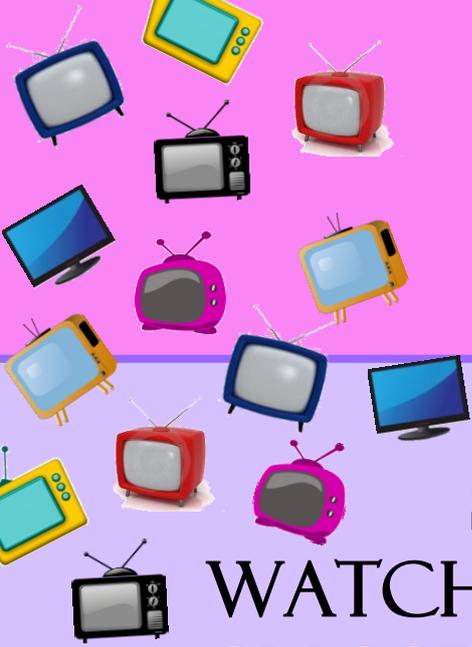


WAGENINGEN UR



SEEING IS EATING?  
WATCHING EATING BEHAVIOUR  
ON SCREEN AND ITS INFLUENCE  
ON FOOD CONSUMPTION  
VOLUME



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MSc Thesis

Seeing is Eating?  
Watching Eating Behaviour on Screen and its  
Influence on Food Consumption Volume

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# Table of Content

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<b>1. Introduction .....</b>	<b>11</b>
<b>Television Time and Unhealthy Eating .....</b>	12
<b>Why Watching Television leads to Unhealthy Eating.....</b>	13
<b>The Present Study .....</b>	14
<b>2. Theoretical Background .....</b>	<b>15</b>
<b>Imitation Behaviour .....</b>	15
<b>The Unconscious.....</b>	16
<b>Factors that Influence Imitation Behaviour .....</b>	17
<b>3. Research Method.....</b>	<b>21</b>
<b>Research Design.....</b>	21
<b>Participants .....</b>	21
<b>Research Measures.....</b>	22
<b>Procedure .....</b>	24
<b>Data Analysis Technique .....</b>	27
<b>4. Results .....</b>	<b>29</b>
<b>Manipulation Check.....</b>	29
<b>Video Effects on Amounts of Food Consumed .....</b>	29
<b>Video Effects on Mood, Product Evaluation, and Body Perception.....</b>	30
<b>5. Discussion and Conclusions.....</b>	<b>32</b>
<b>References .....</b>	<b>30</b>
<b>Appendix: Scales .....</b>	<b>xxx</b>

## List of Figures and Tables

---

<b>Figure 1</b> Trend of overweight in Dutch adults in % (Statistics Netherlands, 2009) .....	11
<b>Figure 2</b> Snapshots of the videos.....	26
<b>Figure 3</b> Course of the experiment .....	27
<b>Table 1</b> Diagram of the experimental design.....	21
<b>Table 2</b> First phase of the experiment .....	25
<b>Table 3</b> Second phase of the experiment .....	26
<b>Table 4</b> Third phase of the questionnaire .....	27
<b>Table 5</b> Mean (SD) of significant differences between conditions .....	31



## Abstract

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**Background:** Past research has shown that watching television leads to unhealthier food choices and to an increase in food consumption volume. However, the specific components of television programs that are supposedly responsible for this change in eating behaviour have been largely unexplored. Therefore, whether watching eating behaviour in television leads to a higher food consumption volume in viewers was tested experimentally in the present study.

**Methods:** In a between subjects experiment, 116 participants (88 women, 28 men) were exposed to one out of three 90-seconds videos that showed: (1) eating behaviour and food (n=40), (2) no eating behaviour but food (n=38), or (3) neither eating behaviour nor food (n=38). Immediately after this, participants evaluated three types of chocolate cake in a taste test, with the instruction to eat as much cake as they liked. Thereafter, the participants filled in a questionnaire including questions about satiety status, body mass index, restrained eating behaviour, as well as compensatory intentions and mental conflicts experienced during the experiment.

**Results:** The findings did not support the hypothesis since no differences between the three conditions could be found. However, it is noteworthy that watching the video including eating behaviour and food made participants feel less pleasurable as well as glad, and increased their desire to do sports.

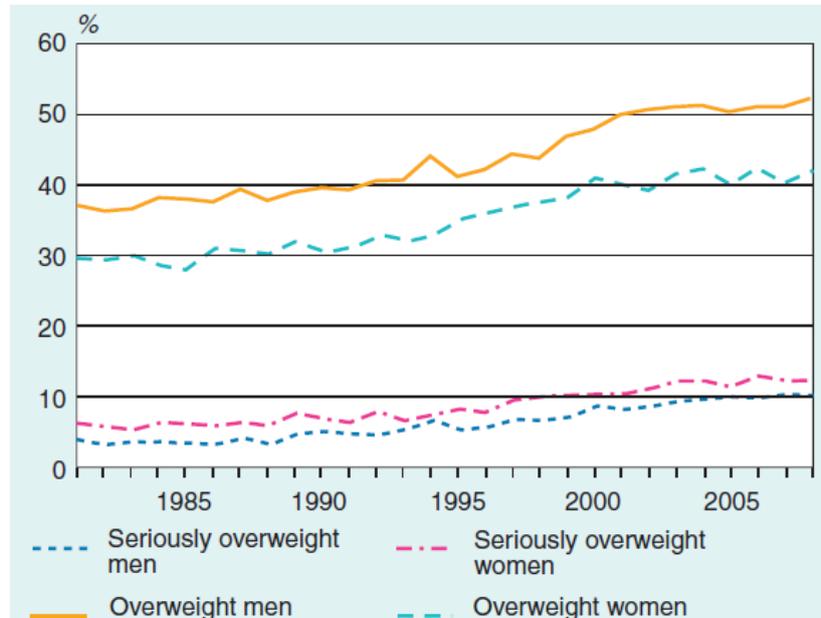
**Conclusions:** Watching someone eating for 90 seconds on screen does presumably not impact the subsequent food consumption of the viewers. Compared to the other two videos that showed food only and neutral behaviour, participants did not eat significantly more or less. Further research is needed to get a deeper insight into this effect.



# 1. Introduction

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As shown in figure 1, the prevalence of overweight<sup>1</sup> increased from 37% to 52% among adult men and from 30% to 42% among adult women between 1981 and 2009 in the Netherlands (Schokker et al., 2007).



**Figure 1** Trend of overweight in Dutch adults in % (Statistics Netherlands, 2009)

The prevalence of overweight also increased among Dutch children and adolescents (aged two to 20 years) from 11% in 1998 to 13% in 2009 (Statistics Netherlands, 2011). Diseases that are associated with overweight are among others type 2 diabetes mellitus, cardiovascular diseases, and various types of cancer (Health Council of the Netherlands, 2003). The health risks grow as a person's weight increases. Consequences are more disability adjusted life years (DALY), a shorter life expectancy, an increase in medical treatments, and lower work ability among the disease sufferers, as well as a general increase in health care costs (Health Council of the Netherlands, 2003). According to the World Health Organization (WHO, 2011), one of the main causes of the increasing trend in overweight and obesity is a global shift towards an unhealthy energy-dense diet that contains high amounts of sugar and fat.

