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ScienceDirect
Journal of Consumer Psychology 21 (2011) 49 – 56
Journal of CONSUMER PSYCHOLOGY

Motivating consumer behavior by subliminal conditioning in the absence of basic needs: Striking even while the iron is cold

Martijn Veltkamp [a,*], Ruud Custers [b], Henk Aarts [b]

[a] University of Twente, Department of Marketing Communication and Consumer Psychology, PO Box 217, 7500AE Enschede, The Netherlands
[b] Utrecht University, Department of Social Psychology, PO Box 80140, 3508 TC, Utrecht, The Netherlands

Received 30 December 2009; revised 25 August 2010; accepted 21 September 2010
Available online 15 October 2010

Abstract

Previous research suggests that priming of behavioral concepts (e.g., drinking water) motivates consumers outside conscious awareness, but only if primes match a current need (e.g., fluid deprivation). The present article reports two studies testing whether subliminal conditioning (subliminally priming a behavioral concept and linking it to positive affect) can motivate such need-related behaviors even in the absence of deprivation. Both studies showed an interaction effect: Motivation to drink water increased with fluid deprivation, and subliminally conditioning drinking water more positive only motivated drinking in the absence of deprivation. Furthermore, Study 2 suggests that motivation resulting from conditioning is more specific than following deprivation, as only the latter can be reduced by pursuing alternative behaviors (i.e., eating high-liquid foods). Thus, although traditionally the motivation for need-related behaviors is thought to depend on deprivation, this research shows subliminal conditioning can motivate consumers as if they were deprived.

Keywords: Deprivation; Conditioning; Motivation; Subliminal persuasion; Priming

An important question in consumer psychology is to understand how environmental cues such as commercials, role models or slogans can motivate consumers to perform specific behaviors such as buying a particular brand of coke or eating a healthy sandwich. The question of whether such environmental cues can also motivate consumers outside their conscious awareness has interested psychologists to an equal – if not larger – degree. Probably the most famous research example addressing this question is that of James Vicary. He claimed already in the fifties of the last century that priming "drink Coke" and "eat popcorn" on a cinema screen outside visitors' awareness (i.e., subliminally) increased their motivation to buy and consume these products.

Although Vicary's claims were later exposed as a publicity hoax, recent experimental studies have found support for the effect of subliminal priming on consumer behavior. Karremans and colleagues found that subliminally priming people with the brand name of a thirst-quenching beverage increased people's choice for that beverage (Karremans, Stroebe, & Claus, 2006), but only when people were thirsty. Strahan, Spencer, and Zanna (2002) found that subliminally priming people simply with words related to drinking also increased fluid consumption in a taste task, but again only if participants were fluid deprived. Finally, Bermeitinger et al. (2009) showed that presenting people with the brand name of a dextrose pill motivated people's intake of those pills, but only for people who were tired and hence needed an energy boost. These studies suggest that Vicary's ideas were partly right after all. Subliminally priming consumers with behaviors related to eating or drinking *does* influence their consumption, but only if people are already deprived. Priming effects on consumption, then, seem to be dependent on basic needs such as hunger and thirst. Indeed, Strahan et al. (2002) concluded that when it comes to motivating consumption by means of subliminal primes, one needs to strike while the iron is hot.

* Corresponding author. Fax: +31 534894259.
E-mail addresses: m.veltkamp@utwente.nl (M. Veltkamp), r.custers@uu.nl (R. Custers), h.aarts@uu.nl (H. Aarts).

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doi:10.1016/j.jcps.2010.09.011

However, for other types of behavior, deprivation does not seem to be required for priming effects to occur. Priming people with achievement has been found to increase performance and persistence of behavior (Bargh, Gollwitzer, Lee Chai, Barndollar, & Trötschel, 2001), even when primes are presented subliminally (Hart & Albarracin, 2009). In the consumer domain, subliminally priming retail brands associated with a thrift goal (i.e., Wal-Mart) was found to make consumers more motivated to behave in accordance with this goal; they preferred lower-priced products over more prestigious (and expensive) alternatives (Chartrand, Huber, Shiv, & Tanner, 2008). Similarly, Brasel and Gips (2011) showed that a "Red Bull" prime, a brand associated with speed and risk taking, motivated participants to go as fast as possible and take more risks in a racing game. Apparently, behaviors such as achieving or saving money motivate behavior when primed because they are desired in their own right (for an overview, see, e.g., Dijksterhuis, Chartrand, & Aarts, 2007).

Recently, it has been argued that the reason that primed goals affect motivation outside of awareness is that goals are represented in people's minds as desirable and that priming such goals activates a positive affective tag that functions as a reward signal (Custers & Aarts, 2010). As a result, subliminally priming a behavior together with positive affect motivates people to engage in that behavior, effectively creating a behavioral goal by means of subliminal conditioning (Aarts, Custers, & Marien, 2008; Custers & Aarts, 2005). This suggests that creating associations between behavior and positive affect through conditioning may actually motivate consumption of articles that are usually motivated by deprivation (e.g., drinks or food), even in the absence of actual deprivation, and outside conscious awareness. In the present paper, we test this intriguing hypothesis. That is, we investigate the effect of subliminal conditioning on consumption and investigate how these effects may differ from those of deprivation.

