Understanding Society

The Effect of Background Music in Advertising on Ad Memory

Lotte van der Star
2066262

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Communication and Information Sciences

Specialization *Business Communication & Digital Media*

Department Communication and Cognition

School of Humanities and Digital Sciences

Tilburg University, Tilburg

Supervisor: Dr. T.O. Lentz

Second Reader: Dr. E. Abrahamse

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Abstract

Individuals see about 377 advertisements a day. However, they do not process each advertisement consciously or direct. The objective of an advertisement is to be seen, so the advertisement needs a cue that improves an individual's ad memory. Music is a cue that can help improve customers' ad memory, even when the ad is experienced unconsciously. Thereby, music can provide a more intense emotion. A more intense emotion, in turn, can provide better ad memory. However, previous studies show different outcomes of whether music in advertisements improves ad memory. This difference may be caused by the degree of congruency of the music with the advertisement. In addition, previous studies did not distinguish between individuals with Sensory Process Sensitivity (SPS) and individuals without Sensory Process Sensitivity. Individuals with SPS experience a more intense emotion in response to sensory stimuli. Therefore, SPS may cause a more intense emotional reaction to music. An online experiment was conducted. The study was a between-participant design in which 262 individuals saw an advertisement in one of the three conditions (without music, with congruent music, or with incongruent music). This experiment aimed to see if music in an advertisement would cause better ad memory, if this effect was mediated by the intensity of emotion, and whether there was a moderation effect by SPS on emotion. Contrary to the expectations, no significant results were found. Since no results were found and previous results diverged, background music may not be an important factor for ad memory.

Keywords: Music, congruency, incongruency, emotion, memory, sensory process sensitivity

Table of Content

The Effect of Background Music in Advertising on Ad Memory

Dutch individuals are confronted with around 377 advertisements each day (Quest, 2015). As a result, most of the time individuals do not make their decision directly or consciously, when exposed to an ad (Petty & Cacioppo, 1986). Therefore, it may be difficult to direct the attention of potential customers to the advertisement. The objective of an advertisement is to be seen, or even better, to be remembered. To retrieve information, thoughts, or feelings from when an advertisement was watched, typically available cues (e.g., brand names) may not be effective because of the overload of advertisements (Keller, 1987). Hence, examining how someone processes information, is suggested to be beneficial. The Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986) explains that processing can go through two different routes: the central route and the peripheral route. The information processed in the central route needs to contain strong arguments. It takes time and cognitive effort to process this information. The peripheral route requires less attention and effort to process the information. People process information via the peripheral route when a message is processed unconsciously or when there is no time to process a message properly. This processing is based on signals (Petty & Briñol, 2011). These signals are called peripheral cues. Peripheral cues can be used to ensure that advertisements would remain in people's minds (ad memory) (Petty & Cacioppo, 1986).

Music is a peripheral cue that is proven to be very useful for generating ad memory (Park & Young, 1986). For example, people may come to remember a new political candidate based on the music included in his campaign. If they hear the music once more, they will probably think of this political candidate again (Radar, 1994). Thus, music may improve ad memory (Petty & Cacioppo, 1986). However, even though most studies revealed a higher level of ad memory when music is used in advertisements, there are still controversial findings (Guido, 2016). A study by Anand and Sternthal (1990) posits that

advertisements do not necessarily benefit from music. Others explain that those controversial findings may be caused by characteristics of the music, in particular the fit between the music and the advertisement (Fraser & Bradford, 2020). If there is a correct fit between the music and the advertisement, it is called congruency, and can be beneficial for ad memory. Congruency is caused by the relevancy and expectancy of background music to the advertisement (Abolhasani et al., 2021). Therefore, music that is congruent with the ad may act as a positive peripheral cue on memory.

The effect of music on ad memory can be explained by the effect of music on emotion. Music can lead to a higher level of emotion, even when the music is not experienced consciously (Jäncke, 2008). Positive emotions and high levels of arousal may act as memory-enhancing, when it is corresponding with specific events like commercials (Jäncke, 2008). The processing of music in the brain occurs in areas related to emotion processing, memory retrieval, and memory processing, which makes that music regulates the effect of emotion and memory (Johanna et al., 2015). As a result, a higher level of emotion may lead to better ad memory.

Another factor that can affect the level of emotion, and thus ad memory, is sensory sensitivity. This is a topic that has not been investigated extensively. However, as much as 20% of the population is highly sensitive to their environment (Aron & Aron, 1997), which means that many individuals fall in this category. In previous studies of ad memory, no distinction is made between people who are highly sensitive and who are not highly sensitive. By looking at the different needs of the population, the ad can be adjusted better to each person’s needs. This adjustment may create a wider reach for the advertisement.

Being highly sensitive to all kinds of stimuli is referred to as Sensory Processing Sensitivity (SPS) (Pluess, 2015). Individuals who experience SPS are easily overwhelmed by internal and external stimuli. In addition, SPS can cause increased emotional response and

empathy, greater awareness of what is happening around them, and being prone to overstimulation (Aron et al., 2012; Homberg et al., 2016). Since sensory sensitivity can lead to higher emotional levels, it is worth looking at the interaction between sensitivity and the presence of music on emotion. This interaction effect may lead to a more intense emotion for individuals with SPS, which ultimately may provide a positive effect on ad memory.

In the existing research about the effect of background music in advertisements on ad memory, there are three distinct views on the effect of music on ad memory (with music, without music, depending on congruency). As a result, the question remains what the effect of background music in an advertisement on memory is. Music, as a peripheral cue, has been shown to influence the level of emotion. In addition, the level of emotion may affect ad memory. It will be interesting to see if the effect on ad memory is mediated by emotion. Finally, it is worth investigating if highly sensitive individuals experience a higher level of emotion when they process music. These factors combined lead to the following research question:

"What is the effect of background music in an advertisement on ad memory and is this effect mediated by emotion? Is this mediation effect moderated by Sensory Processing Sensitivity?"

2. Theoretical Framework

2.1. Music and Memory

2.1.1. Congruency

An important characteristic of background music is congruence, this concept is not used uniformly by all researchers. Firstly, Aaker & Keller (1990) saw congruence as relevance, referring to consistency between the two entities. Secondly, other researchers described congruence as expectations, referring to the idea of whether one can expect one entity to accompany the other entity (Meyers-Levy & Tybout, 1989). Finally, Heckler & Childer (1992) consider congruence to be two-dimensional, with both relevancy and

expectancy as components of congruency. They define relevancy as “the extent to which the information, contained in the stimulus, contributes to or detracts from the clear identification of the theme or primary message being communicated”. Expectancy is defined as “the degree to which an item or piece of information falls into a predetermined pattern of structure evoked by this theme” (Maille & Fleck, 2011). Since most studies concerning music in advertisements use the two-dimensional concept, this study will also use the two-dimensional concept for congruency (Hecklers & Childers, 1992). Therefore, in this study, congruency is when the music in an advertisement is expected and relevant, when the music is not relevant and not expected, it is called incongruency.

2.1.2 Other characteristics

Other structural characteristics that can affect memory are elements such as tempo, timbre, harmony, and textual elements together (Bregman, 2005).

2.1.3 Previous findings on the effect of background music on memory

There are three considerable views in the literature about the effect of background music on memory. First, most studies claim that background music has always had a positive effect on ad memory (Allan, 2006; Hoyer et al., 1984). Music helps individuals retain advertisement messages. Thereby, according to Allan (2006) music attracts attention and stimulates memory for advertisements. In contrast, studies by Kellaris et al (1993) and Gorn et al (1991) both reported that advertisements without music produced a higher level of recall. Anand & Sternthal (1990) found that messages were more difficult to process in the working memory when the message is combined with music (Guido, 2016).

