



## Beyond Vicary's fantasies: The impact of subliminal priming and brand choice <sup>☆</sup>

Johan C. Karremans <sup>a,\*</sup>, Wolfgang Stroebe <sup>b</sup>, Jasper Claus <sup>b</sup>

<sup>a</sup> *Department of Social Psychology, Radboud University Nijmegen, Postbus 9104, 6500 HE Nijmegen, The Netherlands*

<sup>b</sup> *Department of Social and Organizational Psychology, Utrecht University, The Netherlands*

Received 7 November 2005; revised 14 November 2005

Available online 30 January 2006

### Abstract

With his claim to have increased sales of Coca Cola and popcorn in a movie theatre through subliminal messages flashed on the screen, James Vicary raised the possibility of subliminal advertising. Nobody has ever replicated Vicary's findings and his study was a hoax. This article reports two experiments, which assessed whether subliminal priming of a brand name of a drink can affect people's choices for the primed brand, and whether this effect is moderated by individuals' feelings of thirst. Both studies demonstrated that subliminal priming of a brand name of drink (i.e., Lipton Ice) positively affected participants' choice for, and their intention to, drink the primed brand, but only for participants who were thirsty. Theoretical and practical implications of these findings are discussed.

© 2005 Elsevier Inc. All rights reserved.

*Keywords:* Subliminal priming; Advertisement; Goals

### Introduction

Subliminal advertising became notorious in 1957 through the publicity surrounding James Vicary, a private market researcher, who claimed to have substantially increased sales of Coca Cola and popcorn in a movie theatre, by secretly and subliminally flashing the message "Drink Coca Cola" and "Eat popcorn." Nobody has replicated Vicary's findings; his study has never been published and appears to have been a publicity hoax (Pratkanis, 1992). In the present article, we argue that Vicary's fantasies do have some basis of reality. We argue that subliminally priming a brand name for a drink can increase the likelihood that participants will choose that drink, given the opportunity to do so. But importantly, as we will argue and demonstrate, priming of a brand name for a drink will

only affect choice behavior of people who are thirsty (i.e., have a goal to drink) and not of people who are not thirsty.

It is one of the great paradoxes that, even though the idea of being manipulated without one's awareness has been so abhorrent to people that subliminal advertising has been legally banned in Australia, Britain, and the United States, American consumers appear to spend more than \$50 million annually on self-help audiotapes that contain subliminal messages (Pratkanis & Aronson, 2001). The industry flourishes, even though scientific testing of such tapes in areas of self esteem (Greenwald, Spangenberg, Pratkanis, & Eskenazy, 1991), memory improvement (Audley, Mellett, & Williams, 1991; Greenwald et al., 1991), and weight loss (Merikle & Skanes, 1992), failed to find evidence for the effectiveness of these subliminal suggestions (for an overview, see Brannon & Brock, 1994; for an overview of earlier studies that also failed to find evidence for the influence of subliminal messages, see Moore, 1982, 1988).

However, that these subliminal messages were ineffective is hardly surprising. For instance, some of the subliminal messages contained entire sentences (e.g., "I have high

<sup>☆</sup> The present research was partly funded by a research grant (VENI-Grant, No. 451-04-104) from the Dutch Association of Scientific Research (NWO), awarded to the first author.

\* Corresponding author.

E-mail address: [j.karremans@psych.ru.nl](mailto:j.karremans@psych.ru.nl) (J.C. Karremans).

self-worth and high self-esteem”). To be processed, subliminal verbal primes have to consist of one or perhaps two (very short) words and not of whole sentences. Furthermore, priming merely increases the accessibility of the primed (as well as of related) concepts and is therefore unlikely to improve our memory or our self-concept (Greenwald, 1992).

What about brand choices? Unlike self-improvement messages, short brand names can be primed subliminally. So far, however, only a few studies assessed the impact of subliminal priming of a brand name on motivation or brand choice. One of these studies has been conducted by Cooper and Cooper (2002), who subliminally primed participants with pictures of Coca Cola cans and the word “thirsty.” This research revealed that the priming manipulation had a positive effect on self-rated thirst. A study examining a specific effect of subliminally primed drinks, albeit an unsuccessful one, has been conducted by Dijksterhuis, Wegner, and Aarts (reported in Dijksterhuis, Aarts, & Smith, 2005). Participants were either subliminally primed with the word “drink” or with the word “cola” as compared to neutral words. Afterwards, they were offered a drink and given a choice between cola and mineral water. Although respondents in the experimental conditions drank substantially more than those in the control condition, the cola prime did not affect participants’ choice of beverage. An early study by Hawkins (1970) also failed to find an effect of subliminal primes of a brand on participants’ choices (see also Beatty & Hawkins, 1989).

