

**Commercial Breaks and Ongoing Emotions: Effects of Program
Arousal and Valence on Emotions, Memory and Evaluation of
Commercials**

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Abstract

While effects of program context on commercials have been investigated exhaustively, most of these studies investigated a limited number of independent and dependent variables. Conversely, the present study examined the effects of program elicited arousal (medium and high) and valence (positive and negative) on subjects' emotions, memory as well as evaluation of neutral commercials. Moreover, the pod position (first, third and fifth) of the target commercial has been examined in conjunction with the above-mentioned variables. Results show that program arousal affects cued recall, commercial evaluation and arousal during the commercials negatively, indicating that commercials are better recalled and evaluated more favorably in a medium arousal program context than in a high arousal program context. Also program valence affects commercial evaluation and emotional valence during the commercial negatively. Commercials are better liked and subjects feel more positive during commercials shown in a negative program context compared to commercials shown in a positive program context. Effects of pod position are found as well. Results show that program context effects gradually disappear after the end of the program. Cued recall and evaluation of the commercial are only significantly affected by program context for the first pod position. However, the effect of program arousal on arousal during the commercial remains the whole commercial break.

Introduction

The effects of program context on commercials have been investigated exhaustively. However, most of these studies only examined the influence of a few independent (arousal or valence) variables on a limited number of dependent variables (memory or evaluations of commercials). Therefore, the present study examines the coherence of these effects with all significant variables. Research in the past two decades has shown that context has an important influence on advertisement effectiveness. Context effects have been found for radio commercials (Shapiro, MacInnis & Park, 2002) and magazine advertisements (Norris & Colman, 1992), but by far most effects have been studied and found for television commercials (Broach, Page & Wilson, 1995; Coulter, 1998; Furnham, Gunter & Walsh, 1998; Gorn, Pham & Sin, 2001). In general, the results of these studies show that the program context influences the effectiveness of the embedded commercials.

Studies examining the effects of program context on commercial effectiveness usually vary two dimensions of emotional content, namely valence (pleasure) and arousal (intensity). This distinction in dimensions of emotions was originally formulated by Mehrabian and Russell (1974) in the pleasure-arousal-dominance theory, and by Russell (1980) in the pleasure-arousal theory. These theories state that physical and social stimuli in an environment have a direct influence on the emotional feeling state of a person, and consequently on behavior. According to the pleasure-arousal theory, emotion consists of two dimensions. Valence indicates the direction of the emotion, ranging from negative valence to positive valence, while arousal indicates the intensity of the emotion, ranging from calm and drowsy to excited and energized. The importance of the distinction between arousal and valence dimensions has been proven by several studies (Broach et al., 1995; Shapiro et al., 2002; Gorn et al., 2001).

The present study aims at examining a large range of variables in order to provide a wider view of program context effects on commercial effectiveness, and for enabling measurements of interaction effects. Therefore, program context effects on emotions, memory and evaluation of the commercial on different pod positions is studied. The two variables which are manipulated to vary program contexts in the present study are program arousal and program valence. Previous studies show that both variables affect commercial effectiveness. Program arousal mainly influences memory, and program valence mainly influences commercial evaluation. While most studies examined effects of low versus high arousal, the present study examines the effects of a medium versus a high arousal program context. Prior research largely ignores fading effects of program context. Therefore, the present study examines whether program context effects gradually disappear after the end of the program. Finally, as well in contrast with other studies examining program context effects on commercials, also program context effects on emotions during the commercial are examined.

Program context effects on the perception of subsequent commercials can be explained by the excitation-transfer theory of Zillmann (1983). This theory addresses the influence of emotional arousal on subsequent, potentially unrelated emotions, responses and behavior. The most important assumption of this theory is that arousal is non-specific. Therefore elicited arousal (for example

caused by a television program) isn't necessary linked to this stimulus and consequently doesn't have to disappear with the stimulus. The arousal level fades gradually after the arousing stimulus has disappeared, so arousal can be transferred to a subsequent stimulus (for example to television commercials). Hence, prior elicited arousal affects processing of the commercials, and consequently affects emotions, memory and evaluation of the commercials. The theory implies that program context effects will be strongest for the commercial shown on the first pod position, and weakest for the commercial shown on the last pod position.