Working memory is a temporary storage space for small amounts of information over brief periods, and a gateway into long-term memory (Baddeley, 1992; Burmester, 2017). Working memory can only process a certain amount of information at once (Baddeley, 2010). If working memory needs to process the brand, the advertisement message, the music, and

the corresponding emotion, it was concluded that this was too much information to process at once (Anand & Sternthal, 1990). However, other research suggests that when people need to process information, music does not affect information processing (Rader, 1994). It may be that music can be processed, without affecting the advertising message.

The third view suggests that the degree of ad recall and the ability of processing depends on the degree of congruency (Fraser & Bradford, 2012). The majority of studies found a higher effect on memory for advertisements with congruent background music than without or incongruent music (Anand & Sternthal, 1990; Eckhardt & Bradshaw, 2014; Guido et al., 2016). Congruent background music helps to understand and process the advertised message more clearly and effectively, which makes it easier to process the message in working memory (Guido et al., 2016; Hoyer et al., 1984). Thereby, Hung (2000) found that an incongruent fit is more difficult to understand and process and therefore can lead to frustration for a consumer. However, a follow-up study of Heckler & Childers (1991), by Abolhasani et al. (2021), focused on incongruency and found no significant difference between the conditions congruent and incongruent. The study did show a significant difference between irrelevant background music and memory, as irrelevant music led to a lower recall level. Since relevancy is an important factor of congruency, it can be concluded that the effect of background music on ad memory will be higher when the music is congruent.

To summarize, there are three views with different results on the effect of background music on ad memory. One view claims that music always leads to better ad memory, the second view claims that no background music gives better results, and the third view says that the effect depends on the congruency of the background music. It is shown that incongruent music can cause difficulties in processing information in the working memory.

However, due to the congruency between music and advertisement, it is feasible to process all the information in working memory. Based on the previous findings H1 is constructed:

H1: Advertisements with congruent music lead to a higher memory level than advertisements without music or incongruent music.

2.2. Emotion, Music, and Memory

2.2.1. The Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM) describes how people process advertising messages and how this impacts their attitudes (Petty & Briñol, 2011). The level of elaboration, in other words, the level of processing, can range from no thought on the presented information to extensive elaboration on each point of the information. The model explains the difference in processing with two routes; the central route and the peripheral route (Petty & Briñol, 2011; Petty & Cacioppo, 1986). The central route, labeled cognitive by Park and Young (1986), is a result of someone carefully and thoughtfully weighing the genuine qualities of the evidence offered in support of an argument, and the involvement is high. The peripheral route, mostly affective, occurs most likely because of a simple peripheral cue in the persuasion context (e.g., an appealing element). The simple peripheral cue triggers change without requiring a thorough examination of the information, and the involvement is low (Petty & Cacioppo, 1986). Since customers who are exposed to an advertisement make their decision most of the time not directly, consciously, or with low involvement, the way the mind processes information via peripheral cues, may be extremely beneficial for ad memory (Lilleker, 2014). Hence, with the help of simple peripheral cues, it is more likely that individuals process the advertisement.

2.2.2 Peripheral cues

People see a large number of advertisements in a day. To deal with this, people use a coping technique that helps them systematically process only important messages. When a

message is less important, people rely on non-content cues to determine whether to process it. When information comes in via the peripheral route, opinions are formed and modified as a consequence of these simple cues (Rader, 1994).

Music is a controllable peripheral cue and can be beneficial in persuasive communication (Tol & Ritchie, 2014; Radar, 1994). Especially when music consists only of instruments, music may be an excellent persuasive tool (Radar, 1994). An overview article from Radar (1994) about music as a peripheral cue explains the benefits of music in advertisements. Music can get and hold attention, it increases central cues (e.g., information about the product/brand), but it does not depend on it. Thereby, music blends well with the other elements of the message, reducing misunderstanding of the message, and when the message is repeated often it reduces the possibility of irritation. The above information suggests that music may be a powerful tool for persuasive communication.

2.2.3 Emotion and Memory

In a persuasive message, music may create a more intense emotional state (Dibben, 2004; Radar, 1994). Music can put consumers in a positive mood, it can awaken one, stimulate, and elicit specific feelings (Jänke, 2008). When people hear the music again, they regain this positive mood toward the brand. Those positive moods can be formed by merging a conditioned stimulus (product/brand) with an unconditioned stimulus (music), which in turn creates a positive emotional response toward the brand (Radar, 1994). This, in return, ensures a positive brand attitude (Park & Young, 1986). In addition, advertisements may be considered unattractive if they are not accompanied by music (Radar, 1994). Therefore, music may be a tool that creates a positive level of emotion.

Although most studies explain music as a predictor of emotions, some studies found little or no effect on emotional response when music is used in advertisements (Stout & Leckenby, 1986). The reason that little or no effect was found, was most likely due to a

mismatch between the advertisement and the background music (incongruence). A good fit between the music and the advertisement (congruence) positively impacts the emotional response (Alpert & Alpert, 1990).

Emotion has two prominent dimensions: valence and intensity (Cuesta, 2018; Jäncke, 2008). Positive emotions and high intensity may act as memory enhancers (Srull, 1983; Yang & Chen, 2012; Moore & Hutchinson, 1983). However, many studies suggest that it is mostly intensity, regardless of valence, that leads to stronger recall. The intensity of the mood is arousing, which improves ad memory (Srull, 1983). In the current study, intensity is measured for the five basic emotions: Anger, Fear, Sadness, Disgust, and Enjoyment. Those emotions are often used for research on the emotional response (Centre for Clinical Psychology, n.d.). Subsequently, this study will focus on the intensity of emotions for ad memory.

Emotional messages may result in a positive effect on long-term memory (Friestad & Thorson, 1986). A variety of different studies have found that music is processed in areas in the brain that are relevant to processing emotions as well as to retrieving and processing memory (Jänke, 2008). According to Scherer & Zetner (2001), music is one of the most powerful cues in bringing emotional experiences from memory back into awareness. Emotions are used as contextual information linked to remembered information, this is called ‘The semantic associative network model of memory’. Next to emotions, words, pictures, and music are represented in this network. If one of those factors (emotions, words, pictures, or music) is stimulated, the other factors will be stimulated as well, which helps to retrieve emotional information from our memory (Bower, 1981). Even if we listen passively to the music, it still activates many psychological functions, like emotion and memory, in our network (Jänke, 2008). As a result, it makes no difference if music is listened to actively or passively, music will provide an emotional reaction. The more intense this emotional reaction

is while listening to music, the more this improves ad memory.

To conclude, music is one of the more controllable cues, and establishes many benefits. Music, as a peripheral cue, is possibly a factor in the creation of emotions during information processing. Therefore, background music may have a positive influence on the level of emotions. However, if the music is incongruent, the intensity of emotion may not be positively impacted by music, which leads to hypothesis 2:

H2: Advertisements with congruent music create a more intense emotion than advertisements without music or with incongruent music.

Emotion is possibly related to memory. When someone experiences a high intensity of emotion, this will likely improve ad memory. Therefore, hypothesis 3 is constructed:

H3: A more intense emotion leads to better ad memory.

2.3 Sensory Processing Sensitivity

A person perceives stimuli and reacts to their environment by processing sensory information. Everyone is different in the way he or she perceives and processes stimulus, with some being more sensitive than others (Pluess, 2015). Individuals who are highly sensitive to stimuli have a trait called Sensory Processing Sensitivity (SPS). SPS is a temperament, continuum trait linked to cognitive, sensory, and emotional information processing in the brain (Acevedo et al., 2014). Individuals who experience SPS are more sensitive to external stimuli and pay more attention to stimuli (Jagiellowicz et al., 2011). They process stimuli more intensely, have increased emotional reactivity and empathy, and experience ease of overstimulation more quickly (Greven et al., 2019; Pluess, 2015). Thereby, people with SPS tend to be more attuned to their thoughts and emotions (resulting in emotional sensitivity). Research has shown that highly sensitive individuals tend to be more conscientious, intuitive, and better at avoiding mistakes. They are highly aware of

subtleties or small changes, and more attuned to thoughts and emotions of themselves and others (Greven et al., 2019). Individuals with SPS benefit greater from positive experiences, but also suffer more from negative experiences in comparison with individuals without SPS (Wen, 2021). Hence, it may be expected that individuals have a more intense emotional reaction to sensory stimuli.

