

# **Fighting the Temptation**

---

## **Promoting Healthy Consumer Choice through Subliminal Priming**

**Daniela Skibbe**

**27 August 2010**

**Twente University**

**Instructors**

**Dr. M. Veltkamp**

**Dr. P.W. de Vries**

Bachelor Thesis

## **Abstract**

A lot of existing research of subliminal priming suggests that it is possible to unconsciously influence people's behavior. The aim of the present study was to further investigate in which way different affective priming valences would influence consumer behavior when it comes to product choice. Furthermore, the study tested the idea of enhancing and decreasing the desire of certain choice possibilities. Therefore, an experiment was conducted in which participants were primed with positive affective valence, negative affective valence or a combination of both and after that had to choose a product out of two product categories (fruit and chocolate). The results suggest that the effect of priming depends on the presence of an overarching goal that is related to the primed product. Furthermore, it was found that a combination of negative and positive priming valence is most effective in influencing product desire and choice.

In 2008 the World Health Organization (WHO) stated that “obesity is one of the greatest health challenges of the 21st century“. According to the WHO, in 2005, 1.6 billion adults were overweight and 400 million of them were obese worldwide. The WHO suggests that this number will increase to approximately 2.3 billion overweight adults and 700 million who will be obese in 2015. These are alarming numbers not only because overweight increases health risks but also because this will lead to an enormous increase in health costs as well. In the end, that will be an economic burden for everyone (Finkelstein, Ruhm, & Kosa, 2005).

Actually, most people know that one of the main reasons for being overweight is too much food and fat consumption and as several studies show (e.g. Roefs & Jansen, 2002; Drewnowski, Brunzell, Sande, Iverius, & Greenwood, 1985), people also hold negative associations with fat food.

Thus, if people have negative thoughts about high-fat food why do they still consume a lot of it? Shouldn't it be the goal to stay away from that kind of food? To answer those questions, it is necessary to understand the underlying mechanisms of goal reaching and decision making which will be considered in the following section.

Taking into account the theoretical background, the present study tries to investigate in which ways it would be possible to influence food choices that actively promote healthy consumer choices.

### **Goals and their influence on decision making**

In the literature, goals are defined as desired end states which already exist in people's minds and influence people's behavior (Custers & Aarts, 2005; Aarts, Custers, & Veltkamp, 2008). In that way, choices which are made reflect what people desire.

With regard to the question, which I posed out above, making a decision does not just depend on what people think. More importantly, it is what people want, thus it is the goal that they try to gain, that makes them act. That implies that there is a difference between what people like and what they want. According to Berridge (1996) liking and wanting are two separate concepts. The first, liking, refers to a kind of sensory pleasure that someone associates with food whereas the second one, wanting, is a function of craving for something. These concepts can operate independently, that means, even if people have negative thoughts about palatable food they can still want it. This would explain why even if people have negative associations with palatable food and know about the detrimental influence of high calorie consumption on their health they still have the desire to consume such food.

But it is not that simple. People often make choices which are related to each other to meet multiple goals such as playing tennis to socialize and at the same time improving ones fitness (Fishbach & Dhar, 2007). Kruglanski & Shah (2002) describe this relationship as a goal system in which goals are connected to each other in the human mind. Thus, they built a cognitive network in which higher-order goals are related to lower-order goals. This goal system interrelation can be problematic when people try to pursue multiple goals which are not compatible. According to Fishbach and Dhar (2005) trying to fulfill such incompatible goals lead to a goal conflict. Thus, multiple goals with contradictory directions force the individual to balance between them.

When it comes to eating such a conflict would occur if a person tries to meet the goal of weight control and, at the same time, the goal of enjoying palatable food. In that case, weight control would be the focal goal whereas the enjoyment of palatable food can be labeled as an alternative goal. Both goals are highly desired but reaching them together at the same time would be almost impossible. The success of resisting the alternative goal to meet the focal goal depends on the self-control a person has to suppress the thoughts of getting the alternative goal (Fishbach, Kruglanski, & Friedman, 2003).

### **The Self-Control Dilemma in Goal Reaching Explained on the Basis of Restrained Eating**

Goals which are frequently activated with certain representations, like wanting something to eat and going to McDonalds, can build an automatic connection in the human mind. Likewise, these connections can facilitate or inhibit each other depending on their kind of relationship (Fishbach et al., 2003). In other words, the representation of a McDonald's Arch might activate the goal to get something to eat and vice versa. In that way goals can operate implicit which means the goal representations become briefly approachable through contextual cues, like the logo of McDonalds, and is able to make an individual act to fulfill the goal without conscious awareness of that goal (Fishbach & Dhar, 2007; Bargh & Chartrand, 1999). Summarizing, environmental stimuli can prompt certain goals and likewise set them in motion without conscious awareness.

But people are no unconscious acting individuals which were totally controlled by environmental influences. It depends on the individual's ability to control and inhibit such automatic unwanted responses (e.g. seeing the McDonald's Arch and wanting a hamburger) in regard to suppress the detrimental alternative and reach the focal goal. Especially people

who do not have sufficient inhibitory control are prone to domination by environmental impulses and cues (Nederkoorn, van Eijs, & Jansen, 2004).