Program Context and Memory for Commercials

An important issue of advertising effectiveness is whether people remember the television commercial and the advertised brand. Studies examining effects on memory mainly examined the role of arousal. These studies usually suggest that messages containing high arousal content are remembered better (Bolls, Potter and Lang, 1996; Lang, Dhillon and Dong, 1995; Libkuman, Stabler and Otani, 2004). Prior research provides several explanations for the phenomenon that high arousal levels cause better memory for messages. The simplest explanation is that people generally tend to give more attention to messages containing high arousal levels. As well, arousal itself results in more attention (Bradley, Greenwald, Petry & Lang, 1992). In recent research, the limited capacity model of television viewing is used to examine how arousing content affects viewers' attention, allocation of cognitive resources, encoding and storage of television messages (Lang, 2000). According to this model, message structure and content can elicit arousal, which results in automatic allocation to resources for coding and storing of information. Messages containing higher levels of arousal cause higher levels of viewer arousal, and subsequently cause the use of more resources to code and store the message in memory. The limited capacity model further suggests that memory capacity will be exceeded sooner with arousing messages in comparison with calm messages. This results in loss of memory for a short period. Another theory that explains the role of arousal on memory is the activational theory (Duffy, 1957). This theory states that arousal and performance correlate with each other. According to this theory, this relationship has an inverted U-shape, with performance being highest at medium arousal levels. Medium and high arousal levels were studied by Shapiro et al. (2002) who examined effects of a medium and a high arousal program context on the level and nature of processing of commercials. Their results indicate that subjects' processing levels are more deeply when the program arousal level is medium rather than high. This effect supports the activational theory. Nevertheless, previous studies mostly examined differences between low and high arousal, and left medium arousal out of consideration. Hence, very little is known about effects of medium arousal. This is striking because it appears that medium arousal causes better memory than high arousal. To investigate whether medium arousal actually causes better memory compared to high arousal, this study examines the effect of both a medium arousal and a high arousal program context on memory for commercials.

Other studies examined the effect of just program valence on memory. Furnham et al. (1998) examined context effects of either a comedy show or a news bulletin on television commercials.

Results indicate that free recall of television commercials is better for news than for a comedy show. Enjoyment of the program was found to be associated with poorer memory for the commercial. Comparable results were found by Gunter, Furnham and Beeson (1997) who conclude that program context doesn't affect recall of commercials, but program evaluation ratings do. Greater program involvement, among other things indicated by measures of liking and affective responses, is associated with poorer free and cued recall of subsequent commercial content. Norris and Colman (1994) found similar results, indicating poorer memory for commercials shown after entertaining and enjoyable programs, but these results are not significant. In contrast with most previous studies, Norris, Colman and Aleixo (2003) found in their study that enjoyment of the television program correlates positively with recognition of commercials shown in the second commercial break. Recall and recognition scores of the commercials in the first break didn't reach significance. Conflicting results of previous studies might be explained by a study examining the effect of congruency between the television program and the commercial (Sharma, 2000). This study shows that free recall and cued recall are influenced by program-commercial congruency, with highest recall scores when program and commercial are congruent.

Previous studies also examined the effects of both program valence and program arousal on memory. These studies generally suggest that arousal is a better predictor of memory than valence. Nevertheless, valence affects memory in a way that positive messages are remembered better than negative messages (Lang et al., 1995; Bolls, Lang and Potter, 2001; Libkuman et al., 2004). One of the few studies examining context effects of both program arousal and valence on memory, was conducted by Pavelchak, Antil and Munch (1988). They investigated the effects of watching the Super Bowl on arousal and valence of viewers in three cities (the city of the winning team, the city of the losing team and a neutral city), and how these emotions influence recall of commercials broadcasted during the match. Their results indicate that recall is negatively related to arousal, and unrelated to valence. Newell, Henderson and Wu (2001) replicated this study and found similar results, indicating that arousal affects recall of commercials negatively. Comparable results are found in an experiment examining effects of a negative high arousing news item on memory for commercials shown during a newscast (Mundorf, Zillmann & Drew, 1991). Results show that, compared with the control condition, recall scores for commercials in a negative high arousing program context are significantly poorer for a period of two and one-half minutes. Subjects in these studies saw real-life events including extremely disturbing and exciting footage. Possibly, because of the reality, viewer arousal levels were extremely high and consequently impaired information acquisition, processing and retrieval. According to the excitation-transfer theory, extremely high arousal levels shut down the information processing system, so for a short period, no capacity is left to process the following stimulus. This effect is called post-arousal impairment (Mundorf et al, 1991).

In summary, it appears that (extremely) high and medium arousal levels influence memory for commercials differently. It seems that, in spite of the few studies done into medium arousal context effects, medium arousal causes better memory for commercials compared to high arousal levels. Therefore, the following hypothesis is tested:

H1: Memory for television commercials is better for commercials shown in a medium arousal program context, compared to commercials shown in a high arousal program content.

Effects of valence on memory for commercials are less consistent. Previous research shows conflicting effects of valence on memory, therefore the following research question is examined:

RQ1: Does program elicited valence influence memory for television commercials?

