Do Consumers Pay Attention to Emotion?

An Eye-tracking Study of Visual Attention in Pre-roll Advertisements

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Abstract

The current advertising landscape is characterized by a high degree of complexity as the presence of distinct ad variables can affect consumers' perception of an advertisement and enforce specific marketing objectives. The rapid emergence of new advertising mediums is creating new opportunities for advertisers, but also new challenges regarding the implementation of the correct variables to match a specific outcome.

The focus of this thesis is on the newly developed pre-roll advertisement format and on the allocation of visual attention to its different components. As suggested by the literature, attention is a key and unavoidable step in the information-processing journey of consumers. Moreover, the inclusion of emotional elements in advertisements has been identified as an important variable that can affect the allocation of attention.

More specifically, the purpose of this study is to examine how pre-roll advertisements containing an emotionally-valenced framing are capable of influencing consumers' visual attention. Accordingly, either a positively-valenced or negatively-valenced framing was included in the pre-roll advertisement and the visual behavior of the participants was measured. It was hypothesized that framings of positive valence would elicit more visual attention to the pre-roll advertisement, whereas negatively-valenced framings would redirect consumers attention to the countdown button and background components.

The experiment was conducted using a screen-based eye-tracking device. The four hypotheses were all rejected, as the results demonstrated that negatively-valenced framings increase the visual attention to the pre-roll advertisement, whilst positively-valenced framings elicit higher total fixation duration to the countdown and background components, respectively.

Accordingly, some interesting managerial implications are identified, suggesting that the use of a negative emotional framing can enhance consumers viewership of the pre-roll advertisement. Oppositely, it is suggested that, by employing a positive framing, total fixation duration towards the pre-roll advertisement diminish whilst it is increased to less relevant screen areas, that are, the countdown button and the background.

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We would also like to thank our supervisor, Jesper Clement, for introducing us to the field of neuromarketing and for inspiring us to follow this path for our master's thesis, as well as helping us in identifying the research topic and giving us constructive feedback on our ideas. These months were challenging but filled with knowledge as we had the chance to dive into an exciting topic, that brought the best out of our abilities.

A special acknowledgment goes to our families and friends, for always supporting us during these years and for helping us in this achievement. Their support has been instrumental in reaching this moment and we hope to count on it for the coming challenges.
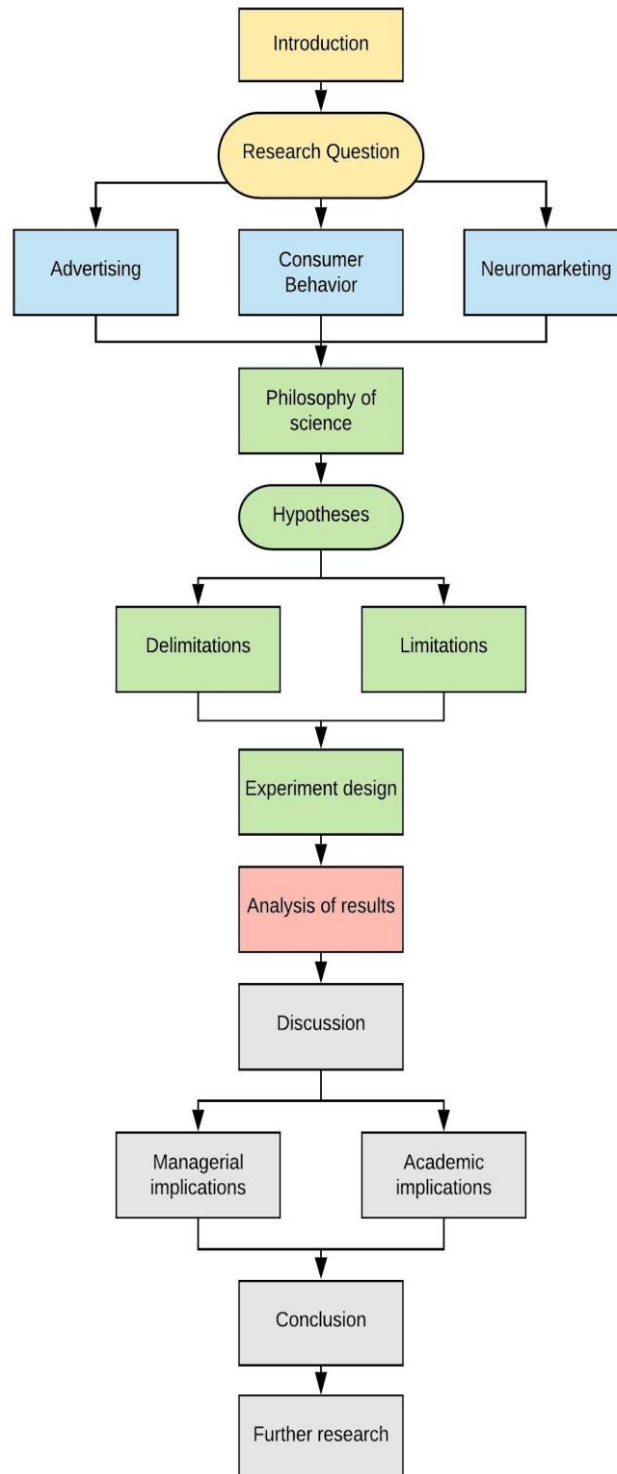
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0. READER'S GUIDE

To facilitate the reader's comprehension of this study, the following framework provides an illustration of the structure applied in the thesis.

The picture above shows the general overview of the thesis. Firstly, in the introduction, the background of the study is provided, introducing some of the key concepts on which the study is based on and then flowing into the identification of the problem, the research gap, and the formulation of the research question and ending with the purpose of the study.

Subsequently, the literature review chapter is built around three main areas, namely Advertising, Consumer Behavior, and Neuromarketing, and provides the theoretical background of the study by examining key areas within each field.

Following the review of the literature, the philosophy of science foundation of the study is presented and, accordingly, the hypotheses are set. Stemming from the hypotheses, the delimitations and limitations of the research are discussed, subsequently, the experiment design is described in detail along with the validity, reliability, and benefits and drawbacks of the research approach.

In the following section, a brief explanation of the parameters set for the analysis is given and the results of the data analysis are presented according to the four hypotheses.

The final chapter starts with a discussion of the results, elaborating in more detail on the main findings. From these findings, the main academic and managerial implications are identified. Finally, the conclusion provides an overview of the study and the main results. In the last section, some interesting insights and suggestions for future research are provided.