Such a deficit of response inhibition is a typical characteristic of so called “restrained eaters” (Nederkoorn et al., 2004). Restrained eaters are defined as highly concerned about their weight and the desire to control it by restraining their food intake (Herman & Polivy, as cited in Roefs, Herman, MacLeod, Smulders, & Jansen, 2004). Their eating behavior is characterized by an ongoing dispute between two contrary goals, weight control and consuming palatable food. Thus, to reach the goal of weight control they continuously try to suppress thoughts about delightful food (Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2007). The result is a goal conflict in which the desire to eat palatable food interferes with the weight control goal. Furthermore, the ongoing conflict takes away a great amount of the limited cognitive capabilities which are needed to control and inhibit impulses. The result is a deficit in mental resources that affects the regulation of food stimuli and the self-control abilities of restrained eaters in a negative way (Stroebe et al., 2007).

As already mentioned, an external representation or cue can automatically activate a goal. Furthermore, depending on the negative or positive valence of that cue, the desire to reach the goal will be either inhibited or facilitated (Fishbach et al., 2003). Consequently, if a representation of something can promote a goal, then it should also be able to suppress a goal.

This could help to solve goal conflicts, for example when people have to make a choice between two alternative goals whereby one alternative goal (e.g. consuming less fat food) is in line with a focal goal (e.g. weight control) and the other alternative goal (e.g. enjoying palatable food) is not in line with the focal goal. In such situations, confronting a person with a cue that is able to inhibit the alternative goal which is discrepant to the focal goal (e.g. enjoying palatable food and weight control) could help the person to decide for the alternative goal which is in line with the focal goal (e.g. consuming less fat and weight control). Eventually, that could not only solve goal conflicts in eating but also help to promote healthy consumer choices in general.

### **Affecting the behavior of consumers through subliminal priming**

In the literature, the phenomenon of activating thoughts or representations through a certain cue is called “priming” (e.g. Dijksterhuis, Aarts, & Smith, 2005). Various studies show that priming a certain behavior can unconsciously enhance the occurrence of that behavior (Velkamp, Aarts, & Custers, 2008; Fishbach et al., 2003; Sengupta & Zhou, 2007; Kozup,

Creyer, & Burton, 2003). According to Dijksterhuis et al. (2005) there are two types of priming. Priming which influence one's behavior consciously, thus people are aware of that influence, are called "supraliminal" primes, whereas priming without conscious awareness is referred to as "subliminal" priming. In the present study, I will concentrate on subliminal priming. The main reason for that is that people who are aware of a priming influence can unconsciously develop control strategies to undermine the influence of the prime (Bargh, as cited in Dijksterhuis et al., 1999). In the end, this would make the prime ineffectual.

Priming can be provoked in two different ways, semantically or affectively. In both cases, a word, which operates as the prime, promotes a related concept in one's mind (De Houwer, Hermans, Rothermund, & Wentura, 2002).

In semantic priming, words are used which are semantically related (e.g. fruit and diet). The relation between these two words results in the activation of a related concept (e.g. weight concern). The underlying idea is that thoughts in our mind are semantically connected by certain links in a network. Thus, activation of one thought will spread through these links and will trigger another related concept. In contrast, affective priming uses words which share the same positive or negative valence (e.g. fruit and beautiful, fat and rubbish) but are not semantically connected with each other (De Houwer et al., 2002).

In this study, affective priming was used. The advantage of that kind of priming, compared to semantic priming is that it is not altered by prior experience. Affective priming connects the target word with a positive or negative valence but not with a semantic concept (Storbeck & Robinson, 2004). Bargh (1997) refers to this as a "quick and dirty" affective way of interpretation. According to Custers and Aarts (2005), if a target is primed with words with a positive affective valence it will deliver the message that the target is the desired goal. This results in a higher motivation to fulfill the goal when possible. Veltkamp, Arts and Custers (2007), for example, tried to influence the drinking behavior of Dutch university students and showed that subliminal priming enhanced the motivation to drink by linking that behavior to a positive outcome.

In another study by Holland, Aarts and Custers (2007), they extended the idea of affecting goal desire through subliminal priming and showed that, besides enhancing desire, it is also possible to reduce the desire to reach a certain goal. They primed the goal of socializing with negative affective words and reduced in that way the motivation of participants to go out. But increasing or decreasing goal desire will only occur if the primed goal state already exists in the subject's mind. With other words, a person needs to be motivated to reach a certain goal. In that case, priming can enhance or decrease the motivation

to reach a goal and this in turn leads to goal-consistent behavior (Dijksterhuis et al., 2005; Holland et al., 2007).

When it is possible to facilitate respectively inhibit an existing motivation of people to engage in a certain behavior, the question arises if it would be also possible to motivate people to make a specific choice between two alternatives through subliminal priming?

### **Solving the Goal-Conflict and promoting healthy consumer choice through subliminal priming**

As already described, not only restrained eaters but people in general do not appreciate that high palatable food is detrimental to their health or weight concerns but according to De Houwer (2001), people in general still love the delicious taste of it. We are all surrounded by different kinds of food and our daily live involves to choose from a large assortment. Thereby not only restrained eaters need to handle a goal conflict. Everyone who wants to eat healthier wants to consume less fat or wants to eat more vegetables has to handle the temptations on the supermarket shelves. Even if people, which hold eating goals like that, do not like to consume food that goes against their goals, as Berridge (1996) pointed out, they can still desire such food. So to speak, not just restrained eaters but people in general have to handle a conflict between their goals and their contrasting desires.