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<sup>1</sup> The categorisation of people into different weight groups is done by means of the body mass index (BMI). The BMI is defined as a person's weight in kilograms divided by the square of his/her height in meters. A BMI greater than or equal to 25 stands for overweight and a BMI greater than or equal to 30 stands for serious overweight respectively obesity (WHO, 2011).

## Television Time and Unhealthy Eating

Some researchers have linked this unhealthy shift in diet to the increase in television viewing time which could be observed over the last years. During 2010, television viewing increased by 4% in the Netherlands. The average person now watches 191 minutes television per day in the Netherlands (Mediaonderzoek, 2011). In an average American household, the television is even switched on for six hours and 47 minutes each day (German & Lally, 2007). A five years follow-up study showed that the television viewing time increased from around 151 to 185 min/day in young children aged 5 to 6 years at baseline and from 175 to 195 min/day in older children aged 10 to 12 years at baseline (Pearson, 2011). Each year the average American child spends about 900 hours in school and 1500 hours watching television (German & Lally, 2007). At the same time the average consumer is also exposed to a growing amount of movies, series, videos, etc. provided on the internet. In 2010, the number of people watching or downloading movies, videos or television program via the internet reached 43% across 15 different European countries (IAB Europe, 2010).

A number of related research studies showed an association between watching television and unhealthy eating. Vereecken et al. (2005) for example compared information concerning television viewing and eating behaviour from a large number of countries across Europe and North America. The information was based on a survey about health behaviour in school-aged children from 2001/2002 which was completed by 162,305 participants. Except for one, all countries showed a statistically significant relation between increased television viewing and a higher daily consumption of sugared drinks and sweets, as well as a lower consumption of fruits and vegetables. Furthermore, watching television was found to be associated with an increased energy intake and a higher consumption of calorie-dense foods (Blass et al., 2006). The findings of Bowman (2006) suggested that more than two hours of television viewing per day is associated with (serious) overweight in men and women. Those who watched at least two hours of television per day had a higher energy intake, were more likely to be overweight, and obtained more energy from snacks and dinner. Stroebele and Castro (2003) found that adult participants consumed an additional amount of calories equal to almost one meal on days when they were watching television while eating. According to the findings of Temple et al. (2007), viewing television disrupts the habituation<sup>2</sup> to food cues in children and increases

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<sup>2</sup> The term habituation refers to the “general process of decreasing responsiveness after repeated exposure to a stimulus” (Aspen, p. 12). By means of habituation, humans get used to repeated stimuli and therewith automatically decrease their response to those stimuli. Temple et al. (2007) assume that viewing television can disrupt habituation to food cues and therewith lead to extended eating and overconsumption.

their longing for more energy-dense food products, which both contribute to a higher energy intake. Additionally, as Goldberg, Gorn, and Gibson (1978) have shown, children's food choices are strongly influenced by the television commercials they have been exposed to. It seems clear from the literature that watching television coincides with a high intake of "empty calories"<sup>3</sup> (Bulck, 2000, p. 280).

### **Why Watching Television leads to Unhealthy Eating**

Different hypotheses were formulated to explain the relation between watching television and unhealthy eating. Blass et al. (2006) assumed that viewers do not recognise internal signals of satiety as strong as usual while viewing television because they are distracted and at the same time influenced by the television program. This would explain the finding by Signorielli (1981) that 83% of adolescent viewers usually eat while watching television. Based on those findings it seems that unhealthy eating behaviour does habitually accompany watching television. According to Van den Bulck (2000) another possibility is that eating habits may be adapted to television watching habits. For example, meals are eaten while watching television because the meal takes place at the same time at which a good movie is shown, and meal times are put off or a proper meal is replaced by a ready-made dish to avoid missing a program (Van den Bulck, 2000). A third possible cause are food advertisements that lead to an increase in food intake (Halford et al., 2007) and to the consumption of (advertised or non-advertised) energy-dense food products (Buijzen, Schuurman, & Bomhof, 2007; Harris, Bargh, & Brownwell, 2009).

However, these hypotheses are formulated very generally and do not give specific indications for factors within the television program that contribute to the development of an unhealthier eating style. For a deeper going understanding of the relation between watching television and food intake, the different components of the television program need to be dissected and examined. Several studies will be necessary to do that. Harris, Bargh, and Kelly (2009) gave a suggestion on where to start with the search. They assumed that the perception of the act of eating itself is one of the reasons why people eat more when being exposed to television food advertisements. A profound literature review did not show any prior studies focussing on this issue. However, Wansink (2006) conducted studies in which he showed that viewing the behaviour of others (outside the television) has an implicit impact on what people eat and how

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<sup>3</sup> Empty calories refer to calories that are derived from foods with little or no nutritional value (Dictionary.com, 2011).

much they eat. Vartian, Wansink, and Herman (2008) could furthermore show that people who are eating together with others adapt their food consumption behaviour to one or more persons sitting at the table with them. The present study concentrated on the question whether a similar adaption of behaviour takes place when people are exposed to eating behaviour on screen. It was not focused on food advertisements, as suggested by Harris, Bargh, and Kelly (2009) because there are much more representations of eating behaviour in television than those shown in food commercials. Gerbner, Morgan, and Signorielli (1981) found that at that time eating and/or drinking happened about ten times in an hour in a typical week's prime time. Furthermore, up to 15 different characters in the television program ate, drank or talked about eating and/or drinking in one night's program. Additionally, in weekend morning programs 28 instances of eating and/or drinking could be found per hour.

### **The Present Study**

The following research tested the effects of exposure to eating behaviour on screen compared to the effects of exposure to the sole presentation of food and the presentation of neutral behaviour on screen on actual food intake. It was hypothesized that the participants who were exposed to a video showing eating behaviour eat more compared to those who were exposed to a video showing only food or neutral behaviour.

The next chapter of this thesis is about the theoretical framework underlying the above formulated study aim. The methods of the study are explained in chapter 3, followed by the results in chapter 4. Chapter 5 contains the discussion and conclusion of the study.

## 2. Theoretical Background

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In the introduction, the assumption was formulated that watching eating behaviour on screen can lead to an increase in the viewers' food consumption volume. In this chapter, it will be discussed how this causal relationship can be explained on psychological and social level. On this account, the human tendency to imitate others' behaviour will be addressed. Imitation behaviour is one out of different possible consequences of the perception-behavior link and is expected to be the main reason for the relationship between watching eating and the subsequent adaption of the own behaviour. Furthermore, the unconscious mind will be discussed because the perception-behaviour effect is assumed to occur mainly unconsciously. Finally, the most important factors that can moderate imitation behaviour will be defined.

### **Imitation Behaviour**

The hypothesis that watching somebody eating on screen leads to an increase in the own food consumption volume is based on the assumption that humans tend to adapt their behaviour to others' behaviour. Adaptive processes have a guiding role in terms of social behaviour (Bargh & Morsella, 2008). The presence of, for example, certain events, environments, or people lead to the automatic, internal representation of them. This representation stores all the important information that people need to respond and by this leads ultimately to behaviour. This is the so-called perception-behaviour link (Bargh & Morsella, 2008). At any time and in any given situation, people receive behavioural impulses so that they know how to react. These impulses can amongst others lead to the imitation of others' behaviour (Bargh & Morsella, 2008). According to Dijksterhuis and Bargh (2001), humans have a natural tendency to imitate and to act in a similar way as those around them. This imitation of others' behavior helps to behave in the expected and appropriate manner, and facilitates liking and bonding between individuals (Dijksterhuis & Bargh, 2001). In the present study, imitation is expected to be the main reason for adapted eating behaviour during and after watching eating behaviour on screen.