1. INTRODUCTION

In today's world, advertising represents one of the most important points of contact between companies and consumers, with individuals being exposed to a substantial number of advertising and marketing-related messages on a daily basis. Some authors have estimated that a typical consumer is exposed to hundreds, if not thousands, of messages per day (Milosavljevic & Cerf, 2008). In recent times, the opportunities for advertisers have sensibly increased with the diffusion of digital media, which allows them to reach consumers on their computers or smartphones at all times and in a matter of seconds (Truong, McColl & Kitchen, 2010). Accordingly, the attention of researchers has shifted from traditional advertising formats, such as print ads, to the new advertising formats that started developing on digital media, such as banner ads or video ads. Consistent research has been conducted both from an advertising perspective, as to investigate the effectiveness of the ads and the different variables that play a role in affecting them, (e.g. Ducoffe, 1996; Barnes, 2002; Goldfarb & Tucker, 2011) as well as from a consumer behavior perspective, in an effort to understand the new role of online consumers (e.g. Hoffman, Novak & Peralta, 1999; Koufaris, 2002; Darley, Blankson & Luethge, 2010)

In this chapter, we will present some industry data to substantiate our claim regarding the importance of digital advertising and, in particular, pre-roll advertisements. Subsequently, we will introduce some of the key areas on which this thesis is based, which will be further investigated in the next chapter. Finally, we will clearly state the problem, present the research gap and the research question that was formulated to address the gap. The last section will describe the purpose of the study.

1.1 Digital Media

The advent of digital media has been the 21st century most important breakthrough in regard to the way people access information and communicate (Daugherty, Eastin & Bright, 2008). As of July 2019, around 56% of the world's population were active internet users, which translates into an impressive 4.33 billion internet users (Statista A, 2019). Out of the total internet users, 2.82 billion people are estimated to be social media users, a number that is destined to increase in the coming years (Statista A, 2018). As of January 2019, social media penetration stood at 45% of the total world population (ibid.)

In coherency with the constantly expanding popularity of online environments, the field of digital advertising has accordingly expanded in relevance over the last years and has established its position as one of the main areas of advertising. Companies quickly acknowledged they had to keep up and develop new ways to communicate with consumers in this newly developed and interactive world. Currently, online marketing activities are a key aspect of almost every company, from small businesses to global enterprises, thanks to the wide range of opportunities they offer in terms of marketing and, more specifically, advertising.

Within digital media, advertising has significantly benefited from the growth in popularity of social media. On social media, people developed new and more interactive ways to communicate with others and started creating and developing incredibly complex and interconnected personal networks in this new online environment, and advertisers saw the opportunity to use this to their advantage (Daugherty et al., 2008).

In 2018, worldwide digital advertising revenues were estimated at around US$267 billion, an estimate that is forecasted to exceed US$520 billion in 2023 (Statista B, 2018). The distribution of revenues is led by search advertising (i.e., search engine marketing & search engine optimization) followed by social media advertisements, which contain either photo ads or video ads (ibid). In addition, display banner advertisements and video advertisements were placed as the third and fourth mediums in terms of revenues, respectively (ibid). Nonetheless, when the different digital advertising methods are evaluated in terms of advertising spending worldwide, display ads are still the forefront medium in terms of total ad spending, closely followed in the last decade by search advertisements (Statista Advertising Dossier U.S, p. 8; Statista B, 2019). In the past three years advertising spending for social media advertisements and video advertisements has risen considerably in combination with the increase in revenues, a figure that is expected to almost rival search advertisements spending and trump display banner ads by 2021 (ibid). Video advertisement is by far the lowest method in terms of spending out of the four above-mentioned mediums, with its amounted spending in 2019 remaining under one-third of display advertising and under half of both search and social media advertising budgets (ibid).
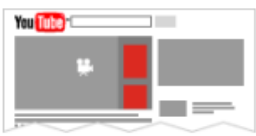
In terms of global revenue growth of all advertisement mediums in 2019, including both online and offline methods, digital advertisement undoubtedly led the field, experiencing the highest revenue growth, which amounted to 11.3% (Statista C, 2018). Meanwhile, the second-best growth medium, namely cinema ads, displayed a revenue increase of 5.2%, while the remaining offline channels (e.g, TV, radio, billboards, etc.) are experiencing detrimental performances in relation to revenue growth. In particular, magazines and newspaper advertisements had negative growth rates of -6.4% and -7.4%, respectively (ibid). The U.S. is a colossus in digital ad spending, with an estimated market volume of US$112.3 billion in 2019, which more than exceeded the spending of the remaining top 5 countries combined (i.e., China, U.K., Japan, Germany) (Statista B, 2019). Within the United States, the observable trend regarding which digital format is the most rapidly growing in popularity in the advertising industry, identified social media advertisements as having the highest growth in employment and revenue, which amounted to 24%, whilst mobile ads and video ads had a 22% and 19.7% increase in 2019, respectively (Statista C, 2019).

1.2 YouTube

One of the mediums which are currently being exploited by advertisers to a high degree is YouTube. YouTube was founded in 2005 and quickly rose to popularity, becoming the main online video sharing platform in the world (Artero, 2010). With an impressive 1.8 billion users on a monthly basis around the world, YouTube is only second to Facebook in terms of monthly users (Gilbert, 2018). Moreover, users spend on average more than one hour every day watching YouTube content on a mobile device (YouTube, 2019). Quite naturally, YouTube became one of the platforms which attract the highest investment related to companies' advertising efforts. In 2017, YouTube's global advertising revenues amounted to around 7.8 billion USD, with revenues set to increase to 11.76 billion USD in 2020 (Statista D, 2018). Correspondingly, as YouTube confirms, in the last two years YouTube advertising activities performed by small and medium businesses have doubled in number (YouTube, 2019).

Currently, videos are one of the most interesting advertising formats, given the high degree of personalization and a large amount of content which can be included in a relatively short amount of time, but, most importantly, the proven effectiveness in influencing consumers (Mei, Hua, Yang & Li, 2007). However, a significant drawback of video advertisements is the audience's perceived intrusiveness, which occurs when people are occupied in a specific cognitive process, such as the processing of a music video on YouTube, and this process is interrupted by the presence of an advertisement (ibid.). Therefore, advertisers face the challenge of increasing the effectiveness of their video ads, while at the same time trying to limit their intrusiveness.

YouTube offers six different types of ads that companies can implement (YouTube Help, 2019). The first type is display ads, which consist of static or animated banner ads that appear to the right of the video in the upper right part of the page (ibid.). The second type is overlay ads, which consist of semi-transparent rectangles appearing in the bottom part of the video box and can be closed by pressing an 'X' button (ibid.). Moreover, YouTube offers video advertisements, which are the main type of ad utilized on the platform. Video ads can be skippable, meaning that after a few seconds a 'Skip Ad' button will appear in a black box on the right side of the video box, where users can click to proceed to the video. Video ads can also be non-skippable, meaning that only a countdown will appear in the black box on the right, but users must wait for the end of the ad for the video to play automatically. It is important to note that video ads can be placed at the beginning, as so-called pre-roll ads, in the middle or at the end of a video as in-stream ads (ibid.). Another type is bumper ads, which are short non-skippable video ads of up to 6 seconds which must be viewed before the start of the video (ibid.). Finally, YouTube also offers sponsored cards ads, which appear on the right side of the video box as suggested content (ibid.). In figure 1 below, an overview of the six types of YouTube advertisements is presented.