Throughout the years, multiple measures were developed to measure individuals' sensitivity. Firstly, Aron & Aron (1997) created a Highly Sensitivity Person (HSP) scale to measure sensitivity, this scale focuses on emotion. Secondly, Evans & Rothbart (2007) created the Adult Temperament Questionnaire (ATQ), which focuses on sensory stimuli. Thirdly, Dixon et al. (2016) created the Hypersensitivity Scale, which focuses on measuring heat and cold. Finally, de Gucht et al. (2022) combined the most important aspects of those questionnaires and created and tested the Sensory Processing Sensitivity Questionnaire (SPSQ). This is a questionnaire consisting of 43 items, where respondents can indicate at which level certain statements are applied to them on a 7-Likert scale. Compared to previous SPS questionnaires, the SPSQ has the benefit of measuring multiple aspects of SPS (emotion, sensory stimuli, and heat and cold) collected from the previous questionnaires combined) and focus not just on the negative, but also on the positive aspects of Sensory Processing Sensitivity. Therefore, the SPSQ is used in this study (de Gucht et al., 2022).

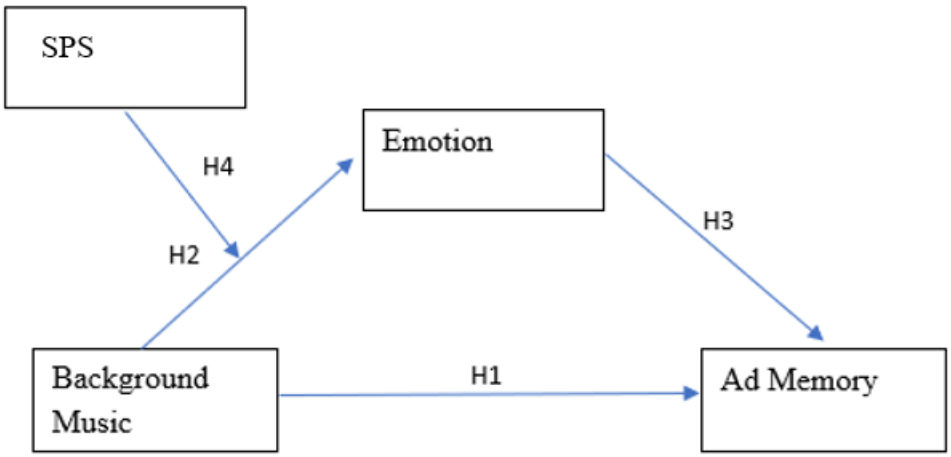
SPS is relevant for the current study, as this study investigates the mediated effect of emotion on memory as a result of background music. SPS may provide a more intense emotion as a result of sensory stimuli, and thus may be a moderation for this effect. Since 20% of the population falls into the SPS category, this is a rather large group. Researching this group may lead to new insights of the connection between emotion, SPS, and advertisements. Therefore, the fourth hypothesis is:

H4: The effect of the type of background music on emotion is higher for individuals with a high sensitivity level, than for individuals with a low sensitivity level.

Figure 1 contains the hypotheses in the conceptual model

Figure 1

The conceptual model



3. Method

3.1 Design

For this study, an online experimental between-participant design was used, with background music as the independent variable, ad memory as the dependent variable, level of emotion as mediator, and level of sensitivity as moderating variable. This experiment aimed at gaining insight into the effect of background music in advertisements on the ad memory of individuals, and if emotion regulates this. Moreover, this research investigated if the level of emotion is strengthened by the level of sensitivity.

3.2 Participants

A total of 275 participants were recruited via the Human Subject Pool (*N*=99),

SurveyCircle (*N*=49), and convenience sampling (*N* = 127) (Treatwell & Davis, 2020). 13 respondents were excluded from the survey, because answers were left out or too many of their answers were outliers (see 4.2 for outlier detection procedure). The resulting sample was 262, including 184 women and 78 men. The largest group of participants was between 18-25 years old (*N* = 120). Furthermore, 35 participants were between 26-35, 14 participants were between 36-45, 21 participants were between 46-55, and 24 participants were 55 years old or older. Most participants had finished their HBO (*N* = 95). 1 participant did not finish an education, 59 participants finished Secondary Education, 26 participants finished their MBO, 87 participants finished their WO, and one participant preferred not to say. All participants had a Dutch nationality. The participants were randomly assigned to one of the three conditions with equal distribution (See Table 1).

Table 1

Condition randomization

		Participants before outlier removal	**Participants**	**Percentage**
Music	Without	92	88	33.6%
	Congruent	92	85	32.4%
	Incongruent	91	89	34%
	Total	275	262	100%

3.3 Materials & Stimuli

The video advertisement “Een fiets voor het leven” (A bike for a lifetime) was pulled from YouTube. The commercial advertised the ‘V-Light’, a bicycle light that helps to be more visible when cycling in the dark (see Figure 2). The main reason for this advertisement

was the broad target audience. Furthermore, the Dutch population, from which the participants were recruited, is very familiar with this widely used product (Hung, 2000). The choice was made to show the participants only one advertisement, as they had to fill in their emotions after seeing the video. Their emotion could be affected by the first video, which could have made the results less reliable.

Figure 2

Batavus commercial

Originally, the advertisement had a voice-over and background music. For the manipulation, both elements were deleted and partially replaced. The advertisement was manipulated into three versions, one without background music, one with congruent background music, and one with incongruent background music. For each condition, a new Dutch recording of the voice-over was added.

3.3.1 Pre-test

A pre-test (*N*=26) was conducted to examine which combination of music and advertisement was the most congruent, and which was the most incongruent. A total of 8 different songs were presented in combination with the advertisement (see Appendix A), and

the participants were asked to evaluate the level of relevancy and expectancy for each song, according to Galan's (2009) theory about congruency. The different genres (rock, classic, and pop) used in the pre-test, were based on the findings that illustrate that those genres are most used in advertisements (Fraser & Bradford, 2012). Thereby, all the tracks were instrumental, without lyrics, since most advertisements use instrumental music, and instrumental music without lyrics is claimed as a peripheral cue (Shevy & Hung, 2013; Rader, 1994). For congruent background music, the song 'So Far Away' by Martin Garrix was chosen, this is a slow pop song. For incongruent background music, the song 'Overcome' by Robert Spurling' was chosen. This is a rock song, which starts in a normal tempo, but in the middle, the tempo accelerates. In Overcome, the guitar is the most audible. Appendix B contains the links to the advertisements.

3.4 Measures

3.4.1 Sensitivity

The level of sensitivity was measured with the Sensory Processing Sensitivity Questionnaire (De Guch et al., 2022). This questionnaire consists of 43 items, for which respondents had to indicate if certain statements applied to them (e.g. "I get easily upset from stressful situations" or "I find certain screeching sounds very annoying"). The questionnaire consisted of a 7-Likert scale (1 = Not at all, …, 7 = Completely). Since the questionnaire has been merged from three separate questionnaires (one focuses on sensory stimuli, the other on emotion, and the last focuses on measuring heat and cold), the reliability of the scale was checked. The reliability of the scale was excellent, $\alpha = .92$. Therefore, this study refrained from the sub-questionnaires and proceed from the SPSQ.