As theorized, program context effects should fade out as time passes by. Therefore, it can be expected that program context effects on memory will be smaller for commercials shown later in the commercial break. Mundorf et al. (1991) found in their study that program context affected memory for commercials significantly for two and one-half minutes. Strikingly, no other study has examined this fading out effect on memory for commercials. Since only one paper was found which discussed fading effects of program context on commercials, the following research question is examined in the present study:

RQ2: Does the influence of program elicited arousal and valence on memory for television commercials, gradually disappear after the program has ended?

Program Context and Evaluation of Commercials

Besides remembering the commercial, an important issue of advertising effectiveness is a positive evaluation of the commercial. Previous research shows that program context influences commercial evaluation. In studies on commercial evaluation, valence is considered more important than arousal, so most of these studies only examined the effect of valence on commercial evaluation. Goldberg and Gorn (1987) found that, compared to a sad television program, commercials shown after a happy program are rated more positive. This effect is stronger for emotional commercials than for informational commercials. Murry, Lastovicka and Singh (1992) examined how emotions elicited by a positive, negative or neutral program context and program liking affect commercial evaluation. Their results indicate that not program elicited emotions, but program liking influences commercial evaluation. The distinction between effects of program liking and program elicited emotions was also made by Coulter (1998). Results of his study show that program liking mediates the effect of program elicited emotions on commercial evaluations. The relation between program liking and commercial evaluation is strengthened when the emotional tone of the program and the emotional tone of the commercial are congruent. When the viewer likes the program and therefore wants the program to continue and the commercial doesn't alter viewers' emotional state, commercial evaluations are more favorable because the viewer is allowed to continue the pleasant emotion. However, when continuance is desired and the commercial disrupts the program, commercial evaluations are lowered. This effect is also found by Isen (1984) and Zillmann (1988) who indicate that people are motivated to maintain a positive emotional state and repair a negative emotional state. Therefore, negative emotional states created by a program may enhance commercial evaluations when viewers focus their attention on the

positive aspects of the commercial in the hope of feeling better (Murry et al., 1992). A study examining program-commercial congruency effects on commercial evaluation shows different results (Kamins, Marks and Skinner, 2001). The effects of happy and sad television programs on happy and sad commercials were investigated. Results show that a happy commercial viewed in the context of a happy program is evaluated more favorably, compared to the same commercial viewed in the context of a sad program. The reverse effect was found for sad commercials. Commercial evaluations are more favorable when shown in the sad program context condition than in the happy program context condition.

Other previous studies investigating commercial evaluation, examined the effects of both arousal and valence. Broach et al. (1995) examined context effects of program arousal and program valence on viewers' evaluations of neutral television commercials. They found different effects for high versus low arousal. In the high arousal condition, a positive relation was found between the evaluation of the commercials and the valence direction of the program which precedes the commercial (assimilation effect). In the low arousal condition a negative relation was found between the evaluation of the commercials and the valence direction of the preceding program (contrast effect). These results confirm that both arousal and valence influence evaluations of commercials. Gorn et al. (2001) found different results in their examination of the influence of subjects' arousal and valence levels, elicited by music, on the evaluation of magazine advertisements with either positive valence or negative valence. In their study, subjects' valence level didn't affect ad evaluation, but the arousal level did. Ad evaluations are more polarized in the ad's valence direction under high arousal than under low arousal levels. This effect was found to be stronger for positive ads than for negative ads.

In summary, prior studies show diverse effects of valence on commercial evaluations. Part of the studies indicate that commercials are evaluated more favorably in a positive program context compared to in a negative program context, while another part of the studies indicate the opposite effect. Arousal also appears to have an effect on commercial evaluation, but results are inconsistent as well. Because results of previous research are inconclusive regarding effects of program context on commercial evaluation, the following research question is investigated in the present study:

RQ3: Do program elicited arousal and valence influence evaluation of television commercials?

As theorized, it might be expected that program context effects on evaluations of commercials slowly disappear during the commercial break. Effects are expected to be strongest for the first commercial and weakest for the last commercial in the pod. Results of the study of Murry et al. (1992) show that program liking influences commercial evaluation strongest for commercials in the first position of the pod. Coulter (1998) also examined whether commercial evaluation is influenced by the pod position. Results show that program context effects decrease over the first three positions in the pod, as the emotions associated with the program diminish. Because it is unclear in which way and direction program context affects commercial evaluation, the following research question is examined in the present study:

RQ4: Does the influence of program elicited arousal and valence on evaluation of television commercials, gradually disappear after the program has ended?

Program Context and Emotions during Commercials

Many studies investigating program context effects on memory and evaluation have been conducted. However, only one study examined the effect of program valence on the elicited emotions during the commercial. Goldberg & Gorn (1987) found that subjects who saw a happy program feel happier while watching the commercials than those who saw a sad program. No studies were found that examined effects of program arousal on emotions during the commercials. Nevertheless, it might be expected that program context effects will be transferred to the emotions during the commercial as well, and consequently influence the experienced arousal and valence levels during the commercials. Since only one study investigated program context effects on emotions during the commercials, the following research question is examined:

RQ5: Do program elicited arousal and valence influence arousal and valence during television commercials?

