Chapter 4
Moment-to-Moment Processing of TV Commercials

4.1 Introduction

Research in psychology suggests that, given a hedonic experience that extends over time, such as a commercial, people will evaluate the sequence differently depending on both the key moments in the extended series and the pattern of the sequence (e.g., Fredrickson and Kahneman 1993; Hsee and Abelson 1991; Kahneman 1999; Kahneman et al. 1993; Loewenstein and Prelec 1993; Ross and Simonson 1991; Varey and Kahneman 1992). In the first part of this chapter several key aspects with regard to people’s moment-to-moment processing of series of hedonic events in relation to overall assessments are discussed. This research stream provides the theoretical and empirical basis to show why it is important to investigate consumers’ moment-to-moment processing of TV advertising.

In the past, research in advertising has investigated several aspects of consumers’ moment-to-moment responses to TV commercials. This chapter proposes a theoretical framework of how consumers’ moment-to-moment processing of TV commercials may take place. Next, it discusses the different phases in consumers’ moment-to-moment responses to TV commercials within this framework, together with the instruments that were used to measure these responses. This chapter aims to show why insights are lacking in our understanding of consumers’ moment-to-moment processing of TV commercials in relation to consumers’ evaluations of the entire commercial and to their decision to discontinue viewing during commercial exposure. At the same moment, it provides instruments that may be used to collect consumers’ “in-process” data during commercial exposure.
4.2 Evaluation of hedonic temporal sequences

In experiencing hedonic temporal sequences - a series of hedonic outcomes spaced over time - research in psychology suggests that people do not simply add up the hedonic values associated with the separate moments to arrive at an overall assessment of the series (Fredrickson and Kahneman 1993). As discussed by Baumgartner et al. (1997), studies on people's moment-to-moment evaluations during temporal sequences (e.g., Fredrickson and Kahneman 1993; Redelmeier and Kahneman 1996; Kahneman et al. 1993; Schreiber and Kahneman 1998; Loewenstein 1987; Loewenstein and Prelec 1993) find evidence that, people seem to rely on a weighted average model, wherein certain key moments during the sequence are weighted more heavily than others in their evaluations. In contrast, people might ignore other factors in evaluating extended experiences. As argued specifically by Baumgartner et al. (1997), people might not be sensitive to total or cumulative gain or loss nor to the duration of their affective experience (e.g., Fredrickson and Kahneman 1993; Redelmeier and Kahneman 1996; Varey and Kahneman 1992). For example, no effect of the duration of the events was found in the pain study by Redelmeier and Kahneman (1996) and in the study of emotionally arousing films by Fredrickson and Kahneman (1993). In other studies, the effects of duration were very small (Schreiber and Kahneman 1998; Varey and Kahneman 1992). These studies are compatible with the idea of evaluation by moments, people apparently construct and evaluate a representative moment and use the evaluation of this moment as a proxy for the evaluation of the entire episode (Kahneman 1999). It is, therefore, important to investigate the influence of key moments in a series of events, such as a TV commercial, on people's moment-to-moment and overall evaluation of the series. The disproportionate influence of the end note (final moment), the peak (maximal value), the direction and the rate of change on the evaluation of a hedonic temporal sequences are documented especially well.
4.2.1 Peak and end note

Research on overall utilities for extended hedonic episodes indicates that individuals do not simply average a series of positive and negative events to arrive at a net evaluation. Instead, the net evaluation has been found to be more strongly correlated with the peak and final experiences of the sequence (e.g., Fredrickson and Kahneman 1993; Kahneman 1999; Loewenstein and Prelec 1993; Ross and Simonson 1991; Varey and Kahneman 1992). The peak refers to the highest level of hedonic response during the temporal series, while the end note refers to the ending hedonic response to the series of events. This dominance of peaks and end notes has been explained as a manifestation of the availability heuristic that is widely used in a range of judgments and decisions (e.g., Tversky and Kahneman 1983). According to this explanation, both the peak and end note are relatively salient points of the experience stream, and are hence highly available in memory. Peaks are salient because they are the most intense points of the experience stream and also because they are unique either locally or globally. End notes are salient since they have been experienced most recently and hence enjoy an advantage in terms of memory encoding and recall (see Fredrickson and Kahneman 1993; Miller and Campbell 1959; Ross and Simonson 1991).

The dominance of peaks and end notes has been empirically documented in a number of studies. The participants in these studies generally provided a real-time record of their experience during an episode and later provided a global evaluation of the entire episode or indicated a choice of which of several episodes they would rather repeat (Kahneman 1999). For example, Ross and Simonson (1991) showed that events, which end on a happy note are evaluated more favorably than those that do not, even if the latter sequence generated more positive feelings during its early stages (Kahneman 1999). Varey and Kahneman (1992) found that increasing the duration of an aversive episode by adding low or moderate pain to the end of a series of negative experiences (thereby giving the episode a happy, or at least hopeful, ending) reduces the global evaluation of pain, even though the additional moments extend the duration of the painful episode and thus should increase the total pain experienced during the entire episode. Also in the study by Fredrickson and Kahneman (1993) in which respondents were exposed to short plotless films of pleasant
subjects, such as low-level flying over an African landscape, or of unpleasant subjects, such as an amputation, high significant correlations were found between global evaluations and the peak, respectively end evaluation. In other research the importance of the peaks and end notes is demonstrated by having patients experiencing a painful medical procedure (Redelmeier and Kahneman 1996), immersion of one hand in cold water (Kahneman et al. 1993) and in aversive sounds of varying loudness and duration (Schreiber and Kahneman 1998).

### 4.2.2 Direction and rate of change

Other research, involving examining preferences for sequences of outcomes, shows that people are sensitive to the hedonic trend of the series. Conventional economic wisdom suggests that people will exhibit positive time discounting on the basis of the notion that delayed outcomes are valued less, leading to a preference for declining series (Baumgartner et al. 1997). Instead, people often exhibit negative time discounting (Loewenstein and Prelec 1993), preferring an improving series of pleasant outcomes to a declining one. This sensitivity to trend appears to depend on not only the direction (increase versus decrease) and amount of change but also the speed with which it occurs over time (velocity). People do not only prefer improvement in series of hedonic events, but they are also prefer a series of pleasant events in which the improvement occurs at a fast pace (e.g., Hsee and Abelson 1991; Hsee, Abelson, and Salovey 1991).

It has been proposed that a heuristic process, involving the use of reference points, underlies the effect of positive hedonic trend on overall evaluations (e.g., Hsee and Abelson 1991; Loewenstein and Sicherman 1991). Specifically, it is been argued that the current experience in a sequence of experiences is judged not in isolation, but with respect to its preceding experience. Thus, the current experience in an increasing sequence (as compared to flat or decreasing sequences) is likely to be evaluated more favorably, since it is at a higher hedonic level than its reference point of the preceding experience. Consequently, the overall evaluation of the experience stream is likely to be greater for an increasing sequence, as compared to a flat or decreasing sequence.
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For example, Ross and Simonson (1991) reported that subjects were willing to pay more for a diskette containing computer games, if the games they sampled became more attractive over time than those subjects who sampled a diskette that contained a less attractive game at the end. Similarly, Varey and Kahneman (1992) found that subjects globally judge a series of aversive experiences (e.g. waiting in line, carrying a suitcase, having a headache) as more negative if the aversiveness increases over time. Also when the average wage obtained is equal across series, people also prefer increasing wages over time in comparison to obtain an equal amount of money at each time (Loewenstein and Sicherman 1991). Likewise, in a medical setting, Dubé and Morgan (1996) found that an increasing hedonic trend of hospital experiences had a significant positive effect on retrospective judgments of the overall hospital experience. Finally, Hsee and Abelson (1991), Hsee et al. (1991) and Hsee, Salovey, and Abelson (1994) showed that overall satisfaction resulting from a sequence of objective instances (for example, income or school grades) that were increasingly positive over time was higher than the satisfaction from a series that had the same overall value but did not exhibit this trend.