Ad format	Placement	Platform	Specs
Display ads	Appears to the right of the feature video and above the video suggestions list. For larger players, this ad may appear below the player.	Desktop	300x250 or 300x60
Overlay ads	Semi-transparent overlay ads that appear on the lower 20% portion of your video.	Desktop	468x60 or 728x90 image ads or text
Skippable video ads	Skippable video ads allow viewers to skip ads after 5 seconds, if they choose. Inserted before, during, or after the main video. If you turn on this option, you may see a combination of skippable and bumper ads play back to back.	Desktop, mobile devices, TV, and game consoles	Plays in video player.
Non-skippable video ads	Non-skippable video ads must be watched before your video can be viewed. These ads can appear before, during, or after the main video.	Desktop and mobile devices	Plays in video player. 15 or 20 seconds in length, depending on regional standards.
Bumper ads	Non-skippable video ads of up to 6 seconds that must be watched before your video can be viewed. If you turn on this option, you may see a combination of skippable and bumper ads play back to back.	Desktop and mobile devices	Plays in video player, up to 6 seconds long
Sponsored cards	Sponsored cards display content that may be relevant to your video, such as products featured in the video. Viewers will see a teaser for the card for a few seconds. They can also click the icon in the top right corner of the video to browse the cards.	Desktop and mobile devices	Card sizes vary

(Figure 1) Source: https://support.google.com/youtube/answer/2467968?hl=en

1.3 Key areas and definitions

1.3.1 Pre-Roll Advertisements

Out of the six advertisement formats that YouTube offers, this thesis will focus primarily on the above-mentioned video ads, also commonly called pre-roll ads when they are presented before a video. Pre-roll ads can be skippable, meaning that, after forced viewership of the first seconds of the ad, viewers are able to skip the ad by pressing a 'skip' button (YouTube Help, 2019). Oppositely, they can also be non-skippable, meaning that viewers do not have the option to skip and must wait for the entire ad to end before the intended video content is shown (ibid.).

The main rationale behind pre-roll ads, but also the most significant drawback, lies in the fact that they are presented in the space in which users are expecting the desired content to appear. This can have a positive impact on the processing of the ad, since *"Consumers about to watch a video are in a heightened state of attention, anticipating fulfillment of their search goal"* (Campbell, Thompson, Grimm & Robson, 2017, p. 411). Therefore, this favorable state can result in a higher likelihood that the message presented in the advertisement is successfully processed, given the heightened attentional state. On the other hand, however, the fact that the ad appears instead of the content users are expecting to see, can result in annoyance and perceived intrusiveness, since the presence of unwanted advertising content delays the viewing of the intended content (Campbell et al, 2017).

1.3.2 Neuromarketing and eye-tracking

Parallelly to the rise in popularity of the new advertising opportunities brought about by the diffusion of digital media, marketing researchers have been looking for new ways to investigate how people behave and react when exposed to new advertising formats and to assess which factors play a role in increasing the effectiveness of this new generation of advertisements (Verlegh, Voorveld, & Eisend, 2015).

An interesting field that has taken up this challenge is neuromarketing. With the use of new technological methods to measure individuals' behavior and reactions to specific stimuli, neuromarketing aims at analyzing which specific characteristics of a marketing stimulus, such as an advertisement, increase its effectiveness (Morin, 2011). These methods are based on the observation of individuals' brain activity when they are exposed to a specific stimulus and include techniques such as fMRI and EEG (ibid.). The hope associated with neuroimaging procedures is to enable companies to obtain information that was previously unattainable with traditional marketing research methods, such as questionnaires, focus groups or market tests, which were hindered by the fact that many consumers cannot or are not entirely honest when expressing their preferences (Ariely & Berns, 2010).

An interesting neuromarketing method, which is currently being employed by researchers to assess advertisements' effectiveness in attracting consumers' visual attention, is eye-tracking. Through the direct measurement of individuals' eye movements, eye-tracking devices are able to analyze where people are looking at a specific point in time and to identify gaze patterns when they are exposed to marketing stimuli (Wedel & Pieters, 2008). Considering the prominent visual aspect of video advertisements, eye-tracking can be considered as an appropriate procedure to investigate the effectiveness of this type of ads. Attention is the primary variable about which eye-trackers can render key information and it is considered extremely relevant when dealing with video advertisements. Researchers have identified attention as a key and unavoidable step when people are exposed to advertisements, without which individuals are not able to process the message and information included in the ad (Percy & Rosenbaum-Elliott, 2016).

1.3.3 Attention

In an environment in which consumers are exposed to an overwhelming number of marketing stimuli on a daily basis, the challenge for advertisers consists of successfully attracting individuals' attention (Milosavljevic & Cerf, 2008). Attention can be conceived as a choice, where people always have a consistent number of stimuli in front of them, but, due to the limited information-processing capabilities of the human brain, they cannot attend to all of them, but they must choose to which specific stimulus to direct their attention (ibid.).

There are two different attentional mechanisms that play a role in this choice, namely bottom-up and top-down attention. Bottom-up attention is a rather automatic and involuntary process through which individuals pay attention to a specific stimulus as influenced by the visually-salient features present within it (Pieters & Wedel, 2004). Visually-salient features are, for example, colors, shapes or contrast, which have been proven to affect attention allocation in a bottom-up process (ibid.). On the other hand, top-down is a more conscious and intentional process, through which attention is allocated based on personal factors such as brand familiarity or specific needs (ibid.).

1.3.4 Emotion and attention

Another key neuromarketing variable, which has been extensively studied in the last two decades, is emotion. Emotions can be described as autonomous and unconscious responses to environmental stimuli, which can be manifested in terms of internal reactions (Hansen & Christensen, 2007). In particular, researchers have tried to investigate and establish a connection between emotion and attention, in terms of the effect that emotion and emotional components have on individuals' visual attention when they are exposed to marketing-related stimuli. Research suggests that emotional stimuli are more effective in attracting visual attention and that they have a privileged route in terms of information processing with respect to neutral stimuli (Genco, Pohlmann & Steidl, 2013; Vuilleumier, 2005).

Moreover, it has been found that positive emotions, as for example, happiness or surprise, are more effective in attracting and retaining visual attention than their negative counterparts, such as fear or disgust, and that, only by evoking positive emotions, advertisers will be able to ensure a high level of attention towards the advertisement (Hill, 2011).