With regard to restrained eating, Stroebe et al. (2007) suggest that if the motivation of restrained eaters to focus on their focal goal (weight control) were to be enhanced then they would have the ability to handle their goal-conflict and resist the temptation of high-calorie food. In a further study, Papies, Stroebe and Aarts (2008) demonstrated that subliminal priming the diet goal of restrained eaters has exactly the effect mentioned above. But priming the dieting goal only influenced their self control abilities, in the end, the goal conflict still remains.

A really promising method to actually solve conflicts between desired focal and alternative goals would be to weaken the desire of the conflicting alternative goal. Thus, the purpose of the present study is not to subliminal influence or to activate the focal goal but rather to directly influence the choice of two desired alternatives. Thereby giving an answer to the research question in which way it is possible to influence food choice through subliminal priming.

As previously mentioned, enhancing motivation to react according to the primed goal state is only effective if the primed goal concept already exists in people's minds. Otherwise

priming has no effect on motivation and in turn does not influence people's behavior (Custers & Aarts, 2006). Priming studies, as considered so far, usually prime the desired focal goal, instead of an alternative choice, to unconsciously influence people's behavior (e.g. Holland et al., 2007; Veltkamp et al., 2007; Papies et al., 2008; Strahan, Spencer & Zanna, 2004; Fishbach et al., 2003). In these studies, it is argued that priming the focal goal activates the corresponding alternative goal and in that way enhances the motivation to perform goal consistent behavior. That would mean, if a primed focal goal can activate a related alternative then, in return, priming an alternative could also activate the related focal goal. Furthermore, attaching words with positive valence to the alternative goal will signal that the activated focal goal is the desired one, which in turn enhances motivation to choose the primed alternative. By contrast, priming an alternative choice with negative valence should weaken the desire for that choice which means that people, in that case, should prefer the other, not primed, product. In other words:

- H1: Priming a product choice directly will automatic activate the related goal.
- H2: Negative affective priming and positive affective priming are equally effective in promoting a healthier product choice.
- H3: A combination of positive and negative priming has a stronger effect than positive or negative priming alone.

Several other studies showed that it is possible to influence behavior through subliminal priming. In those studies, they affected the likelihood of engaging in a certain behavior (e.g. Custers & Aarts, 2005) or the amount of drinking or eating (e.g. Veltkamp et al., 2007; Strahan et al., 2005). Although, these studies showed that priming can promote goal consistent behavior, they did not change desire. Furthermore, they only primed the focal goal (e.g. diet) and tried neither to prime an alternative choice (e.g. chips) nor to influence the choice between several products. Therefore, the purpose of the present study is, on the one hand, to show that it is also effective to prime a product choice (e.g. salad) instead of a focal goal (e.g. diet) and, on the other hand, to promote a certain product when it comes to choices between several products. Therefore, an experiment was conducted in which people were subliminally primed to choose a healthier alternative (e.g. an apple) over an unhealthy alternative (e.g. a Mars bar).



## Method

### *Participants*

Ninety-nine Students from the University of Twente, 55 of them were Dutch and 43 were German, participated in the present study. Fifty-nine of all participants were female and 40 were male. They were recruited through an online application from the University and through flyers which were spread around the campus or passed out directly during lectures. As reward for their participation they received either one course credit or were paid €.

### *Design*

A between-subject design was chosen with prime valence as independent variable and food choice as dependent variable. Participants were randomly assigned to one of three priming conditions (positive/neutral, negative/neutral or positive/negative). To avoid that language could have any influence on the experiment, especially on the subliminal priming effect, every questionnaire and task was provided in the mother language (Dutch or German) of the participant.

### *Pretest*

A pretest was designed to determine which different sorts of fruits and chocolate could be used in the experiment. Therefore, 20 university students (ten women, ten men, always five of them were German or Dutch) were asked to fill in a short questionnaire in which the preference of different kinds of fruits and chocolate were determined. None of these students took part in the actual experiment.

The questions investigated how much they like a product and which one they would prefer if they had to choose. Each product could be evaluated on a 7-point scale reaching from liking the product a lot to liking the product not at all. A low score indicated a preference for that particular product. The list of products contained different kinds of chocolate (milk, pure and white chocolate, Mars, Snickers, Twix, Bounty and Milky Way) and fruit (apple, pear, banana, tangerine, orange, strawberry and white grapes). According to the test results, three fruits (apple, banana and white grapes) and four chocolate products (milk chocolate, Twix, Mars and Snickers) were chosen. All of them had a nearly comparable average score, for fruit placed between  $M_{\text{fruit}} = 2.25$ ,  $SD = 1.3$  and  $M_{\text{fruit}} = 2.75$ ,  $SD = 1.7$  and for chocolate placed between  $M_{\text{choc}} = 2.30$ ,  $SD = 1.4$  and  $M_{\text{choc}} = 2.75$ ,  $SD = 1.3$ .