Dijksterhuis and Bargh (2001) defined 'three musketeers' of social perception that lead to imitation. First, humans can perceive observables which can for example be facial expressions, postures, arm and hand movements, or speech related variables. The higher the exposure to observables and the easier it is to perceive them, the greater the effect on the own behaviour. Secondly, traits can be imitated implying that people automatically decode the

social behaviour of others in respect of relevant trait concepts and adapt their behaviour to these concepts. Perceiving the aggressive behaviour of a person could for example lead to aggressive behaviour in the perceiver. The third musketeer consists of social stereotypes and relies on the assumption that people have stereotypes in their heads that guide them on how to behave when confronted with a person, a story or something else from a known stereotype group. With view on the present study, especially trait inferences and observables could influence the viewers' consumption behaviour. Trait inferences would generate specific attitudes towards for example product, food group, diet, or lifestyle. Observables would bring viewers to imitate (eating) behaviour and facial expressions. The facial expressions could in turn induce moods and emotions based on a feedback process caused by facial muscles (Dijksterhuis & Bargh, 2001).

## **The Unconscious**

The imitation behaviour that is described above is assumed to occur mainly unconsciously (Bargh & Morsella, 2008). Therefore, this paragraph serves to give insight in the unconscious and its strong influences on human behaviour and decision-making. Until quite recently mental life (including for example cognitive processes and information processing) was considered to exist and work mainly or even entirely at the conscious level. However, ever more scientists come to the conclusion that the unconscious mind is much more powerful than presumed (Bargh & Morsella, 2008; Bargh, 2007; Dijksterhuis & Bargh, 2001; Scarabis & Heinsen, 2008; Wansink, 2006). Vartanian, Wansink, and Herman (2000) suggested that people fail to recognize environmental stimuli that influence a variety of their behaviour. According to Zaltman (Morse, 2002), 95% of thinking takes place "below the surface" (p.2) and Bargh (2008) brought the discussion to a new level by arguing that the human being does not have a free will at all based on the assumption that humans are unconscious of the causes that determine their actions. Bargh (2008) brought his theory to the point by stating: "The phenomenological feeling of free will is very real, (...) but this strong feeling is an illusion, just as much as we experience the sun moving through the sky, when in fact it is we who are doing the moving" (Bargh, 2008, p. 148-149). Neuropsychological research also showed that the explicit (conscious) system is not able to work (a) when there is too much information, (b) when the given information is too complex, (c) when there is time pressure, and (d) when there is only low involvement (Scarabis & Heinsen, 2008). Regarding the present study, it seems logical that the implicit system resorbs the motion pictures in 'autopilot' mode (unconsciously) considering the fact that an average consumer watches more than three hours

of television a day – including highly emotional and excitatory programs. According to Vartanian, Wansink, and Herman (2000), it is important to pay attention to unacknowledged factors that influence consumption behaviour, especially with a view to the increased concerns pertaining to overeating and overweight, as well as their effects on health outcomes.

## **Factors that Influence Imitation Behaviour**

The perception-behaviour effect, including the adaption of perceived behaviour, can be influenced and even inhibited by different moderators: (a) disincentives, (b) conflicts with current goals and purposes, (c) self-focused attention, (d) liking (Dijksterhuis & Bargh, 2001), and (e) the simultaneous occurrence of different unconscious behavioural impulses (Bargh & Morsella, 2008). In the following, these mediators are described one by one.

### **(a) Disincentives**

Disincentives refer to the negative consequences that are associated with engaging in a primed<sup>4</sup> behaviour (Dijksterhuis & Bargh, 2001). When disincentives are present people are tended to (unconsciously) deliberate about whether to adapt the perceived behaviour or not. For example, Macrae and Johnston (1998) conducted an experiment in which participants were primed with the construct of helpfulness. After the participants were told that the experiment was over, they went to an elevator accompanied by a confederate who dropped a lot of pens. The participants who had been primed were more likely to help picking up the pens than those who had not been primed. However, when in another condition the pens were leaking and messy looking, the primed participants were not more tended to help the confederate than the other participants. Seemingly, the costs for helping the confederate were too high in this condition.

### **(b) Conflicts with current goals and purposes**

It is assumed that the effects of primed behaviour can be weakened by personal, currently operating goals when the primed behaviour is incompatible with these goals. Macrae and Johnston (1998) conducted a second experiment which demonstrated such a conflictive situation. Participants were again primed with the concept of helpfulness and were confronted with the confederate who dropped his pens. However, this time some participants were informed that they were running late for the next experimental session and that they had to

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<sup>4</sup> Priming implies that the processing of stimuli is influenced by prior stimuli that activated certain implicit memory content. The priming stimuli activate context information that codetermines how subsequent (target) stimuli are interpreted and how fast they are processed (Lexikon für Psychologie und Pädagogik, 2011).

hurry. The goal to be in time for the next session overruled the priming effects which is why the primed participants were not more helpful than those who had not been primed.

(c) Self-focused attention

In the state of self-focus, the effect of primed behaviour can be overruled (Dijksterhuis & Bargh, 2001; Wheeler, DeMarree, & Petty, 2007). Baaren, de Bouter, Chartrand, Maddux, and van Knippenberg (2000) conducted experiments that mirrored this influence of self-focus. In their experiments, they adhered closely to the procedure used by Chartrand and Bargh (1999). In one experiment, the primed participants were confronted with a cloze in a for them unknown language which had to be completed by means of the words I, me, or mine. Then, it was tested if the primed participants imitated a present confederate in shaking with the foot or rubbing the nose. In contrast to the participants who had not been primed, the primed participants did not imitate the confederate because the manipulation had enhanced their self-focus.

(d) Liking

The relation between imitation and liking is bidirectional. Greater liking causes more imitation and more imitation leads to greater liking (Chartrand & Bargh, 1991; Dijksterhuis & Bargh, 2001). It is assumed that imitative behaviour fosters social interactions, increases bonding and liking between people, and facilitates mutual care (Iacoboni, 2009). However, that rapport between the interaction partners moderates the effect does not mean that the perception-behaviour link requires for its functioning liking or other positive emotions between the partners (Dijksterhuis & Bargh, 2001).

(e) Simultaneous occurrence of different unconscious behavioural impulses

A multitude of behavioural impulses is perceived at any given point in time and therefore conflicts between these impulses are sometimes inevitable (Bargh & Morsella, 2008); e.g. a person is confronted with delicious chocolate cake after reading an article about the increased attractiveness of thin looking women. In this case the inclinations to eat or not to eat exist at the same time. In case of such an internal conflict the person starts to experience the inclinations consciously, even though he or she does not cave in to the impulses (Bargh & Morsella, 2008).