1.4 Statement of Problem

The current advertising landscape is characterized by multiple media, several different advertising formats and incredibly different advertising executions, both on a strategic and creative level. In this environment, the main challenge for advertisers is to understand which specific variable, manipulation or change effectively triggers the desired reactions in consumers. An important concept that is strictly linked to advertising is attention, since, in an extremely competitive environment, in which consumers are exposed to hundreds, if not thousands of marketing-related messages on a daily basis, attracting their attention is of paramount importance (Milosavljevic & Cerf, 2008). Not only advertisers but also researchers are constantly analyzing these aspects in an effort to understand the specific effects of many of these variables.

An interesting variable is represented by emotion or, in other words, the role that the inclusion of emotional components plays in affecting the effectiveness of advertising efforts. Interestingly, it has been observed that, out of the numerous variables and manipulations that can be made to advertisements, such as, for example, colors, shapes or contrast, the emotional component is a major influencer of advertising effectiveness (Percy and Rossiter, 2016; Cecil, 2013, World Advertising Research Center A, 2019). However, the role of emotional components has not been extensively studied with respect to the newly developed digital advertising formats, such as pre-roll advertisements. The problem identified by the authors consists of the unclear role that emotional elements play when considering pre-roll ads. In particular, considering the importance of attracting and maintaining consumers' attention in today's competitive advertising landscape, the role of emotional elements in affecting the allocation of attention should be addressed and examined more in-depth.

1.5 Research Gap

When dealing with pre-roll video ads on popular platforms, such as, for example, YouTube, research has been conducted mainly in terms of the annoyance generated by the presence of advertisements next to the actual content users wanted to see (e.g. (Belanche et al., 2017)). Studies have utilized surveys, mouse-tracking techniques, reaction times and viewing times to understand how individuals deal with this type of intrusive and unwanted advertising format (Kim & Seo, 2017; Belanche et al., 2017; Pashkevich, Dorai-Raj, Kellar & Zigmond, 2012). Nevertheless, researchers have so far not thoroughly analyzed a key aspect of consumers' be-

havior related to this form of advertisement, which is the allocation of visual attention. As suggested by consumer behavior research, concerning information-processing, attention is the initial and unavoidable step through consumers must go through in order for companies' advertising efforts to be successful (Percy & Rosenbaum-Elliott, 2016). This can be translated into simpler terms as the need for advertisers to ensure that people do pay attention to the advertisements that are placed in front of them. Failure of this step will prevent information-processing from initiating and result in unsuccessful advertising efforts and a considerable amount of money and resources wasted for companies (ibid.).

However, to the authors' knowledge, no study focused on how consumers view pre-roll video advertisements when an emotional framing is employed, hence, consumers visual attention in relation to pre-roll ads have so far not been taken into consideration under such circumstances. Moreover, the techniques employed in the above-mentioned studies correspond to those traditional marketing methods which have been deemed limited and imperfect by some neuromarketing researchers (e.g. Ariely & Berns, 2010). For this reason, the authors believe that a neuromarketing approach by means of an eye-tracking experiment to analyze individual's visual behavior when exposed to pre-roll video advertisements with an emotional framing is not only relevant but needed in order to further investigate consumers' information processing when they are exposed to this newly developed advertising format.

1.6 Research question

The important impact that advertising has on consumers' daily lives is undeniable, with consumers constantly being exposed to a growing number of stimuli and companies inverting a substantial percentage of their revenues in advertising efforts (Milosavljevic & Cerf, 2008; Pieters & Wedel, 2017). Neuromarketing approaches have now been used for almost two decades in trying to understand how individuals behave when exposed to advertisements, both, by employing brain imaging procedures, such as EEG or fMRI, and on a physiological level, using eye-tracking or facial expression analysis techniques (Lee et al. 2007). However, the advent of new communication media, such as social media and other digital platforms, has taken advertising opportunities to another level, given the countless and ever-enhanced opportunities for companies to connect with users (Verlegh, Voorveld, & Eisend, 2015). Neuromarketing researchers have tried to catch up, by analyzing the new behaviors generated by these new advertising opportunities.

For the purpose of this study, attention will be considered in terms of visual attention, meaning that the authors will consider that individuals have in fact paid attention to a specific object when they have directed their gaze towards such object and fixated on it.

Going more in-depth, this study will try to investigate the effect that the inclusion of emotionally valenced elements has on visual attention for pre-roll video advertisements. The influence of emotional components on visual attention has mainly been studied on a neural level and in terms of automatic attention, as to investigate the automatic and biological reaction to threats or unpleasant images as opposed to pleasant ones (Carrietè et al. 2004; Vuilleumier, 2005). However, to the authors' knowledge, visual attention to pre-roll advertisement stimuli has not been studied from a neuromarketing perspective with the aim of investigating advertising effectiveness.

For this reason, the research question will be formulated as follows:

"How do pre-roll advertisements containing emotionally-valenced elements influence individuals' visual behavior?"

A limitation to the adoption of visual attention is the fact that even if the attention step is successful, this does not entail that the message is successfully processed, as there are subsequent steps that need to happen, as suggested by McGuire's information-processing model (Percy & Rosenbaum-Elliott, 2016). This means that, even though attention is allocated to the stimulus, the advertising efforts might still be unsuccessful (ibid.). For the purpose of this study, however, we will focus only on the attention step, while further studies might be able to measure the impact on the following steps, as, for example, on memory.

1.7 Purpose of the study

The initial purpose of this study is to evaluate and measure individuals' allocation of visual attention to specific parts within the pre-roll advertisement format when either a positive or negative emotional component is included as an integral part of the ad. A second purpose of the study is to investigate whether the inclusion of a positive or negatively-valenced framing has an impact on individuals' judgment of the content that follows the pre-roll advertisements. In this case, the authors have chosen to show movie trailers after the pre-roll advertisements and the likability of the different trailers was measured. More comprehensively supporting the initial purpose, the study seeks to explore the relationship between the emotionally valenced components and the visual attention directed to the advertisements' countdown button or to the background components, individually. The terms 'emotionally-framed advertisements' and 'ads with an emotionally-valenced framing' will be used to describe pre-roll ads presenting this manipulation.

2. LITERATURE REVIEW

In the literature review chapter, the relevant academic literature that provides the backbone on which the study is based will be presented. In this chapter, the authors will present the description of important concepts and the definition of key terms, which have inspired and substantiated this thesis, elaborating further the concepts presented in the previous chapter.