Differences and similarities between motivation resulting from deprivation and subliminal conditioning

It is widely known that motivation to obtain resources crucial for survival (e.g., fluid, food, or social contact) fluctuates with deprivation. While motivation is high when people are deprived, it is eliminated when resources are replenished (McDougall, 1908; Murray, 1938; see also Pittman & Zeigler, 2007). This mechanism is to a large extent the result of learning. It is assumed that very early in childhood, people learn that performing a specific behavior (e.g., drinking) is rewarding given that there is a state of deprivation (incentive theory, e.g., Berridge, 2007; Toates, 1986; Veltkamp, Aarts, & Custers, 2009), but not when such deprivation is absent. This does not mean that determining whether performing this behavior is rewarding requires much elaboration. Seibt, Häfner, and Deutsch (2007), for instance, demonstrated that the automatic affective reactions to food become more positive with people's level of deprivation. Hence, the reward value of objects or actions that can lift the state of deprivation (e.g., eating bread, drinking coke) becomes more positive with deprivation and returns to zero after resources are replenished and the deprivation is lifted. The reward value of actions that are crucial for the well-being of an individual is therefore shaped by deprivation through a learned relation between deprivation and reward value. Hence, motivation for behaviors that lift a state of deprivation increase or diminish with the level of deprivation. Not surprisingly then, this is exactly what is found in studies where behaviors and products that are related to deprivation are subliminally primed (Bermeitinger et al., 2009; Karremans et al., 2006; Strahan et al., 2002; Veltkamp, Aarts, & Custers, 2008a).

Such fluctuations in motivation depending on deprivation are not expected, though, when motivation results from subliminal conditioning. According to the literature on evaluative conditioning (for an overview, see De Houwer, Thomas, & Baeyens, 2001), merely pairing a to be conditioned stimulus (CS) with positive or negative stimuli (US) causes changes in the valence of the CS. This can also motivate behavior. For example, subliminally co-activating an originally neutral behavior like doing puzzles with positively valenced words has been shown to increase the motivation for that specific behavior outside awareness: Participants were found to be more eager to actually perform puzzles (Custers & Aarts, 2005) and to obtain puzzles (Veltkamp, Aarts, & Custers, 2008b). These changes in the valence of the CS are relatively stable over time. For instance, this type of conditioning has been found to be highly resistant to extinction, in that presenting the CS without the US after conditioning does not eliminate the conditioning effects (De Houwer et al., 2001). Hence, it is expected that the motivating effects of subliminal conditioning on behavior (Custers & Aarts, 2005; Aarts et al., 2008) would be insensitive to changes in deprivation, and create a long-lasting link between deprivation-related behaviors (e.g., drinking) and positive affect. Thus, consumers should be motivated to perform such behaviors following subliminal conditioning even in the absence of deprivation. This idea was tested in Study 1.

If subliminal conditioning is able to motivate behavior when deprivation is low, an important question becomes what happens if deprivation is high during conditioning. Would subliminal conditioning be redundant for people who are deprived? A possible answer to this question can be found when one considers the hierarchical structures in which behavior is organized. Previous research suggests that many behaviors are part of goal structures (Aarts & Dijksterhuis, 2000; Kruglanski et al., 2002), where multiple lower-order goals are related to attaining one higher-order goal. According to this view, reducing deprivation (e.g., thirst) could be seen as a higher-order goal that can in theory be attained by various means (e.g., drinking a beverage, eating cucumber). However, creating an association between drinking and positive affect would result in a lower-order goal that could only be fulfilled by means of drinking. Such a motivation, then, would be very specific and pertain directly to the behavior and not to a higher-order goal.

Taken together, the hierarchy structure of goals perspective suggests that subliminal conditioning is effective for high deprived individuals as well, because it creates motivation on a more specific behavioral level. These effects should become apparent if people are allowed to attain the higher-order goal (i.e., reducing deprivation) without performing the focal behavior

(e.g., quenching thirst by means of eating rather than drinking). This should not have an effect on the motivation to attain the focal behavior following subliminal conditioning but *should* diminish motivation for that behavior without such a conditioning procedure. This idea will be tested in Study 2.

The present research

In the present paper, we report two studies that aimed to examine the combined effects of deprivation and conditioning for the behavior of drinking water. Drinking water was selected as it is an effective way to reduce fluid deprivation and fluid is clearly an essential resource of which people should not become too deprived. However, apart from being motivated by deprivation, people can, in principle, also be motivated to drink water because it is rewarding in itself. Furthermore, we chose a relatively neutrally tasting product (water) of which it could be expected that attaching it to positive affect would enhance its positivity rather than a specific soda or brand which may already be positive for participants to begin with (cf. Gibson, 2008).

Study 1 tested whether co-activating the subliminally primed behavior representation of drinking with neutral affect would result in drinking motivation depending on fluid deprivation, but would be high irrespective of deprivation if the representation was conditioned to positive affect. Study 2 focused on the behavioral specificity of participants´ motivation, by testing for high fluid-deprived individuals whether replenishing fluid deprivation by means of eating cucumber would diminish drinking motivation if 'drinking' was co-activated with neutral affect, but would not affect drinking motivation if 'drinking' was conditioned to positive affect.