3.4.2 Emotion

Many questionnaires were found to measure emotions. However, most questionnaires were not constructed for the study of advertisements, but rather of psychological effects or

discrete emotions. Therefore, a custom-designed emotion questionnaire, based on the research of Srull (1983), was constructed. The intensity of emotions was measured using the 5 basic emotions (Anger, Fear, Sadness, Disgust, and Enjoyment) (Centre for Clinical Psychology, n.d.). The participants had to indicate to what extent they felt each emotion on a 7-Likert scale (1=Not at all, … 7= An extreme amount) (See Appendix C) (Srull, 1983). If the participants felt another emotion, they were able to fill which emotion and how strong the emotion felt under the subheading 'other, namely'. Even though emotions were not expected to strongly correlate, the reliability of the scale was acceptable, $\alpha = .71$. However, this may be the result of participants who filled in an overall score of 1 as they did not feel any emotion ($N = 47$). In addition, the mean for emotion was low ($M = 1.69$, $SD = 0.66$).

3.4.3 Ad memory

Ad memory was measured by testing the knowledge about the advertisement in a partially custom-designed memory test, based on the ad recall measures of Furnham et al. (2002) and Anthony et al. (2020) (See Appendix D). First, participants were asked for the name of the brand in the advertisement. The participants had to select one of the six options (all bicycle brands). Second, the survey asked which product in the advertisement was promoted (a special backlight for your bicycle). Here, the participants had to select one of the five options (all bike-related, e.g., a child bicycle) (Furnham et al., 2002; Anthony et al., 2020). Finally, the question of what occurred in the advertising was raised. There were ten possible answers denoting events, of which six were correct. Participants could earn a point for each correct answer. However, if they selected a wrong answer in the event range, one point was subtracted (this subtraction only counted for the event range, not the brand name and the product). Therefore, the maximum score on this memory test was eight.

3.5 Procedure

The survey was constructed on Qualtrics. Participants were briefed before the start of

the study via an information letter. It explained how and which data was collected, that it was stored until ten years after date, and collected anonymously. Moreover, it contained the contact person and the retraction policy. After reading the information letter, participants provided written informed consent. There were no further risks for participating in this experiment. The participants could opt out at any moment without consequences. Furthermore, no specific information about the goal of this experiment was given to ensure the participants would not be biased.

After the participants gave their consent, the survey began. First, the participants had to answer three demographic questions about their gender, age, and level of education. Second, they saw the advertisement in one of the music conditions (congruent, incongruent, or no music). Direct after seeing the advertisement, they had to fill in the questions about their emotional state. Third, the level of sensitivity was measured with the Sensory Processing Sensitivity Questionnaire. Finally, ad memory was tested. Because participants were distracted in the meantime by the emotions questionnaire and Sensory Processing Sensitivity Questionnaire, the advertisement was not top-of-mind anymore which ensured memory could be tested correctly (Guido et al., 2016). After the survey was completed, participants were debriefed, thanked for their effort, and participants were given an e-mail address to utilize if they had any more questions regarding the study. Participants who participated via the Human Subject Pool earned 0.5 credits. The survey took approximately 15 minutes.

3.6 Analysis

The study involved an experimental between-participant design, including one independent variable (background music), one dependent variable (memory), one mediator (emotion), and one moderating variable (level of sensitivity).

A moderated mediation model was built using Hayes Process Macro (model 7) to

answer hypothesis 4. As there was no evidence for moderation of the mediation, a simple mediation model was built using Hayes Process Macro (model 4) to answer hypotheses 1, 2, and 3. All analyses are done with SPSS 27.

4. Results

4.1 Descriptive Statistics

Table 2 shows the mean scores for emotion and memory in each condition. As can be seen in the table, on average the intensity of emotion is higher for the conditions with music, than in the conditions without music. In contrast, ad memory is higher for the condition without music, than in the conditions with music.

Table 2

Means and standard deviations of emotions and memory, divided by condition

	Condition			
	Without music	Congruent music	Incongruent music	Total
Emotion	*M* = 1.65	*M* = 1.69	*M* = 1.73	*M* = 1.69
	SD = 0.61	*SD* = 0.67	*SD* = 0.71	*SD* = 0.66
Memory	*M* = 4.13	*M* = 3.85	*M* = 3.79	*M* = 3.92
	SD = 1.51	*SD* = 1.43	*SD* = 1.51	*SD* = 1.49

4.2 Checking Assumptions

To detect outliers and influential cases, the Mahalanobis Distance test, Cook's test, and the Leverage Value test were performed. One observation was deleted because their Mahalanobis Distance was 25.34, the cut-off value according to the Chi-Square table for four variables is

18.47 (Statistics of DOOM, 2016). A second observation was deleted because its Cook's value was 0.9, and the cut-off value is 0.5 (Grande, 2015). Visual inspection revealed no problems in linearity and heteroscedasticity. Multicollinearity showed no problems, since the VIF values were below 3 (between 1.03 and 1.01) (Gaskin, 2011). The Durbin Watson (*DW* = 1.81) showed that the residuals are uncorrelated. Finally, normality was tested for the standardized residuals. The *p*-value of the Kolmogorov-Smirnov test was below .05 ($p < .001$), which shows that the residuals were not normally distributed. Therefore, significance will be assessed using the (bootstrapped) confidence intervals rather than the *p*-value.

4.3 Test of Hypotheses

4.3.1 The Moderation Effect

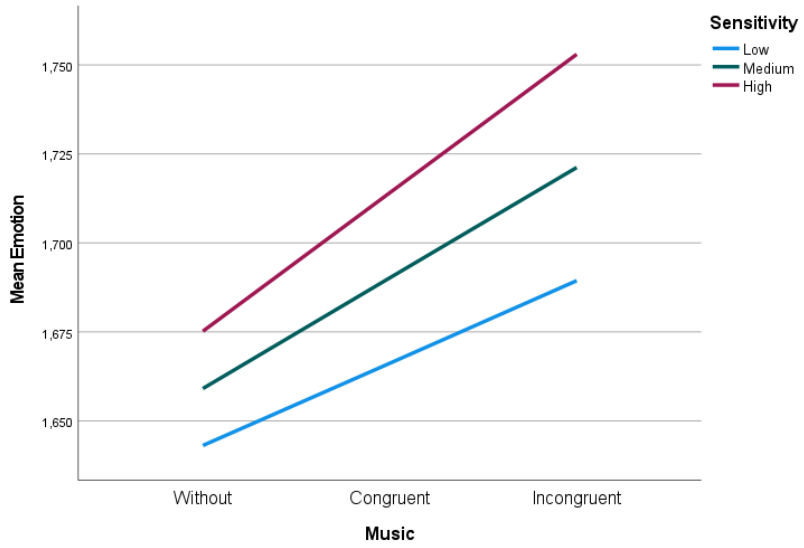
4.3.1.1 The Index of Moderated Mediation. The Index of Moderated Mediation (IMM) tests if there is a moderation mediation effect in this analysis (i.e., if the effect of background music on memory is mediated by emotion, and whether this effect is moderated by the level of sensitivity). The hypothesized moderation was analyzed first, because, in the absence of moderation of the mediation, the analysis can be simplified. The IMM was -.002, 95% BCa CI [-.04, .03]. Since 0 is included in the confidence interval, there is no evidence for moderated mediation. In other words, the indirect effect of background music on memory via emotions is not moderated by SPS.

4.3.1.2 The effect of the type of background music on emotion is positively moderated by the level of sensitivity (H4). The analysis showed that the interaction effect of background music and SPS on emotion was not significant (b = 0.01, *SE* = .07, *p* = .857, 95% BCa CI [-0.12, 0.14]). Thereby, SPS was not a significant (b = 0.03, SE=.05, *p* = .528, BCa CI [-0.06, 0.13]) predictor of emotion.

Although the results are not significant, the simple slopes in Figure 3 show that there may be an effect in the direction that is predicted.