Effects of program context on emotions during different pod positions in the commercial break have not been published. However, as theorized, it might be expected that program context effects gradually disappear after the end of the program. Therefore, the following research question is investigated in the present study:

RQ6: Does the influence of program elicited arousal and valence on emotions during television commercials, gradually disappear after the program has ended?

In summary, previous studies show that arousal mainly affects memory, whereas valence mainly affects commercial evaluations. Most studies examined the effects of high and low arousal, and found that high arousal causes better memory. The present study examines the effects of medium and high arousal in order to test whether medium arousal causes better memory than high arousal, which is supposed by the activation theory. Results of previous studies investigating program valence effects, show conflicting effects on both memory and evaluation of commercials. The excitation-transfer theory is used to explain program context effects. Consequently, it is expected that program context effects on memory, evaluations and emotions will gradually disappear after the end of the program.

Method

Design

The experimental design of this study is a 2 x 2 x 3 between-subjects experimental design with program arousal (medium and high), program valence (positive and negative) and pod position (first, third and fifth) as independent variables. The dependent variables measured are memory for the commercials, commercial evaluation and emotions during the commercial. Memory for the commercials was measured with free recall and cued recall, commercial evaluation was measured with six semantic differentials, whereas commercial elicited emotions were measured with a visual scale.

Subjects

Subjects were 228 university students (146 women and 82 men, mean age = 20.7 years). The experiment was part of an introductory course in media psychology, and subjects received course credits for participation. Subjects were randomly assigned to the experimental conditions.

Stimulus Development

Program context. The experimental design of the present study consisted of four program context conditions. Because prior research has demonstrated their ability to induce a wide range of feelings in a relatively short time frame (Philippot, 1993; Gross & Levenson, 1995), movie fragments were chosen to realize program context conditions with the intended arousal and valence levels. The use of movie fragments has the advantage of providing external validity to the study. In this study, each program context condition consisted of two movie clips in order to exclude the possibility that other variables than program arousal and program valence accounted for effects, and because the use of more than one movie clip increases measurement reliability (Epstein, 1983). Movie clips which were in accordance with the intended arousal and valence levels of the program context conditions were already used by Shapiro et al. (2002). Eight movie clips were borrowed from this study, and were subjected to a pretest. Twenty subjects participated in this pretest, and rated their emotions evoked by the movie clips on a visual scale measuring arousal and valence (Lang, 1985). Results showed that only four of the eight movie clips, belonging to two program context conditions, reached the intended arousal and valence levels. Subsequently, nine other movie fragments were selected for a second pretest, in where another twenty subjects participated. From this pretest the four remaining movie clips with the intended values were selected.

The selected movie clips for the present study were all fragments from movies, with duration of 3 to 5 minutes, comparable to the length of movie clips advised and used by Rottenberg, Ray and Gross (in press). The clips and accompanying arousal and valence levels of the movie clips can be found in table 1.

Table 1

Pretest results of arousal and valence levels of selected movie clips

Program context condition & Movie clips	Arousal level	Valence level
<i>High arousal/Positive valence</i>		
Car ride with Madonna; BMW Star	6.50	6.25
'I've got the power'; Bruce Almighty	6.20	7.55
<i>High arousal/Negative valence</i>		
Teenager picks up hitchhiker; The Hitcher	6.66	3.78
Suicide scene; Full Metal Jacket	7.37	2.05
<i>Medium arousal/Positive valence</i>		
Magic Carpet Ride song; Aladdin	4.27	7.58
Hakuna Matata song; The Lion King	4.05	7.53
<i>Medium arousal/Negative valence</i>		
'John Travolta' dying; Phenomenon	4.72	2.81
'Kate Winslet' lying in bed; Finding Neverland	4.20	3.60

Note. 1= low arousal, 9=high arousal; 1=negative valence, 9=positive valence

Commercials. To enhance validity of the experiment, the commercials had to comply with a couple of requirements. Firstly, in order to exclude program-commercial congruency effects, the present study used commercials which were relatively neutral on both arousal and valence levels. Furthermore, only commercials with duration of 30 seconds were selected, since it is the most common length for commercials in the Netherlands. Commercial lengths were kept equal to prevent duration effects (Wheatley, 1968). Just commercials which were unknown by the subjects were selected, to make sure that memory effects couldn't be contaminated by prior exposure. Finally, real commercials were aimed at for enhancing the external validity of the study (Aaker, Stayman and Hagerty, 1986). A part of the requirements could be satisfied by using commercials from commercial Belgian broadcasting stations. The spoken language in Belgium is the same as in the Netherlands, so the selected commercials were in the mother tongue of the subjects, as most commercials on Dutch television are. Additionally, Belgian commercial broadcasting stations cannot be received in The

Netherlands, so the subjects couldn't be familiar with the commercials. In order to construct a relatively natural television viewing context, the commercial pod consisted of five commercials.