To better understand the details of the methodology which are described in chapter 3, it is furthermore important to know that emotions can help organizing a person's response to environmental stimuli (Hazlett & Hazlett, 1999). According to Hazlett and Hazlett (1999), the emotional response of television viewers towards an advertisement can be a powerful instrument to influence people's attention, advertisement liking, brand liking, and consumption behaviour. Sensory input goes directly to the amygdale, the emotional centre of the brain. This pathway is much shorter and faster than the pathway to the areas of the brain where more complex cognition appears. This results in that people often feel and show emotional reactions before they consciously think about it. This also partly explains why television viewers are often unaware of what elements in for example an advertisement influence their behaviour. Emotions have two dimensions: valence (e.g. positive/negative or pleasant/unpleasant) and intensity. The dynamic change of these dimensions, the so-called emotional flow, in the viewer while watching commercials appeared to be very important for the commercial's impact. Hazlett and Hazlett (1999) conducted a study in which they established the emotional flow of participants who were watching television advertisements by means of facial EMG<sup>5</sup> responses. Two of the used advertisements were beauty-product commercials that showed attractive models. Both male and female participants showed at some times of the commercials stronger emotional reactions towards the models. Both genders had a significant emotional peak when they saw a close-up view of a female model using the promoted product. The reaction of the male participants was purely positive. The female participants showed an emotional response which had positive and negative components. The negative response of the female viewers could have been caused by a self-critical comparison process which might have led to less self-confidence and negative emotions. An explanation for the positive response in the male and female participants could have been the attractiveness of the model. Attractiveness can lead to positive emotions and can induce an emulation process. Furthermore, it could have been that the female participants identified themselves with the model (Hazlett & Hazlett, 1999). This explanation would be in line with the 'law of attraction' theory which suggests that humans have a strong preference and liking for people who are similar to themselves with regard to self-attributes that are important for their identity (Byrne & Griffitt, 1973; LaPrelle, Hoyle, Insko, & Bernthal, 1990; Montoya, Horton, & Kirchner, 2008). These findings give one reason why watching different scenes of eating behaviour can affect the viewer differently. Based on these research findings

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<sup>5</sup> EMG stands for electromyography and implies the measurement of the electrical activity given off by muscles (U.S. National Library of Medicine, 2011).

by Hazlett and Hazlett (1999) for the present study methodology, it seemed to be crucial to choose an actress the participants could identify themselves with. It was thought that this might lead to more liking and therewith to a higher likelihood that the participants imitate the perceived behaviour.

Finally, another methodical relevant and therefore influential factor when watching eating behaviour is the consumed food. Simmons, Martin, and Barsalou (2005) conducted a study in which they observed which effects pictures of appetizing foods have on the activity of different brain circuits. While seeing the pictures two brain regions were activated which lie close to gustatory regions that have been shown to be active during studies of taste perception. One of the activated regions was the so-called insula/operculum which is located near regions that become active when a person tastes glucose, sucrose, salt, or umami. On the one hand, the insula/operculum in the gustatory system receives projections from the main subcortical processing area for gustatory input, which is the ventroposterior medial nucleus of the thalamus. This region has been associated with taste par excellence. On the other hand, the insula/operculum sends among others projections to the orbitofrontal cortex (OFC). The OFC is the other important region which was activated during the experiment. It lies close to regions which become active when a person experiences taste stimuli directly. According to Simmons, Martin, and Barsalou (2005), besides having theoretical implications these findings are especially important with regard to societal issues like eating disorders, obesity and advertising. It can be expected that the more people are confronted with pictures of appetizing food the more they are stimulated and tended to taste food directly. Based on the proven importance of appetizing food, in the present study the product shown in the videos is a decorative chocolate cake. This product was chosen because it is generally regarded as a well-tasting and 'tempting' product. It was expected to have an appetizing and stimulating effect on the participants.

### 3. Research Method

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#### Research Design

A so called one-factor three-level experiment was used in which participants were randomly allocated to three different conditions. The factor ‘watching eating behaviour on screen’ was manipulated. As shown in table 1, the conditions consisted of (1) a 90-seconds video showing eating behaviour (eating-behaviour condition), (2) a 90-seconds video showing only food and no eating behaviour (food condition), and (3) a 90-seconds video showing no food and no eating behaviour (non-food condition).

**Table 1** Diagram of the experimental design

Randomization	Condition	Outcome
R	<i>Eating-behaviour video</i> food + eating behaviour	Amount of food consumed
R	<i>Food video</i> food + no eating behaviour	Amount of food consumed
R	<i>Non-food video</i> no food + no eating behaviour	Amount of food consumed

#### Participants

The participants were selected from the sample population (Wageningen University students) by means of the non-probability sampling technique ‘convenience sampling’, which implies that participants were chosen because they were accessible to the researcher and easy to recruit (Bryman, 2004).

#### Inclusion and exclusion criteria

It was strived for 90 participants at least; 30 participants for each condition. Inclusion criteria for participants were (a) a minimum age of 18 years, (b) be enrolled as a student at Wageningen University, and (c) be Dutch. The criterion on the cultural background of participants was included to prevent biased results (Conner & Armitage, 2002; Van den Bulck, 2000). Everyone who did not meet these criteria, who was allergic for the offered food, or who was obviously aware of the study’s purpose was excluded from participation.

#### Recruitment of the participants

Some days before the experiment took place, e-mails were sent to about 800 students who had signed up as volunteers to participate in studies organized by the Marketing and Consumer

Behaviour Group. The e-mail included an invitation to take part in a set of three experiments with a total duration of 15 to 20 minutes. The participants were promised a small gift after completing the experiment. Additionally, at days at which the experiment took place, flyers were spread in the Forum building to attract more students.

## **Research Measures**

Before the actual experiment started, a pre-test was carried out. The design of this test was based on an approach developed by Dillman (2007) and contained three stages: (1) review by four knowledgeable colleagues and analysts, (2) cognitive interviews with five students from the target sample, and (3) a small internal pilot study. In this paragraph, the composition of the questionnaire that was finally used for the experiment is explained. For the scales see appendix.

### **Emotional state and satiety status scale**

To shield the purpose of the manipulation, the participants were told that the first phase of the experiment was about watching people in television and its effect on the viewers' emotions. To support the cover story, the participants had to report their emotional state before and after the exposure to a video. These items all started with 'I feel...' followed by: pleasurable, depressed, excited, stressed, relaxed, satisfied, angry, contented, frustrated, glad, proud, and confident. This scale was based on the 'emotional response to indulgence' scale developed by Ramanathan and Williams (2007). Reliability of this scale in the current study was in the pre- and post-test  $\alpha = 0.89$ . As the participants' satiety status can interfere with the effects of the video, three items dealing with the participants' satiety status were hidden in the emotional state scale: I am hungry, I am saturated, and I have the desire to eat something. By testing the satiety status before and after the exposure to the videos, it could be tested if the videos had a direct influence on the participants' satiety. Reliability of this scale was in the pre-test  $\alpha = 0.85$  and in the post-test  $\alpha = 0.86$ . Later on in the questionnaire, the participants estimated how long it was ago that they had eaten something excluding the taste test. This information gave additionally indirect insight in the participants' satiety status. To give the impression that the question was about the general state of the participants, the participants also responded to items pertaining to their general bodily state: I have a lot of energy, I am tired, I have the desire to move, and I have the desire to get exercise. Each item was scored on a scale from 1 (totally disagree) to 7 (totally agree).