### Priming task

The priming task was introduced as perception test. In the introduction of the task, participants were told that, at the beginning of each trial, they will see a little cross centered in the middle of the computer screen and that they had to focus on it when it appeared. The function of the cross was to make sure that participants looked at the computer screen during the task. Further, the introduction described that after they saw the cross different words or letter strings would appear, in a fast sequence, aimed to influence their perception. After that, a small circle might show up at the place where they first saw the cross. Participants were told that their task was to press a “yes” button as fast as possible if the circle showed up or a “no” button if it did not.

The whole task consisted of three sets, each with 18 trials and a pause of 2.5 seconds between sets. In the beginning, participants started with five practice trials without a prime. As already mentioned, in the beginning a white cross appeared on the black screen for about 500 ms followed by a letter string (the premask for about 500 ms), the target word (“fruit” respectively “chocolate”) which appeared 30 ms, another letter string (the postmask for 100 ms) and the prime word (e.g. “pain” as negative prime, “beautiful” as positive prime or “just” as neutral prime) for about 150 ms. At the end, a little circle appeared in some trials for about 20 ms. Even if the circle appeared shorter than the target word participants were able to consciously recognize it because no pre- or postmask covered the circle.

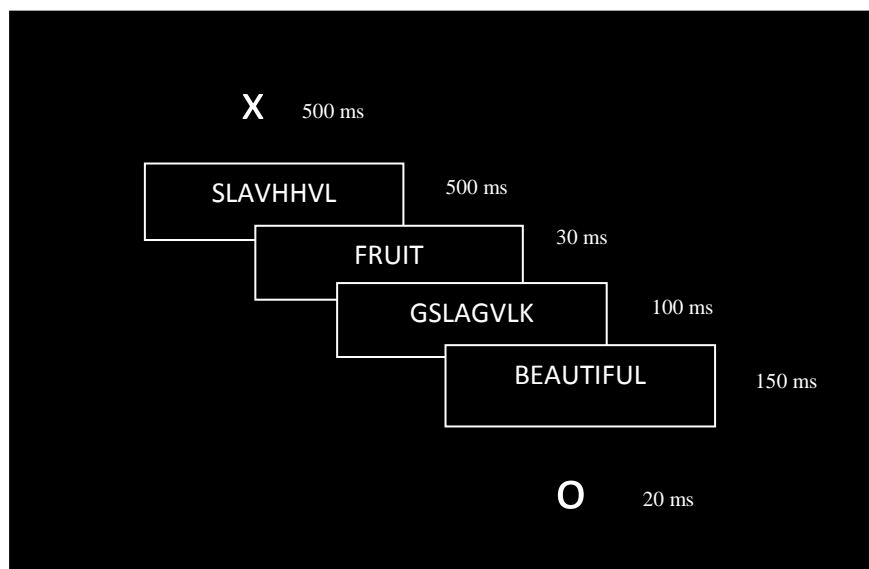


Figure 1. Example of the priming task as used in the experiment

### *Procedure*

The study was conducted in the research laboratory of the Faculty of Behavioral Science of the University of Twente. Participants were placed in one of four cubicles each with a computer on which the experiment was completed. Before the experiment started all participants had to read and sign the paper for informed consent. To make every step in the study plausible, participants were told that they were taking part in a study designed to investigate the influence of personality and cognitive abilities on the perception of taste. In that way it was possible to make sure that participants chose at least one food alternative by the end of the experiment.

In the beginning of the experiment, participants had to fill in the Food Choice Questionnaire (FCQ), developed by Steptoe, Pollard and Wardle (1995). The FCQ consists of 36 questions which measure nine different dimensions that are important in food choice. For example, the dimension of “health” is defined by questions like “It is important to me that the food I eat on a typical day contains a lot of vitamins and minerals.”. The aim of the FCQ was to investigate which factors in food choice are important to each participant. Through this it was possible to identify possible goals that participants have when it comes to food.

The FCQ was followed by 48 questions, selected from the NEO-PI-R, which helped to distract the attention of people’s thoughts about food and to pretend to investigate possible personality factor which could be related to taste perception. In a follow up step, participants performed the priming task, which they were told was to investigate their cognitive ability. After the priming task, the message appeared on the computer screen that they had to contact the researcher for the last part of the experiment.

In the last step, the researcher came in the cubicle with two identical plastic bowls, one filled with milk chocolate drops and mini Twix, Snickers and Mars bars. The other plastic bowl contained white grapes, apples and bananas. All fruits were checked every day for their freshness to make sure that their appearance had no influence on participant’s choice. Participants were given a self made paper-and-pencil taste-test and were told that they can choose with which kind of food they wanted to make the taste-test.

It was explained that they could choose between chocolate and fruit because the taste-test were conducted to test two categories of food (natural food and factory food) and that the researchers had, at that point, equal numbers of people in both conditions. In that way, it would be not important which category they would choose. After they made a choice, they were left alone in the cubicle to test the chosen product and fill in the taste-test. This self made paper-and-pencil test asked in addition to questions about attributes of the product (e.g.

tastiness or look) also to which extent a choice of each product was considered. This question was included as an indicator of desire. When they had finished the paper-en-pencil test they were debriefed by the researcher.