Figure 3

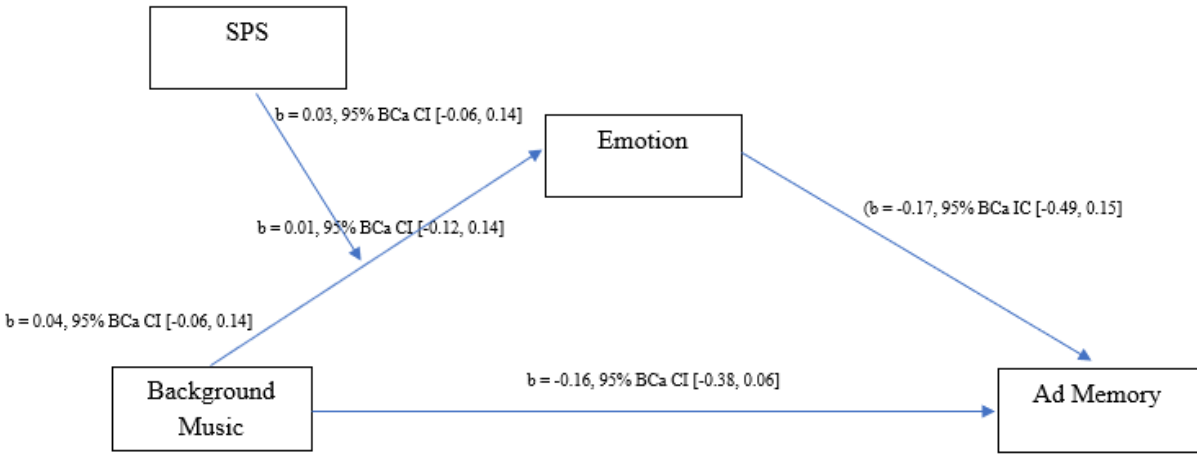
Simple slopes of different SPS levels in the music conditions, tested on emotion



4.3.1.3 The Moderation Mediation. In Figure 4, the path coefficients and the 95% bootstrapped CI results for the Moderation Mediation Model are shown. This visualization shows that no evidence is found in this analysis.

Figure 4

Moderation Mediation Model



Indirect effect: b = -0.005, *SE* = .01, 95% BCa CI [-0.05, 0.01]

Direct effect: b = -0.16, *SE* = 0.11, 95% BCa CI [-0.4, 0.05]

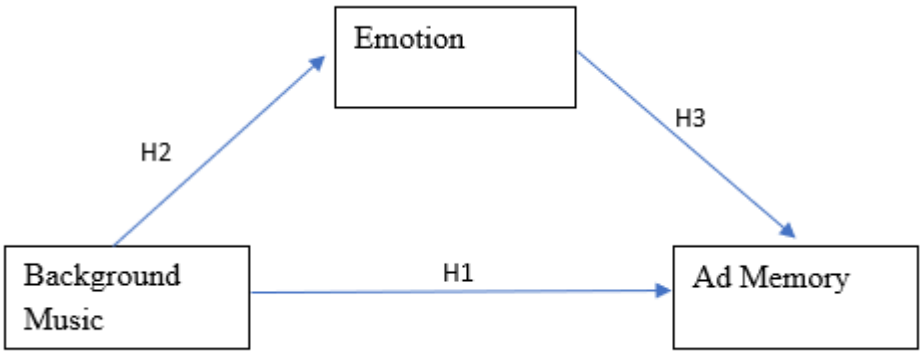
Total effect: b = -0.002, *SE* = .02, 95% BCa CI [-0.04, 0.03]

4.3.2 The Mediation Effect

Since no evidence was found for a moderated mediation effect, a simpler model (Hayes Process Macro model 4) was built to analyze the other hypotheses. This model excludes the moderation effect and focuses on the mediation effect. Figure 5 shows the conceptual model for the Mediation Effect.

Figure 5

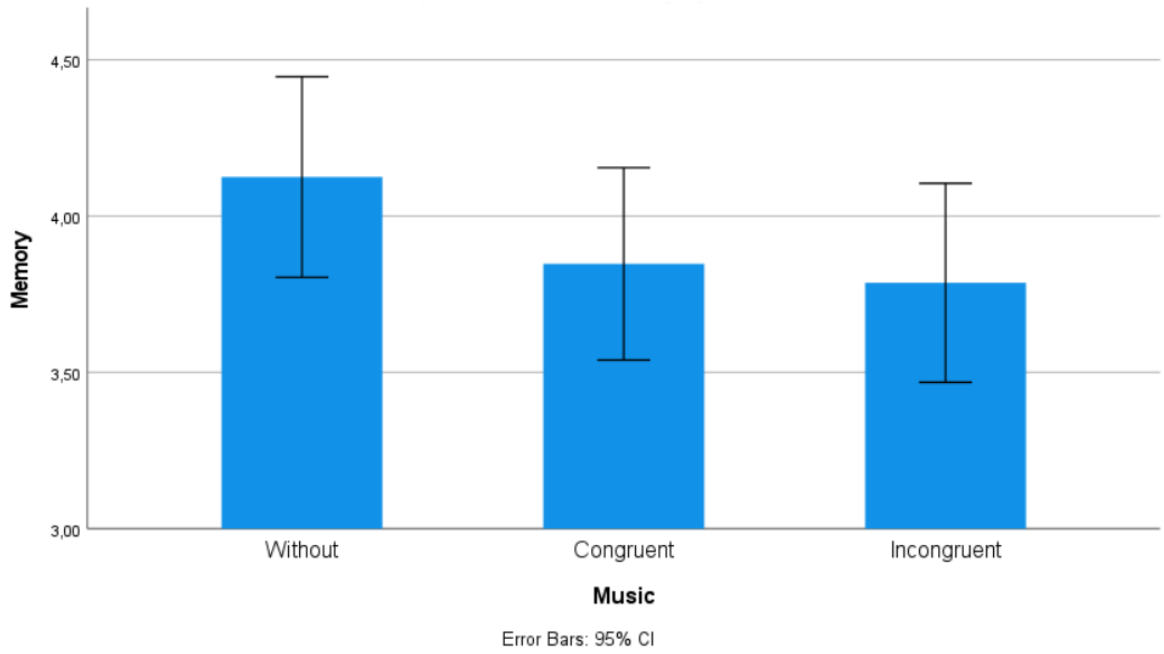
Conceptual Model Mediation Effect



4.3.2.1 Advertisements with congruent music create a higher memory level than advertisements without music or incongruent music (H1). The analysis showed no significant effect for type of background music on memory (b = -0.16, *SE* = .11, *p* = .148, 95% BCa CI [-0.38, 0.06]). To see the difference between the music conditions, a planned contrast would have been used. However, since no significant effect was found, no further research is warranted. Figure 6 shows the means of memory in each condition.