Study 1

This study tested the idea that whereas the motivation to drink following subliminal priming should normally depend on the deprivation of fluids, conditioning the mental representation of drinking to positive affect can motivate drinking behavior in the absence of actual deprivation. Deprivation was manipulated by asking participants to eat crackers in an alleged consumer product task. In actuality, consuming crackers was expected to exacerbate participants' need for fluid (cf. Strahan et al., 2002) and thus was part of the deprivation manipulation. Next, half of the participants were allowed to drink water (hence, the low deprivation condition). Participants then engaged in a conditioning task where drinking water was subliminally primed and paired with neutral or positive affect. Importantly, the accessibility of the drinking representation thus was equal for all participants. Finally, to assess changes in behavior, we unobtrusively measured water consumption as part of a product-comparison task. In line with earlier work (e.g., Strahan et al., 2002; Veltkamp et al., 2008a), it was expected that water intake would increase with fluid deprivation. Importantly, however, positively conditioning "drinking" would enhance water intake when fluid deprivation is relatively low.

Method

Participants and design

Sixty-five undergraduates participated in the experiment in exchange for a small fee. This study used a 2 (deprivation: low vs. high) × 2 (conditioning: neutral vs. positive) between-participant design.

Procedure

To conceal the real purpose of the study, the study was announced as an experiment on perception and consumer product judgment. The experiment was run in a room containing three tables separated by large screens. Thus, in each part of the experimental session participants could see only their own table.

Deprivation manipulation

Participants started with an alleged product-comparison task where they had to eat two different crackers and filled out a short questionnaire to rate different aspects of the crackers (e.g., shape). Next, participants in the low deprivation condition were provided with an empty glass and a jug filled with water, allowing them to take water before proceeding to the next part of the experiment. In the high deprivation condition, participants were not provided with the drinking gear, and hence did not quench their thirst.

Pilot work

Prior to the experiment, we conducted a pilot test to assess the effects of our treatment on self-reported thirst. Thirty-one undergraduates (drawn from a different student population) were assigned randomly to either the low or high deprivation condition. After a 10-minute filler task, they indicated on a 10-point scale (ranging from 1, not at all, to 10, very much) how thirsty they felt at that moment. An ANOVA revealed a significant effect of the deprivation manipulation on ratings of thirst, $F(1,30)=24.04$, $p<.001$, $\eta^2=.45$. The reported level of thirst was significantly higher in the high deprivation ($M=6.50$, $SD=.43$) than in the low deprivation ($M=3.65$, $SD=.39$) condition. Thus, the crackers without water consumption treatment (high fluid deprivation) increased rated thirst over 10 minutes post-ingestion.

Conditioning manipulation

Next, participants were seated behind a computer and learned that they would do a "dot-detection task" where all kinds of words would be presented on the screen, sometimes followed by dots presented briefly above or below these words. Their task was to indicate whether they had seen a dot or not. In actuality, in this task drinking words were subliminally primed and paired with either positive or neutral affective words (for a similar procedure, see e.g., Aarts, Custers, & Holland, 2007; Custers & Aarts, 2005). Because the focal behavior was drinking a glass of water, we used the following three drinking words: drinking, glass, and water. These words were each paired with either nine positive words (good, nice, fun, love, great, smile, friend, pleasant, peace) or nine neutral words (thus, furthermore, when, although, therefore, however, such, also, because; taken from Custers & Aarts, 2005).

The task consisted of 54 pairing trials (randomized presentation). In the *positive conditioning* condition, each drinking word was paired with 9 positive words (27 pairings) while nonwords were paired to 9 neutral words (27 pairings). In the *neutral conditioning* condition, drinking words were paired with the neutral words (27 pairings) and nonwords with the positive words (27 pairings). Thus, the number of drinking words and positive words was identical in both conditions, but the crucial difference was that with positive conditioning the drinking words were directly linked to the positive words.

A pairing trial consisted of the following events: a cross was presented on the screen for 500 ms, signaling the beginning of the trial. Next, a random letter string (e.g., HBSNPXR) appeared on the screen (premask, 500 ms), immediately followed by either a subliminally presented drinking word or random letter string (30 ms). Then, a random letter string appeared again (postmask, 100 ms), followed by a positive or neutral word (150 ms). Occasionally, a dot was presented for 30 ms (not post-masked, hence consciously visible) above or beneath the neutral or positive word. Participants indicated whether they had seen a dot, and 2500 ms later a new trial started.

Water consumption

At the last table, there were three glasses that differed in shape. Each glass was filled with 100-g water (thus, participants could maximally consume 300 g of water). Participants learned they would perform another product-comparison task, where they had to compare three glasses on different dimensions (e.g., shape, ease of use). Accordingly, participants had to drink from all three glasses to form an impression of the different dimensions but remained ignorant on the real purpose of this test, that is, to measure the amount of consumed water.

Finally, participants were debriefed. Participants were unaware of the hypotheses under investigation. In line with our previous subliminality check of this procedure (Aarts et al., 2008), participants had not seen the drinking words in the dot-detection task. Furthermore, none of them felt that the dot-detection task had influenced their water intake in the product-comparison task.