## Results

To investigate the overall effect of priming on the chosen product, an ANOVA test was used with priming condition and gender as independent variable and choice as dependent variable. No significant main effects of priming were found,  $F(2, 98) = .158, p = .85$ , but a significant interaction effect of gender and priming were observed,  $F(2, 98) = 6.66, p < .01$ . To find an explanation of the interaction effect between gender and priming, the mean scores, from women and men, of each dimension of the FCQ were compared. Therefore, an independent-sample t-test was used. Previously all test scores were standardized.

Results showed a significant difference between women and men in relation to the dimension of “health”,  $t(96) = -4.67, p < .01$ , and “weight control”,  $t(96) = -4.56, p < .01$ . Both dimension seemed to relate to each other. Thus, the correlation between the goal dimension “health” and “weight control” was determined,  $r = .57, p < .01$ . The positive correlation indicates that both dimensions measure the same goal. Thus, both test scores were averaged to get one dimension for the goal of “health/weight control”.

The FCQ determines which aspects are important for people when it comes to food choice. Thus, according to the observed results, the differences in goal association could explain the interaction effect between gender and priming.

As previously pointed out, priming a target automatically activates related concepts in one’s mind and, in that way, promotes behavior according to the prime. According to this, it was hypothesized that the primed target activates the related focal goal and produces goal related behavior. That is to say, only people who want to eat healthy and control their weight would react to the prime and choose a fruit over a chocolate bar.

To test that idea, the effect of priming was tested again with priming condition and the test score of “health/weight control” as independent variable and choice as dependent variable. As expected, a significant interaction effect between priming condition and the “health/weight” score was found,  $F(2, 98) = 4.71, p = .01$ . To investigate this interaction effect further, the effect of priming for participants with a high score of “health/weight control” and a low score of that goal dimension were tested.

According to the results, priming had no effect on product choice for participants with a low score on “health/weight control”,  $F(2, 52) = .32, p = .73$ , but a significant effect of priming on product choice was found for participants with a high score on that goal dimension,  $F(2, 44) = 6.48, p < .01$ .

These results lead to the conclusion that the effect of priming depends on the presence of an overarching goal. Furthermore, as was hypothesized, priming a product choice directly automatically activates the related goal concept (see fig. 2).

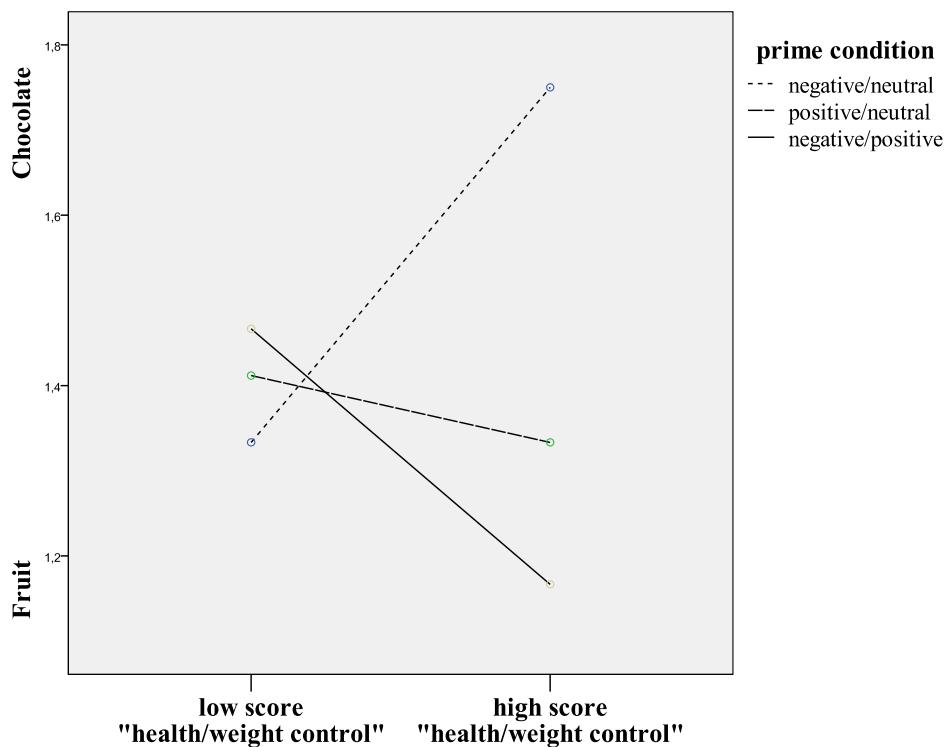


Figure 2. Effect of priming as a function of the high or low score on the goal dimension of “health/weight control”

Further, a Post Hoc test was used to investigate which priming condition had the greatest influence on product choice in the group with the activated “health/weight control” goal. The results revealed that the combination of positive and negative priming had the strongest effect on product choice ( $p < .01$ ) which confirms the hypothesis that a combination of positive and negative priming to a stronger effect lead than positive or negative priming alone.

Whereas positive priming, compared to negative priming, had a marginal more effective influence on product choice ( $p = .06$ ) no significant difference in effect could be found between positive and negative/positive priming ( $p = .85$ ).

Thus, the hypothesis that positive and negative priming are equally effective was not confirmed. According to the results, positive priming has a stronger effect than negative priming when it comes to influencing product choice.