This pattern of findings is rather discouraging. However, we believe that these studies neglected a crucial condition for subliminal priming of a brand of drink to affect choice behavior, namely that the presence of the motivation to drink (i.e., being thirsty) is essential for subliminal priming of a brand of drink to be effective. This proposition is based on recent theorizing and empirical findings by Strahan, Spencer, and Zanna (2002; see also Strahan, Spencer, and Zanna, 2005). They argued that subliminal priming will only affect people’s behavior if the subliminal prime is goal-relevant, and people are motivated to pursue the goal. They demonstrated that people who were thirsty (as compared to people who were not thirsty) were more likely to drink a beverage, and evaluated a thirst-quenching beverage as more positive, after they had been primed with thirst-related cognitions (e.g., thirst, dry). Thus, these findings suggest that subliminal primes will affect a person’s behavior mainly if the prime is relevant to the current goal of the person.

However, these studies have not addressed the crucial issue of whether subliminal exposure to a brand name can positively affect people’s choices for that particular brand. Based on the general reasoning that the primed concept (i.e., a brand of drink) should be consistent with the individuals’ motivation to attain a goal (i.e., quenching one’s thirst) to influence goal-directed actions (i.e., choosing a drink), we expect that priming of a brand of drink will affect choice behavior mainly for people who are thirsty.

For instance, if a person is not thirsty, it is unlikely that subliminal exposure to Lipton Ice will motivate that person to go to a vending machine, and choose a Lipton Ice. In contrast, a thirsty person, who may already have been contemplating getting a drink, should be more likely to choose a (thirst-quenching) beverage that (due to priming) is highly accessible than one that is less accessible (for similar reasoning, see Moskowitz, 2005). This reasoning is also in line with the work by Bargh and colleagues (e.g., Bargh, Chen, & Burrows, 1996), who argue that trait priming can affect behavior, but only when a person is in the right context to which the trait is applicable (Higgins, 1996). For example, a person primed with the concept of rudeness will only behave rudely if he or she has the opportunity to do so, and if the behavior is applicable to the situation (e.g., when the experimenter neglects the participant when she is coming to collect her money; Bargh et al., 1996; Study 1). Likewise, priming a brand of drink will only be effective when applicable to the situation. That is, only a thirsty person who is choosing a drink will be affected by the prime.

In testing the prediction that priming a particular brand of drink will positively influence a thirsty person’s choice for, and intention to, drink that particular brand, we try not only to enhance our understanding of subliminal advertisement, we also want to extend theoretically the findings of Strahan and colleagues in at least one other important way. Their research has shown that priming of the goal (e.g., quenching one’s thirst) seems to amplify one’s actions (e.g., drinking) to accomplish the goal. In the present research, participants are not primed with the specific goal, but rather with a *means* to accomplish the goal. That is, a thirst-quenching brand of drink could be considered as a means by which one could accomplish one’s goal (reduce one’s thirst). People often have multiple means available to reach a particular goal, and we hypothesize that they will be more likely to select the means that is highly accessible at the moment of attempting to attain that goal.

### *The present research*

We report two studies which tested our general hypothesis. In both experiments, thirsty and non-thirsty participants were subliminally exposed to either “Lipton Ice” (a brand of ice tea) or a neutral word, after which choice for, and intention to, drink that brand were measured. We had several theoretical reasons to choose Lipton Ice as a prime. First, that the primed brand is perceived as thirst-quenching seems to be an essential requirement for the success of priming. For example, thirsty individuals, who have been primed subliminally with Coca Cola, are unlikely to want to drink Coke if they think of it as a sweet drink that increases rather than decreases thirst. A second condition would be that participants are not habitual drinkers of the brand to be primed. For example, the ideal Coca Cola customer, who drinks Coke whenever he or she is thirsty, is unlikely to be affected by subliminal exposure to “Coca

Cola”: he or she will always choose a Coca Cola irrespective of being primed with Coca Cola (i.e., a ‘ceiling-effect’).

To avoid these pitfalls, we conducted a pretest to select a brand of drink, which participants would consider thirst-quenching, but which, at the same time, was generally not the habitual choice for our participants. The pretest, in which participants were asked to indicate how often they drank a number of beverages, and to indicate the extent to which they considered each beverage thirst-quenching, revealed that Lipton Ice best met these conditions.