### **Evaluation of the actress**

After the exposure to the video, the participants were asked if they knew the actress personally or by sight. In case the participants answered this question positively, not only the content of the videos but also experiences with the actress and related emotions became influential factors which could have interfered with the video effects. As described in the literature section, how much someone likes a person, finds her attractive, or can identify him/herself with this person can influence the tendency to imitate this person (Dijksterhuis & Bargh, 2001; Hazlett & Hazlett, 1999). Therefore, the participants judged the actress by means of three items: The girl in the video seems nice, I find the girl in the video attractive, I think the girl in the video is charismatic. Each item was scored on a scale from 1 (totally disagree) to 7 (totally agree).

### **Evaluation of the chocolate cake samples**

While eating, the participants rated and evaluated the chocolate cake samples. The product evaluation had the function to distract the participants from the actual study purpose. Then, the participants indicated how much they usually like cake and chocolate on a scale from 1 (totally disagree) to 7 (totally agree). They also gave an estimation for how often they usually consume cake and chocolate by means of a scale from 1 (never) to 5 (very often).

### **Compensatory intentions and mental conflicts**

As compensatory intentions and mental conflicts during the taste test could have influenced the participants' consumption volume, they were measured according to the scale of Kronick and Knäuper (2009). Additionally, some items about the participants' body perception were added to the scale since this could also have influenced the food consumption volume (Pruneti, Fontana, & Bicchieri, 2004; Guarino et al., 2005; see Appendix 1 for items). Each item was scored on a scale from 1 (totally disagree) to 7 (totally agree). The scale had a reliability of  $\alpha = 0.81$ .

### **Restrained eating behaviour**

The general restrained eating behaviour of the participants was measured according to the Dutch Eating Behaviour Questionnaire (Van Strien, Frijters, Bergers, & Defares, 1984/1986) because this could also have influenced the amount of food consumed by the participants (see Appendix 1 for items). The 13 items were scored on a scale from 1 (never) to 5 (always). Reliability of this scale in the current study was  $\alpha = 0.88$ . The participants were also directly

asked if they followed a diet by means of a response scale going from 1 (totally not) to 5 (very strong).

### **Height, weight, age, gender, and education**

As participants with different weight categories could have reacted differently to the exposure (Nijs, Muris, Euser, & Franken, 2009), participants reported their height and weight which were used to determine their BMI. The questionnaire ended with questions pertaining to the participants' age, gender, and education. The gender could have been a confounding variable because many body-, weight-, and health-related factors may be gender specific (Van den Bulck, 2000). Also age and education could have been confounding variables, but this was less likely because all participants had a similar age and went to the same university.

### **Procedure**

The experiment was held during two consecutive weeks (02/05/2011-12/05/2011) at weekdays between 1.30 and 5.00 pm in a computer room in the Forum building. The experiment took place behind a computer and took about 15 minutes. The experiment was divided into three phases: (1) exposure to a video, (2) product tasting, and (3) post-tasting questionnaire.

### **Introduction and informed consent**

The room allowed simultaneous seating of a number of participants at individual tables with each one computer. To prevent mutual influence during the experiment some space was kept between the participants. Before the experiment started, written informed consent was obtained from the students. The form included information on the procedure of the experiment, the gathered data, and how the study results were planned to be used. It explained that the privacy of the participants and confidentiality of data identifying the participants were strictly maintained, and that the participants were free to stop the experiment at any point in time. The study purpose was concealed in order to blind the participants. According to the cover story participants would take part in two unrelated experiments. The first part of the experiment was masked as a study examining how the perception of people on screen influences the viewers' emotional state. The second and third part of the experiment was presented as a taste test aiming on the evaluation of a newly developed product. However, for ethical reasons at the end of the post-tasting questionnaire participants had the possibility to sign up to receive an e-mail with information about the actual study purpose and the study

outcome once the study was completed. After signing the informed consent form, the participants could log in at the computer and start the experiment. All questions and the videos were presented in this questionnaire which was constructed by means of the online survey program ‘Qualtrics’. The first question in this digital questionnaire asked the participants to write down their individual participant number which they could find on the informed consent form. This was done so that participants could be identified.

### **Experiment phase 1 - exposure to the video**

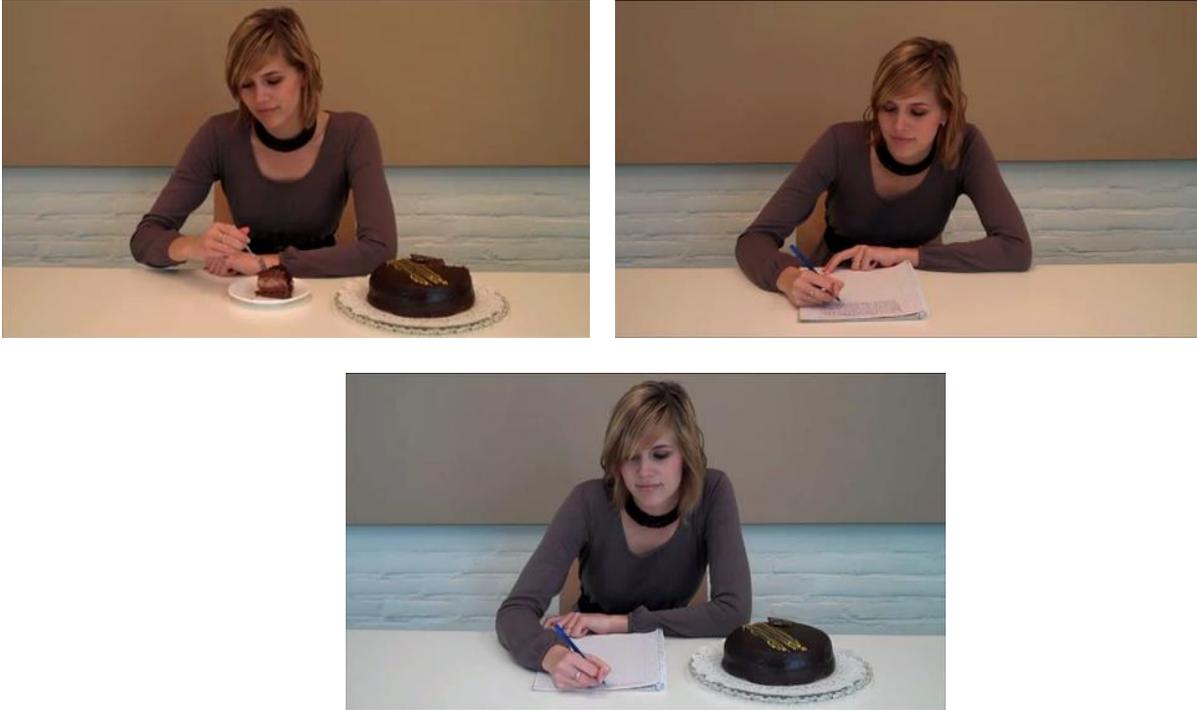
The first phase of the experiment took approximately five minutes. Table 2 shows the stages of this phase.