Figure 6

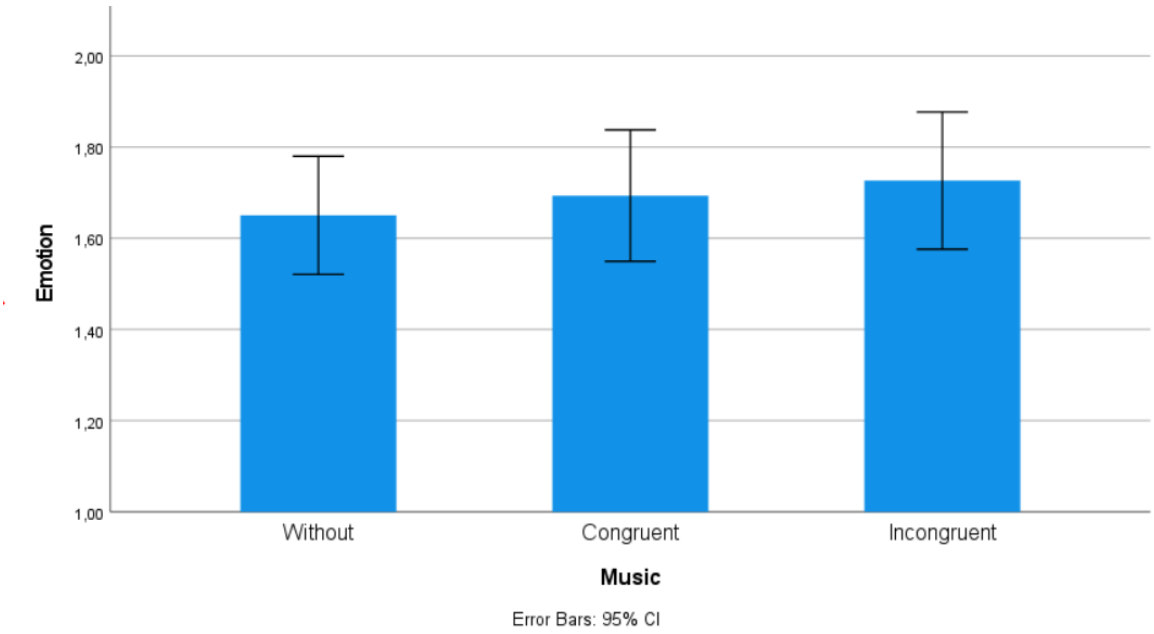
Memory in the music conditions



4.3.2.2 Advertisements with congruent music create a more intense emotion than advertisements without music or incongruent music (H2). The analysis showed no significant effect for type of background music on emotion (b = 0.04, *SE* = .05, *p* = .447, 95% BCa CI [-0.06, 0.14]). To see the difference between the music conditions, a planned contrast would have been used. However, since no significant effect was found, no further research is warranted. Figure 7 shows the means of emotion in each condition.

Figure 7

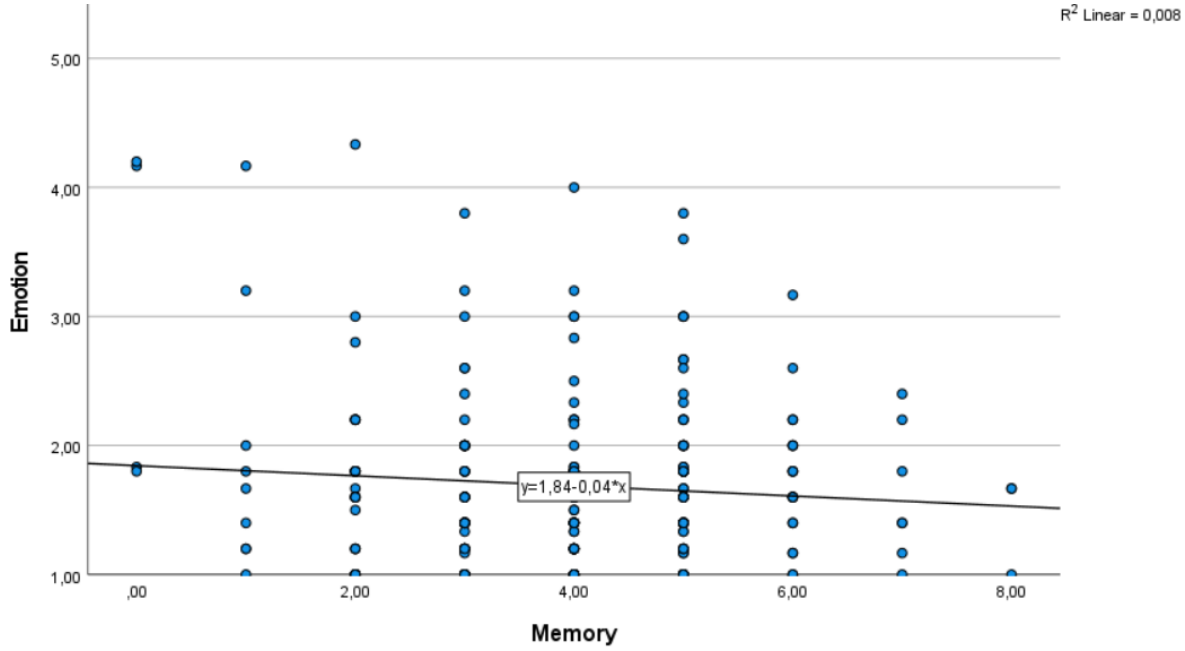
Emotion in the music conditions



4.3.2.3 A more intense emotion leads to better ad memory (H3). The analysis showed that emotion was no significant predictor of memory (b = -0.17, *SE* = .14, *p* = .179, 95% BCa IC [-0.49, 0.15]). Figure 8 shows a scatterplot of the effect of emotion on memory.

Figure 8

Scatterplot of emotion by memory

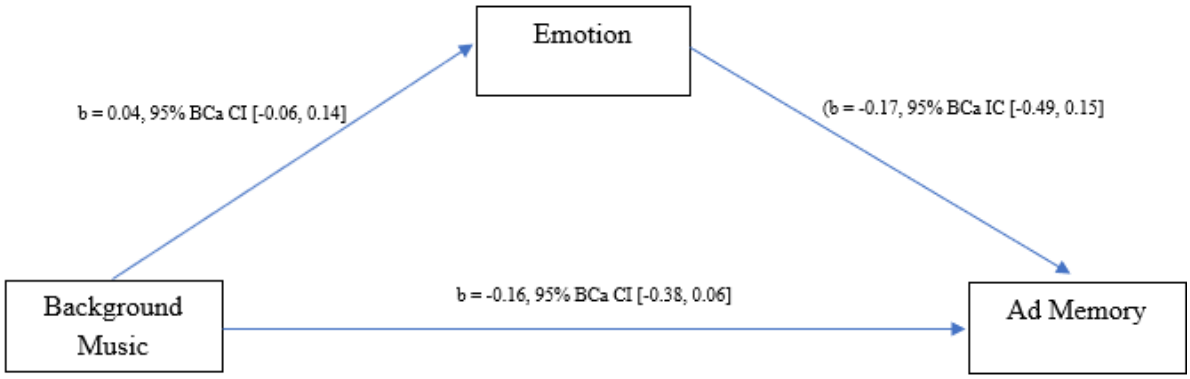


4.3.2.4 The Mediation. In Figure 9, the path coefficients and the 95% bootstrapped CI results for the Mediation Model are shown. This visualization shows that no significant

effect is found in this analysis.

Figure 9

Mediation Model



Indirect effect: b = -0.007, *SE* = .01, 95% BCa CI [-0.04, 0.01]

Direct effect: b = -0.16, *SE* = 0.11, 95% BCa CI [-0.40, 0.06]

4.4 Explorative Research

Emotion was measured according to the 5 basic emotions (anger, fear, sadness, disgust, and enjoyment). It was possible to divide those emotions in valence (positive vs. negative), and see if there were significant results for this other element of emotion in explorative research (Gerard et al., 2021). For enjoyment, anger, and the negative emotions combined (anger, fear, sadness, and disgust), significant results were found.

4.5.1 Positive emotions (enjoyment)

Sensitivity was a positive and significant predictor of enjoyment (b = 0.27, *SE* = .13, *p* = .042, 95% BCa CI [0.01, 0.56]). The multicategorical (Helmert) function is used to separate the conditions in congruent music vs. without music and incongruent music combined. This results in a positive and significant difference (b = 0.46, *SE* = .21, *p* = .03, 95% BCa CI [0.04, 0.78]) for the effect of music on enjoyment.