In order to select commercials that are neutral on arousal and valence levels, 160 Belgian commercials were screened. Subsequently, twelve commercials were selected on their neutrality, by means of a personal evaluation, and subjected to a pretest. Forty-eight first-year students in communication studies participated in the pretest. Based on the pretest results, five commercials were selected for the experiment. The final set of commercials consisted of five 30-second commercials, advertising a dairy beverage, a phone and internet company, a musical, a cereal product and a mobile phone company. The most neutral and informative commercial was chosen to be the target commercial: the commercial advertising the dairy beverage called Danone Actimel. This target commercial was placed on the first, third or fifth position in the commercial break. The remaining commercials were placed in a random order: Tele 2, Oliver Twist, Kellogs Special K, and Mobistar.

Experimental conditions. The experiment consisted of twelve experimental conditions. Program arousal and program valence levels were manipulated using four program conditions. Each program condition consisted of two movie clips containing equal arousal and valence levels. Pod position was manipulated using three conditions. The target commercial was placed on the first, third or fifth pod position. Each subject was assigned to one of the twelve experimental conditions, and saw one of the four program contexts and subsequently a commercial pod with the target commercial on one of the three positions.

Measures

This study measured the effects of program arousal and valence on successively free recall of the commercials, cued recall of the target commercial, emotions (arousal and valence) during the target commercial and commercial evaluation.

Arousal and valence measures. Arousal and valence levels were measured for emotions evoked by the program context and for emotions during the target commercial. To measure whether the program context elicited the intended emotions, a manipulation check was carried out for viewers' arousal and valence levels evoked by each movie clip. The emotions evoked by the movie clips and the emotions during the commercials were measured using the Self-Assessment Manikin (SAM), a visual scale which represents the user's emotional response to a stimulus, with respect to the dimensions arousal, valence, and dominance (Lang, 1985). The arousal and valence scales of SAM correlate highly with psycho-physiological and physiological measures of arousal and valence (Greenwald, Cook, & Lang, 1989). The SAM scale was proven to be a valid measure of emotions associated with television messages (Lang et al., 1995). SAM reflects each dimension with a graphic character arrayed along a continuous nine-point scale. For valence, SAM ranges from a smiling happy figure to an unhappy figure. For arousal, SAM ranges from an excited figure to a sleepy figure. Finally, the dominance scale goes from a very small figure to a very big figure. Dominance was measured in order to follow the instruments' protocol, but these ratings were not used in the analyses. For the analyses, the arousal

and valence scales were inverted, so high scores on arousal represent high arousal levels, and high scores on valence represent positive valence scores.

Memory measures. Memory for the commercials was measured using a free recall and a cued recall test. For the free recall test, subjects were asked which advertised products and which advertised brands they could remember. Subjects scored one point for each product or brand they remembered, and could score a total of 10 points. The number of scored points was combined for a total free recall score.

A cued recall test was conducted for the target commercial. Subjects were asked to write down as much as they could remember about the Danone Actimel commercial. They could score a total of 32 points, with each point representing a characteristic of the commercial.

Evaluative measures. Commercial evaluation was measured using six 9-point semantic differentials derived from Goldberg and Gorn (1987). These measures have proven to be effective and reliable in the original study, as well as in another study which used the same scales (Kamins et al, 2001). The six semantic differentials measured whether the subjects evaluated the target commercial ineffective to effective, sad to happy, unsatisfactory to satisfactory, unpleasant to pleasant, bad to good and disliked to liked.

Procedure

The experiment was conducted in a computer room, containing 33 computers, and was carried out in twelve sessions divided over two days. Subjects performed the experiment on a computer, and followed the general procedure as pointed out. The whole experiment, including the questions, the explanation of the answering scales and the video, was presented and carried out on the computer. Each part of the experiment was presented separately, and subjects were not able to return to a previous part of the experiment. Results were processed electronically, and data were collected online.

The experiment started when the experimenter welcomed the students and gave a brief introduction to the experiment. Subjects started with reading a short introduction, answering general questions (age, gender, education and mother tongue) and read an explanation of the answering scales. Subsequently the video was introduced and subjects saw successively one of the four program context conditions, followed by the pod of five commercials. After watching the video, the questionnaires were presented. Firstly, subjects had to indicate their emotions evoked by each movie clip using the SAM-scale. After that, free recall was measured, and subjects had maximally three minutes to recall the commercials and accompanying brands. When the three minutes were passed, the subject was automatically forwarded to the next page. On this next page, cued recall was measured for the target commercial, and subjects had also maximally three minutes to recall commercial characteristics. Finally, emotions during the target commercial and commercial evaluation were measured in the following part of the experiment. To make sure that subjects remembered the commercial and could make a solid evaluation of it, a short summary of the target commercial was given before the questions. When all subjects were finished they were thanked for their participation. The whole procedure took approximately 45 minutes.

