion: Striking while the iron is hot. *Journal of Experimental Social Psychology, 28*, 556–568.
- Trappey, C. (1996). A meta-analysis of consumer choice and subliminal advertising. *Psychology and Marketing, 13*(5), 517–530.
- Triandis, H. C. (1980). Values, attitudes, and interpersonal behaviour. In H. E. Jr., & M. (Eds.), *Nebraska symposium on motivation, Vol. 27*. (pp. 195–259) Lincoln: University of Nebraska Press.
- Veltkamp, M., Aarts, H., & Custers, R. (2007). On the emergence of deprivation-reducing behaviors: Subliminal priming of behaviour representations turns deprivation into motivation. *Journal of Experimental Social Psychology, 44*(3), 866–873.
- Verwijmeren, T., Karremans, J. C., Stroebe, W., & Wigboldus, D. H. J. (unpublished manuscript). Vicary's victory: Brand choice is affected by subliminal ads embedded in a movie.
- Winkielman, P., Berridge, K. C., & Wilbarger, J. L. (2005). Unconscious affective reactions to masked happy versus angry faces influence consumption behavior and judgments of value. *Personality and Social Psychology Bulletin, 31*(1), 121–135.
- Wood, W., & Neal, D. T. (2007). A new look at habits and the habit–goal interface. *Psychological Review, 114*(4), 843–863.
- Wood, W., Tam, L., & Guerrero Witt, M. (2005). Changing circumstance, disrupting habits. *Journal of Personality and Social Psychology, 88*, 918–933.