That priming actually had an influence on the desire of the two product groups (fruit and chocolate) was also found by analyzing the results of the question “To what extent did you consider to choose one of the following products?”. This question was one element in the self made paper-and-pencil-test which had to be filled in after the priming task. Participants judged each product on a 5-point scale reaching from “not at all” to “very much”. Table 1 shows the average score of fruit respectively chocolate consideration.

The correlations between priming and the test scores of the two main categories fruit and chocolate were determined. A significant negative correlation was found between priming and the choice consideration of chocolate,  $r = -.29$ ,  $p = .03$ , and a marginal significant positive correlation between priming and the consideration of a fruit,  $r = .21$ ,  $p = .08$ .

Table 1  
Average scores of product consideration dependent on priming condition

Prime condition		chocolate	fruit
negative/neutral	Mean	3,08	3,11
	Std. Deviation	,87	,95
neutral/positive	Mean	2,68	3,33
	Std. Deviation	1,27	,98
negative/positive	Mean	2,31	3,63
	Std. Deviation	1,03	1,11

## General Discussion

The aim of the present study was to investigate how healthy consumer choice can be promoted with help of subliminal affective priming. It was hypothesized that a primed product would automatically activate related goal concepts, and dependent on the valence of the used prime, would result in goal consistent behavior. Furthermore, it was assumed that whereas positive priming should enhance the desire for the primed product, negative priming should reduce the desire for the primed product. Accordingly, a combination of both priming valences should then produce an even stronger effect.

As the present results show, effects were only observed for participants with high health/weight concern. According to the priming literature, priming can only have an effect if the activated goal concepts already existed in people's minds (e.g. Shah & Kruglanski, 2003). Thus, priming a nonexistent goal, consequently, would produce no effect. With regard to the present results, it can be assumed that the primed products must have activated the related goal otherwise no priming effects had been observed.

Compared to the negative priming condition, participants in the positive priming condition chose a fruit more often over a chocolate bar which indicates that the positive prime valence enhanced the motivation of goal consistent behavior. This in turn led to an increased desire for the goal consistent product (apple, banana or grapes). Whereas, against the expectations, the negative priming condition did not decrease the desire for the chocolate bars, a combination of positive and negative priming did have a significant effect. The combination of both prime valences did not just enhance the desire for fruit but also decreased the desire to choose a chocolate bar. In that priming condition, which also produced the strongest effect of all, almost all participants choose fruit over chocolate.

These results not only show that it is possible to increase/decrease the desire of a product through affective subliminal priming. Furthermore, they give evidence that subliminal affective priming can reduce the goal conflict of eating and in that way is able to promote a healthy consumer food choice.

The question arises why negative priming alone was not effective in decreasing desire whereas, in combination with positive priming, the desire to choose chocolate was well reduced. Furthermore, whereas the present study found no effect of negative priming, Holland et al. (2007) showed that negative priming successfully decreased the desire to engage in a certain behavior.

A possible answer to these differences could be found in the different experimental designs. The study conducted by Holland and colleagues primed focal goals which in turn activated the related choice. In that way, a negative activated focal goal decreased the desire to perform goal consistent behavior. More precisely, the focal goal of socializing was negatively primed and, in turn, decreased the desire of going out. In this study a goal related choice was primed and not the focal goal. It was argued that the primed product would activate related desired focal goals and, through this, dependent on the prime valence, enhance or decrease the desire for the primed product. Thus, it is likely that in the negative prime condition of this study, the primed product (chocolate) did not activate related focal goals.

Support for that assumption comes from a research from Shah and Kruglanski (2003). In their study, they also primed alternative goals, which are referred to as “means”. According to them, means are cognitive representations of goals (e.g. jogging as the representation of the goal of staying fit) which can, depending on their links, activate different related focal goals. Moreover, goal activation through related means is dependent on the perceived effectiveness of that mean in fulfilling the activated goal. With other words, for one person going for a walk each day would be a strong mean for the focal goal of staying fit, whereas for another person two hours at the gym each day would be a stronger mean than going for a walk in reaching the fitness goal. Thus, the same means can be differ in the individual perception of their strength in fulfilling a focal goal. Even if a mean is able to activate a related focal goal, the effectiveness of priming depends on the perceived strength between the mean and the focal goal (Shah & Kruglanski, 2003; Fishbach, Shah & Kruglanski, 2004).

In the present study, fruit was probably perceived as a strong mean of the focal goal of health and, in that way, positive priming facilitated the desire of fruit in accordance to fulfill the focal goal. By contrast, in the negative priming condition, chocolate was probably not perceived as a strong mean of any related goal. This suggests that with absence of the focal goal, priming had no effect. This would also explain why negative priming in combination with positive priming was well able to reduce the desire of chocolate. It is likely that the positive fruit prime activated the related health goal and in that context the negative affective prime could influence the desire of chocolate. Thus, in view of the present results, it seems reasonable that the negative prime of chocolate was well processed, but only in the positive/negative priming condition, which then resulted in a decline of desire.

Theoretical implications of mean priming or “bottom up” priming, as it is referred to in the literature, suggest that it is people’s need for closure that makes affective mean priming so effective. According to Nisbett and Wilson (1978), people who need or want to make a fast decision are more vulnerable to cues or, otherwise to say, primes. The decision participants had to made in the present study was such a “time-pressure” choice but what when people make a choice without time pressure? Would affective mean priming have the same effect on desire than with time pressure?