4.3 Post-process versus in-process assessments

Studies mentioned above have mainly focused on the influence of moment-to-moment responses during the sequence of hedonic events on overall responses, made after being exposed to the entire sequence. In this thesis we are interested whether the neglect of time duration and the effect of the peak-end rule, the direction and the rate of change on overall evaluation also apply for different dimensions of consumers’ responses to TV commercials. Also, as argued by Kahneman (1999), several experiments have pointed to the existence of a continuous evaluative process within people, which manifests itself in physiological responses at several levels, in expressions of affect and in an immediate propensity to approach or void (Larsen and Frederickson 1999; Stone, Shiftman, and DeVries 1999). This means that a consumer experiencing pleasure or distress from a TV commercial, s/he can immediately respond with a corresponding acceptance or rejection of the commercial. The notions of acceptance or rejection imply that a consumer’s response at a certain moment in the
commercial can directly and immediately influence the consumer to react emotionally and/or instrumentally to continue or to discontinue watching. Therefore, it is intriguing to investigate whether moment-to-moment processing of different commercial dimensions influence moment-to-moment consumers’ decisions to stop watching the commercial. We may think that each episode in which the consumer may decide to stop viewing may be broken down into a series of shorter episodes, with each one having its own peak, end, direction and rate of change in different commercial dimensions that influence consumers’ emotional and/or behavioral response to the commercial at that moment.

For these objectives we need to obtain reliable measures of instant consumers’ responses during commercial, and thus to use in-process measures instead of post-process measures (Kahneman 1999; Larsen and Frederickson 1999; Stone et al. 1999). Post-process retrospective evaluations are suspect because they are liable to biases of memory and to a process of evaluation that sometimes violates elementary logical rules, according to which the overall assessment of an episode is the product or sum of average instant moment-to-moment assessments and duration (Kahneman 1999; Kahneman, Wakker, and Sarin 1997). Retrospective evaluations of experiences are likely to provide erroneous and inaccurate estimates of the true real instant experiences, while moment-to-moment evaluations concurrently with experience maximize validity and accuracy (Kahneman 1999; Larsen and Frederickson 1999; Stone et al. 1999).

4.4 Moment-to-moment responses to TV advertising

Over the past decades, numerous theoretical advertising frameworks have been proposed to understand which processes consumers engage in the elaboration of a commercial (Rosbergen 1998; Vakratsas and Ambler 1999). Most advertising models agree that consumers need first to be exposed to the ad (contents) and need to pay attention to the stimulus under interest. Then, intermediate mental responses take place before the ad may affect consumers’ actual behavior (conation). In general, the intermediate mental effects are divided into two categories, which may interact with each other. The first category is cognition, the “thinking”
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dimension of a consumer’s response and the second category is affect, the “feeling” dimension of a consumer’s response. Commercial and consumer characteristics influence the different phases in the advertising model. Specific advertising models differ from each other in terms of 1) assumption of the layer of intermediate consumers’ responses to advertising input, 2) focus on one or more intermediate responses, 3) assumption of a fixed hierarchy in the layers of consumers’ responses to the ad and 4) assumption of a strategy of how consumers process information (Rosbergen 1998; Vakratsas and Ambler 1999).

However, these advertising models do not provide insights into how consumers’ moment-to-moment attention to and processing of the commercial influences their decision to stop watching it at a particular point in time (Van de Rozenberg 2003). Even when consumers decide to be exposed to the entire commercial, the advertising frameworks do not reflect how consumers’ moment-to-moment attention and processing during the commercial influence their overall responses to the commercial. Consumers’ avoidance of a TV commercial is seen as a moment-to-moment behavioral measure of consumers’ response to a TV commercial (Siddarth and Chattopadhyay 1998) and therefore, in agreement with most advertising models, moment-to-moment affective and cognitive responses to the commercial contents should influence this behavioral avoidance behavior. Using overall retrospective emotional and attitudinal measures, Olney et al. (1991) also showed that affective and cognitive responses explain consumers’ viewing time of TV commercials. Also the framework, suggested by Mehrarian and Russell (1974), studying people’s approach to or avoidance of environmental stimuli, showed that emotional responses influenced this behavior.

Because, as most advertising models postulate, consumers’ exposure and attention are the first and necessary conditions for consumers’ to process a commercial, consumers should also first be exposed and pay attention to a commercial moment, before generating moment-to-moment mental and behavioral responses to it. As revealed by Lang et al. (2000, p. 95), empirical support is found that viewers’ attention levels and responses during viewing of a single message fluctuate across commercial moments as a function of a television message’s structure and content (e.g., Alwitt 2002; Baumgartner et al. 1997; Hazlett and Hazlett 1999; Hughes 1992; Lang 1995a; Olney et al. 1991; Reeves et al. 1985; Reeves and Thorson
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1986; Reeves et al. 1985; VandenAbeele and MacLachlan 1994a; Young 2002) and consumers’ differences (Siddarth and Chattopadhyay 1998; Van Meurs 1998b, 1999). Based on this reasoning, we propose a general framework of how consumers process TV commercials moment-to-moment, presented in Figure 4.1.

Figure 4.1: Proposed framework of consumers’ moment-to-moment processing of TV advertising

When being exposed to a commercial moment, consumers first need to pay attention to it to identify the commercial moment and its contents as such and before moment-to-moment affective and cognitive responses to the commercial moment are generated. Affective and cognitive responses to the commercial moment, but also responses to previous moments may interact with each other and influence consumers’ behavior to continue or discontinue to watch the commercial moment under interest. Individual (moment-to-moment) commercial and consumer characteristics may influence each stage within this framework. In the next session we discuss studies that have investigated (consumer and commercial factors influencing) one or more dimensions of moment-to-moment responses to
TV commercials as presented in Figure 4.1. Details of these studies are summarized in Table 4.5.

4.5 Moment-to-moment consumers’ attention

As described by Rosbergen (1998), attention may be conceptualized as having capacity limitations (Broadbent 1971; Kahneman 1973; Kahneman and Treisman 1984), which causes consumers to focus their cognitive resources on a limited number of stimuli. In processing information from a TV commercial, then, consumers must decide which stimuli to attend to (focus) and how much attention to devote to each stimulus (amount), which both direction and intensity are affected by characteristics of the ad, response opportunity factors, and consumer characteristics (MacKenzie 1986). Despite the agreement among advertisers and researchers about the important role of consumers’ attention to every key moment in the commercial, only a few studies have examined consumers’ moment-to-moment attention during commercial exposure. In addition, those studies did not measure consumers’ moment-to-moment attention uniformly (see Table 4.5). Some studies inferred the amount of attention consumers paid to each TV commercial moment using motoric, more voluntary, measures, such as exposure times, while others used observation to investigate whether consumers really watched the screen. Also, indirect measures such as water pressure, electrical demand and more automatic, physiological measures such as heart rates and galvanic skin responses have been used to infer moment-to-moment consumers’ amount attention during commercial exposure.

4.5.1 Exposure time

Several studies have used the people meter or set meter to investigate the exposure times of individual consumers as measures of consumers’ moment-to-moment attention to TV programming and commercials in a natural setting (e.g. Siddarth and Chattopadhyay 1998; Danaher 1995; Van Meurs 1998b, 1999; Zufryden et al. 1993; see also Table 1.1). The people meter registers the turning the television set on or off, interim logging in or logging off by a viewer, changing channels and switching between Teletext and regular programming, provided that each consumer log on and off
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reliably (Van Meurs 1999; Soong 1988). For example, Danaher and Beed (1993) found that 92 % of panelists push their button correctly. A set meter also electronically registers viewing and switching behavior per television set, without registering the type or number of viewers watching the set. Others used an identical instrument in a laboratory setting in which consumers could control their exposure time to TV commercials (e.g., Olney et al. 1991). Whether consumers can log on and log off their television reliably, are physically present in the room and are really looking at the television can be accurately controlled in a laboratory setting. Table 1.1 gives an extensive overview of these studies and their results. These studies showed that ad and consumers’ characteristics influenced consumers’ moment-to-moment exposure time to TV commercials.

Another instrument to measure moment-to-moment exposure time to TV commercials in a laboratory setting is the CONPAAD instrument (i.e. CONjugately Programmed Analysis of ADvertising; Grass and Wallace 1969; Nathan and Wallace 1965; see Table 4.5). Consumers operate either a foot or a hand device, which controls the volume of the audio, and/or another food or hand device that controls the brightness of the video of a commercial. The theory is that the more attention and interest in the commercial the consumer has, the more physical effort (pressure on the device) s/he is willing to exert to see and hear the commercial.