## Study 1

Participants in Study 1 were subliminally primed with Lipton Ice or a control word, after which they chose between Lipton Ice and another beverage (Spa Rood), and indicated their intentions to drink Lipton Ice. Level of thirst was measured with a self-report scale.

### Method

#### Participants and design

Sixty-one students (20 men, 41 women) participated and received 1€. Participants were randomly assigned to one of the two priming conditions (Lipton Ice vs. neutral prime). Thirst was a continuous variable based on participants’ self-rated thirstiness.

#### Procedure

Participants were told that they were going to participate in two unrelated studies to be completed on a computer in individual cubicles. After the experimenter, who was blind to conditions, had lead the participant to the cubicle, the experimenter left and all further instructions for both the allegedly unrelated studies were presented on the computer screen. The first study was a visual detection task, which examined how accurate people are in detecting small deviances. In fact, this task was designed to subliminally prime half of our participants with Lipton Ice, and the other half with a control word, containing the same letters as Lipton Ice (i.e., Npeic Tol). Instructions stated that in this task a string of capital B’s (BBBBBBBBB) would 25 times be briefly presented on the center of the screen. Every now and then, there would appear a small b in a string of capital B’s (e.g., BBBBbBB). After each block of five presentations, the participant was asked to indicate how many of the five presented strings had contained a small b. Allegedly to help participants focus, before a string of B’s would appear, a string of X’s appeared as an orienting cue. In fact, the X’s served to mask the prime. The prime was presented for 23ms, preceded by a string of X’s (XXXXXXXXX) for 500ms, and immediately followed by the same string of X’s for 500ms (for a detailed description of this method, see Bargh & Chartrand, 2000). The string of B’s followed immediately, and was presented for 300ms.

Previous research using similar subliminal priming procedures has demonstrated that participants are unable to

consciously perceive a 23 ms presentation of a word (e.g., Fishbach, Friedman, & Kruglanski, 2003; Shah & Kruglanski, 2002). In fact, these authors found no evidence of participants recognizing any of the primes, even though their presentation lasted twice as long (50 ms). When our participants were debriefed and checked for awareness of the primes, it emerged that all participants in both studies were unaware of primes, and no participant realized the true nature of the studies. However, to be even more confident that the primes were really subliminal, we ran a separate set of 20 participants, who completed the same ‘visual detection task’ (i.e., the task in which participants were primed) as used in Studies 1 and 2. Following recommendations by Bargh and Chartrand (2000), these participants were informed that during this task words were very briefly presented between the masks and their task was to try to guess the word. None of the 20 participants was able to guess the prime, Lipton Ice. Thus, if effects of the Lipton Ice prime occur, they seem to operate outside of participants’ conscious awareness.

In the second part of the study, instructions stated that participants were now going to participate in a study on consumer behavior. Participants were first instructed to indicate which of two brand names they would prefer if they were offered a drink now. They made their choice by pushing the q-key on the keyboard if they preferred the brand name located on the left side of the screen, and by pushing the p-key if they preferred the brand on the right side. Participants chose between Lipton Ice and Spa Rood (a Dutch brand of mineral water). Whether Lipton Ice or Spa Rood appeared on the left side on the screen was counterbalanced (in both Studies 1 and 2 no order-effects were found).

Next, participants’ intentions to drink Lipton Ice were measured with two items (“If you would sit on a terrace now, how likely is it that you would order Lipton Ice” [1 = *not likely at all*, 7 = *very likely*], “I would like to drink Lipton Ice at this moment” [1 = *not at all*, 7 = *very much*]). The scores on these items were averaged to create an index for intention to drink Lipton Ice,  $\alpha = .89$ . Participants also answered the same items with regard to intention to drink Coca Cola,  $\alpha = .93$ , and intention to drink Spa Rood,  $\alpha = .88$ . The order of Lipton Ice, Coca Cola, and Spa Rood intention measures was randomized.

Participants then indicated on two items how thirsty they were at this moment (“How thirsty are you at this moment,” “How much do you feel the need to drink at this moment?”). These items were averaged to create an index for the amount of thirst,  $\alpha = .91$ . We are aware that measuring individual differences in thirst after the dependent variable and after the manipulation has some methodological limits (e.g., thirst may be influenced by the manipulation). However, we chose this procedure for two reasons. First, asking individuals to rate their level of thirst is likely to make thirstiness highly accessible. Thus, it would be unclear whether any interaction with thirst ratings was due to levels of thirstiness or to the fact that thirsty individuals had been made aware of their thirstiness (i.e., goal priming). Second, if participants first had

to complete a measure of thirstiness, and subsequently had to make a choice between two beverages, participants might think that the study was on which beverage would be considered the most thirst-quenching. We wanted to avoid as much as possible that participants would make such deliberative considerations in making their choice.