4.5.2 Negative emotions (anger, fear, sadness, and disgust)

The negative emotions combined show a negative and significant effect on memory (b = -0.40, *SE* = .14, *p* = .005, 95% BCa CI [-0.72, -0.05]). Anger alone is a negative and significant predictor on memory (b = -0.26, *SE* = .10, *p* = .013, 95% BCa CI [-0.45, -0.05]).

4.5 Outcomes Hypotheses

This study aimed to investigate the effect of background music on ad memory, with the level of emotion as mediator, and the level of sensitivity as moderator. The hypotheses with the outcomes can be found in Table 3.

Table 3

The hypotheses tested, including the outcome

Hypotheses	Outcome
H1: Advertisements with congruent music create a higher memory level than advertisements without music or incongruent music.	Not supported
H2: Advertisements with congruent music create a more intense emotion than advertisements without music or with incongruent music.	Not supported
H3: A more intense emotion leads to a better ad memory.	Not supported
H4: The effect of the type of background music on emotion is positively moderated by the level of sensitivity.	Not supported

5. Discussion

As can be seen in Table 3, no hypothesis was supported. The findings and the limitations of this research will be discussed. Thereby, suggestions for future research and implications are given.

Advertisements with congruent music create a higher memory level than advertisements without music or incongruent music (H1).

For H1, no significant results were found, and thus the hypothesis is not supported. The hypothesis was based on numerous studies that found that congruent background music in an advertisement causes a better ad memory (Hoyer et al., 1984; Allan, 2006). Fraser and Bradford (2013) found that with congruent background music information is easier to process, and an advertisement is easier to understand and process, which can lead to better ad memory. However, as described in the theoretical framework, other studies did find a higher level of ad memory while there was no background music in the advertisements (Kellaris et al., 1993; Gorn et al., 1991). This study cannot provide evidence for any of these views, since no significant results were found.

There may be several reasons why no significant effect was found. Firstly, this hypothesis was based on the insight of Radar (1994), who stated that music would not cause overload in the working memory. In addition, that study also found that when individuals are cognitively involved, music could have a distracting effect. The current research was based on processing via the peripheral route (affective) and did not take involvement (the central route) into account. Since no distinction was made, the results in the current study could be affected by individuals that were involved in the advertisement while processing. Future research may make a distinction between individuals who are involved and individuals who are not involved with the advertisement.

Secondly, attention was paid to structural characteristics, such as tempo, timbre, and harmony (Bregman, 2005). However, the pre-test was focused on the characteristic 'congruency' and not on tempo, timbre, and harmony. It cannot be ruled out that these characteristics influenced the results, as this was not checked.

Thirdly, the 'congruent' and 'incongruent' conditions only differ slightly in mean scores. A possible explanation for this small difference may be as some participants did not experience the 'congruent' condition as the 'congruent' condition, and vice versa. Although the mean score on congruency in the pre-test for the congruent music was relatively high, and the mean score for incongruent music was relatively low, the results were divided (see Figure 10 and Figure 11), and the present study did not include a manipulation check.

Figure 10

Results for pre-test congruency, where purple is the relevancy and red is the expectancy (1 = strongly not agree, …, 5 = strongly agree)

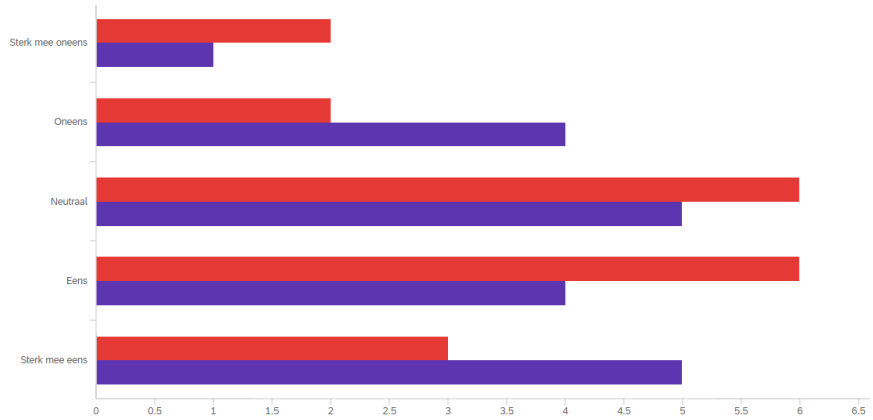
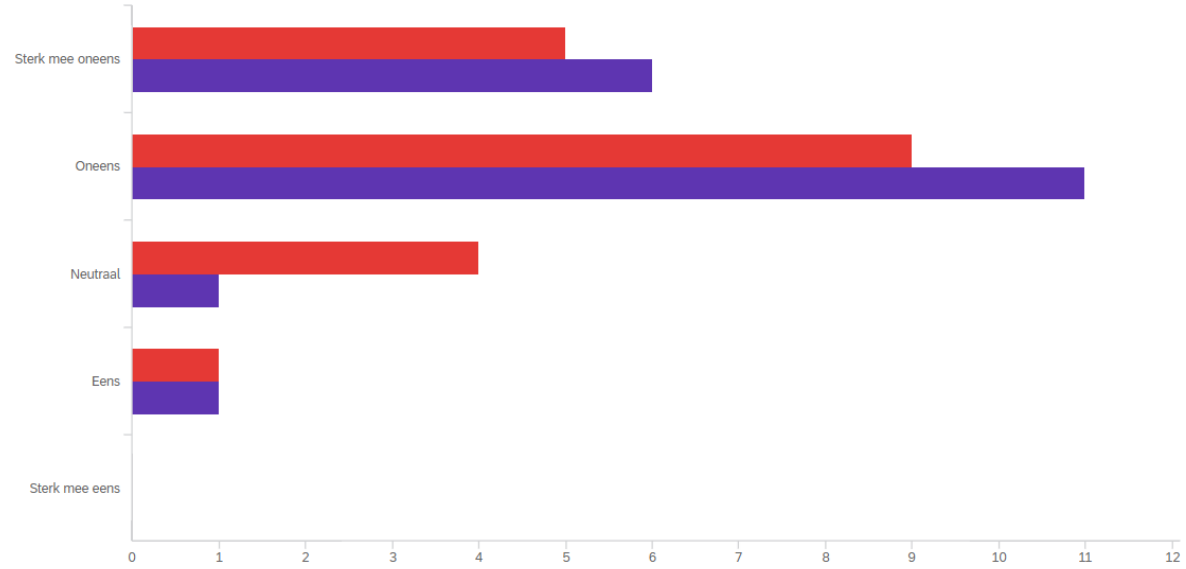


Figure 11

Results for pre-test incongruency, where purple is the relevancy and red is the expectancy (1 = strongly not agree, …, 5 = strongly agree)



Finally, since no significant results were found, it may also be the case that there is no effect of music on ad memory. However, there is no clear reason why the effect would be absent in this study, while it has been reported by numerous studies (e.g., Guido et al., 2016; Eckhardt & Bradshaw, 2014; Anand & Sternthal, 1990) before.

Advertisements with congruent music create a more intense emotion than advertisements without music or with incongruent music (H2).

No significant difference in H2 is found between the conditions. A possible explanation can be the method of how emotion is measured. Several participants indicated that they did not feel any emotion while viewing the ad. Expressions were limited to the 5 basic emotions, but participants could fill in another emotion in the box ‘other’. However, this was not obligated and many participants left it blank. It may have been that the participants did not feel any (other) emotion, but measuring emotion themselves is often perceived as difficult (Ciuk et al., 2015).

In addition, participants could already be in a certain affective state before they started the questionnaire. For example, someone who just found out that he is accepted for a new job

is in a different emotional state than someone who has been rejected for a new. Consumers may mistakenly link their pre-existing affective state to their emotional reaction to the advertisement. This may have influenced the emotion they felt after viewing the ad (Gorn et al., 2001). Future research may use techniques, such as pupil dilation (eye-tracking), skin conductance (EDA/GSR), brain activity (EEG, fMRI), heart rate (ECG), and facial expressions (Farnsworth, 2020), which can measure the change in emotion more accurately.