Particularly, this chapter will be based on three pillars, namely advertising, consumer behavior, and neuromarketing. Relevant advertising literature, encompassing advertising in general terms and then narrowing down to online advertising and, finally, to pre-roll advertisements, will compose the first pillar. In the second area, the authors will identify some of the key models which describe how consumers, in general terms, process the information included in advertisements and then present some key aspects that can affect this information processing journey. Subsequently, the third pillar will be based on the definition of the field of neuromarketing and the presentation of neuromarketing studies that investigated consumers' visual attention. In the figure below, the literature review is represented visually according to these three pillars.
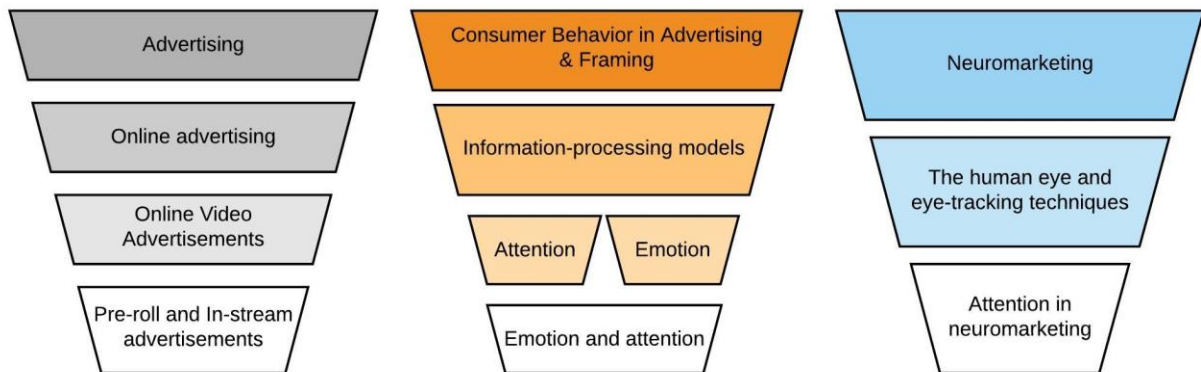
2.1 Advertising

Advertising is a crucial activity for any business interested in enhancing the promotion of their brand, products, and services. The objective of advertisements is to establish a long-lasting positive brand attitude and competitive advantage by attracting potential customers towards the business (Percy & Rossiter, 2016; Plummer, Rappaport, Hall, and Barocci, 2007). Advertisements are capable of building quick and long-term brand awareness, persuade customers to alter their predisposed brand attitudes or product options, increase consumer purchasing behaviors, facilitate the remembrance of the advocated component, along with many other benefits (Jones, 2007, Percy & Rossiter, 2016; Meyers-Levy and Malaviya, 1999).

Alternatively stated, advertisements are incredibly effective if implemented properly with a myriad of research demonstrating their numerous advantages. For instance, Eisend and Tarrahi quantified advertisement knowledge by conducting a study utilizing a larger empirical data set than any previous academic advertising research, consisting of 44 meta-analyses containing over 1700 studies and over 2.4 million subjects. The study showcased that depending on various advertisement input categories (e.g., emotion, message, strategy) distinct beneficial outcomes (eg., credibility, awareness, attention) could accordingly be generated in the target audience (Eisend and Tarrahi, 2016). Apart from showcasing the intrinsic effectiveness of utilizing advertisements, Eisend & Terrahi demonstrated the level of complexity of the creative field in advertisements; considering that, according to the selected inputs present in an ad, a different outcome can be manifested in the customer. The importance of such studies is that they illuminate evident cause-and-effect phenomena in advertisement composition in relation to accomplishing desired marketing objectives. Albeit the remarkable amount of data employed in their analysis, the research contains limitations as innumerable advertising inputs exist in comparison to the handful of inputs examined in the study. Similarly, the potential outcomes are also heavily insufficient compared to actual reality and, in addition, outcomes are not only positive in nature as shown in the study as unfavorable advertising outcomes are certainly also an axiom.

The creative composition of an advert is included as a part of the theory of advertising communication models, an imperative methodology in the construction of effective ad. As specified by Percy & Rossiter, the theory concerns how advertising works and features the dominant elements that advertising managers and brands must acknowledge prior to employing ads in their marketing campaigns (Percy & Rossiter, 1985). Advertising communication models are important as not only do they illustrate the key components in advertising but they are also capable of persuading individuals to make a decision in accordance with a given marketing objective (Percy & Rossiter, 1985; Percy & Rossiter, 2016). The theory consists of the following four components and guidelines:

- The initial step in establishing any communication strategy or model for an advertisement is to identify the target audience which can be defined as "*behaviorally and attitudinally as the group of people (or households, companies or retailers) from whom sales are expected to come. A target audience consists of those people who will be most responsive to advertising*" (Percy & Rossiter, 1985, p. 511). Market segmentation approaches and defining optimal audiences is an intricate field of research in itself consisting of diverse manners of distributing, distinguishing, and selecting a segment based on as an example the economic, cultural, demographical, behavioral, and psychographic factors an audience (Kotler et al, 2016; Moore, 1991; Budeva and Mullen, 2014).

- Secondly, the communication objective also known as communication effect ought to be determined in the advertising campaign, simply put, it relates to the desired outcome a brand wishes to attain from the advertisement (Percy & Rossiter, 1985). The objectives and outcomes can vary from universal objectives such as enhancing brand awareness or brand attitudes to more specific outcomes of strengthening ad attention, purchase intentions, credibility, memorial retention, etc. (Eisend and Tarrahi, 2016, Percy & Rossiter, 2016; Percy & Rossiter, 1985). These outcomes can be generated simultaneously or individually and with differing levels of potency in the perspective of the target audience (Percy & Rossiter, 1985).

- The third key component of how advertisements function is the aforementioned variable of ad input, concretely, the execution in terms the advertising process operating to achieve the predetermined objective, as described by Percy & Rossiter *"The creative department and the media department, respectively, can be left to construct specific advertisements and a media plan that will meet the communication objectives"* (Percy & Rossiter, 1985, p. 519). Hence, the composition of advertising inputs that ought to be included in the ad must be carefully selected to adhere to the desired outcome. Additionally, if the communications effects ought to be accomplished, the in-ad variables pertaining to the particular effects must be consciously or unconsciously processed by the targeted audience (Percy & Rossiter, 2016; Percy & Rossiter, 1985).

- A paramount function in mediating advertising efficiency is held by the fourth key component regarding the chosen medium to convey the advertising communication (ibid). In contrast to the above-mentioned key components, the media mix has progressively evolved over time causing brands to experience a transition from only applying traditional offline media in their marketing campaigns (e.g., television, billboards, press, radio, flyers, cinema, magazines, etc.) to the emergence of ever-growing digital media platforms containing entirely new advertising requirements, conditions, and possibilities (e.g., search engine marketing, online video ads, display & banner ads, social media ads, influencer marketing, etc.) (Blazey, WARC, 2018).

Out of the four subjects in advertising communication models, the target audience is the least investigated subject in our research whilst in the following section, a comprehensive examination implemented to illuminate the digital medium and the potentials and challenges residing in its evolving advertising formats.