**Table 2** First phase of the experiment

<b>First phase of the experiment</b>	
(a)	Introduction
(b)	Questions about the participants’ emotional state and satiety status
(c)	Exposure to one video
(d)	Questions indicating if participants knew the actress
(e)	Questions about the attractiveness and charisma of the actress
(f)	Questions about the participants’ emotional state and satiety status

The participants were exposed to one out of three videos, depending on the condition to which they were automatically allocated to by Qualtrics. A completely randomized design was used to assign the participants to the conditions. The participants were blinded. The experimenter did also not know to which conditions the participants were assigned until the analysis of the experiment. As shown in figure 2, the video showed one of the following three scenes: (a) a person sitting at a table and eating a piece of cake while in front of the person a chocolate cake is present; (b) the same person in a similar posture writing a letter while in front of the person a chocolate cake is present, and (c) the same person in a similar posture writing a letter, but this time no cake is present. The videos were standardized by making them as similar as possible except for the independent variable. The actress was, as the participants themselves, a young student because it was expected that the participants would be more tended to imitate someone for whom they have a direct preference or liking (Dijksterhuis & Bargh, 2001) based on some attributes which they have in common with this person (Byrne & Griffitt, 1973; LaPrelle, Hoyle, Insko, & Bernthal, 1990; Montoya, Horton, & Kirchner, 2008). After completing the first phase of the experiment, the participants raised a hand to show the experimenter that they were ready for the next phase. The break between the first

phase and the second phase of the experiment needed to be kept as short as possible in order to prevent that the effect of the video attenuated and that the participants were not influenced by too many other external factors. The break had to have a similar length for each participant so that the conditions could be compared.



**Figure 2** Snapshots of the videos

**Experiment phase 2 – product tasting**

A plastic cup of water and three small bowls filled with approximately 50 grams of palatable pieces of similar looking chocolate cake products were placed in front of the participants. The amount of cake was written in grams, on the outside, on the bottom of each bowl. Every bowl had a number on it with which the product in the bowl could be identified. The products used for the tasting were similar to the product shown in the video based on the idea that the participants might want to have a similar product to which they were exposed. The stages of the second phase of the experiment are shown in table 3.

**Table 3** Second phase of the experiment

Second phase of the experiment	
(a)	Introduction
(b)	Product-tasting and simultaneous answering of evaluative questions about the samples
(c)	Questions indicating how much the participants usually eat and like chocolate

After this phase, the participants again raised their hand. The product samples and the informed consent form were taken away by the experimenter and the participants could move on to the last part of the experiment. The bowls and the form were taken away and stored together to make sure that the bowls were attached to the right participant.

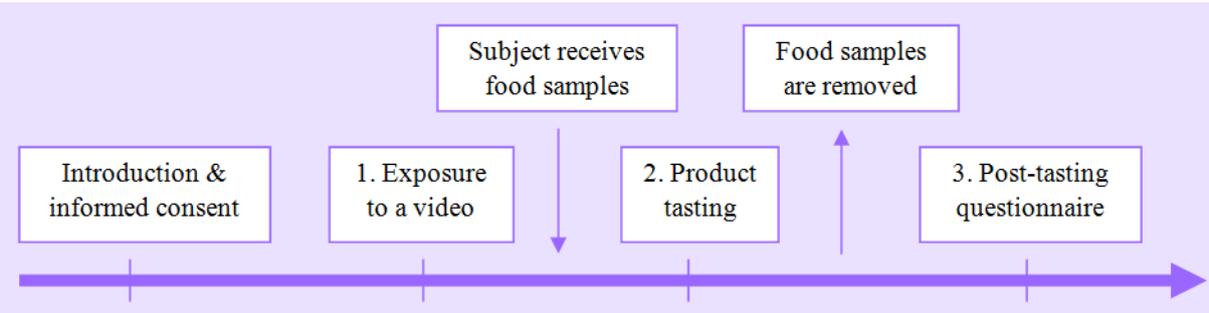
**Experiment phase 3 – Post-tasting questionnaire**

Phase three involved exclusively questions. The order and contents of the self-reported measures are listed in table 4.

**Table 4** Third phase of the questionnaire

Third phase of the experiment	
(a)	Question about time span since last food intake
(b)	Questions about compensatory intentions and mental conflicts during the experiment
(c)	Questions about body perception
(d)	Questions about restrained eating behaviour
(e)	Questions about height and weight
(f)	Questions about age, gender, and education

After completing the experiment, the participants could choose a gift and leave. As soon as the participants left, the amount of chocolate cake left in the bowls was weighed and written down together with the baseline amount of chocolate cake and the respective participant’s number in an Excel file. To summarize, the graphic in figure 3 presents the most important steps of the experiment.



**Figure 3** Course of the experiment

**Data Analysis Technique**

The analysis was performed by use of SPSS 18. Ratings for some scale items were reversed so that all ratings went into the same direction. Furthermore, mean scores on scales were calculated. To determine the participants’ weight status, body mass indexes (BMI) were

calculated using the standard formula of weight (kg) through height (m)<sup>2</sup> (Rolfes, Pinna & Whitney, 2009). After sorting the data, it was searched for outliers in terms of amount of food eaten by calculating the standard deviations. Participants were regarded as outliers when their consumption was equal to the mean consumption plus more than three times the standard deviation in the condition. No outliers were found. By using the analysis of variance (ANOVA) and the Krustal-wallis H Test, it was checked for differences between conditions and the participants' gender, age, BMI, time span since last food intake, access evaluation, product evaluation, restrained eating, as well as compensatory intentions and mental conflicts during the experiment. This was done to examine whether the randomization was successful. For the significant outcomes of the ANOVA the effect size ( $\eta^2$ ) was computed. An effect size of 0.4 was considered as large. Differences within conditions were determined by means of the Paired-Samples T-Test or the Wilcoxon-Mann-Whitney-Test (Field, 2009). For the significant outcomes of the T-Test, effect sizes ( $r^2$ ) were calculated. An effect size of 0.25 was considered as large. Additionally, ANOVAs were conducted to test for interaction effects between the conditions and restrained eating, BMI, as well as compensatory intentions and mental conflicts. This was done by first transforming the variable in question to a median-split variable. Then, the amount of food consumed was used as dependent variable, conditions and the variable in question as independent variables, and satiety status as well as time span since last food intake as covariates. Correlations were detected by means of the Pearson product-moment correlation coefficient and the Spearman's rank correlation coefficient. A correlation coefficient ( $r$ ) of 0.8 or higher was regarded as reflecting a high correlation (Bühl, 2008). A confidence interval of 95% was used for every statistical test.

## 4. Results

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### Manipulation Check

One person was removed from the data set because he did not fulfil the inclusion criteria in that he was not a student and not a member of the age group for which was strived. A total of 88 women (76%) and 28 men participated in the experiment. They had an average age of 21 years (range: 18-30). From the total sample, 81% had normal weight ( $n = 94$ ), 9.5% were overweight ( $n = 11$ ), 6.9% were underweight ( $N = 8$ ), and 2.6% were obese ( $n = 3$ ). The sample had a mean BMI of 21.9 kg/m<sup>2</sup>.

The conditions did not significantly differ with regard to gender, age, BMI, and BMI categories (all  $p$ s > 0.05). As shown in table 5, only time span since last food intake showed significant differences across conditions ( $F(2/113) = 5.718$ ,  $p < 0.01$ ;  $\eta^2 = 0.30$ ). The average time span in the eating-behaviour condition ( $M = 2.9$ ) was significantly higher compared to the average time span in the food condition ( $M = 2.1$ ;  $p = 0.02$ ) and in the non-food condition ( $M = 2.0$ ;  $p = 0.01$ ). The actress in the video was equally positive evaluated by the participants and no differences were found between the conditions. ( $p > 0.05$ ). Furthermore, no differences were found in compensatory intentions and mental conflicts during the experiment as well as in restrained eating behaviour between the conditions (all  $p$ s > 0.05).