## Results

### Choice

First, we tested whether subliminal exposure to “Lipton Ice” positively affected participants’ choice for Lipton Ice, and whether this effect would be moderated by degree of thirst. Participants’ choice (1=Lipton Ice, 0=Spa Rood; in this manner, the dependent variable represents the percentage of participants choosing Lipton Ice) was regressed onto priming condition (dummy coded), amount of thirst (standardized score), and their interaction. This analysis revealed only the predicted interaction between priming condition and amount of thirst,  $\beta = -.27$ ,  $t(60) = -2.06$ ,  $p < .05$ . To further examine this interaction, participants’ choice was regressed onto amount of thirst, separately for the priming and control condition. Consistent with our hypothesis, these analyses revealed a significant positive association between amount of thirst and the likelihood to choose Lipton Ice only in the Lipton Ice prime condition,  $\beta = .39$ ,  $t(30) = 2.30$ ,  $p < .05$ , but not the control prime condition,  $\beta(29) = -.12$ ,  $t(29) = -.65$ , *ns*.<sup>1</sup>

### Intention to drink Lipton Ice

To assess whether the same effects occurred for intention to drink Lipton Ice, we regressed participants’ intention to drink Lipton Ice onto priming condition, the amount of thirst, and their interaction. This analysis revealed, albeit marginally, the predicted interaction effect between priming condition and amount of thirst,  $\beta = -.25$ ,  $p = .054$ , (see Fig. 1). Further inspection revealed, as expected, that the association between amount of thirst and intention to drink Lipton Ice was significant in the Lipton prime condition,  $\beta = .40$ ,  $t(30) = 2.37$ ,  $p < .03$ , but not in the control condition,  $\beta = -.05$ ,  $t(29) = -.28$ , *ns*.

### Other effects

We conducted additional analyses to rule out alternative explanations of our findings. First, we assessed whether priming of Lipton Ice affected self-reported thirst. There was no effect of priming condition (Lipton Ice vs. control) on participants’ reported amount of thirst,  $F(1, 60) = .02$ , *ns*. This excludes the possibility that the prime by thirst interaction on choice was due to the Lipton Ice prime increasing participants’ intention to drink Lipton Ice, which in turn could have increased participants’ self-reported amount of thirst.

We further examined whether the effect of our prime on intention to drink Lipton Ice was brand-specific. We therefore

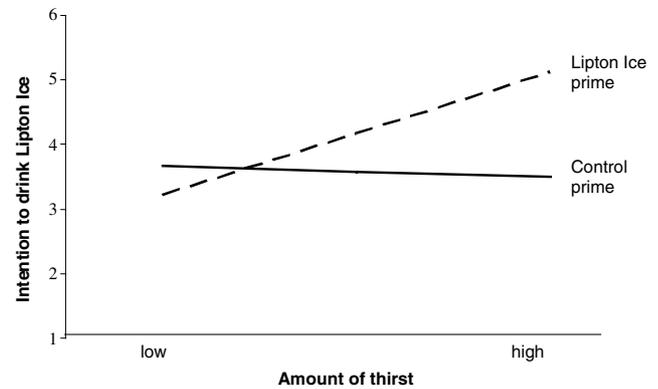


Fig. 1. Intention to drink Lipton Ice as a function of amount of thirst (standardized score), and priming condition, Study 1.

repeated regression analyses that had been conducted on intention to drink Lipton Ice for participants’ intention to drink Coca Cola, and their intention to drink Spa Rood: the Lipton Ice prime had no significant effect on participants’ intention to drink Coca Cola or to drink Spa Rood, and neither was there an interaction effect of priming condition with the amount of thirst on both intention to drink Coca Cola or Spa Rood.

Taken together, the findings of Study 1 are perfectly in line with our predictions: priming participants with a name of a thirst-quenching drink is likely to increase their choice for this drink, and their intention to drink this brand, but only for individuals who are thirsty.

## Study 2

Study 2 was designed to extend and complement the findings of Study 1. First, because Study 1 was the first study that demonstrates the positive influence of subliminal brand primes on people’s choices, we wanted to replicate the findings. Second, and more importantly, in Study 2 we manipulated (and not simply measured) level of thirst of our participants. In this manner, we could exclude the possibility that the positive association between self-reported thirst and likelihood to choose Lipton Ice observed for participants primed with Lipton Ice was not due to a difference in thirst, but to some other difference that may have been correlated with self-reported thirst.