Results

Manipulation checks

To determine whether program arousal and program valence were manipulated as intended, a multivariate analysis of variance (MANOVA) was conducted. In this analysis the program arousal manipulation and the program valence manipulation were the factors and the evoked arousal and valence levels of the first and second movie clip were the dependent variables. The analysis showed that the program arousal manipulations were effective for both the first movie clips ($F(1,4)=30.19, p<.001$) and the second movie clips ($F(1,4)=8.18, p=.01$). Mean arousal scores for the medium arousal movie clips were significantly lower ($M=4.84; M=5.00$) than mean arousal scores for the high arousal movie clips ($M=6.21; M=5.74$). Also valence manipulations were effective for the first movie clips ($F(1,4)=228.46, p<.001$) and the second movie clips ($F(1,4)=471.57, p<.001$). Mean valence scores for the negative movie clips were significantly lower ($M=4.41; M=3.84$) than mean valence scores for the positive movie clips ($M=7.68; M=7.85$). Analyses showed that program context manipulations were successful.

Memory for Commercials

The effect of program context on memory for the commercials was measured with free recall of all commercials and cued recall of the target commercial. For free recall, an analysis of variance (ANOVA) was conducted, with program arousal and program valence manipulations as between-subjects factors and free recall score as dependent variable. No main effects of program arousal and program valence on free recall were found. Yet, an interaction effect of program arousal and program valence was found ($F(1,223)=10.90, p<.001$). In the medium arousal condition, commercials were better remembered in a positive program context ($M=3.20$) compared to in a negative program context ($M=2.85$). Oppositely, in the high arousal condition, commercials were better remembered in a negative program context ($M=3.15$) compared to in a positive program context ($M=2.58$).

Furthermore, an analysis of variance was conducted for cued recall scores, with program arousal and program valence manipulations as between-subjects factors and cued recall score as the dependent variable. The main effect of arousal was significant ($F(1,223)=6.31, p=.01$). Cued recall scores for the target commercial characteristics were higher in a medium arousal program context ($M=4.31$) compared to in a high arousal program context ($M=3.69$). No significant main effect was found for valence ($F(1,223)=2.18, p=.43$).

To investigate whether program arousal and program valence affect cued recall for each pod position differently, analyses of variance were conducted for each pod position separately. For the first pod position, a main effect of program arousal was found ($F(1,73)=3.89, p=.05$). Cued recall scores were higher in a medium arousal program context ($M=4.57$) compared to in a high arousal program context ($M=3.71$). No significant main effects of arousal were found for the third ($F(1,69)=1.67, p=.20$) and fifth ($F(1,73)=0.89, p=.35$) pod positions. Program valence didn't affect cued recall on each of the pod positions.

Evaluation of Commercials

A reliability analysis was conducted to check whether the six items measuring commercial evaluation could be combined into an additive score for commercial evaluation. Cronbach's alpha for the six items was .89, representing a reliable measure. Therefore, an additive index of the six semantic differentials was constructed for commercial evaluation.

The effect of program arousal and program valence on commercial evaluation was measured using an analysis of variance, with program arousal and program valence manipulations as between-subjects factors and commercial evaluation as the dependent variable. Results showed that both valence ($F(1,223)=5.18, p=.02$) and arousal ($F(1,223)=3.76, p=.05$) affected commercial evaluation. Commercials were better liked in a negative program context ($M=5.83$) compared to in a positive program context ($M=5.42$). And commercials were better liked in a medium arousal program context ($M=5.79$) compared to in a high arousal program context ($M=5.44$).

In order to examine whether program arousal and program valence effects gradually disappeared after the end of the program, analyses of variance were conducted for each pod position separately. For the first pod position, a nearly significant effect of valence was found ($F(1,73)=3.68, p=.06$). Commercials were evaluated more favorably in a negative program context ($M=5.94$) compared to in a positive program context ($M=5.33$). Furthermore an interaction effect was found for arousal and valence on the first pod position ($F(1,73)=4.21, p=.04$). In a high arousal program context, commercials were better liked in a negative program context ($M=6.07$) compared to in a positive program context ($M=4.79$), but no differences were found for commercials shown in a medium arousal context ($M=5.80; M=5.84$). No significant effects were found for program arousal ($F(1,69)=0.05, p=.81$) and valence ($F(1,69)=0.34, p=.56$) on commercial evaluation for the third pod position. As well, no significant effects of program arousal ($F(1,73)=3.30, p=.07$) and valence ($F(1,73)=1.29, p=.26$) were found for the fifth pod position, but arousal affected commercial evaluation slightly, although not significant. Commercials were evaluated more favorable in a medium arousal program context ($M=6.12$) compared to in a high arousal program context ($M=5.57$).