### Video Effects on Amounts of Food Consumed

Participants consumed 55 grams (219 calories) of cake on average. The highest amount of food was consumed in the non-food condition with an average volume of 56 grams (226 calories), followed by the food condition with an average volume of 55 grams (220 calories). The tail-end formed the eating-behaviour condition with an average volume of 53 grams (212 calories). Watching the food video and non-food video versus the eating-behaviour video did not lead to significantly different food consumption volumes across the conditions ( $p > 0.05$ ). The results showed that the video effects on the amount of food consumed were considerably influenced by the subjects' satiety status prior to the exposure ( $p = 0.00$ ), the subjects' satiety status after the exposure ( $p = 0.00$ ), and the mean mark that was given to the products ( $p = 0.03$ ).

It was tested whether restrained eaters respond differently to the videos in terms of their food consumption. On this account, first the median score of restrained eating was calculated ( $Mdn = 3.5$ ). Then, a new variable was made in which all participants who scored lower than the

median were seen as low restrained eaters and all participants who scored above the median as high restrained eaters. An ANOVA was conducted in which the amount of food consumed was the dependent variable and the conditions as well as the median-split variable of restrained eating the independent variables. Time span since last food intake and satiety status were included as covariates. The test did not show significant interactions between the conditions and the median-split variable of restrained eating ( $p > 0.05$ ). The same test was conducted another two times to test whether participants with a higher BMI or compensatory intentions and mental conflicts during the experiment responded differently to the videos in terms of their food consumption volume. The medians of BMI (Mdn = 21.6) and compensatory intentions and mental conflicts (Mdn = 5.4) were calculated and the variables were transformed into median-split variables. The test was conducted as before only that this time first the median-split variable of BMI and then the one of compensatory intentions and mental conflicts were used instead of the median-split variable of restrained eating. No interactions were found between the conditions and the median-split variables of BMI as well as compensatory intentions and mental conflicts during the experiment ( $ps > 0.05$ ).

### **Video Effects on Mood, Product Evaluation, and Body Perception**

As shown in table 5, watching the eating-behaviour video made participants feel less pleasurable and glad, and increased their desire to get exercise compared to watching the food video and the non-food video (all  $ps \leq 0.05$ ). Especially the increase in the desire to do some exercise is remarkable as it indicates a contrast effect to what was expected. A strong significant difference was found between the eating-behaviour condition and the food condition ( $p = 0.01$ ). The difference between the food condition and the non-food condition was also significant ( $p = 0.05$ ). Furthermore, a marginal effect on satisfaction and anger was found in that the eating-behaviour video made participants feel slightly less satisfied and less angry ( $ps = 0.08$ ). Ratings on satiety did not differ across the conditions ( $ps > 0.05$ ). Within-group comparisons revealed significant differences in the food condition ( $p = 0.05$ ,  $r^2 = 0.32$ ) indicating that the video in which only food was shown had a slightly decreasing effect on the participants' satiety status. Regarding the cake evaluation, no significant differences in participant ratings between the conditions (all  $ps > 0.05$ ) could be found. It was checked whether the videos had an effect on the body perception of the participants ('I am pleased with my weight' and 'I am pleased with the appearance of my body'). No significant differences were found across the conditions ( $ps > 0.05$ ). Moreover, it was tested whether the participants' feelings of pleasure, gladness, satisfaction, and anger, as well as their desire to

get exercise mediated the relation between video exposure and food intake, but this was not the case (all  $p$ s > 0.05). The finding that the feelings were influenced by the videos while the food intake was not leads to the assumption that the video effects on the participants' feelings and their effects on food intake are triggered by different processes.

**Table 5** Mean (SD) of significant differences between conditions

<b>Variable</b>	<b>Eating</b> (n=40; 34%)	<b>Food</b> (n=38; 33%)	<b>Non-food</b> (n=38; 33%)	<b>Overall</b> Total	<b>p-value</b>	<b>Effect size</b>
Time since last food intake	2.9(2.4)	2.1(1.6)	2.0(1.7)	2.3(2.0)	0.00	0.30
Pleasurable (2)	4.9(5.0)	5.6(6.0)	5.2(5.0)	5.2(5.0)	0.05	-
Glad (2)	4.5(1.2)	5.2(5.0)	5.1(5.0)	5.0(5.0)	0.03	-
Desire to get exercise (2)*	4.0(4.0) <sup>a</sup>	3.0(3.0) <sup>b</sup>	3.7(3.0) <sup>c</sup>	4.4(5.0)	0.03	-

\*The difference between a and b, as well as the difference between b and c were significant ( $p$ s ≤ 0.05).

## 5. Discussion and Conclusions

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The present study was designed to test the hypothesis that watching eating behaviour on screen leads to a higher food consumption volume in viewers compared to watching food only or another neutral behaviour on screen. The results of the study did not support the hypothesis. The participants exposed to the eating-behaviour video did not eat significantly more compared to those who watched the food or non-food video.

An explanation for the lack of significant differences in food consumption volume between the conditions could not be found by looking at possible confounders such as time since last food intake, satiety status, compensatory intentions, mental conflicts, restrained eating, and weight status.

Surprisingly, the results showed that a low satiety status was associated with a lower food consumption volume. An explanation for this association could not be found. There were also no significant associations found between the amount of food consumed and the participants' BMI, restrained eating behaviour, or time span since the last food intake. Blass et al. (2006), who showed in their study that watching television while eating leads to a higher food consumption volume, could also not find any significant associations between food consumption volume and the named variables. I agree with Blass et al. (2006) that it is unexpected and odd that these variables, which can often be used to predict one's eating behaviour, did not show any association with the food consumption volume. Regarding the study of Blass et al. (2006), it can be assumed that the above named characteristics could not predict the food consumption volume because the participants were deaf for their inner voice telling them how much to eat due to the distraction and priming induced by the television program. This assumption is in line with the finding of Francis and Birch (2006) that children's attention is concentrated on the television program with 93% during meals and with 96% during snacks. Blass et al. (2006) themselves also stated that adult viewers do probably not recognise internal signals of satiety as strong as usual while viewing television. However, this could not have been the reason for the present study because the eating took place after the videos were shown. Maybe no associations were found between the named characteristics and the participants' food consumption volume because the amount that could be eaten by the participants was too low. The maximum amount of cake that could be consumed was about 160 grams. Furthermore, the participants were clearly asked to at least eat a bit from all three

cake products that were offered. Thus, the food consumption volume that could actually be controlled by internal signals was very small, maybe too small to actually activate the natural, internal warning system. This assumption does not only give a possible explanation for the lack of associations described above but also for the lack of significant differences in food consumption volume between the conditions. Another possible explanation could be that the participants' self-focus diminished the priming effect. As described in chapter 2, in the state of self-focus, the effect of primed behaviour can be overruled (Dijksterhuis & Bargh, 2001; Wheeler, DeMarree, & Petty, 2007). The self-focus could have been caused by the emotional state scale at the beginning of the questionnaire which led the participants by means of statements formulated in the first person (e.g. I feel, I have, I am) to think about their current emotional and physical state.