### Method

#### Participants and design

One hundred-and-five students (32 men, 73 women) participated and received 1€ for participation. They were randomly assigned to one of the conditions of the 2 (thirst: thirsty vs. not thirsty)  $\times$  2 (prime: Lipton Ice vs. control) between participants design.

#### Procedure

After participants were seated behind a computer in one of the cubicles, the experimenter asked half of the

<sup>1</sup> Logistic regression analyses revealed the same results.

participants (those in the thirsty-condition) if they were willing to take part in a small pilot study before the actual experiment started. Allegedly, this was a “tongue detection” task (see Aarts, Dijksterhuis, & DeVries, 2001). Participants were given a very salty sweet (a “dropje,” a common sweet in the Netherlands), which on one side had a letter on it. Participants were asked if they could detect, by using their tongue, which letter was on the sweet. They were given 1 min to detect the letter. The assumption of this task is that the salty taste and the post-ingestive effects of the salt would increase feelings of thirst. Hence, this condition is referred to as the thirsty-condition. We adapted this task from previous research by Aarts et al. (2001), who successfully manipulated thirst in this manner. In their study, participants who received this type of salty sweet (i.e., a “dropje”) were more likely to accept an offer to drink a beverage than participants who did not receive such a sweet. Apart from this scientific evidence, it is common knowledge in the Netherlands that a salty “dropje” can make one extremely thirsty. Participants in the control condition (not-thirsty condition) did not participate in the “pilot-study,” and thus received no salty sweet.

Next, participants did the same visual detection task as in Study 1. Again, during this task, half of the participants were subliminally primed with “Lipton Ice,” while the other half of participants were primed with a control non-word (“Npeic Tol”).

After the visual detection task, participants continued with the same consumer task as used in Study 1. Again, participants were asked to choose between Lipton Ice and Spa Rood if they would be offered a drink now. Next, participants’ intention to drink Lipton Ice ( $\alpha = .78$ ), as well as their intention to drink Spa Rood ( $\alpha = .89$ ) and Coca Cola ( $\alpha = .86$ ) were, in randomized order, measured in the same way as in Study 1.

## Results

### Choice

The percentages of thirsty and not thirsty participants, who chose Lipton Ice in the two priming conditions, are depicted in Fig. 2. A 2 (prime: Lipton Ice vs. neutral)  $\times$  2 (thirsty vs. not thirsty) ANOVA with choice (0 = Spa Rood, 1 = Lipton Ice) as dependent variable revealed a main effect

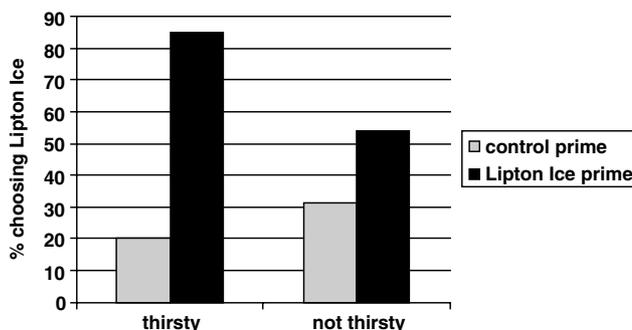


Fig. 2. Percentage of participants choosing Lipton Ice as a function of thirst and prime, Study 2.

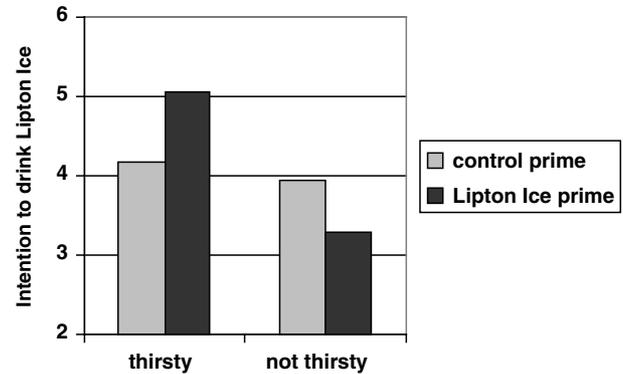


Fig. 3. Intention to drink Lipton Ice as a function of thirst and prime, Study 2.