Results and discussion

To test whether the deprivation and conditioning manipulations affected water intake, the quantity measure was subjected to a 2 (conditioning: neutral or positive) × 2 (deprivation: low or high) between-participant ANOVA. The results showed a main effect of deprivation, $F(1,64)=5.18$, $p=.03$, $\eta^2=.08$. Participants consumed more water in the high deprivation condition compared to the low deprivation condition. The main effect of conditioning was not significant, $F(1,64)=1.41$, $p=.24$, $\eta^2=.02$. Most importantly however, the two-way interaction showed the expected interaction of conditioning and deprivation: $F(1,64)=4.50$, $p=.04$, $\eta^2=.07$ (see also Fig. 1). Closer inspection of this interaction effect showed, in line with our hypothesis, that water consumption increased as a function of conditioning in the low deprivation condition, $F(1,64)=5.43$, $p=.02$, $\eta^2=.08$. In the high deprivation condition, conditioning had no additional effect on water intake, $F<1$.

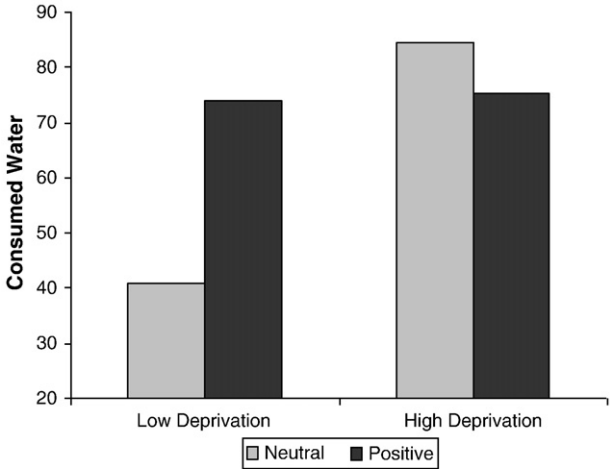

Fig. 1. Quantity of drinking (in grams) as a function of deprivation and conditioning (Study 1).

These results provide support for the hypothesis that a current state of deprivation motivates behavior after subliminal priming (cf. Strahan et al., 2002; Veltkamp et al., 2008a), but that linking the subliminally primed behavior to positive affect motivates behavior in the absence of deprivation.

Study 2

Study 1 showed that attaching positive affect to the behavior representation of drinking water can motivate that behavior as if participants were deprived, thus suggesting positive affect and deprivation have similar effects on motivation. However, because a conditioning procedure renders a behavior itself more desirable to pursue, whereas the desirability to perform that behavior would otherwise depend on an overarching desire to reduce deprivation (cf. Kruglanski et al., 2002), the effects of conditioning and deprivation may differ in their behavioral specificity. That is, replenishing deprivation (e.g., of fluids) without performing the previously primed behavior (drinking) should normally reduce the motivation to perform that behavior as the state of deprivation is elevated (Milgram, 1979; Rolls et al., 1980). However, because conditioning a behavior to positive affect renders that behavior itself more desirable, motivation should not be reduced until that exact behavior was performed. Study 2 tested this idea.

Specifically, all participants were instructed to abstain from drinking for at least two hours, thereby creating a relatively high level of fluid deprivation. Next, "drinking" was subliminally primed and linked to positive or neutral affect. By presenting the conditioning task to participants who were all relatively high deprived, we were able to eliminate a possible alternative interpretation for the findings in Study 1. That is, although there is no *a priori* reason to assume so, the conditioning manipulation may have been ineffective for highly deprived participants (e.g., they may have been more fatigued or less concentrated), and thus the effects of positive conditioning only showed up for low

deprived participants. If so, there should be no effects of positive conditioning in the present study, as all participants were relatively high deprived before engaging in the conditioning task.

According to the present reasoning, after the conditioning task participants should be motivated to drink either because of fluid deprivation or of the nonconscious association with positive affect. Next, half of the participants were allowed to eat a high fluid-content food (i.e., cucumber, containing 96% of water; Davidson, 1999). In this eating condition, then, participants reduced fluid deprivation without reference being made to the focal behavior of drinking. Finally, participants were allowed to drink water. It was expected that eating cucumber would attenuate the motivation to drink in the neutral conditioning condition, but would not affect motivation when drinking water was co-activated with positive affect.

Methods

Participants and design

Eighty-two undergraduates participated in the experiment in exchange for a small payment. They were randomly assigned to one of the conditions of the 2 (deprivation reduction: no vs. yes) × 2 (conditioning: neutral vs. positive) between-participant design.

Procedure

Participants were recruited by means of a sign-up procedure. To conceal the real purpose of the study, the study was announced as an experiment on the relation between drinking and eating and performance on a concentration test. Participants were instructed to refrain from drinking and eating for at least two hours before arriving at the laboratory (see Strahan et al., 2002). To check whether participants had adhered to the abstinence regime, a bogus pipeline technique was used (Jones & Sigall, 1971). Specifically, participants were asked to hold a cotton bud against the inside of their cheek and put it in a plastic bag that was sealed afterwards, which allegedly allowed us to analyze the objective deprivation level later on. Importantly, participants then reported how many minutes ago they had last drunk and eaten. These reports showed that all participants had adhered to the instructions (M_{drunk} = 3.6 hour). Participants were then seated behind a computer.