4.5.2 Watching the screen

Other researchers argued that people meters and set meters do not register whether consumers are physically present in the room and/or really look at the screen at moment of registration and therefore used observers or video camera’s to register “watching the screen” (e.g., Anderson 1985; Krugman, Cameron, and White 1995; see Table 1.1). For example, Anderson (1985) used a videotape of consumers’ TV viewing behavior in a laboratory setting to determine the periods of time they really looked at the screen, while Krugman et al. (1995) made use of in-home observations of the periods consumers watched the screen. Both studies, and also other studies (see Table 1.1), concluded that if the television is on, consumers frequently enter and leave the viewing area, and when present they are often engaged in other activities, and thus do not look at the screen. The studies also revealed that consumers looked longer on screen during TV
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shows, talk shows and two one-minute commercials. They showed that increasing the number of edits in a message resulted in significant slowing of the heart rate. Following previous research (Lacey and Lacey 1974; Lacey, Kagan, and Lacey 1963; Lang 1990; Lang 1995a; Lang, Newhagen, and Reeves 1996), they argued that consumers then paid more attention to TV commercials with more edit changes.

Galvanic skin response (GSR), also known as electrodermal response (EDR), measures the skin’s electrical resistance or conductance (e.g., Klebba 1985). When the consumer’s autonomic nervous system is activated by (some element of) a stimulus, the skin resistance or conductance drops. The pattern of GSR or EDR responses indicates the physiological changes that may occur during the commercial presentation. Some advertising researchers have examined whether GSR/EDR would covary with (intense) attention to TV advertising, but the empirical support for this hypothesis is mixed at best (Kohan 1968; VandenAbeele and MacLachlan 1994b; Watson and Gatchel 1979; see also Table 4.5).

4.5.5 Conclusions

Besides the detailed viewing analysis made possible by second-by-second ratings, the other big advantage of the people meter and set meter is that they are completely unobtrusive instruments: Consumers are not aware that details of their viewing behavior are collected (except that they need to log in and log out on the people meter’s device). Although the people meter gives precise registration of viewing behavior, it cannot register whether the consumer is physically present in the room and/or s/he really watches the commercials, while not doing something else like reading or talking (Danaher 1995). However, using self-controlled exposure times in a laboratory setting or in-home observations to measure consumers’ attention, this can be controlled. Therefore, self-controlled exposure times, and measuring whether consumers really watch the screen, may be seen as a direct measure of consumers’ amount of attention to TV commercials (Krugman et al. 1995; Olney et al. 1991; Rosbergen 1998). By using electrical demand or water pressure as a measure of consumers’ attention to TV commercials, this relationship can be questioned. Consumers may be doing other competitive activities to watching TV that do not require any electricity or water and they do not have to look at the screen when they
programming than during commercials. Krugman et al. (1995) found support for the hypothesis that consumers doing more competitive activities (e.g., reading, chores and hobby craft) to watching TV, also paid less attention to the screen, while this was not the case when consumers were engaged in complementary activities (e.g., eating, drinking, conversations about program) to watching TV.

4.5.3 Electrical demand and water pressure
Two studies used water pressure (Knealy 1988; Whalan 1986, both cited in Nakra (1991)), and another study used electricity demand (Bunn 1982) to measure consumers’ moment-to-moment attention during TV commercials. The theory is that water pressure and/or electrical demand increase when consumers are engaged in other activities than TV advertising such as going to the toilet, making a cup of coffee, vacuuming and thus pay no more or no less attention to TV commercials. Using these measures, the three studies indicated that consumers have less attention for TV commercials than for TV programming (see also Table 1.1).

4.5.4 Physiological measures
Physiological instruments measure physiological processes that are started when consumers are exposed to advertisements (Bagozzi 1991). Physiological instruments differ from non-physiological instruments in the sense that they record automatic responses of the human nervous system instead of overt movements of the human body initiated by the responses of the nervous system. Analyzing advertising with the use of physiological instruments is based on the idea that “arousal produces adrenaline, which enhances the activation process via a faster heart rate, increased blood flow, an increase in skin temperature and perspiration, pupil dilation, and an increase in brain-wave frequency” (McDaniel and Gates 1996, p.275), and that consumers had to focus their attention on the stimulus in order to get aroused by it (Sanbonmatsu and Kardes 1988). As shown in Table 4.5, several studies investigated whether intensity in physiological responses corresponded with physical and emotional ad characteristics that are expected to attract attention. Lang et al. (2000) registered the heart rate of consumers exposed to one-minute fragments of dramas, comedies, science fiction, cop shows, cartoons, sports, information shows, self-help
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are present in the viewing area (Krugman et al. 1995). Exposure to a commercial moment seems to be a necessary, but not a sufficient case, for attention to the commercial moment to occur and exposure times do not provide detailed information about moment-to-moment attention paid to (different elements of) the commercial. In addition, when using the CONPAAD instrument as measure of attention, respondents need to perform cognitive effort in using the instrument, which may take attention away from the commercial or intervene with attention levels. Using exposure times and CONPAAD as measures for consumers’ moment-to-moment attention, voluntarily responses are obtained, because subjects voluntary press the button to stop exposure or continue exposure. This is not the case with physiological instruments, for which respondents do not have to put forth effort to generate responses: responses are obtained automatically. However, the value of physiological measures as indicators of attention has also been questioned for several reasons (Rosbergen 1998). First, as is discussed in the following sections, physiological measures are primarily used to measure consumers’ affective and cognitive responses to TV commercials and these responses are very likely to be intertwined with attention processes (Bagozzi 1991). Also, other instrument and person-related factors may mediate the relationship between physiological measures and consumers’ attention for the commercial (Aaker et al. 1992). Also, physiological measures of attention do not say anything about the moment-to-moment focus of attention to the commercial (Davis 1997). The advantages and disadvantages of each instrument to measure consumers’ moment-to-moment attention to (elements of) TV commercials during exposure are summarized in Table 4.1. So, overall we conclude that (self-controlled) exposure time, CONPAAD and “watching the screen” measures, electrical demand, water pressure and physiological measures do not suffice as measures of consumers’ moment-to-moment amount and focus of attention to TV commercials. However, since eyes go where consumers’ attention is allocated (Rayner 1998), eye movement registration may provide a direct voluntary, but also automatic measure of consumers’ amount and focus of attention to TV commercials.

4.5.6 Eye tracking

In research on print advertising, eye movements have shown to be a valid and direct measure of consumers’ amount and focus of attention to
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(elements of) the ad (e.g., Janiszewski and Warlop 1993; Krugman et al. 1994; Lohse 1997; Pieters et al. 1999; Pieters, Warlop, and Wedel 2002; Rosbergen, Pieters, and Wedel 1997; Wedel and Pieters 2000; Pieters and Wedel 2003). For example, it is found that ad size (Lohse 1997; Young 1984), product interest (Bogart and Tolley 1988), length of copy (Janiszewski 1993), the type of warning used in ads for cigarettes (Krugman et al. 1994), and color and content (Lohse 1997) affect consumers’ visual attention to the print ad. Rosbergen et al. (1997) identified three segments of consumers that responded differently to physical ad properties on the basis of local gaze duration pattern.

Table 4.1: Overview of instruments to measure moment-to-moment attention during TV commercials. (See also Rosbergen 1998)

<table>
<thead>
<tr>
<th>Instrument to measure</th>
<th>Direct measure</th>
<th>Amount or focus</th>
<th>Voluntary or automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure</td>
<td>No</td>
<td>Amount</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Self-controlled exposure</td>
<td>Yes</td>
<td>Amount</td>
<td>Voluntary</td>
</tr>
<tr>
<td>CONPAAD</td>
<td>Yes</td>
<td>Amount</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Watching the screen</td>
<td>Yes</td>
<td>Amount</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Electrical demand and water pressure</td>
<td>No</td>
<td>Amount</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Physiological</td>
<td>No</td>
<td>Amount</td>
<td>Automatic</td>
</tr>
<tr>
<td>Eye movements</td>
<td>Yes</td>
<td>Amount</td>
<td>Voluntary/automatic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and focus</td>
<td></td>
</tr>
</tbody>
</table>

Not only for static stimuli, but also in dynamic situations, such as driving, basketball foul shooting, golf putting, table tennis, baseball, gymnastics, walking in uneven terrain, mental rotation, and interacting with computer scenes (see for overview Rayner 1998), research has showed that eye movement data can be very well used to understand consumers’ attention. TV commercials have a complex and dynamical structure of contents in terms of fluctuations in presence/nonpresence, frequency, size, location and duration of different elements (see Chapter 3). This is probably

27 mtm = moment-to-moment.
the reason why, to date, eye movements have not yet been used to measure consumers’ visual attention to TV commercials and its elements. Commercial elements continuously change during exposure, which may make it difficult to collect eye movements for different elements in TV commercials during exposure. The disadvantages and advantages of eye movement registration are also mentioned in Table 4.1.