Emotions during Commercials

Emotions during the target commercial were measured using the SAM-scale. The effects of program arousal and program valence on arousal and valence during the commercials was measured using a multivariate analysis of variance, with program arousal and program valence manipulations as between-subjects factors and arousal and valence levels during the commercial as dependent variables. Results showed that program arousal affected arousal during the commercial significantly ($F(1,223)=22.37, p<.001$). Subjects reported higher arousal levels during a commercial shown in a medium arousal program context ($M=4.25$) compared to commercials shown in a high arousal program context ($M=3.04$). Also a significant effect of program valence on valence during the commercial was found ($F(1,223)=8.39, p<.005$). Subjects felt more positive during a commercial shown in a negative program context ($M=6.24$), compared to commercials shown in a positive program context ($M=5.65$).

To examine whether program arousal and program valence effects on arousal and valence during the commercial disappear gradually after the end of the program, analyses of variance were conducted for each pod position separately. For the first pod position, a main effect of arousal was found ($F(1,73)=11.96, p<.001$). Subjects reported higher arousal levels during commercials shown in a medium arousal program context ($M=4.31$) compared to commercials shown in a high arousal program context ($M=2.79$). No effects of program valence on commercial valence were found for the first pod position. A significant effect of arousal was also found for commercials shown on the third pod position ($F(1,69)=4.95, p=.03$). Subjects felt more aroused during commercials shown in a medium arousal program context ($M=4.19$), compared to commercials shown in a high arousal program context ($M=3.11$). No effect of program valence on commercial valence was found for the third pod position. For the fifth pod position, an effect of program arousal on commercial arousal was found as well ($F(1,73)=5.77, p=.02$). Subjects felt more aroused during commercials shown in a medium arousal program context ($M=4.26$) compared to commercials shown in a high arousal program context ($M=3.24$). A significant effect of program valence on commercial valence was found for the fifth pod position ($F(1,73)=7.55, p=.01$). Subjects felt more positive during a commercial shown in a negative program context ($M=6.60$), compared to commercials shown in a positive program context ($M=5.73$).

Discussion

Overall, the results of this study suggest that program context affects memory for commercials, commercial evaluation and emotions during the commercial. In contrast with most previous research, the present study shows that both valence and arousal affect both memory and evaluation of commercials. The effects of arousal are in accordance with the excitation-transfer theory; program arousal is transferred to the commercials, and consequently affects emotions, memory and evaluations of the commercials. Results show that in the medium arousal program context, subjects feel more aroused during the target commercial, recall more of the target commercial and evaluate the commercial more positive compared to commercials shown in the high arousal program context. As theorized, the effects of program arousal disappear gradually after the end of the program. Results indicate that besides arousal levels, also the valence level of the program is transferred to the commercials, and consequently affects emotions, memory and evaluation of the commercials. In a positive program context subjects feel less positive during the commercial and evaluate the commercial less positive compared to commercials shown in the negative program context. Effects of program valence and program arousal on commercial evaluation disappear gradually after the end of the program.

Memory for commercials was measured using cued recall and free recall. Cued recall scores for commercials indicated that commercials shown in a medium arousal program context are remembered better than commercials shown in a high arousal program context. This effect corresponds with the results of Shapiro et al. (2002) who concluded that subjects' processing levels are more deeply when the arousal level is medium rather than high. Other studies indicated that high levels of arousal cause

better memory than low arousal levels (Lang et al., 1995; Bolls et al., 1996; Bolls et al., 2001, Libkuman et al., 2004). The combination of the present study and the above-mentioned studies supports the activation theory (Duffy, 1957), which states that the arousal-performance relationship has an inverted U-shape, with memory-performance being highest at medium arousal levels. Program valence has no significant effect on cued recall. This result is not consistent with a couple of previous studies which examined the role of valence on memory and showed that positive valence causes better memory compared to negative valence (Goldberg & Gorn, 1987; Norris et al., 2003) and studies showing the opposite effect (Norris and Colman, 1994; Furnham et al., 1998).

Free recall results show an interaction effect of program arousal and valence, with better memory for commercials shown in a medium arousal positive program context compared to a medium arousal negative program context, and the opposite result is found for a high arousal program context. The found interaction effect of free recall is unexpected, and never found in previous research. Therefore, further research has to examine this effect more in depth, to investigate the underlying processes causing this effect.