### **Priming: Bottom-up or Top-down?**

A large amount of priming research uses top-down approaches instead of bottom-up priming. In top-down priming a focal goal will be activated through a positive or negative prime and



leads to prime consistent behavior. Bottom-up priming, as the name implies, proceeds exactly the other way around. Whereas in top-down priming a precise goal can be activated (e.g. diet), the goal activation in bottom-up priming is dependent on the individual perception of the relation between the primed mean and connected goals. For example, a steak could be a mean of the goal socializing at a BBQ or could be perceived as a negative mean of a health goal because of high calorie content. In that way, the activation of a goal would rely on the strength between a product and the built connection to a goal.

Even if it seems obvious that top-down priming would be more accurate in goal activation and, in turn, more promising in successful guiding healthy consumer choices, a bottom-up approach would probably be more practical and effective.

Most food choice decision are made on the supermarket shelf, after work on the way back home or when people stay in the line of a fast food restaurant. Stroebe and colleagues (2008), for example, suggest to place cues, which trigger the goal of diet, around strategic locations that imply food choices. According to the fact that we are surrounded by advertising and most of us have successfully developed strategies to ignore them, it is probable that such diet or health cues will be ignored as well unless the cue is directly placed on the product.

Priming a product directly, for example, through a symbol that functions as an affective prime and in that way activates the related goals would probably have a greater influence than diet cues in the immediate surrounding area. Furthermore, products which are also related to goals other than dieting (e.g. health, ethical concerns, consume natural ingredients) would also increase product desire. In that way, it would be possible to promote not just dieting effort but healthy food choice in general.

An affective subliminal prime as for example the traffic-light labeling, as discussed by the European Union, is a possible solution, but probably with disastrous economic consequences for marketers of red-labeled food, especially under consideration that red is a color that evokes danger. Instead, the food industry could, together with federal governments, work on a symbol that primes more than just calorie content and weight concern. In this study, it was found that health, natural content or ethical concerns are equally important factors than simply just weight concern. Thus, an affective prime like a symbol or logo which activates these goals could improve healthy food choice for a great amount of the human population. Furthermore, as earlier discussed, goals are related to each other and are also able to activate each other. That would imply that the activation of the health goal would also activate the goal of diet as well.

These assumptions are quite theoretical in nature and further research needs to prove their practical reliability. The present research not only showed that it is possible to influence people's choice through subliminal priming a product instead of a goal. Furthermore, the results gave also insight in which priming valence produces the most promising effect as it comes to priming means. In accordance to the practical potential of direct food priming, future research should pay more attention to mean priming instead of just priming goals.

Our daily life is filled with food choices that are comparable of that in the present study. In the long term, people who are not able to resist such daily food temptations will enhance their risk of heart attacks, strokes or getting obese, just to mention a few possible undesirable effects. The results of the present study, which addresses subliminal influencing food choice, hopefully give further insight in influencing product choice and provide new implications for health campaigns and diet programs to prevent food choice behavior that puts the health of people at risk.

## Appendix

List of words used in the priming task (in Dutch):

**Target words:** FRUIT  
CHOCOLADE

### Priming words:

<u>Positive prime words:</u>	GOED	<u>Negative prime words:</u>	SLECHT
	FIJN		PIJN
	LEUK		VERDRIET
	ZOMER		PIJN
	GEWELDIG		ZIEKTE
	LACH		AFVAL
	MOOI		VERDRIET
	PLEZIER		DIEF
	VREDE		OORLOG
	GELUKKIG		

Neutral prime words: ALDUS  
ENFIN  
VOORTS  
ZOWAT  
OPEEN  
HOEWEL  
WANNEER  
OPDAT  
ECHTER

- Aarts, H., Custers, R., & Holland, R. (2007). The nonconscious cessation of goal pursuit: when goals and negative affect are coactivated. *Journal of Personality and Social Psychology* (92), 165-178.
- Bargh, J., & Chartrand, T. (1999). The unbearable automaticity of being . *American Psychologist* (54), 462-479.
- Berridge, K. (1996). Food reward: brain substrates of wanting and liking. *Neuroscience and Behavioral Reviews* (20), 1-25.
- Chartrand, T., & Bargh, J. (1996). Automatic activation of impression formation and memorization goals: Nonconscious goal priming reproduces effects of explicit task instructions. *Journal of Personality and Social Psychology* (71), 464-478.
- Cun, W., & Kruglanski, A. (2005). Consumption as a multiple-goal pursuit without awareness. In F. Kardes, P. Herr, & J. Nantel, *Applying Social Cognition to Consumer-Focused Strategy* (S. 201-217). New Jersey: Lawrence Erlbaum Associates, Inc.
- Custers, R., & Aarts, H. (2005). Beyond priming effects: The role of positive affect and discrepancies in implicit processes of motivation and goal pursuit. *European Review of Social Psychology* (16), 257-300.
- Custers, R., & Aarts, H. (2007). In search of the nonconscious source of goal pursuit: Accessibility and positive affective valence of the goal state. *Journal of Experimental Social Psychology* (43), 312-318.
- De Houwer, J., Hermans, D., Rothermund, K., & Wentura, D. (2002). Affective priming of semantic categorisation responses. *Cognition and Emotion* (16), 643-666.
- Dijksterhuis, A., Aarts, H., & Smith, P. (2005). The power of the subliminal: On subliminal persuasion and other potential applications. In R. Hassin, J. Uleman, & J. Bargh, *The New Unconscious* (S. 77-105). New York: Oxford University Press, Inc.
- Drewnowski, A., Brunzell, J., Sande, K., Iverius, P., & Greenwood, M. (1985). Sweet Tooth Reconsidered: Taste Responsiveness in Human Obesity. *Physiology & Behavior* (35), 617-622.
- Finkelstein, E., Ruhm, C., & Kosa, K. (2005). Economic causes and consequences of obesity. *Annu. Rev. Public Health* (26), 239-257.
- Fishbach, A., & Dhar, R. (2006). Dynamics of goal-based choice: Toward an understanding on how goals commit versus liberate choice. In C. haugtvedt, P. Herr, & F. Kardes, *Handbook of Consumer Psychology* (S. 611-637). Hillsdale, NJ: Erlbaum Press.