4.6 Moment-to-moment affective responses

As described by Hazlett and Hazlett (1999), creators of TV commercials are enlisting a staggering array of sensory - and sensual-rich images and computer graphics, as well as popular music, humor, drama, and more - all designed to elicit an affective response in the viewer to help communicate the advertising message (Bruzzone and Tallyn 1997; Peterson and Malhotra 1998). As Section 3.7 indicates, TV commercials are able to portray a sequence of (evoked and experienced) affective responses that fluctuate during exposure. As discussed by Hazlett and Hazlett (1999), multivariate research into affective responses, behavior, and word meanings has found that emotional phenomena can best be organized into two overall dimensions (Lang et al. 1993; Mehrabian and Russell 1974; Russell 1980). One dimension is valence (positive/negative) and the other intensity (low or high arousal). The various discrete emotions such as warmth, liking, fear, sadness, anger, etc., fall into the emotional space described by these two dimensions. The different types of (moment-to-moment) affective responses evoked by the commercial and experienced by the consumer can be characterized by positive or negative valence at some level of intensity. In investigating of moment-to-moment affective responses to TV advertising, researchers have measured different affective responses using different instruments, which are discussed next.

4.6.1 Warmth

Warmth has face validity as an affective response to the content of commercials and is shown to be an acute, specific, and reactive emotion, changing quickly in response to features of ads (Aaker et al. 1986; Holbrook and O'Shaughnessy 1984; VandenAbeele and MacLachlan 1994a). Therefore, two studies on TV advertising have measured
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customers’ moment-to-moment warmth responses during commercial exposure using the “feelings” monitor (Aaker et al. 1986; VandenAbee and MacLachlan 1994a; see Table 4.5). With the “feelings” monitor, subjects have to track their affective, for example warmth reactions that are elicited by a commercial using either paper and pencil or a computer (Shimp 1997). Both Aaker et al. (1986) and VandenAbee and MacLachlan (1994a) used the paper-and-pencil version of the “feelings” monitor. Subjects moved a pencil down the paper, moving it to the left and right to continuously reflect their reactions about the commercial. Subjects were directed to maintain a constant rate of speed in moving their pencils down the page while keeping their eyes fixed on the commercial and not on the page. Among other conclusions (see Table 4.5), both studies found that felt warmth levels change substantially during exposure to a TV commercial. In addition, VandenAbee and MacLachlan (1994a) showed that these changes are explained by warmth (e.g., music, bodily movement) and non-warmth properties (e.g., product and brand displayed, product demonstration) of the commercials at the same moment.

4.6.2 Favorable versus unfavorable feelings

Many studies investigated consumers’ moment-to-moment favorable feelings during commercial exposure, using a computerized version of the “feelings” monitor (see Table 4.5). In one method, while watching the TV commercials, subjects are continually asked to press one of the five (or seven) buttons on a hand-held unit to continually indicate for example the degree to which they feel positive about what is happening in the TV commercial (e.g., Alwitt et al. 1993; Fenwick and Rice 1991; Polsfuss and Hess 1991). The five (or seven) buttons correspond to a five-point (or seven-point) scale from very positive to very negative. The hand unit records the subjects’ responses every two seconds (in some cases a three-second scan is used). In other related methods, subjects have to turn a dial or to move a slide instead of pressing buttons, usually using a 0 to 10 or a 0 to 100 points scale (see Hughes 1990). For example, Hughes (1992) used a pointed dial system allowing subjects to feel where they are on the scale without taking their eyes from the screen. In another version of the “feelings” monitor, a computer screen displays the anchors of, for example, the feeling scale, ranging from “strong negative feelings” to “neutral” to
"strong positive feelings". By pressing the left mouse button, the subject activates the cursor at the start of a commercial. The cursor moves down at a constant speed, and subjects can control the cursor’s horizontal position by moving the mouse to the left or right and indicating to what extent the commercial elicits positive or negative feelings at any given moment. The computer displays the charted feelings-pattern on the screen and automatically records responses for every second. This method is, for example, used by Baumgartner et al. (1997).

It is shown that moment-to-moment (un)favorable feelings during commercial exposure shift clearly with shifts in ad contents such as the presence and frequency of brand and social ad contents (Alwitt et al. 1993) and political contents (Tedesco 2002). Several studies showed consumers’ moment-to-moment positive and negative feelings during commercial exposure influence overall retrospective ad effectiveness variables, made after having seen the entire commercial, such as overall ad liking (Baumgartner et al. 1997), recall (Hazlett and Hazlett 1999; Hughes 1992) and market sales responses (Polsfuss and Hess 1991). In an important study, Baumgartner et al. (1997) found explicit support of the psychological theories discussed in Section 4.2 on integration of consumers’ moment-to-moment responses into overall judgments of TV commercials. More specifically, in three experiments they showed that consumers have higher preference for TV commercials that have high peaks, end on a strong positive note, and exhibit sharp increases in the trend of affective experiences during commercial exposure. In addition, it was found that ad time spent on building to a peak is helpful in generating strong emotional impact, but total commercial time is related, at most, weakly with overall affective judgments. Other conclusions for consumers’ moment-to-moment affective responses during commercial exposure are found in Table 4.5.

4.6.3 Hopefulness and fear
Using a pointed dial system of the “feelings” monitor in two experiments, Alwitt (2002) measured consumers’ moment-to-moment hopeful and fear feelings during commercial exposure. Among some other conclusions (see Table 4.5), she concluded that the variability in intensity of hope and fear reactions were greater for a suspenseful than a non-suspenseful
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commercial and this variability in intensity of both moment-to-moment reactions was positively related with brand attitude.

### 4.6.4 Facial expressions

Another way to assess moment-to-moment affective experiences during exposure to a stimulus such as a TV commercial is to measure facial expressions during commercial exposure. It is suggested that facial muscles are greatly responsible for emotional experience (James 1884). Derbaix (1995) videotaped the facial expressions of about 200 respondents during 10-second periods of commercial exposure. To code the facial expressions of the respondents, he used a Facial Action Coding System (FACS) adapted from Ekman and Friesen (1975, 1978) to assign each facial expression to one of six primary affective responses (joy, sadness, surprise, fear, anger, disgust). Ten coders were provided with detailed photographs and training to be able to pinpoint three facial areas that had be carefully scrutinized to assign an affective response to the observed face, namely, the brows/forehead, eyes/lids, nose/mouth/chin. In addition, the coders rated the intensity of each emotion on a four-point scale. Duration was taken into account; emotion lasting five seconds or more were generally considered as intense. Following this procedure, Derbaix (1995) found that the moment-to-moment affective dimensions and intensities were not related to overall ad attitude.

Another, physiological method (see also Section 4.6.5) to evaluate facial expression is to measure muscular electromyographic activity (EMG) in the face, as dicussed by Hazlett and Hazlett (1999). This method measures the electrical signal generated by the occurrence of action potentials across a group of muscles dedicated to moving parts of the face (Cacioppo, Tassinary, and Fridlund 1990). These electrical signals can be detected by the careful placement of electrodes over specific muscle groups on the surface of the skin. Facial EMG has been used extensively to measure the intensity and the valence of emotional response to stimuli (Fridlund and Izard 1983) by measuring the activity of the three most important facial areas (see above). Hazlett and Hazlett (1999) compared facial EMG responses to (un)favorable feelings assessments measured with the “feelings” monitor (see Table 4.5). Their results showed that facial EMG more effectively discriminated the valence of emotional response to
specific commercials than measures with the “feelings” monitor. Furthermore, high intensities in facial EMG responses were found to be temporally related to specific emotional points in the commercial. The difference in findings between Hazlett and Hazlett (1999) and Derbaix (1995) may be due to the fact that with respect to coding video-taped faces, facial EMG can assess neuromuscular actions that are too small to generate visible changes in the face (Cacioppo et al. 1986; Hazlett and Hazlett 1999) and thus that facial EMG is more sensitive to moment-to-moment responses in the face.