of priming,  $F(1, 104) = 25.43$ ,  $p < .001$ . Participants in the Lipton Ice prime condition were more likely to choose Lipton Ice (69%) than participants in the control prime condition (25%). However, this main effect was modified by the predicted prime by thirst interaction,  $F(1, 104) = 5.82$ ,  $p < .02$ . As expected, participants in the thirsty-condition were more strongly affected by the Lipton Ice prime than those in the not-thirsty condition. Within the thirsty-condition, participants in the Lipton Ice prime condition were more likely to choose Lipton Ice than participants in the control prime condition (Fig. 2),  $F(1, 104) = 27.10$ ,  $p < .001$ . In the not-thirsty condition, this effect was weaker, and participants in the Lipton Ice prime condition were only marginally more likely to choose Lipton Ice than those in the control prime condition,  $F(1, 104) = 3.44$ ,  $p < .07$ .<sup>2</sup>

### Intention to drink Lipton Ice

The average intentions of thirsty and not-thirsty participants to drink Lipton Ice in the two priming conditions are depicted in Fig. 3. A 2 (prime: Lipton Ice vs. neutral)  $\times$  2 (thirsty vs. not-thirsty) ANOVA with intention to drink Lipton Ice as dependent variables revealed a main effect of thirst condition,  $F(1, 104) = 8.34$ . Participants in the thirsty-condition,  $M = 4.63$ ,  $SD = 1.62$ , reported stronger intentions to drink Lipton Ice than participants in the not-thirsty condition,  $M = 3.64$ ,  $SD = 1.89$ . There was no main effect of prime,  $F(1, 104) = .12$ , *ns*. However, and most importantly, the analysis revealed the predicted interaction effect between priming condition and thirst condition,  $F(1, 104) = 5.05$ ,  $p < .03$ . Further inspection of the interaction revealed that, as expected, thirsty participants tended to have higher intentions to drink Lipton Ice after being primed with Lipton Ice,  $M = 5.06$ ,  $SD = 1.14$ , than after being primed with a control word,  $M = 4.18$ ,  $SD = 1.19$ , although this effect was marginally significant,  $F(1, 104) = 3.17$ ,  $p = .07$ . Participants in the not-thirsty condition were not affected by the Lipton Ice prime,  $F(1, 104) = 1.75$ , *ns*. As in Study 1, no main, or interaction

<sup>2</sup> We also ran a logistic regression analysis, which revealed the same results.

effects, were found for intention to drink Coca Cola or intention to drink Spa Rood.

Thus, overall, the findings of Study 2 replicate the main findings of our first experiment. Although there was a main effect of prime on choice, which we had not found in Study 1, this main effect was modified by the predicted prime by thirst interaction. As in Study 1, participants who had been primed with Lipton Ice were only more likely to choose Lipton Ice when they had been made thirsty. For non-thirsty individuals, the subliminal priming effect was marginal. Essentially the same pattern emerged for intention to drink Lipton Ice.

## General discussion

The present findings demonstrate that subliminal advertising could be feasible—an idea that has been debated for many years, but so far has lacked empirical support. Our studies suggest that exposing individuals subliminally to the brand name of a drink increases the probability that they will choose this drink, provided that they are thirsty. Both studies showed that subliminally exposing our participants to the brand name “Lipton Ice” increased choice for, and intention to, drink Lipton Ice only for thirsty individuals. Subliminal priming had no significant effect for participants who were not thirsty. This consistency is particularly impressive, because it emerged both with self-rated thirstiness as well as when thirst was induced by giving participants salty sweets.

Recall that these effects occurred for a drink that (a) was generally considered to be thirst-quenching (and therefore goal-relevant) in our pretest and that (b) people did not drink habitually. We argued that these are two important additional conditions for subliminal priming to affect choice behavior. However, as an extension of the present research, future research may vary these conditions to test whether these variables are indeed preconditions for subliminal priming effects to occur.<sup>3</sup>

The present findings are in line with social-cognitive literature suggesting that priming is especially likely to affect a person's actions if the prime is relevant or applicable to the person's current motivations (e.g., Higgins, 1996; Strahan, Spencer, & Zanna, 2002). Our studies importantly extend previous research by demonstrating that people with a certain motivation (quenching thirst) are not only influenced by a

specific goal-prime (drink), but also by priming of the *means* (a thirst-quenching beverage) that could be used to reach the goal. Although our research focused on how subliminal primes of a drink affect choices for the primed brand, more generally the findings suggest that a subliminal prime of a specific means to accomplish one's current goal will positively influence a person's actual choice for that particular means.