Conditioning manipulation

Participants were told that the experiment consisted of two perceptual tasks to test concentration abilities, with a break in-between. They then proceeded with the first concentration task, which was actually the conditioning task (identical to Study 1).

Deprivation-reduction manipulation

In the deprivation-reduction condition, participants then received cucumber slices (200 g) and were asked to eat the cucumber before continuing with the second concentration task. Cucumber was selected because it contains 96% water, which means that by consuming the cucumber (containing 192 g of water), participants reduced their fluid deprivation. Participants were given four minutes to eat the cucumber. Pilot tests showed that participants did not mind eating cucumber or considered it a way to reduce fluid deprivation and are able to eat 200 g within four minutes. In the no deprivation-reduction condition, participants were told that there would be a four-minute break before starting with the second concentration task.

Water consumption

Next, all participants received an empty glass and a jug filled with approximately 700 g of water. Participants were allowed to consume the water at their pleasure before the second concentration task would start.

After participants completed the second concentration task they were debriefed, paid, and dismissed. The debriefing showed that participants did not realize the true nature of the study. Furthermore, like in the first experiment none of them indicated that they had seen drinking words in the conditioning task or that this task influenced their water intake.

Results and discussion

A 2 (conditioning: neutral vs. positive) × 2 (deprivation reduction: no vs. yes) between-participant ANOVA with grams of consumed water as dependent variable revealed a main effect of deprivation reduction, $F(1,81) = 12.85$, $p < .01$, $\eta^2 = .14$, as well as of conditioning, $F(1,81) = 3.98$, $p = .05$, $\eta^2 = .05$. That is, while eating cucumber decreased water consumption, positive conditioning increased it (see Fig. 2). However, in line with the predictions, these main effects were qualified by a two-way interaction of conditioning and deprivation: $F(1,81) = 4.04$, $p = .05$, $\eta^2 = .05$.

Further analysis of this interaction effect showed that water consumption remained fairly constant at a high level in the positive conditioning condition, $F(1,81) = 1.05$, $p = .31$, $\eta^2 = .01$, while it decreased sharply after deprivation reduction for participants in the neutral conditioning condition, $F(1,81) = 14.68$, $p < .01$, $\eta^2 = .16$. In addition, positive conditioning had no reliable effect within the no deprivation-reduction condition, $F(1,81) = 0.01$, $p = .96$, $\eta^2 = .00$,

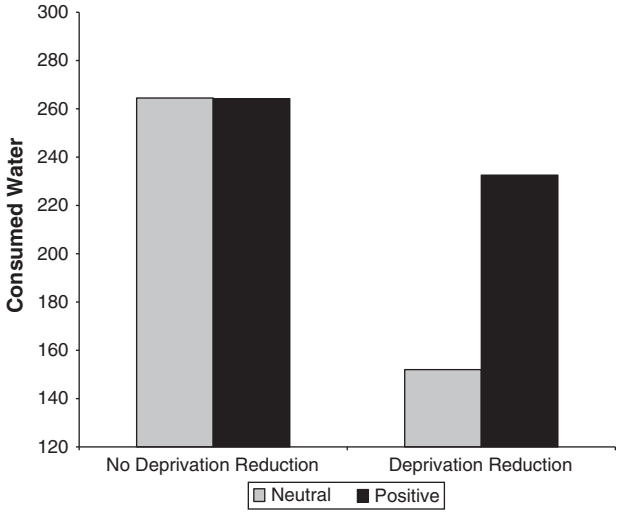

Fig. 2. Quantity of drinking (in grams) as a function of deprivation reduction and conditioning (Study 2).

while positive conditioning significantly increased water intake in the deprivation-reduction condition, $F(1,81)=6.76$, $p=.01$, $\eta^2=.08$.

These findings show that the motivation to drink water as a result of deprivation after subliminal priming ceases to exist without actually drinking if deprivation has been reduced by eating a high fluid-content food item. The motivation for that behavior remains intact though, after the behavior has been subliminally conditioned to positive affect, indicating that people became motivated to perform that specific action. Thus, following subliminal conditioning motivation is not susceptible to variations in deprivation anymore and cannot be reduced by performing alternative deprivation-reducing behaviors.

General discussion

Previous research suggested that subliminally priming behavioral concepts related to eating and drinking can induce motivation to perform those behaviors outside awareness, as long as consumers are already deprived. The present experiments moved one step further and tested whether subliminally conditioning such need-related behaviors to positive affect can increase motivation in the absence of deprivation. Supporting this idea, it was shown that the motivation to drink a glass of water following priming increased with fluid deprivation (thus replicating earlier findings), but that subliminally conditioning drinking more positive motivated drinking in the absence of deprivation. Furthermore, it was found that reducing fluid deprivation by means of an atypical thirst-quenching action (eating cucumber) reduced participants' subsequent water consumption after subliminally priming the drinking behavior, whereas participants for whom the subliminal primes were positively conditioned remained highly motivated. These findings extend previous work and suggest that the effects of deprivation and conditioning differ in their specificity: Motivation for need-related behaviors is normally related to the overarching goal of reducing deprivation, whereas pairing a behavior to positive affect creates motivation to perform that exact behavior. Together, these findings offer several contributions to the existing literature.