4.6.5 Physiological measures

Instead of relying on the conscious control of consumers to assess their moment-to-moment affective responses, as with the “feelings” monitor, other research used physiological responses to infer the intensity of moment-to-moment affective responses (arousal) evoked by a TV commercial. Automatic responses such as the galvanic responses meter and heart rate registration (see also Section 4.5.4) are seen as indicators of reflexive responses, arousal and of an orienting response (Lacey and Lacey 1974; Lacey et al. 1963; Lang 1990; Lang 1995b; Lang et al. 1996; Ohman 1979; Siddle and Spinks 1979; Spinks, Blowers, and Shek 1985). Although Aaker et al. (1986) found that moment-to-moment warmth responses correlate highly with GSR responses measures for warm and humorous ads, VandenAbeele and MacLachlan (1994a) showed that warmth (measured by the “feelings” monitor) and GSR scores nominally measure different things (see also Table 4.5). They argued that arousal as measured by the GSR meter occurs as a result of many warmth- and non-warmth-inducing elements in the commercial. Also, warmth is one of the affective responses, among many others, that could be expected to be accompanied by arousal. By measuring consumers’ moment-to-moment heart rates, Lang (1990) showed that elements that evoke affective consumers’ responses, respectively scene changes, cuts and movements in TV commercials increased the heart rate, and thus increased consumers’ arousal. Using the same argument, Lang et al. (2000) showed that as the frequency of edits in a TV program fragment or a TV commercial increased, consumers’ arousal also increased.
4.6.6 Conclusions
Real-time, or continuous, affective response measurement by the “feelings” monitor during commercial exposure has been used in order to avoid reliance on memory and to trace affective responses over time (VandenAbeele and Maclachlan 1994a). Although, with the “feelings” monitor, respondent’s moment-to-moment affective responses are measured, the moment-to-moment emotional responses are not one hundred percent affective. This is because respondents must use cognitive effort to assess and then indicate, behaviorally, their level of emotion (Hazlett and Hazlett 1999). As cited from Hazlett and Hazlett (1999, p. 9), “the behavioral task may take attention away from the commercial, which may diminish responses, or cause cues to be missed that might have elicited emotion. On the other hand, just at the moment when the commercial grabs the consumer’s attention through emotional events, their attention would be taken away from their task of monitoring feelings.” In other words, the “feelings” monitor implies an amount of central control and cognitive activity from consumers, to receive and translate each element in the message in keeping with its felt affective response and to instruct their muscles to move in a particular way to record responses (VandenAbeele and MacLachlan 1994a). On the other hand, the validity and reliability of the “feelings” monitor has been shown in several studies (Fenwick and Rice 1991; VandenAbeele and MacLachlan 1994a). In academics (see Table 4.5) and practice (Crocker 2000; Fenwick and Rice 1991), the “feelings” monitor has also been proven to be a good immediate moment-to-moment response recording method during TV commercial exposure.

Psychological responses, by contrast are supposed to occur automatically, without any conscious control by the respondents. However, aside from the disadvantages of physiological measures discussed in Section 4.5.5, physiological instruments only measure the valence (arousal, intensity) of an experienced affective response, but do not indicate which direction (negative - positive), or which emotion is experienced. The same arguments can be made for facial expression measures, although activity in some particular face muscles is reasoned to be responsible for certain positive and negative emotions (Ekman and Friesen 1975, 1978). However, the “feelings” monitor is directly able to distinguish between the intensity
and the direction of affective responses. Although VandenAbeele and MacLachlan (1994a) showed that the “feelings” monitor was not able to distinguish between the emotion dimensions of Plutchik (1980), Alwitt et al. (1993) and Alwitt (2002) showed that the “feelings” monitor was also very applicable in measuring other moment-to-moment affective and cognitive responses (see Section 4.7.1). These conclusions are summarized in Table 4.2.

Table 4.2: Overview of instruments to measure moment-to-moment affective responses during TV commercials

<table>
<thead>
<tr>
<th>Instrument to measure mtm affective responses</th>
<th>Direct measure</th>
<th>Intensity, direction or type of affective response</th>
<th>Voluntary or automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Feelings” monitor</td>
<td>Yes</td>
<td>All three</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Video-taped faces</td>
<td>No</td>
<td>All three</td>
<td>Automatic</td>
</tr>
<tr>
<td>Facial EMG</td>
<td>No</td>
<td>All three</td>
<td>Automatic</td>
</tr>
<tr>
<td>Physiological</td>
<td>No</td>
<td>Intensity</td>
<td>Automatic</td>
</tr>
</tbody>
</table>

4.7 Moment-to-moment cognitive responses

Researchers investigating consumers’ (moment-to-moment) cognitive response to TV commercials are interested in which information communicated by the commercial is processed and how information is processed during its actual presentation.

4.7.1 Usefulness of information

In investigating wear-out during commercial exposure, consumers in the Hughes’ (1992) study used the “feelings” monitor to give moment-to-moment evaluations of the usefulness of the information given in the commercial. It was shown that consumers’ cognitive responses during the commercial could be reliably measured by the “feelings” monitor. His study concluded that the moment-to-moment cognitive trace during commercial exposure differed in pattern from consumers’ moment-to-moment affective trace and that moment-to-moment assessments of information usefulness
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increased as new information was presented, but reached a stable state when old information was repeated.

4.7.2 Physiological measures
As Table 4.5 indicates, most of the studies investigating consumers’ moment-to-moment cognitive responses during commercial exposure have used consumers’ brain wave activity (physiological measure) as a measure of consumers’ amount of information processing. It is believed that by monitoring brain wave activity during exposure to a stimulus, such as a TV commercial, one can infer the intensity and manner by which the commercial is being processed. The assumption in these studies is when brain wave activity is high, the information in the commercial is more deeply processed. The human brain is divided into two hemispheres, and both hemispheres produce brain waves. The intensity of emitted waves indicates a hemisphere’s level of involvement and activity. High intensity waves from one hemisphere, but not the other indicates, that the active hemisphere is more involved in the current task or activity. Electroencephalogram or EEG registers changes in the frequency of the electrical activity in the brain (e.g., Davidson et al. 2000).

Most recently, using EEG and a picture sorting task, Young (2002) investigated in which way “branding moments” (moments in which consumers learn about the brand) should be designed in a commercial to positively increase the brand image and positioning of the product advertised. They found that, during commercial exposure, “branding moments” occur at the boundary between outer-directed semantic information, which defines a brand’s positioning in the world, and inner-directed aesthetic information, where experience created by the ad is attached to the shelf.

Rossiter et al. (2001) and Silberstein et al. (2000) used a better, more innovative version of the EEG technology, namely Steady-State Probe Topography (SSPT). SSPT offers a faster temporal resolution needed to

28 After commercial exposure this task requires the respondent to sort cards with images of the commercial into two piles: the images s/he remembers seeing in the commercial and the one s/he does not.
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record cortical activity during exposure to a dynamic stimulus sequence, such as a TV commercial, and gives better insights into the place in the brains where the processing takes place (Silberstein et al. 1990; Silberstein 1995; Silberstein et al. 2000). The objective in Rossiter et al. (2001) and Silberstein et al. (2000) was to investigate how long-term visual commercial scene recognition is related to brain activity of these scenes during commercial exposure. They found that visual recognition of video commercial scenes is due to faster brain electrical activity only in the left hemisphere. As discussed by the researchers, this finding supported the theoretical prediction of Tulving et al.’s (1994) HERA model that short-term memory to long-term memory coding for retention of pictorial content is a left-hemisphere activity. However, it contradicted findings of previous studies in TV advertising, which indicated that the right hemisphere is responsible for pictorial encoding (see Table 4.5; Rothschild and Hyun 1990; Rothschild et al. 1986; Rothschild et al. 1988; Weinstein, Appel, and Weinstein 1980) or that found no differences in activities of the two hemispheres (Alwitt 1985; Appel et al. 1979). This is probably due to the fact that Rossiter et al. (2001) and Silberstein et al. (2000) used a more refined measurement method of brain wave activity that could take into account changes in speed of brain activity, not only brain activity level as in older studies (Smidts 2002). In addition, Rossiter’s et al. (2001) and Silberstein et al. (2000) measured brain activity on the appropriate “locations” for memory encoding (Smidts 2002).

4.7.3 Conclusions

To use the “feelings” monitor to measure cognitive processes has the advantage that it is known which cognitive response is measured and whether it is negative or positive in direction. Using consumers’ brain wave activity as a physiological measure of consumers’ information processing during commercial exposure has the advantage of not disturbing cognitive processes and measures an automatic response. However, with physiological measures, such as brain activity, only the intensity (arousal) of the cognitive responses is assessed. Also, affective and attention processes may generate brain activity or intervene with cognitive processes in producing brain wave activity (e.g., Cuthbert et al. 2000; Luo, Greenwood, and Parasuraman 2001; Smidts 2002). Other advantages and disadvantages of the “feelings” monitor and physiological measures such
as brain wave activation to measure moment-to-moment affective responses also hold for the measurement of moment-to-moment cognitive responses and are summarized in Table 4.3.