In the introduction, we reasoned that when people attempt to reach a certain goal, they will be more likely to choose a means that is highly accessible (through priming) than one that is less accessible. It is important to note that besides this accessibility explanation for the priming effects on brand choice, there might be other possible mechanisms responsible for the effect. For example, recent research by Ferguson and Bargh (2004) demonstrated that goal pursuit is associated with automatic positive evaluation of goal-relevant objects (i.e., objects that help to fulfill the goal). Specifically, in one study they demonstrated that thirsty people, compared to people who were not thirsty, automatically (and implicitly) evaluated objects related to thirst-quenching (e.g., water, glass) more positively. Possibly, in the present research, during the subliminal priming phase, thirsty participants may already have started to evaluate Lipton Ice more positively at an implicit level, which in turn may have determined their choice for Lipton Ice. However, such an explanation seems not to be consistent with previous research findings by Nedungadi (1990), suggesting that a (supraliminal) brand prime can increase the probability of retrieval and consideration of the primed brand, without altering the evaluation of the brand. In future research, it is therefore important to examine whether the subliminal primed brand is automatically evaluated more positively (but only if the brand is goal-relevant), or whether the primed brand is more likely to be chosen without any changes in brand evaluation.

Another possible explanation, and in line with the idea that a primed brand may be more positively evaluated when the prime is goal-relevant, is based on theory and research on source amnesia (e.g., Jacoby, Kelley, & Dywan, 1989). Subliminal priming of the brand may have temporarily increased feelings of familiarity regarding the primed brand, and these feelings may be misattributed such that participants might ‘feel’ (perhaps through greater liking of the primed brand) that the primed brand is the ‘right’ choice. As a result, thirsty participants may have been more likely to have chosen the primed brand without further consideration of alternatives. Such misattribution processes are especially likely to occur when the source of the feelings is unknown, as is the case with subliminal priming. In contrast, people may be more likely to discount these feelings when the prime is supraliminal, or when they are told that any feelings may stem from a subliminal priming manipulation (i.e., when the source is known). Future research may examine whether source amnesia, and associated misattribution processes, indeed play a role in the effectiveness of subliminal brand priming.

We believe that the present findings also have important practical implications. Our findings suggest that consumer choices may be influenced by subliminal primes of certain

<sup>3</sup> We did, however, explore whether participants who indicated that they drank Lipton Ice very regularly (i.e., habitually), in comparison to those who indicated that they did not drink Lipton Ice regularly, were differentially influenced by the primes (at the end of both studies, one question was included that measured how often participants drank Lipton Ice). Both in Studies 1 and 2, habitual Lipton Ice drinkers tended to be less influenced by the Lipton Ice prime than non-regular drinkers. However, although potentially interesting, this finding should be interpreted with care for two reasons. First, the three-way interaction (prime  $\times$  thirst  $\times$  frequency of drinking Lipton Ice) only reached significance for choice (not for intentions), and only in Study 1. Second, in line with our pretest, only a relatively small percentage of participants indicated that they drank Lipton Ice very regularly.

means that could help people to fulfill their goals, but only if they already have the goal. Thus, when sitting on a terrace, subliminal flashes of “Lipton Ice” on a television screen next to the terrace may alter one’s choice to order Lipton Ice. Or, in a computer store, subliminal primes of Macintosh may very well increase Macintosh sales. In these examples, people have the goal, respectively, to quench their thirst or to buy a computer. However, when sitting on the sofa at home, in front of the television, the goals of quenching one’s thirst or buying a computer may not be highly salient (or are not present at all), and subliminal primes of a brand of drink or brand of computer are therefore unlikely to influence a person’s behavior.

Despite the consistent pattern of findings of the current studies, we should acknowledge some limitations. For instance, we did not examine how long the effects of subliminal brand priming last. Also, participants could not choose between drinks that were actually offered to them. However, in view of the evidence suggesting that attitudes are related to behavior when highly correspondent measures are being used (e.g., Kraus, 1995), we consider it very likely that participants, who indicated to choose Lipton Ice, would actually do so, if they had been given the opportunity. Furthermore, our manipulation did not only affect choice but also intention to drink Lipton Ice, and intention has consistently been shown to be the best predictor of actual behavior (e.g., Ajzen, 2002).

To conclude, by demonstrating that the subliminal prime should be directly goal-relevant to be effective, we believe the present research has provided important new insights into the world of subliminal advertisement. Although Vicary’s advertising techniques appear to have existed only in Vicary’s fantasies, the present findings suggest that, if certain conditions are taken into account, his fantasies may indeed become reality.

## Acknowledgments

We thank Esther Papies for her helpful comments on a draft of this article. We also thank two anonymous reviewers for helpful suggestions and comments.