Contributions to the understanding of nonconsciously motivated consumer behavior

First, the present findings may further our understanding regarding the question when environmental cues can motivate consumer behavior outside conscious awareness. Recent literature testing the effects of subliminal priming on consumption behaviors suggested that priming only works if primed behaviors match biological or psychological need states (e.g., Bermeitinger et al., 2009; Strahan et al., 2002). However, other behaviors seem to result in motivation upon priming because they are desired in their own right (e.g., Bargh et al., 2001; Chartrand et al., 2008). In the present research, we based our ideas on the notion that in all these studies, priming resulted in motivation because the primed behaviors are associated with a reward signal, and that conditioning behavior representations to positive affect creates such a reward signal (Custers & Aarts, 2010; Aarts et al., 2008). Hence, it was expected that subliminally conditioning need-related behaviors (i.e., drinking) to positive affect would motivate those behaviors even in the absence of needs, thus extending insights from previous research. This is exactly what we found, which suggests that environmental cues can motivate consumer behavior if the cue activates a desired behavior, either because the behavior replenishes deprivation or because it is positive in its' own right.

The present findings do not only show that subliminal conditioning can motivate need-related behaviors as if people were deprived, but also show that a conditioning procedure creates motivation on a more specific behavioral level. That is, it has been argued that goals are structured (Aarts & Dijksterhuis, 2000; Kruglanski et al., 2002), such that several subgoals are linked to the same super-ordinate (more abstract) goal. In the present research, both drinking water (the primed and conditioned behavior) and eating cucumber serve the overarching goal of reducing fluid deprivation. The findings of Study 2 suggest that priming a need-related behavior creates a higher-level motivation to reduce deprivation; thus including – but not exclusively – for the primed behavior. Hence, once the overarching goal is reached, motivation for the lower-order goals (i.e., drinking) diminishes. We were able to show however, that pairing a behavior representation with positive affect creates motivation for that behavior on that specific level; alternative behaviors related to the overriding goal do not reduce motivation any longer. Thus, although previous research shows that the motivation for need-related behaviors, either on a higher level (e.g., drinking, Veltkamp et al., 2008a) or a lower level (e.g., obtaining a specific beverage, Strahan et al., 2002; or a specific brand, Bermeitinger et al., 2009) depends on deprivation, subliminally linking these behaviors to positive affect should result in motivation to perform the behavior at that very specific level (i.e., obtain that specific beverage or brand).

The finding that subliminal conditioning results in motivation even in absence of deprivation and on a very specific level, not reducible by other means, suggests it may be effective in marketing practice as well. Take for example a soft drink manufacturer that wishes to increase consumers' frequency of buying their specific soda. The present findings suggest that rendering the behavior of drinking that soda accessible by priming may only increase behavior if people are deprived of fluid. However, if drinking the soda is conditioned to positive affect (e.g., linking the act of consuming the beverage to positive experiences), consumers should *remain* motivated to drink the soda after fluid needs are met. Consequently, they are expected to buy the beverage more often. This should at least be true under circumstances similar to that in the present research, where people were not consciously aware that a behavior was linked to positive affect. It may be interesting to see whether product placement, where a product or brand can be unobtrusively inserted into a movie or tv show (see Hang & Auty, 2011), provides an effective context to create such a link in practice.

Also, the present finding that subliminally conditioning is effective at all may be newsworthy in itself, given the ongoing debate on the necessity of contingency awareness in evaluative conditioning (EC). That is, recent studies suggest that EC

effects depend on awareness of the CS–US relation, and that most studies showing subliminal EC effects could also be explained by differences in mood or primed information (e.g., Pleyers, Corneille, Luminet, & Yzerbyt, 2007; Stahl, Unkelbach, & Corneille, 2009). For example, in several studies US valence was manipulated between participants, such that participants saw either positive or neutral/negative information (e.g., Krosnick, Jussim, & Lynn, 1992), which may have induced positive or neutral/negative moods. The present studies render such alternative explanations highly unlikely however. All participants received identical information (behavior/nonword primes) and valenced words (positive/neutral). The only aspect that varied was whether the behavior prime was directly paired to the positive or the neutral information.

What, then, could explain the subliminal conditioning effect in the present research? Stahl et al. (2009) argue that contingency awareness may not be required to find effects of conditioning on motivation – such as in the present studies – as motivational states may be conditioned through more basic and nonconscious processes than for example evaluations. Although this suggestion may explain why we obtained subliminal conditioning effects without contingency awareness, it also raises a new question. Namely, it implies that the necessity of contingency awareness in a subliminal conditioning task depends on the dependent variable of interest (i.e., motivation) and not on the conditioning method itself. Recently, Dijksterhuis and Aarts (2010) argued that attention rather than contingency awareness may be the factor being crucial to obtain EC effects. Indeed, findings on the role of distraction during conditioning indicate that attention, but not contingency awareness, affects EC effectiveness (Field & Moore, 2005). Contingency awareness effects, then, may merely be obtained as it usually highly correlates with attention (see Custers & Aarts, in press). Further research is required to explore this interesting line of thought, especially to understand how nonconscious motivation may result from positive conditioning in the context of advertising and consumer behavior.