Table 4.3: Overview of instruments to measure moment-to-moment cognitive responses during TV commercials

<table>
<thead>
<tr>
<th>Instrument to measure mtm cognitive responses</th>
<th>Direct measure</th>
<th>Intensity, direction or type of cognitive response</th>
<th>Voluntary or automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Feelings” monitor</td>
<td>Yes</td>
<td>All three</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Physiological</td>
<td>No</td>
<td>Intensity</td>
<td>Automatic</td>
</tr>
</tbody>
</table>

4.8 Moment-to-moment behavioral responses

Consumers’ moment-to-moment behavioral responses during TV commercials indicate whether consumers mentally, physically or mechanically/electronically approach or avoid commercial parts, or entire commercials (see also Chapter 1). They may perform a behavior by either moving physically (e.g. leaving the room) or mentally (e.g. reading a book) away from, or to, the commercial (fragment) or to press the right button on the remote control to watch or avoid a TV commercial (fragment). As Section 4.5.1 indicates, a lot of studies that attempt to investigate consumers’ attention during TV commercials actually examined consumers’ moment-to-moment behavioral responses during TV commercials. Exposure times registered by the people or set meter, self-controlled exposure times in a laboratory setting (including CONPAAD), watching the screen and more indirect measures such as water pressure and electrical demand are actually used to investigate consumers’ behavior during TV commercials. Eye movements may also be used to measure consumers’ mental avoidance of TV commercials by assessing whether consumers fixate on the screen or on something else. These measures are extensively discussed in Section 4.5 of this chapter.
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Disadvantages and advantages of these measures to assess consumers’ moment-to-moment approach or avoidance to TV commercials are summarized in Table 4.4.

Table 4.4: Overview of instruments used to measure moment-to-moment behavior during TV commercials

<table>
<thead>
<tr>
<th>Instrument to measure mtm behavior.</th>
<th>Direct measure</th>
<th>Voluntary or automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure</td>
<td>Yes</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Self-controlled exposure</td>
<td>Yes</td>
<td>Voluntary</td>
</tr>
<tr>
<td>CONPAAD</td>
<td>Yes</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Watching the screen</td>
<td>Yes</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Electrical demand and water pressure</td>
<td>No</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Eye movements</td>
<td>Yes</td>
<td>Voluntary/automatic</td>
</tr>
</tbody>
</table>

Table 4.5: Overview of the most important studies using different instruments to collect moment-to-moment responses during TV commercials

<table>
<thead>
<tr>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nathan and Wallace (1965)</td>
<td>n = 4</td>
<td>n = 33</td>
<td>Ad &amp; subject</td>
<td>CONPAAD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Consumers’ intensity of attention during TV commercial is lower than their attention intensity during a football game.</td>
</tr>
<tr>
<td>Watching the screen</td>
<td>See studies in Table 1.1</td>
<td>In - home observations</td>
<td>CONPAAD</td>
<td>Auditory attention is higher for storyboard commercials than for finished commercials.</td>
</tr>
</tbody>
</table>

29 Storyboard commercials are commercials whose video story lines were portrayed by sequentially presented cards and employ audio story lines identical to those of the original commercials (Nathan and Wallace 1965).
Consumers’ Moment-to-Moment Processing of TV Commercials

<table>
<thead>
<tr>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water pressure and electrical demand</td>
<td>See studies in Table 1.1</td>
<td>Water pressure, electrical demand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Physiological measures**

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lang, Zhou, Schwartz, Bolls, and Potter (2000)</td>
<td>n = 2</td>
<td>n = 39</td>
<td>Ad &amp; subject</td>
<td>Heart rate</td>
</tr>
<tr>
<td>Kohan (1968)</td>
<td>n = 3</td>
<td>n = 8</td>
<td>Ad &amp; subject</td>
<td>GSR/EDR responses</td>
</tr>
<tr>
<td>VandenAbeele and MacLachlan (1994b), see also under favorable – unfavorable feelings</td>
<td>n = 12</td>
<td>n = 14, n = 21, n = 30</td>
<td>Ad</td>
<td>GSR/EDR responses</td>
</tr>
</tbody>
</table>

**Moment-to-moment affective responses**

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaker, Stayman, and Hagerty (1986), study 1</td>
<td>n = 16</td>
<td>n = 30</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Aaker, Stayman, and Hagerty (1986), study 2</td>
<td>n = 6</td>
<td>n = 67</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Aaker, Stayman, and Hagerty (1986), study 3</td>
<td>n = 10</td>
<td>n = 101</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>VandenAbeele and MacLachlan (1994a) and VandenAbeele and MacLachlan (1994b)</td>
<td>n = 12</td>
<td>n = 14, n = 21, n = 30, n = 10 (20)31</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
</tbody>
</table>

30 From subjects in the first condition only moment-to-moment warmth measures were obtained. From subjects in the second condition only GSR scores were obtained. From subjects in the third condition moment-to-moment warmth responses and GSR measures were obtained.

31 To test the discriminant validity of the warmth meter, samples of 10 subjects assessed one single dimension of six Plutchik (1980) emotion dimensions (joy, surprise, anticipation, anger, acceptance, disgust). A sample of 20 subjects assessed moment-to-moment attention-raising power.
# Moment-to-Moment Processing of TV Commercials

<table>
<thead>
<tr>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
</table>
| Allet, Benet, and Pitts (1993) | n = 38 n = 360 | Ad | “Feelings” monitor | • Early initial presence of the brand (visual brand name, visual package) in a commercial enhances ad liking early in the commercial and sustains that level throughout the commercial.  
• Commercials with late brand presence reach a more positive level of ad liking in the last four seconds.  
• Early initial presence of social content (close relationship between characters, mutual gaze between characters) results in positive mtm ad liking.  
• When a critical number of 3 instances of brand presence are presented early in a commercial, there is an early increase in mtm ad liking, when a familiar brand is promoted.  
• The rate of presentation of social content in a commercial does not show a cumulation effect. |
| Baumgartner, Sujan, and Padgett (1997), study 1 | n = 30 n = 28 | Ad | “Feelings” monitor | • Overall retrospective ad liking is strongly positively related with high peaks, strong positive end notes and a sharp increase in the trend of the mtm ad liking trace. Time to (after) the peak in the mtm ad liking trace correlates positively (negatively) with overall ad liking. |
| Baumgartner, Sujan, and Padgett (1997), study 2 | n = 30 n = 34 | Ad | “Feelings” monitor | • See conclusion of study 1.  
• Results are in study 1 and 2 are not explained by recency. |
| Baumgartner, Sujan, and Padgett (1997), study 3 | n = 44 n = 94 | Ad | “Feelings” monitor | • The effect of ad duration on overall liking for a commercial is affected by duration such that longer commercials 1) enhance ad liking if ad time adds a segment of increasing mtm overall ad liking that builds to a higher peak, 2) depress overall ad liking if ad time adds a time segment of decreasing mtm ad liking that lowers the final moment of the commercial and 3) leave overall ad liking unchanged if ad time adds a time segment of neutral mtm ad liking that has no effect on peak experience and final moment. |
| Hazlett and Hazlett (1999), see also under facial expressions | n = 17 n = 49 | Ad & subject | “Feelings” monitor | • Mtm ad liking measures discriminate between commercials.  
• Mtm ad liking measures are related to measures of recall. |
| Hughes (1992), laboratory study. See also under information usefulness | n = 11 n = 25 n = 25 | Ad | “Feelings” monitor | • Mtm affective (ad liking) and cognitive (usefulness) responses have different patterns for the same ad.  
• Reminder commercials produce a rapidly rising affect trace that maintains a plateau during the ad.  
• Affective traces quickly reach a stable state when it has been seen many times before.  
• Ad wear-out occurs along the affective or cognitive trace without altering the other trace.  
• Gender wear-out occurs when it becomes apparent that there is no entertainment value to one gender. |

32 Each commercial was viewed by between 54 and 141 respondents.

33 The four commercials were a manipulation of an existing 90-second commercial.
 Consumers’ Moment-to-Moment Processing of TV Commercials

<table>
<thead>
<tr>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hughes (1992), field study</td>
<td>n = 2</td>
<td>n = 80 n = 40 n = 15 n = 15 n = 15</td>
<td>Ad &amp; subject</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Fenwick and Rice (1991)</td>
<td>n = 4</td>
<td>n = 1164</td>
<td>Ad &amp; subject</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Polsfuss and Hess (1991)</td>
<td>n = 1036</td>
<td>?</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Tedesco (2002)</td>
<td>n = 11</td>
<td>n = 93</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Hopefulness/fearfulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alwitt (2002), study 2</td>
<td>n = 6</td>
<td>n = 28</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Alwitt (2002), study 3</td>
<td>n = 4</td>
<td>n = 66</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td>Facial expressions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derbaix (1995)</td>
<td>n = 13</td>
<td>n = 197</td>
<td>Ad &amp; subject</td>
<td>Video-taped facial expressions</td>
</tr>
</tbody>
</table>

34 The commercials were assessed twice with a week in-between by the same subjects to investigate wear-out. Two control groups were used.