As already indicated above, the present study differs from most previous studies that showed a link between television viewing and eating behaviour in that the participants did not eat while watching the video but afterwards (e.g. Francis & Birch, 2006; Blass et al., 2005; Matheson et al., 2004). Thus, until now it is still not fully discovered how watching eating behaviour affects one's food consumption afterwards. However, it can be assumed that the effect on the food consumption volume is much weaker compared to when a participant is eating while watching since the participant is much more distracted and at the same time stronger influenced when watching television. It leads to the thought that this might be a crucial factor for the link between watching television and eating behaviour.

An interesting finding was that watching the eating-behaviour video compared to the food video and non-food video made participants feel less pleasurable and glad, and increased their desire to get exercise. Especially the increase in the desire to get exercise is surprising because it indicates a contrast effect of what was expected. Instead of eating more calories the participants developed the wish to do sports. A possible explanation for this effect could be a conflict between the primed behaviour and current goals and purposes of the participants. As described in chapter 2, conflicts with current goals and purposes can control or even inhibit the effect of primed behaviour (Dijksterhuis & Bargh, 2001). In the questionnaire most of the participants indicated to find healthy eating important. Eating healthy could be a counter-goal to eating chocolate cake. After participating in the experiment, one person stated that the product shown in the video looked so caloric that she did not want to eat too much because she was worried about eating so many calories. This

leads to the thought that some participants could have been drawn back by the possible negative consequences of eating the cake since it is proven that the negative consequences associated with engaging in a primed behaviour can stop the primed person to actually engage in the behaviour (Dijksterhuis & Bargh, 2001). It could also be that the good looking and slim girl in the video led to negative feelings in the (female) viewers about their own look, body size, or shape (Hazlett & Hazlett, 1999) and therewith decreased the effect of the primed behaviour. Watching the slim girl could even have primed diet goals. However, neither negative feelings towards the actress nor the development of diet goals appeared from the analysis.

Last but not least, the study results led to the consideration whether viewers even have the tendency to imitate people on screen. As described in chapter 2, imitation has a guiding role in social behaviour (Bargh & Morsella, 2008). It helps to behave in the expected and appropriate manner, and facilitates liking and bonding between the interacting individuals (Dijksterhuis & Bargh, 2001). However, when watching television, there is no interaction partner who actually could react on the viewers' imitative behaviour. Imitation would neither result in bonding nor liking. In other words it would be useless.

One main weakness of this experiment was the possible low external validity due to the unnatural setting. Eating scenes are usually embedded within a television program. Furthermore, people watch television at home, often together with others, and they are free to choose what and when to eat. The videos shown to the participants were also not comparable to scenes shown in television due to the simple design. The fact that the sample consisted exclusively of students could also have caused a falsification. Francis and Birch (2006) found in their experiment a significant relation between the amounts of food consumed in children who watched television and their previous experiences with eating in front of the television. The more the children were used to it, the more they ate during the experiment. Francis and Birch (2006) assumed that children who frequently ate in front of the television became less sensitive to internal cues. The present study was conducted with students who often regard mealtimes as social events, especially when they are living in student houses where meals are often prepared and consumed together. Besides, it can be assumed that not every student is used to eat in front of a screen, simply because it is very likely that not many students have a television in their rooms or at home. Thus, it can be expected that most students do not eat in front of the screen very often and that they are therefore less tended to engage in behaviour

that is primed on screen. Another weakness could have been that it was not controlled for the usual external eating behaviour of the participants as this could also have mediated the video effects (Van Strien, Frijters, Bergers, & Defares, 1986). It is assumed that external eaters are naturally more tended to act according to the manipulation.

That the study findings did not support the hypothesis does, however, not mean that there is no relationship between watching eating behaviour in television and the viewers' food consumption volume. To be able to reject or accept the hypothesis further research should be done on this particular question. The present study provides different indications on how to create a follow-up study which is better suitable to test the hypothesis. It is suggested to strive for a more natural setting, for example by means of a randomized field experiment. Participants who have a similar satiety status at baseline should take part, so that the conditions are easier to compare. Furthermore, the genders should be present in equal amount or only one gender should be tested at a time. More food should be provided, for example an entire meal or different kinds of snacks. The food should be provided during the exposure and not afterwards. It is also recommended to increase the time in which the participants are exposed to the manipulation based on the assumption that this strengthens the effect. Finally, in a follow-up study, the external eating behaviour of the participants should be measured since this can also mediate the perception-behaviour effect.

Further research about priming mechanisms in television influencing food consumption behaviour should be done because it would be valuable for the academic community and for applications in practice. The benefit for the academic community would be new insights in consumer behaviour. It would increase the understanding on how consumers take decisions and how they response to external cues. This in turn would give suggestions for further research and the development of new theories or the enhancement of existing theories. The implications for practice could be multivarious. Many people eat mindless (Vartanian, Wansink, & Herman, 2008). Because of that, it is important to inform people about external eating cues. The knowledge could be used to educate television viewers, especially parents who let their children watch television and children themselves. This would increase their empowerment and would enable them to defend themselves (and others) against "mental contamination" (Harris, Bargh, & Kelly, 2009, p. 216). However, the education of people alone would most probably not be sufficient to prevent them from engaging in primed behaviour; the environment should also be changed (Vartian, Wansink, & Herman, 2008). For

example, the findings could be used to integrate stricter regulations for television programs. Eating behaviour in television could be reduced and unhealthy eating behaviour in movies for children as well as advertisements in which eating behaviour is shown could be limited. Improved knowledge could also be used for the promotion of healthy eating behaviour.

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## Appendix: Scales

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### *Emotional state items*

1. I feel pleasurable.
2. I feel depressed. (reversed)
3. I feel excited.
4. I feel stressed. (reversed)
5. I feel relaxed.
6. I feel satisfied.
7. I feel angry. (reversed)
8. I feel contented.
9. I feel frustrated. (reversed)
10. I feel glad.
11. I feel proud.
12. I feel confident.

### *Satiety status items ( $\alpha = 0.89$ )*

1. I am hungry. (reversed)
2. I am saturated. (reversed)
3. I have the desire to eat something.

### *Compensatory intentions and mental conflicts ( $\alpha = 0.81$ )*

1. The product tasting was a pleasurable experience for me.
2. I wanted to eat something, but shouldn't have done it. (reversed)
3. I felt guilty while I ate the products. (reversed)
4. I should have eaten less. (reversed)
5. I felt conflictive emotions when I was confronted with the products. (reversed)
6. I will eat less at the next meal time. (reversed)
7. Soon, I will do sports to compensate my overeating. (reversed)
8. I am pleased with my weight.
9. I am pleased with the appearance of my body.

*Restrained eating behaviour* ( $\alpha = 0.88$ )

1. When I put on weight, I eat less than I usually do. (reversed)
2. I try to eat less at mealtimes than I would like to eat. (reversed)
3. I refuse offered food or a drink because I am concerned about my weight. (reversed)
4. I take into account my weight with what I eat. (reversed)
5. I eat food which is especially good for my figure. (reversed)
6. I watch exactly what I eat. (reversed)
7. When I ate too much, I eat less than usual the following day. (reversed)
8. I deliberately eat less in order to not become heavier. (reversed)
9. I try not to eat between meals because I am watching my weight. (reversed)
10. I try not to eat in the evenings because I am watching my weight. (reversed)
11. When I eat something I think about if I can get bigger or thinner from it. (reversed)
12. For me it is important to eat healthy.
13. I see myself as a healthy eater.