Finally, since no significant results were found, it may also be the case that there is no effect of music on the intensity of emotion. However, there is no clear reason why the effect would be absent in this study, while it has been reported by numerous studies (e.g., Alpert & Alpert, 1990) before.

A more intense emotion leads to a better ad memory (H3).

Hypothesis 3 is not supported either. This may be a result of the way that emotion is interpreted. Emotion consists of several dimensions, the two most notable are valence and intensity. This study focuses only on intensity and leaves valence out of consideration. This is in response to studies that suggest that valence does not add value to ad memory, in addition to intensity (Srull, 1983; Yang & Chen, 2012; Moore & Hutchinson, 1983). However, a study by Jänke (2018) shows that it is valence that influences ad memory, and that the intensity of emotion does not play a major role in ad memory. When explorative research was conducted on the valence of emotion, significant effects were found for the positive as well as the negative emotion(s). Therefore, it may be concluded that valence is important for researching emotional reactions. Future research should investigate this effect of valence on emotions.

Finally, since no significant results were found in the original hypothesis, it may also be the case that the intensity of emotion does not cause an effect on ad memory. However, there is no clear reason why the effect would be absent in this study, while it has been reported by numerous studies (e.g., Friestad & Thorson, 1986; Scherer & Zetner, 2011)

before.

The effect of the type of background music on emotion is positively moderated by the level of sensitivity (H4).

No significant results were found for H4. However, the simple slopes in Figure 3 show some possible interesting effects. The ‘high sensitivity’ slope scores the highest on emotion in all conditions, while the ’low sensitivity’ slope scores the lowest on emotion in all conditions. Furthermore, the ‘high sensitivity’ slope climbs the fastest and the ‘low sensitivity’ slope the slowest, which would implicate the effect proposed in H4. However, since no significant results were found, these findings could also be the result of noise. Further research could zoom in on this effect by replicating this study with a larger sample size to see if there is a (small) significant effect.

Another reason for the non-significant results, may be that there is no moderation effect of sensitivity on emotion as result of music.

The Index Moderation Mediation

No evidence was found on the Index Moderation Mediation. As no evidence was found for the effect of background music on ad memory. Hence, there is no evidence that the effect of music on memory is different when it is mediated by emotion, and the emotion is moderated by SPS.

5.1 Limitations

Next to the limitations already described above, additional limitations are discussed here. Firstly, the stimuli were created in the video editor computer program of a HP laptop. Thereby, the voice-over was recorded with the recording device of the same laptop. This can make the stimuli and voice-over appear less professional and believable. Two participants even indicated, in the ‘other’ box where emotion was measured, that the voiceover was mediocre. Future research may create more realistic advertisements.

Secondly, although this study assumed that participants had not yet seen the advertisement before, it may be that participants did see the ad before participating. If the participants had seen the ad more than once, this will naturally affect their ad memory. In the future, people who know the advertisement should be removed from the data, thus increasing the reliability. Thereby, when an individual sees an advertisement for a familiar brand, previously formed attitude overrules the 'new' affective response (Rader, 1994). This could possibly influence the results.

Thirdly, the questionnaire on Sensory Processing Sensitivity was rather long. No control questions were asked to see if the participants were still paying attention. In future research, those control questions should be implemented in the survey.

Finally, most coefficients in this current study were below 0.01. It is a possibility that effects will be found with a larger sample size, since other studies that found a significant effect had coefficients around 0.3 or higher (Guido et al., 2015). However, not all studies did report the coefficients.

5.2 Future Research

Although no significant results for the hypotheses were found, explorative research did find significant results when valence was taken into consideration. These results are in line with the study of Jänke (2008). It is challenging to make any conclusions, since this study was not focused on valence. Hence, follow-up research should be done to confirm these tentative results for different types of emotions.

Other interesting directions for future research may include the relation between SPS and working memory, the relation between SPS and music, or the relation between working memory and peripheral cues (music). Furthermore, more research may be done on the subject of SPS. Research only started 20 years ago and there is still a lot not known about SPS (Aron & Aron, 1997). Thereby, SPS is seen as an important element that can affect the quality of

life (Bakker & Moulding, 2012). For this population, therefore, it is important that more is known about SPS.

5.3 Implications

The effects that have been found in this research are all quite small. In contrast, results found in other studies are rather divergent. Marketers often spend a lot of time looking for the right background music for an ad. The results in this study, and previous studies, can make it questionable if there is an importance in doing so.

6. Conclusion

The results of this study do not contribute to the current literature on music in advertisements, since the results were not significant. The reason for this could be the limitations of this study as discussed above. Another reason could be that there is no effect of music on memory, no effect of music on emotion, no effect of emotion on memory, and no effect of SPS on the intensity of emotion. Therefore, in combination with the diverging results of previous studies, it should be discussed if background music in an advertisement is important enough to spend a lot of time on. However, it has made for interesting follow-up studies. Improvements may lie in the quality of the stimuli, the different ways to measure emotion, and characteristics of music. Furthermore, it may be interesting to conduct research on the differences in (single) emotions as a consequence of music, the topic of SPS in relation to advertising, and the topic of working memory in relation to advertising.

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Appendix

A. Pre-test

A.1 Pre-test 1

Song: ‘Animals’ by Martin Garrix

Link: https://youtu.be/--P9QqF5O4Q

A.2 Pre-test 2

Song: ‘Nocturne op9. NO.2’ by Andrea Romano

Link: https://youtu.be/UkPHcP7neTg

A.3 Pre-test 3

Song: ‘Moonlight’ by Beethoven

Link: https://youtu.be/H9SFi6k_3fU

A.4 Pre-test 4

Song: ‘So Far Away’ by Martin Garrix

Link: https://youtu.be/aPam6qrF2Bw

A.5 Pre-test 5

Song: ‘Divertimento in D majo, K. 136’ by Mozart

Link: https://youtu.be/XrRTbkFe19M

A.6 Pre-test 6

Song: ‘Slow Rock Backing Track Guitar Jam A Minor’ by Nick Neblo

Link: https://youtu.be/vYl8u394kCA

A.7 Pre-Test 7

Song: ‘Overcome’ by Robert Spurling

Link: https://youtu.be/Iq_sQaNK5Ew

A.8 Pre-test 8

Song: ‘These are the times’ by Martin Garrix

Link: https://youtu.be/9RvdEn93gJY

B. Stimuli

B.1 Advertisement without background music

Link: https://youtu.be/sQWrA-mQ35I

B.2 Advertisement with congruent background music

Song: 'So Far Away' by Martin Garrix

Link: https://youtu.be/aPam6qrF2Bw

B.3 Advertisement with incongruent background music

Song: 'Overcome' by Robert Spurling

Link: https://youtu.be/Iq_sQaNK5Ew

C. Emotion Questionnaire

	Not at all	Slightly	A little bit	Moderately	More than a bit	Quite a lot	An extreme amount
Anger							
Fear							
Sadness							
Disgust							
Enjoyment							
Other, namely: ….							

D. Memory Questionnaire

1. Which brand did you see in the advertisement?	A. Gazelle B. Giant C. Cortina D. Batavus E. Sparta F. I do not remember
2. Which product was promoted in the advertisement?	A. An electrical bicycle B. A children's bicycle C. A special bicycle bell D. A special tail light E. A special saddle
3. What did happen in the advertisement? (multiple answers are correct)	A. Bicycles fall against each other B. A bicycle falls in the ditch C. It is raining D. It is snowing E. A child falls F. There is a cat in the basket at the front of the bicycle G. People kissing in the bicycle shed H. The bicycle swings out of line I. The car honks J. Flowers are on the back of the bicycle