Directions for future research

The present research tested how subliminal conditioning can motivate consumer behavior in the absence of deprivation for a very basic physiological need, namely, the need for fluid. Consumption behaviors related to such basic physiogical needs (i.e., fluid and food) are of course only a limited (although important) part of all consumer behaviors, and one may therefore wonder whether the current findings can be generalized to other, more social needs, such as a need to belong. Because the effects of the present studies are based on general learning principles, we expect that similar results should be obtained for other needs as well. That is, we assume that most behaviors can be seen as being part of hierarchical goal structures, and reducing deprivation (whether it is fluid or social contact) will be represented at a high level in that structure (Kruglanski et al., 2002). Priming a social need-related behavior, then, is expected to also be desirable as long the overriding goal (reducing deprivation) is desirable, unless the primed behavior itself is attached to positive affect. For example, Aarts, Gollwitzer and Hassin (2004) showed that priming the goal of making money motivated participants to pursue that goal, conditional on participants' need for money. If the representation of making money would have been paired to positive affect, then participants may have been motivated to make money notwithstanding their needs.

Finally, it should be noted that affective valence may serve different functions in affecting consumer behavior. That is, in the present research it was shown that pairing positive affect to a specific behavior representation increases consumers motivation to perform that behavior when deprivation is low. However, recent research of Winkielman, Berridge and Wilbarger (2005) suggests affective valence can also influence people in another way. They showed that subliminally presenting participants with positive or negative information (i.e., faces) *without* pairing it to a specific behavior subsequently influenced the intake of an unfamiliar beverage (increased intake following positive, decreased intake following negative affect), but only for fluid-deprived participants.

An explanation for these findings may be that participants who were motivated to drink (as they were deprived) used the subliminally presented faces as a source of information concerning the beverage (cf., Clore, Gasper, & Garvin, 2001), as there was no other clear information concerning the desirability of the beverage. If subliminally presented affective information indeed acts as a source of information, then its effects are expected to be more general than that of a conditioning procedure. Thus, if marketers would like to increase consumers' motivation to – for example – obtain a product from a specific brand, it is crucial to make sure the affective information is directly paired to the product of that brand. Otherwise, the presence of affective information may alter the expected desirability of obtaining products for any brand. Because of the different implications, future research could shed more light on this proposed differential role of affect in the nonconscious motivation of behavior.

Conclusion

The topic of the present research, namely, how subliminally presented information can motivate consumers to show certain behaviors or buy specific products, has received a lot of attention in (consumer) psychology lately. It is important to note that although studies in this area (including the present one) are often conceived of as specifically testing the effectiveness of certain influences techniques, the implications are more far-reaching. That is, in daily life consumers process the majority of incoming information outside conscious awareness (Norretranders, 1998; see also Custers & Aarts, 2010); thus, information does not have to be presented subliminally in order to have nonconscious effects (as an illustration, see e.g., Bos, Dijksterhuis, & van Baaren, 2011). For example, a colleague passing by with a candy bar in the corner of your eye, or a "Coca-Cola" sign outside a bar in a crowded street are expected to influence consumer behavior similarly as the

experimental techniques discussed here. In short, previous research would say that consumers will only be influenced by such environmental cues if they activate behaviors that resolve an existing need state; you can only strike while the iron is hot (Strahan et al., 2002). The current findings show, however, that when environmental behavioral cues are co-activated with positive information, one may even strike while the iron is cold.

Acknowledgments

The research reported in this paper was conducted at Utrecht University and supported by the VENI-VIDI-VICI scheme from the Netherlands Organization for Scientific Research (grant nos. 451-06-014, 452-02-047, and 453-06-002).

References

Aarts, H., Custers, R., & Holland, R. W. (2007). The nonconscious cessation of goal pursuit: When goals and negative affect are coactivated. *Journal of Personality and Social Psychology*, *92*, 165−178.

Aarts, H., Custers, R., & Marien, H. (2008). Preparing and motivating behavior outside of awareness. *Science*, *319*, 1639.

Aarts, H., & Dijksterhuis, A. (2000). Habits as knowledge structures: Automaticity in goal-directed behavior. *Journal of Personality and Social Psychology*, *78*, 53−63.

Aarts, H., Gollwitzer, P. M., & Hassin, R. R. (2004). Goal contagion: Perceiving is for pursuing. *Journal of Personality and Social Psychology*, *87*, 23−37.

Bargh, J. A., Gollwitzer, P. M., Lee Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology*, *81*, 1014−1027.

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*, 320−326.

Berridge, K. C. (2007). The debate over dopamine's role in reward: The case for incentive salience. *Psychopharmacology*, *191*, 391−431.

Bos, M. W., Dijksterhuis, A., & van Baaren, R. B. (2011). The benefits of "sleeping on things": Unconscious thought leads to automatic weighting. *Journal of Consumer Psychology*, *21*(1), 4−8.

Brasel, S. A., & Gips, J. (2011). Red Bull "gives you wings" for better or worse: A double-edged impact of brand exposure on consumer performance. *Journal of Consumer Psychology*, *21*(1), 57−64.