Also an effect of pod position on memory was found, indicating only significant effects of arousal on cued recall for the first commercial in the pod, and gradually decreasing effects for the third and fifth commercial. This decrease of program context effects on memory for commercials supports the excitation-transfer theory. In contrast with Mundorf et al. (1991), the duration of program context effects in the present study was only 30 seconds. The difference in duration effects between both studies is probably caused by the discrepancy in arousal levels.

Results of this study also show effects of program context on commercial evaluation. Program valence is negatively related to commercial evaluation. This effect is in line with previous studies (Isen, 1984; Zillmann, 1988; Coulter, 1997), which found that people have a desire to maintain a positive emotional state and repair a negative emotional state. When viewers see the neutral commercials in a negative program context, the commercials repair the negative emotional state, while when viewers see the neutral commercials in a positive program context, the neutral commercials disrupt the positive emotional state.

Results show a negative effect of program arousal on commercial evaluation as well. In a medium arousal program context, commercials are evaluated more favorable compared to commercials shown in a high arousal program context. A possible explanation might be that, in comparison with the high arousal program contexts, the medium arousal program contexts are more congruent with the emotional tone of the commercial, because arousal levels are more equal. Therefore, the transition of program to commercials was less disruptive. Accordingly, studies examining congruency effects show that program-commercial congruency results in more favorable evaluations of the commercial (Kamins et al., 1991). The found result is in line with this effect.

Results for program context effects and pod position show a nearly significant effect of program valence on commercial evaluation for the first pod position. Commercials are evaluated more positive in a negative program context than in a positive program context. Also, an interaction effect of program arousal and valence is found for the first commercial in the pod. In a medium arousal

program context, no differences for program evaluation are found between positive and negative program valence, but in the high arousal program context, commercials shown in a negative program context are rated significantly better than commercials shown in a positive program context. It seems that, because of the less disruptive transition between the program and the commercial in a medium arousal context, it doesn't matter whether the program was positive or negative. In contrast, in a high arousal program context, the transition between program and commercial is larger, and therefore more disruptive. This disruption affects commercial evaluation, either in a positive way (in a negative program context) or in a negative way (in a positive program context). This result is in contrast with results of Broach et al. (1995), who found in the high arousal program context, a positive relation between the valence direction of the program and the evaluation of the commercial.

No significant effects for program arousal and valence on commercial evaluation are found for the third pod position. For this pod position, commercial evaluation ratings in all program context conditions show less variance, indicating a decrease of program context effects. This result supports excitation-transfer theory, because the evoked arousal by the program context influences commercial evaluations, and this effect decreases during the commercial break. For the last pod position, evaluations are negatively affected by arousal, although not significant. Commercials are rated more positive in a medium arousal program context than in a high arousal program context. The small effect of program arousal on commercial evaluation might again be explained by the congruency of arousal levels of the program and commercial for medium arousal programs. But it is unclear why this effect only occurs on the last pod position. Therefore, further research has to examine the fading effect of program context on commercial evaluation more thoroughly.

Results indicate that both program arousal and program valence affect arousal and valence during the commercial negatively. Subjects report higher arousal levels during the target commercial in a medium arousal program context than in a high arousal program context, and valence levels are more positive in a negative program context than in a positive program context. This result is in line with the commercial evaluation ratings, but in contrast with excitation-transfer theory and previous studies (Goldberg & Gorn, 1987). The effect can be explained using the explanation applied to the commercial evaluation effects of valence. Subjects want to be in a positive emotional state. When the neutral commercials are shown in a negative program context, the commercials are perceived more positive than the program, and consequently subjects feel more positive. However, when neutral commercials are shown in a positive program context, the commercials are perceived less positive than the commercial, and consequently subjects feel less positive.

It's interesting to note that subjects who saw a high arousal program feel low aroused during the commercial, and subjects who saw a medium arousal program feel medium aroused during the commercial. This effect also differs with the excitation-transfer theory, which states that the elicited arousal by a stimulus will be transferred to a subsequent stimulus. No previous theories and studies were found that could explain the found effect. Therefore, more research has to be done into this subject. Physiological measures are able to measure emotional responses more thoroughly, and subsequently might provide an explanation for the found effect.

Unlike program context effects on memory and commercial evaluations, the effects on emotions during commercials last longer. Program arousal affects arousal during the commercial for each pod position of the target commercial. This result supports the excitation-transfer theory, and shows that effects of arousal can last for a longer period of time. Strangely, program valence only affects commercial valence for the fifth commercial in the pod. Because no previous theories and studies were found that could explain the found effect, more research has to be done into the effects on program context on emotions during commercials.

The present study shows that not high arousal, but medium arousal causes best memory and best evaluation of commercials. Furthermore, commercials are evaluated more favorably in a negative program context compared to in a positive program context. Program context effects on memory and evaluation are strongest on the first pod position. Hence, to enhance commercial effectiveness optimally, neutral commercials should be placed on the first position in the commercial break of a negative medium arousing program.

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