35 To test for within-city differences, the differences between neighboring cities, and between cities situated far from each other, 80 Midwest mothers, 40 Chicago mothers, two groups of 15 subjects from Los Angeles and two groups of 15 subjects from Walnut Creek participated in the study.

36 In additional analyses Polsfuss and Hess (1991) investigated a large database of commercials representing a broad range of product categories.
## Moment-to-Moment Processing of TV Commercials

<table>
<thead>
<tr>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazlett and Hazlett (1999), see also under favorable/unfavorable feelings</td>
<td>n = 17</td>
<td>n = 49</td>
<td>Ad &amp; subject</td>
<td>EMG facial expressions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Facial EMG measures were a more sensitive discriminator between commercial than mtm ad liking measures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Facial EMG measures were more strongly related to measures of recall than mtm ad liking measures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Significant elevations in the EMG measures were related to specific emotion-congruent events in the commercial.</td>
</tr>
<tr>
<td>Physiological measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aaker, Stayman, and Hagerty (1986), study 1, see also under warmth</td>
<td>n = 16</td>
<td>n = 30</td>
<td>Ad</td>
<td>GSR/EDR responses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Mtm warmth responses correlate highly with skin response measures for warm and humorous ads, but not for informative ads.</td>
</tr>
<tr>
<td>VandenAbeele and Maclachlan (1994a), see also under warmth</td>
<td>n = 12</td>
<td>n = 14, n = 21, n = 30, n = 10 (20)</td>
<td>Ad</td>
<td>GSR/EDR responses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Warmth and GSR scores nominally measure different things, certainly when measured on different subjects.</td>
</tr>
<tr>
<td>Lang (1990)</td>
<td>n = 18</td>
<td>n = 14</td>
<td>Ad</td>
<td>Heart rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Aspects of television that are known to elicit high brain wave activity (scene changes, cuts, movements) also elicit cardiac orienting responses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Emotional TV commercials result in a greater heart rate (arousal) than non-emotional, more rational commercials.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• The presence of emotional cues in TV commercials increase the intensity of evoked cardiac response.</td>
</tr>
<tr>
<td>Lang, Zhou, Schwartz, Bolls, and Potter (2000), see also under attention</td>
<td>n = 2</td>
<td>n = 39</td>
<td>Ad &amp; subject</td>
<td>Heart rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Viewers' arousal increases as the frequency level of edits in the commercials increases.</td>
</tr>
</tbody>
</table>

### Moment-to-moment cognitive responses

#### Information usefulness

<table>
<thead>
<tr>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hughes (1992), laboratory study, see also under favorable/unfavorable feelings</td>
<td>n = 11</td>
<td>n = 25</td>
<td>Ad</td>
<td>“Feelings” monitor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n = 25</td>
<td>n = 25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Reminder commercials produce a rapidly rising cognitive trace that maintains a plateau during the commercial.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• A new product commercial has a positive sloping cognitive trace for that part of the commercial that gives new information.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Cognitive traces quickly reach a stable state when it has been seen many times before.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Ad wear-out occurs along the affective or cognitive trace without altering the other trace.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Cognitive wear-out occurs quickly when a message no longer provides relevant information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Gender wear-out occurs when it becomes apparent that there is no information value to one gender.</td>
</tr>
</tbody>
</table>
### Consumers' Moment-to-Moment Processing of TV Commercials

<table>
<thead>
<tr>
<th>Physiological measures</th>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alwitt (1985)</td>
<td>n = 12</td>
<td>n = 30</td>
<td>Subject</td>
<td>Brain wave activity</td>
<td>Influence of commercial content on brain wave activity may be primarily due to brand message events (brand name mention, specific brand message, brand in use and product shot) and communication media (speaker on screen, superimposed words, voice over).&lt;br&gt;Consumers have slower brain activity reactions to zooms and specific brand messages in the commercial.</td>
</tr>
<tr>
<td>Appel, Weinstein, and Weinstein (1979)</td>
<td>n = 20</td>
<td>n = 30</td>
<td>Subject</td>
<td>Brain wave activity</td>
<td>Relative to print advertising, TV advertising does not generate more brain wave activity in the right hemisphere than in the left. TV commercials that produce a greater amount of brain activity regardless of hemisphere produce a greater amount of advertising recall.</td>
</tr>
<tr>
<td>Rossiter, Silberstein, Harris, and Nield (2000)</td>
<td>n = 10</td>
<td>n = 35</td>
<td>Subject</td>
<td>Brain wave activity</td>
<td>Visual recognition of video commercial scenes is due to faster brain electrical activity only in the left hemisphere.</td>
</tr>
<tr>
<td>Rothschild and Hyun (1990)</td>
<td>n = 9</td>
<td>n = 21</td>
<td>Ad &amp; subject</td>
<td>Brain wave activity</td>
<td>Long term memory correlates significantly with changes in brain wave activity that occurred during viewing. The probability of correct recognition was enhanced when brain activity continued for a longer period of time and when hemispheric laterality shifted to the right during the onset of a commercial scene and then to the left during the following seconds.</td>
</tr>
<tr>
<td>Rothschild, Thorson, Reeves, Hirsch, and Goldstein (1986)</td>
<td>n = 18</td>
<td>n = 26</td>
<td>Ad &amp; subject</td>
<td>Brain wave activity</td>
<td>Commercials that elicited high levels of learning elicited higher brain wave activity. High brain wave activity during commercial exposure is highly correlated with immediate recall and recognition measures if analyzed at commercial level. This relationship does not exist if analyzed on subject level. Brain Activity increases rapidly from the onset of an easily identifiable change in the commercial.</td>
</tr>
<tr>
<td>Rothschild, Hyun, Reeves, Thorson, and Goldstein (1988)</td>
<td>n = 9</td>
<td>n = 21</td>
<td>Ad &amp; subject</td>
<td>Brain wave activity</td>
<td>The right hemisphere is more responsive to visual act and music cues and the left hemisphere is more responsive to verbal, concrete cues. Brain Activity increases rapidly, within 1.5 seconds, from the onset of an easily identifiable change in the commercial.</td>
</tr>
<tr>
<td>Silberstein, Harris, Nield, and Pipingas (2000), see also Rossiter, Silberstein, Harris, and Nield (2001)</td>
<td>n = 10</td>
<td>n = 35</td>
<td>Subject</td>
<td>Brain wave activity</td>
<td>Visual recognition of video commercial scenes is due to faster brain electrical activity only in the left hemisphere.</td>
</tr>
</tbody>
</table>
### Moment-to-Moment Processing of TV Commercials

<table>
<thead>
<tr>
<th></th>
<th>Sample of ads</th>
<th>Sample of resp.</th>
<th>Unit of analysis</th>
<th>Instrument</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weinstein, Appel,</td>
<td>n = 8</td>
<td>n = 15</td>
<td>Subject</td>
<td>Brain wave activity</td>
<td>• Print advertising produces more brain wave activity than does TV advertising.</td>
</tr>
<tr>
<td>and Weinstein (1980)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Relative to print advertising, TV advertising generates disproportionately more</td>
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<td></td>
<td></td>
<td></td>
<td>brain wave activity in the right hemisphere than in the left.</td>
</tr>
<tr>
<td>Young (2002)</td>
<td>n = 8</td>
<td>n = 100</td>
<td>Ad</td>
<td>Brain wave activity</td>
<td>• Peak moments of brain activity during commercial exposure happen when</td>
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<td>semantic information is presented in the commercial at the corresponding</td>
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<td></td>
<td></td>
<td>moment. When information is being learnt during commercial exposure, brain</td>
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<td></td>
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<td></td>
<td>activity is higher.</td>
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<td></td>
<td>• “Branding moments” (moment in which consumers learn about the brand) during</td>
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<td></td>
<td></td>
<td>commercial exposure occur at the boundary between outer-directed semantic</td>
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<td>information, which defines a brand’s positioning in the world, and inner-</td>
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<td>directed aesthetic information, where experience created by the ad is</td>
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<td>attached to the shelf.</td>
</tr>
</tbody>
</table>

#### 4.9 Discussion and outline of empirical studies

Although several studies in advertising have measured consumers’ moment-to-moment responses during commercial exposure, explicit support for theories discussed in Section 4.2 for TV commercials that are seen as sequences of hedonic and utilitarian experiences (see Section 3.7) is very scarce. The general conclusion from this chapter is that different instruments can be used to measure consumers’ moment-to-moment attention, affective, cognitive and behavioral responses during commercial exposure. It reveals that eye tracking is a reliable instrument to measure consumers’ attention to different commercial features, although no study to date has used eye movements in TV advertising research. The “feelings” monitor is an inexpensive instrument to directly measure moment-to-moment (evoked) affective and cognitive responses that differ in dimension, direction and intensity. Self-controlled exposure times are good indicators of consumers’ behavior during commercial exposure. Previous studies have shown that consumers’ attention, affective and cognitive responses, and behavioral responses continuously fluctuate during commercial exposure, influenced by moment-to-moment commercial and consumer characteristics. In addition, these studies show that consumers’ moment-to-moment processing.