Chartrand, T. L., Huber, J., Shiv, B., & Tanner, R. J. (2008). Nonconscious goals and consumer choice. *Journal of Consumer Research*, *35*, 189−201.

Clore, G. L., Gasper, K., & Garvin, E. (2001). Affect as information. In J. P. Forgas (Ed.), *Handbook of affect and social cognition* (pp. 121−144). Mahwah, NJ: Lawrence Erlbaum Associates.

Custers, R., & Aarts, H. (2005). Positive affect as implicit motivator: On the nonconscious operation of behavioral goals. *Journal of Personality and Social Psychology*, *89*, 129−142.

Custers, R., & Aarts, H. (2010). The unconscious will: How the pursuit of goals operates outside of conscious awareness. *Science*, *329*, 47−50.

Custers, R., & Aarts, H. (in press). Learning of predictive relations between events depends on cognitive procedures, not on awareness. *Consciousness and Cognition.*

Davidson, A. (1999). *The oxford companion to food.* Oxford: Oxford University Press.

De Houwer, J., Thomas, S., & Baeyens, F. (2001). Association learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin*, *127*, 853−869.

Dijksterhuis, A., & Aarts, H. (2010). Goals, attention, and (un)consciousness. *Annual Review of Psychology*, *61*, 1−24.

Dijksterhuis, A., Chartrand, T. L., & Aarts, H. (2007). Effects of priming and perception on social behavior and goal pursuit. In J. A. Bargh (Ed.), *Social psychology and the unconscious: The automaticity of higher mental processes* (pp. 51−132). Philadelphia: Psychology Press.

Field, A. P., & Moore, A. C. (2005). Dissociating the effects of attention and contingency awareness on evaluative conditioning effects in the visual paradigm. *Cognition & Emotion*, *19*, 217−243.

Gibson, B. (2008). Can evaluative conditioning change attitudes toward mature brands? New evidence from the Implicit Association Test. *Journal of Consumer Research*, *35*, 178−188.

Hang, H., & Auty, S. (2011). Children playing branded video games: The impact of interactivity on product placement effectiveness. *Journal of Consumer Psychology*, *21*(1), 65−72.

Hart, W., & Albarracin, D. (2009). The effects of chronic achievement motivation and achievement primes on the activation of achievement and fun goals. *Journal of Personality and Social Psychology*, *97*, 1129−1141.

Jones, E., & Sigall, H. (1971). The bogus pipeline: A new paradigm for measuring affect and attitude. *Psychological Bulletin*, *76*, 349−364.

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.

Krosnick, J. A., Jussim, L. J., & Lynn, A. R. (1992). Subliminal conditioning of attitudes. *Personality and Social Psychology Bulletin*, *18*, 152−162.

Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., & Sleeth-Keppler, D. (2002). A theory of goal systems. *Advances in Experimental Social Psychology*, *34*, 331−378.

McDougall, W. (1908). *Introduction to social psychology.* London: Methuen.

Milgram, N. W. (1979). On the inadequacy of a homeostatic model: Where do we go from here? *Behavioral and Brain Sciences*, *2*, 111−112.

Murray, H. A. (1938). *Explorations in personality.* New York: Oxford University Press.

Norretranders, T. (1998). *The user illusion: Cutting consciousness down to size.* New York: Penguin Books.

Pittman, T. S., & Zeigler, K. R. (2007). Basic human needs. In A. Kruglanski, & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 473−489). New York: Guilford.

Pleyers, G., Corneille, O., Luminet, O., & Yzerbyt, V. (2007). Aware and (dis) liking: Item-based analyses reveal that valence acquisition via evaluative conditioning emerges only when there is contingency awareness. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, *33*, 130−144.

Rolls, B. J., Wood, R. J., Rolls, E. T., Lind, H., Lind, W., & Ledingham, J. G. G. (1980). Thirst following water deprivation in humans. *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology*, *239*, 476−482.

Seibt, B., Häfner, M., & Deutsch, R. (2007). Prepared to eat: how immediate affective and motivational responses to food cues are influenced by food deprivation. *European Journal of Social Psychology*, *37*, 359−379.

Stahl, C., Unkelbach, C., & Corneille, O. (2009). On the respective contributions of awareness of unconditioned stimulus valence and unconditioned stimulus identity in attitude formation through evaluative conditioning. *Journal of Personality and Social Psychology*, *97*, 404−420.

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.

Toates, F. M. (1986). *Motivational systems.* Cambridge: Cambridge University Press.

Veltkamp, M., Aarts, H., & Custers, R. (2008a). On the emergence of deprivation-reducing behaviors: subliminal priming of behavior representations turns deprivation into motivation. *Journal of Experimental Social psychology*, *44*, 866−873.

Veltkamp, M., Aarts, H., & Custers, R. (2008b). Perception in the service of goal pursuit: Motivation to attain goals enhances the perceived size of goal-instrumental objects. *Social Cognition*, *26*, 720−736.

Veltkamp, M., Aarts, H., & Custers, R. (2009). Unravelling the motivational yarn: A framework for understanding the instigation of implicitly motivated behaviour resulting from deprivation and positive affect. *European Review of Social Psychology*, *20*, 345−381.

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*, 121−135.