2.1.1 Online Advertising

The dynamic field of digital advertising is in constant evolution and the options in which businesses can advertise by are ever-growing as new media platforms and technological developments keep changing and improving periodically. This hasty development poses major difficulties for businesses as a considerable amount of today's advertising instrumentation did not exist latterly. Challenges arise as a variety of these emerging advertising options are not investigated to their full extent and potential, simply as a result of the rapid growth within the field and the multitude of variables that can be incorporated in the advertisements. Proportionately, we find ourselves in exhilarating times in terms of researching the various growing digital advertising disciplines and their never-ending variables, both from a practical and theoretical perspective.

The internet is a powerful marketing environment and it is becoming a highly exploited media for advertisements as a consequence of its outstanding reach, low costs, and detailed segmentation possibilities (McCoy et al, 2007; Rodgers, Shelly, and Thorson, 2000; Weinberg and Mares, 2015). Furthermore, a transition is gradually occurring in numerous industries as consumption behaviors are changing from offline channels to online computer-mediated environments (Hoffman and Novak, 1996), indicating the need for many brands to have a stronger online presence.

Online advertising manifests itself in various shapes and forms, in its initial development advertisements were displayed as simple text in search engines (i.e., Google Adwords, Bing Ads, Yahoo Ads) in which traction is created as consumers search for a query, specific keywords are arranged to present the advertisement with hyperlinks moving the customer to another webpage if they chose to click on the ad (Shrivastava, Terrance, and Kumari, 2018).

Display advertising also known as billboards of the web, were also present in the primary stages of digital advertising, in this medium brands utilize search engine result webpages or third-party websites to convey their messages in the shape of dynamic or static banner advertisements varying in position, size, and frame (Courtney, Lan, and Gareth, 2018; Weinberg and Mares, 2015).

More recent diversifications in online advertisements emerge in the format of social media ads and online video ads. Social media advertising refers to the employment of social networking platforms to leverage on users' information in order to efficiently target one's advertisements (Weinberg and Mares, 2015), additionally, social networks encourage users to engage and share the observed content creating a multiplying effect on viewership and in rare instances the advertised content acquires such a large-scale reach that it goes viral (Leskovec et al, 2007). Online video advertising refers to the use of video to advertise in digital formats and is most commonly used in video platforms (e.g., YouTube, Vimeo), moreover, video ads are also present in some

social media platforms (i.e., Facebook, Snapchat, Instagram) and to some extent in dynamic ad banners (Weinberg and Mares, 2015). Online video advertisements have yet to reach its full potential in its present state and a more elaborate understanding on the most efficient ways of conducting this ad medium is required (World Advertising Research Center A, 2019).

Nonetheless, all of the aforementioned advertisements are currently scattered all over the web and ever-increasing in numbers, consequently, ad blindness also known as banner blindness conjunctively becomes a more prominent phenomenon. The theory of ad blindness proposes that as the growing amount of online advertisements are presented to consumers throughout a multitude of digital platforms, customers are prone to consciously and unconsciously ignore advertisements whilst the memorial retention in regards to the advertised content is often minuscule (Hervet et al, 2011; Owens et al, 2011; Benway, 1998; Hsieh & Chen, 2011). This effect is clearly observable with banner advertisements but can be extended to other online advertising formats and, therefore, undermine the effectiveness of advertising efforts (ibid.)

This increased growth of number of advertisements directly impacts the viewers receptiveness to digital ads negatively, as consumers are only capable of gazing on one advertisement at the time, having multiple ad stimuli cluttered in their field of vision results in perceived intrusiveness and reduced individual ad viewership, this is commonly known as ad clutter, a popular circumstance in online environments (Ha and McCann, 2008; Hammer, Kennedy, and Riebe, 2009). According to Woodside and Glensek 1984, the presumed effect of advertising noise (i.e., the amount of ads presented to customers in succession) on an individual's engagement, processing capability, and retention of memory is significantly hindered in high noise conditions. Hence, as digital platforms get progressively saturated with the number of advertisements presented to each individual, the performance of the particular advertisement is decreased in terms of numerous beneficial metrics (Woodside & Glensek, 1984).

These concepts can be detrimental to corporations, brands, and businesses as a large sum of their marketing budgets could possibly be going to waste on online media, as customers are not only repeatedly ignoring their advertisements and are unable to memorize the content of the ads they choose to engage with but also as the amount of advertisements increase on each platform their viewership is reduced, customer intrusiveness is increased, and processing capabilities are declining. Furthermore, the negative results of those concepts are further compounded by the progressive decline in attention spans within some online audiences (World Advertising Research Center B, 2019).

Undoubtedly the online domain with all its advertising mediums and formats remains one of the most powerful mediums advertisers have nowadays to transmit their communication efforts and achieve distinct campaign

objects. Hence, as online advertising competitiveness continuously grows, customers are developing aversiveness towards all these advertising stimuli in the aspect of conscious and nonconscious ignoration, processing clutters, and high ad noise intrusiveness. This creates an ongoing necessity in understanding how to navigate these intrusive and low individual attention environments and how to conduct captivating digital advertisements to match a given marketing objective. In the next section, the online video advertising format filled with unexplored possibilities will be further discussed.

2.1.2 Online Video Advertisements

Online video audiences are steadily increasing with the most notable growth is on mobile devices, nonetheless, online video consumption remains one of the most popular and engaging activities on the internet with a large estimated video penetration of nearly global spectrum on all devices (World Advertising Research Center C, 2019; Statista E, 2018). Present market data demonstrate the sheer amount of global users consuming online video on a daily basis, with the highest penetration of 64 percent of internet users in Saudi Arabia, whilst half of the U.S. population, and 30 percent of China is adhering to the same trend (Statista F, 2018). A tendency is present as audiences in developing countries are delayed in terms of online video consumption trends and generally having average low market penetration (Statista E, 2018; Statista F, 2018). The amount of online video viewers in the U.S. is forecasted to exceed 239.2 million by 2021, amounting around 70 percent of the population with their preferred types of YouTube video content being those uploaded by brands and people (Statista A, 2017; Statista A, 2016). Additionally, online video advertising spending is undergoing a similar growth spurt in the U.S. over recent years with expanding growth forecasts (Statista B, 2017). Digital video advertisements out of the many contemporary advertisement mediums seems like one with exceeding potential (Plummer et al., 2007, Damratoski et al, 2011; World Advertising Research Center A, 2018; Cecil, 2013), the complex video illustration and the possibilities of achieving distinct brand objectives based on the variables and composition of the video advertisement is one aspect of its diverse strengths (ibid). Furthermore, videos advertisements operate conjunctively with the heightened audience reach and scalability that online media platforms provide, in addition to, facilitated segmentation possibilities as brands leverage on online data gathering platforms to provide videos with customized audience communication (Cecil, 2013; World Advertising Research Center C; 2019; World Advertising Research Center D, 2019). Online video advertising is capable of yielding modern marketers with reaps of newly emerged opportunities but it is equally followed by the necessity of understanding how its multiple facets and outcomes function in the current consumer market.