- Fishbach, A., & Dhar, R. (2005). Goals as excuses or guides: The liberating effects of perceived goal progress on choice. *Journal of Consumer Research* (32), 370-377.
- Fishbach, A., Kruglanski, A., & Friedman, R. (2003). Leading us not into temptation: Momentary allurements elicit overriding goal activation. *Journal of Personality and Social Psychology* (2), 296-309.
- Fishbach, A., Shah, J., & Kruglanski, A. (2004). Emotional transfer in goal systems. *Journal of Experimental Social Psychology* (40), 723-738.
- Kardes, P. Herr, & J. Nantel, *Applying Social Cognition to Consumer-Focused Strategy* (S. 267-280). New Jersey: Lawrence Erlbaum Associates, Inc.
- Kozup, J., Creyer, E., & Burton, S. (2003). Making Healthful food choices: The influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. *Journal of Marketing* (67), 19-34.
- Kruglanski, A., & Shah, J. (2002). Priming against your will: How accessible alternatives affect goal pursuit. *Journal of experimental Social Psychology* (38), 368-383.
- Le Goff, D., & Spiegelman, M. (1987). Salivary responses to olfactory food stimuli as a dietary restraint and body weight. *Appetite* (8), 29-35.
- Nederkoorn, C., van Eijs, Y., & Jansen, A. (2004). Restrained eaters act on impulse. *Personality and Individual Differences* (37), 1651-1658.
- Papies, E., Stroebe, W., & Aarts, H. (2008). The allure of forbidden food: on the role of attention in self-regulation. *Journal of Experimental Social Psychology* (44), 1283-1292.
- Roefs, A., & Jansen, A. (2002). Implicit and Explicit Attitudes Toward High-Fat Foods in Obesity. *Journal of Abnormal Psychology* (111), 517-521.
- Roefs, A., Herman, C., MacLeod, C., Smulders, F., & Jansen, A. (2005). At first sight: how do restrained eaters evaluate high-fat palatable food. *Appetite* (44), 103-114.
- Shah, J., & Kruglanski, A. (2003). When opportunity knocks: bottom-up priming of goals by means and its effects on self-regulation. *Journal of Personality and Social Psychology* (84), 1109-1122.
- Sengupta, J., & Zhou, R. (2007). Understanding impulsive eaters' choice behaviors: The motivational Influences of regulatory focus. *Journal of Marketing Research* (XLIV), 297-308.
- Stephoe, A., Pollard, T., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite* (25), 267-284.

- Storbeck, J., & Robinson, M. (2004). Preferences and inferences in encoding visual objects: A systematic comparison of semantic and affective priming. *Personality and Social Psychology Bulletin* (30), 81-93.
- Strahan, E., Spencer, S., & Zanna, M. (2005). Subliminal priming and persuasion: How motivation affects the activation of goals and the persuasiveness of messages. In F. Stroebe, W., Mensink, W., Aarts, H., Schut, H., & Kruglanski, A. (2008). Why dieters fail: Testing the goal conflict model of eating. *Journal of Experimental Social Psychology* (44), 26-36.
- Van Osselaer, S., Ramanathan, S., Campbell, M., Cohen, J., Dale, J., Herr, P., et al. (2005). Choice based on goals. *Marketing Letters* (16), 335-346.
- Veltkamp, M., Aarts, H., & Custers, R. (2008). On the emerge of deprivation-reducing behaviors: Subliminal priming of behavior representations turns deprivation into motivation. *Journal of Experimental Social Psychology* (44), 866-873.
- Veltkamp, M., Arts, H., & Custers, R. (2008). Perception in the service of goal pursuit: Motivation to attain goals enhances the perceived size of goal-instrumental objects. *Social Cognition* (6), 720-736.
- Wentura, D. (1999). Activation and inhibition of affective information: for negative priming in the evaluation task. *Cognition and Emotion* (13), 65-91.
- Wilson, T., & Nisbett, R. (1978). The accuracy of verbal reports about the effects of stimuli on evaluations and behavior. *Social Psychology* (41), 118-131.