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37 15 respondents were exposed to 8 TV commercials and 15 other respondents were exposed to 8 print ads.
Consumers’ Moment-to-Moment Processing of TV Commercials

moment processing significantly influence overall ad effectiveness variables, such as persuasion, comprehension, recognition and recall. However, insights are lacking into how consumers form an overall response to the entire commercial based on their different moment-to-moment responses during commercial exposure. Also, previous studies do not provide insights into how consumers’ moment-to-moment processing of TV advertising affect their decision to stop watching a commercial.

Only the study by Baumgartner et al. (1997) investigated specifically the integration of consumers’ moment-to-moment affective responses into overall affective judgments of TV commercials: Peak, final moment and velocity in moment-to-moment responses strongly influenced overall affective assessments, while consumers were insensitive to commercial duration. As discussed by Baumgartner et al. (1997, p. 220): “Other advertising studies provide some suggestions for this, such as Aaker et al. (1986) and Polsfuss and Hess (1991) who assume that the average of consumers’ moment-to-moment emotional responses is a good indicator for their overall commercial assessment. Hughes (1992) argues that this may not be a good indicator, because commercials with an increasing slope, decreasing slope or a flat pattern in their moment-to-moment affective responses may produce the same average affective response, while consumers have different overall judgment for these commercials. Other research revealed that other specific moments in ad contents and consumers’ responses to them may influence overall commercial judgments. These include consumers’ evaluation of the last moment in the commercial (Aaker et al. 1986), the range of responses, and balance of positive and negative changes (Thorson 1991).” No other research in TV advertising has confirmed Baumgartner’s et al. (1997) findings for other moment-to-moment affective responses of TV commercials, such as humor, which is a frequently used message strategy by advertisers to attract consumers’ attention to their commercials (see Section 2.3.1). For example, if humor is considered to be a simple, affective reaction, in the sense of being a valenced feeling state, then one might expect that the dominance of peaks, end notes and peaks obtained by Baumgartner et al. (1997) for simple like/dislike moment-to-moment affect would also apply to moment-to-moment humor. However, there is some evidence in the literature that, unlike the simple affect measured by Baumgartner et al.
(1997), humor is a more complex type of positive affect based on multiple appraisals of stimuli (see Chapter 5). It is, therefore, not clear if humor will be processed in the same way as simple like/dislike affect, with preference given to the peaks and final moments of the moment-to-moment humor trace. This will be investigated in the first study, presented in the next chapter. In addition, the first study attempts to find evidence for incongruity-resolution theory within individual commercials. This theory posits that feelings of surprise are transformed into a humorous response (Alden et al. 1999; Alden et al. 2000; Raskin 1985). Therefore, in the first study moment-to-moment surprise levels are also collected to investigate the relationship between moment-to-moment surprise and humor responses on overall perceived humor ratings of an individual TV commercial.

Other studies show that consumers’ moment-to-moment affective and cognitive responses change during commercial exposure (see Table 4.5). These studies increase our understanding of how consumers process commercials moment-to-moment, but they force consumers to be exposed to the entire commercial, which is not the case in a natural environment (see studies in Table 1.1). Ad content, which is under direct managerial control, fluctuates during the course of a commercial (see Chapter 3) and, as shown by different studies in Table 4.5, it directly influences consumers’ moment-to-moment affective or cognitive responses during TV commercials. Therefore, we expect that moment-to-moment ad contents have different effects on moment-to-moment affective, and respectively, cognitive responses. As indicated by Figure 4.1, moment-to-moment affective and cognitive responses may influence consumers’ behavioral decisions to continue or discontinue to avoid the commercial at a particular point in time. Using this reasoning, we think that changes in ad contents have effects on consumers’ moment-to-moment decisions to continue or discontinue a commercial during exposure (see also Olney et al. 1991). Other studies, not specifically related to TV advertising indirectly indicate that people’s affective and cognitive responses to stimuli interact with each other regarding their influence on stimulus avoidance or approach (e.g., Bless 2000; Fiedler 2000; Forgas 2000, 2001; Mackie and Worth 1991; Schwarz 2001). Different dimensions of ad contents may also have an interaction effect on their influence on consumers’ moment-to-moment viewing behavior to TV commercials. The second study in this thesis, presented in Chapter 6 has the objective to investigate the influence of two
Consumers’ Moment-to-Moment Processing of TV Commercials

important dimensions of moment-to-moment ad contents and their interaction on consumers’ behavior to stop viewing a commercial during exposure.

Studies investigating how consumer and commercial characteristics influence consumers’ moment-to-moment attention use (self-controlled) exposure time, observations whether consumers really look at the screen or indirect measures such as water pressure, electrical demand or physiological measures to assess consumers’ amount of attention to TV commercials. As discussed in Section 4.8, these measures are behavioral measures of consumers’ decisions to continue or discontinue to watch a TV commercial. Also, these measures give no, or very limited, information about the consumers’ focus of attention during commercial exposure. Consumers’ eye movements enable researchers to determine both the amount and focus of attention to a TV commercial. The third study, presented in Chapter 7, will show how eye tracking methods are very useful in determining consumers’ attention to a key element in ad contents, namely the brand name. It is the first study in marketing to use eye movements in TV advertising and it aims to show whether and how consumers’ moment-to-moment focus and amount of attention to the brand name influences moment-to-moment behavioral decisions to avoid a commercial.

The overall objective of the three studies is to show how (consumers’ attention to) moment-to-moment ad contents or ad-evoked feelings influence overall retrospective assessments of commercials or moment-to-moment behavioral responses to avoid a commercial. Because advertisers directly use ad contents as part of a message strategy to influence consumers’ attention and responses to TV commercials, these studies are also of practical relevance. The results of the three studies do not only identify which specific commercials fail to obtain an overall positive consumers’ response or to retain consumers until the end, but also when and why during their exposure this occurs. Because of data collection instruments and the need to control for confounding effects, laboratory experiments are used in the three studies. In the first and second study, not only the main effects of different dimensions of ad contents are analyzed, but also their simultaneous effect on the dependent variable is taken into account. Not only the effects of the levels of ad contents, but also the
Moment-to-Moment Processing of TV Commercials

impact of rate of change in ad contents on the dependent variable are examined. In all three studies, because of task requirements, we employ independent samples of individuals to obtain moment-to-moment assessments of ad contents or ad-evoked feelings, following many other advertising studies (e.g., Holbrook and Lehmann 1980; Olney et al. 1991; Pieters et al. 2002). In the first two studies, individuals use a computerized version of the “feelings” monitor to evaluate ad contents and ad-evoked feelings moment-to-moment. This instrument shows to be a non-expensive direct measure of consumers’ and judgmental responses to TV commercials and it is able to distinguish in valence, intensity and dimensions of responses (see Table 4.3 and Table 4.4). In the first two studies, we apply a similar methodology, namely functional data analysis, to obtain a representative moment-to-moment trace of ad contents or ad-evoked feelings. In contradiction to the first study, consumers in the second and third study are not forced to watch the entire commercial. For the reasons given in Section 4.8, self-controlled exposure times are used to measure consumers’ behavioral avoidance of TV commercials. Then, a random-effects hazard model is used to relate (consumers’ moment-to-moment attention to) moment-to-moment ad contents to consumers’ decisions to stop watching a commercial. The third study differs from the other studies that it explicitly takes consumers’ moment-to-moment focus of attention to ad contents into account. The next three chapters discuss these three studies in further detail.
Consumers’ Moment-to-Moment Processing of TV Commercials