Previous outlooks of advertising research accept the evidence of dynamic contents such as video advertisements being more attractive, engaging, and compelling than static image advertisements, and in turn static image ads displayed an advantage in terms of the abovementioned metrics in comparison to static written text ads (Cecil, 2013; Plummer et al, 2007). Nevertheless, limitations do exist in drawing such harsh generalizations

as many variables and factors (e.g., colors, shapes, context, size, communication, strategy, etc.) can alter the results in the given mediums rapidly making comparative measurements a disorderly endeavor.

In a comparison of 11 advertisement formats conducted by the World Advertising Research Center (WARC) which included both offline and online mediums, TV and online video demonstrated the highest magnitude of long-term potential metrics in relation to further increasing their effectiveness against current practices (World Advertising Research Center A, 2019; Blazey, WARC, 2018). However, in terms of return on investment (ROI), on average the online video advertising medium demonstrated inferior performance in comparison to other formats with huge variations in ROI from video ad to video ad (Blazey, WARC, 2018). Additionally, in WARCs 100 analysis of the world's top effectiveness campaigns, an evident dominance of video advertisements (Online & TV) was present in the winning campaigns whilst victorious brands selected video formats as the main advertising mediums employed in the marketing mix (World Advertising Research Center B, 2018). The video advertising input of successful campaigns were the creatives capable of engendering emotions in customers and strategies centered on emotional inclination appeared exceptionally compatible with video formats (ibid). Both TV and online video ad formats have proven to be credible means of evoking positive connotations associated with the advertised message and the communicative experience towards customers (World Advertising Research Center A, 2018; Damratoski et al, 2011).

When utilized correctly, video advertising in online and offline contexts is perceived as a persistent means of transmitting a point across to the targeted audience through sustained viewability, clarity of communication, and emotional context. Consequently, it can additionally be observed that the performance of video advertisements varies greatly depending on the advertisement, with detrimental performances in terms of ROI being present in numerous online video ads while on the other end of the spectrum top advertisements campaigns are leading their marketing efforts with the employment of video advertisements. The expertise of the advertiser becomes a paramount factor for the success or the downfall of the video advertisement since the performance of the marketing objective will experience great deviations depending on how the campaign and advertisement are executed. However, by determining which parameters are crucial performance indicators in the composition of video advertisements, brands can simplify their strategic and creative processes albeit no approach is suitable or can be used under all circumstances.

According to the reviewed literature, out of the numerous variables that can be included in video advertisements (e.g., logo, colours, length, product, stories, celebrities, shapes, story, brand, etc.), the emotional component emerge as an influential factor in the overall effectiveness of the advert (Cecil, 2013; World Advertising Research Center A, 2019; World Advertising Research Center A, 2018; Percy & Rossiter, 2016; Hahn and

Kovashka, 2019). Some research suggests that it is the emotional component which is one of the factors responsible for the performance of the video advertisements, whereas others advocate that the video advertising medium itself promotes the manifestation of emotional reactions or connections in the audience (ibid). Perhaps a two-way relationship is present, where the two concepts are closely intertwined. Nonetheless, emotions appear to be an important aspect of video advertisements and will be further elaborated in the coming sections. Although the video advertisement format may not be the core advertising strategy of a number of businesses for reasonable reasons, these reflections implicate the dexterity of online video advertisements in achieving certain objectives. The complexity and amount of variables present in influencing audiences through video formats can be challenging to navigate, hence, not every business or campaign has the necessity, means, or expertise to implicate this advertisement format.

2.1.3 Pre-roll and In-Stream Advertisements

As online video consumption increasingly emerges as one of the most popular online activities globally, large online video platforms such as Youtube, Facebook, and Vimeo have started to implement new forms of advertisement to match users behaviors. Accordingly, Pre-roll and In-Stream advertising are recent and unique forms of digital video advertising that are presented in the same space customers are expecting to watch their predetermined content. The important difference between pre-roll advertisements and in-stream advertisements is that the pre-roll ads are shown to the customer prior to them viewing their intended content whilst in-stream ads are presented while they are streaming a video (YouTube Help, 2019).

TrueView in-stream ads provide users with an option to skip the ad after a brief display through a skip button, nonetheless, pre-roll and regular in-stream ads are most often entirely non-skippable and the advertisement must be viewed until a countdown button is finished before users are allowed to watch their intended content (Dorai-raj et al, 2012). This forcing of viewership is perceived as highly intrusive, disruptive, and unpleasant by customers resulting in pre-roll and in-stream advertisements having the greatest negative impact on YouTube and video platform users (Dorai-Raj et al, 2011; Dorai-Raj et al, 2012; Campbell et al, 2017). According to Campbell, pre-roll ads that have less complex affective characteristics actively fail to engage viewers cognitive resources, this results in viewers having more cognitive facilities available to experience the aversiveness and intrusiveness of being forced to the pre-roll advertisement (Campbell et al, 2017, p.411). In other words, TrueView in-stream and pre-roll advertisements that are unsuccessful in engaging viewers to pay attention to the advertisement naturally get skipped or even worse evoke negative experiences in customers. This is one of the various reasonings behind advertisers having difficulties conducting pre-roll advertisements successfully and also websites such as Youtube experiencing issues monetizing this type of ad format (Campbell et al, 2017). To avoid the intrusiveness and negative connotations of pre-roll and in-stream ads, viewers are increasingly adopting the use of ad-blocking software (Slefo, 2016). For instance, ad blocking penetration

rates amongst internet users worldwide reached over 11% in 2016 (Statista C, 2017). This growing tendency causes problems for advertisers utilizing pre-roll formats since there is a likelihood of optimal segments or potential customers not viewing their online ads due to ad blockers (Singh and Potdar, 2009).

Researchers have identified another challenge concerning pre-roll ads, a behavior called ad abandonment. Ad abandonment occurs when viewers consciously decide to avert their attention or abandon the video while the non-skippable pre-roll ad is playing (Goodrich et al, 2015; Campbell et al, 2017). Furthermore, advertisements that are perceived as intrusive, harmfully impact the hosting webpage and the advertised brand in terms of negative attitudes and intentions (Goodrich et al, 2015).

According to Rejón-Guardia & Martínez-López, advertising intrusiveness is the main component responsible for advertising clutter (2014, p. 565-566). Ad clutter is the overload responsible by the competitiveness of brands and businesses in online communication media resulting in consumers feeling overwhelmed by the intrusiveness of their advertisements (ibid). Advertising clutter can generate various unwanted behaviors in customers, including, but not limited to, ad avoidance in which customers evade fixating at the ad, reduced consumer ad recall, diminished positive attitudes of message and brand, in addition to decreased purchase intentions (Rejón-Guardia & Martínez-López, 2014).