## References

- Aarts, H., Dijksterhuis, A., & DeVries, P. (2001). On the psychology of drinking: Being thirsty and perceptually ready. *British Journal of Psychology*, *92*, 631–642.
- Ajzen, I. (2002). Residual effects of past on later behavior: Habituation and reasoned action perspectives. *Personality and Social Psychology Review*, *6*, 107–122.
- Audley, B. C., Mellett, J. L., & Williams, P. M. (1991). *Self-improvement using subliminal audiotapes: Consumer benefit or consumer fraud?* Paper presented at the meeting of the Western Psychological Association, San Francisco, CA.
- Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H. Reis & C. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253–285). New York: Cambridge University Press.
- Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation in action. *Journal of Personality and Social Psychology*, *71*, 23–244.
- Beatty, S. E., & Hawkins, D. (1989). Subliminal stimulation: Some new data and interpretation. *Journal of Advertising*, *18*, 4–8.
- Brannon, L. A., & Brock, T. C. (1994). The subliminal persuasion controversy: Reality, enduring fable, and Polonius’ Weasel. In S. Shavitt & T. C. Brock (Eds.), *Persuasion: Psychological insights and perspectives*. Boston: Allyn and Bacon.
- Cooper, J., & Cooper, G. (2002). Subliminal motivation: A story revisited. *Journal of Applied Social Psychology*, *32*, 2213–2227.
- Dijksterhuis, A., Aarts, H., & Smith, P. K. (2005). The power of the subliminal: Subliminal perception and possible applications. In R. Hassin, J. Uleman, & J. A. Bargh (Eds.), *The new unconsciousness* (pp. 77–106). New York, NY: Oxford University Press.
- Dijksterhuis, A., Wegner, D. M., & Aarts, H. (2001). Unpublished data set.
- Ferguson, M. J., & Bargh, J. A. (2004). Liking is for doing: The effect of goal pursuit on automatic evaluation. *Journal of Personality and Social Psychology*, *87*, 557–572.
- Fishbach, A., Friedman, R. S., & Kruglanski, A. W. (2003). Leading us not onto temptation: Momentary allurements elicit overriding goal activation. *Journal of Personality and Social Psychology*, *84*, 296–309.
- Greenwald, A. G. (1992). New Look 3: Unconscious cognition reclaimed. *American Psychologist*, *47*, 766–779.
- Greenwald, A. G., Spangenberg, E. R., Pratkanis, A. R., & Eskenazy, J. (1991). Double-blind tests of subliminal self-help audiotapes. *Psychological Science*, *2*, 119–122.
- Hawkins, D. (1970). The effects of subliminal stimulation on drive level and brand preference. *Journal of Marketing Research*, *7*, 322–326.
- Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In A. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York: Guilford Press.
- Jacoby, L. L., Kelley, C. M., & Dywan, J. (1989). Memory attributions. In H. L. Roediger & F. I. M. Craik (Eds.), *Varieties of memory and consciousness: Essays in honor of Endel Tulving* (pp. 391–422). Hillsdale, NJ: Erlbaum.
- Kraus, S. J. (1995). Attitudes and the prediction of behavior: A meta-analysis of the empirical literature. *Personality and Social Psychology Bulletin*, *21*, 58–75.
- Merikle, P. M., & Skanes, H. F. (1992). Subliminal self-help audiotapes: Search for placebo effects. *Journal of Applied Psychology*, *77*, 772–776.
- Moore, T. E. (1982). Subliminal advertising: What you see is what you get. *Journal of Marketing*, *46*, 38–47.
- Moore, T. E. (1988). The case against subliminal manipulation. *Psychology & Marketing*, *5*, 297–316.
- Moskowitz, G. B. (2005). *Social cognition: Understanding self and others*. New York: Guilford Press.
- Nedungadi, P. (1990). Recall and consumer consideration sets: Influencing choice without altering brand evaluations. *Journal of Consumer Research*, *17*, 263–276.
- Pratkanis, A. R. (1992). The cargo-cult science of subliminal persuasion. *Skeptical Inquirer*, *16*, 260–272.
- Pratkanis, A. R., & Aronson, E. (2001). *Age of propaganda: The everyday use and abuse of persuasion*. New York: Henry Holt and Company LLC.
- Shah, J. Y., & Kruglanski, A. W. (2002). Priming against your will: How accessible alternatives affect goal pursuit. *Journal of Experimental Social Psychology*, *38*, 368–383.
- 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*, *38*, 556–568.
- Strahan, E. J., Spencer, S. J., & Zanna, M. P. (2005). Subliminal priming and persuasion: How motivation affects the activation of goals and the persuasiveness of messages. In F. R. Kardes, P. M. Herr, & J. Nantel (Eds.), *Applying social cognition to consumer-focused strategy*. Mahwah, NJ: Erlbaum.