Nevertheless, TV advertisements function in a similar fashion to pre-roll and in-stream ads whereupon the commercial or advertisement is showcased in between (i.e., commercial break) or before the watched content is played, although the perceived intrusiveness, viewer engagement, and customer attitudes of TV ads are not interpreted nearly as negatively by viewers as their online cousins (Lee and Lumpkin, 1992; Edwards, Li, and Lee, 2002). The multitude of negative viewership connotations experienced by pre-roll ads and in-stream ads have not been directly conveyed or manifested in TV ads, or, at the very least, certainly not in the same degree of harmfulness, despite the similarities of the two mediums and the extra option to skip the ad in some in-stream formats. One of the reasonings behind such variance can be explained by the online context wherein pre-roll and in-stream ads operate in: "*The Internet is an environment that provides a stronger sense of control and freedom than an offline setting, causing consumers to be in a goal-directed state when using it. Reactance is used to explain the heightened sensitivity to advertisements triggered by a goal-directed state online. Reactance refers to a motivational state that is brought about by a perceived loss of freedom and an accompanying focus on restoring it. Ads that impede a consumer's sense of freedom online are therefore seen as intrusive and are avoided in an effort to restore lost freedom"* (Campbell et al, 2017, p. 412). Consequently, as pre-rolls and in-stream advertisements hinder viewers from their watching objectives by appearing instead of the intended video, they are perceived by viewers as exceedingly intrusive and negative types of ads in comparison to other advertising formats, hence, contributing to consumers actively seeking to avoid such ads by means of

ad blockers, ad abandonments, or simply not paying attention to them. In the subsequent section, the behavior of consumers in relation to processing advertisements and some important variables in mediating consumer behavior will be examined.

2.2 Consumer Behavior

2.2.1 Consumer Behavior in Advertising

In this section, some findings will be presented concerning the identification of personal factors, which are subjective and intrinsic to the viewer, that can influence the effectiveness of advertisements.

The focus of advertisers has been traditionally directed towards the specific and objective characteristics of an ad as being the main drivers of its effectiveness, with a wide-spread belief that even small modifications to an ad can represent the main determinants of success or failure (Mackenzie, Lutz & Belch, 1986). However, it has been proven that also personal factors, which are internal, subjective and specific to the viewer, are important in determining the success of an advertisement (ibid.). These personal factors revolve around the affective component of advertisements and researchers have identified the *attitude towards the ad* as being an important concept, which encompasses consumer's feelings towards a specific ad (Mitchell & Olson, 1981). Attitude towards the ad can be defined as *"a learned predisposition to respond in a consistently favorable or unfavorable manner to advertising in general"* (Lutz, 1985, p. 53). Moreover, it should be noted that attitudes can be held generally towards all instances where an individual encounters advertising content, as in this case, but they can also be more specific and directed towards a specific ad in a specific situation (ibid.). Nonetheless, researchers have concluded that the affective component of an ad, in terms of the pleasant or unpleasant feelings it evokes in the viewer, is an important mediator of advertising effectiveness (Mackenzie et al., 1986).

Another personal factor that affects individuals' behavior when presented with an ad, which is detached from the final execution of the ad, is the goal that the viewer has when viewing the ad (Rayner, Miller & Rotello, 2008; Pieters & Wedel, 2007). Rayner et al. observed a significant difference in ad-viewing behavior when participants were asked to consider purchasing the products presented in the ad, with respect to a situation in which this goal of purchasing the product was not present (2008). In particular, the overall goal specifically affected participants' fixations to specific features of the ad, namely the text and pictorial elements, with goal-oriented participants looking at the text before and more often than the picture, as in a state of information evaluation, while non-goal-oriented participants were more significantly attracted by the pictorial element (ibid.). Also, Pieters & Wedel, building on Yarbus' thesis suggesting that the task that is assigned to individuals affects the distribution of the fixation points when looking at an object, conducted an eye-tracking experiment to compare viewing patterns when participants were assigned 5 different goals while viewing print advertise-

ments (2007). Interestingly, they found that, when participants were asked to memorize the ads, higher attention was registered to the text, pictorial and brand element of the ad, while, when assigned a brand-learning goal, higher attention was registered to the text element, but, at the same time, less attention was given to the pictorial element (ibid.).

As previously mentioned, another factor which poses a serious threat to the effective realization of advertising campaigns, specifically in the online environment, is the so-called banner blindness effect (Hsieh & Chen, 2011). Internet consumers having learned from past experiences how the advertising content is presented, selectively choose to ignore the ad and concentrate directly on the desired content (ibid.). Moreover, it should be noted that, in addition, the online context in which an advertisement is presented affects consumers' perception and behavior towards it (Hsieh & Chen, 2011). For example, advertising content that deviates from the usual content that viewers encounter on a specific page, such as, for example, a video ad on a news website, will be less effective in attracting viewers' attention and will be more likely subject to the banner blindness effect (ibid.).

In addition, a personal aspect, which affects advertising effectiveness is brand familiarity. Brand familiarity refers to the previous contacts and experiences that a consumer had with a specific brand (Alba & Hutchinson, 1987). This, in turn, affects the behavior of consumers when they are presented with a familiar brand and their conscious and unconscious reaction towards brand-familiar content (Campbell & Keller, 2003). Interestingly, it has been found that, when consumers are exposed to an advertisement for an unfamiliar brand, they perceive the content as new and more interesting and, therefore, will spend more time processing it, compared to an ad for a familiar brand (ibid.). It has also been suggested that brand familiarity has a similar effect on purchasing behavior, where, in a situation in which consumers are shopping for an unfamiliar brand, they will spend more time analyzing the available information and evaluating the choice, while for familiar brands, less time will be employed (Biswas, 1992).

2.2.2 Framing

An important aspect that can affect individuals' perception of a specific message or object and, hence, their behavior towards it, is the framing that is given to the message.

On a general level, the concept of framing is defined as the effect that the way a specific message is presented has on a person's conceptualization of the message (Chong & Druckman, 2007). In other words, it can be observed that presenting a message or issue in a specific manner, i.e. positive or negative, has an important impact on how people perceive that message and in turn behave in relation to it (ibid.). For example, it has

been demonstrated that, by changing the frame under which a social issue is presented, an impact is made on the public's perception of the issue and their responses in surveys (ibid.).

The concept of framing is also strongly interconnected with advertising, where the presentation of the message plays a key role in influencing consumers and generating favorable attitudes. Advertisers commonly exploit the power of framing by crafting positively or negatively framed advertisements concerning, for example, in health-related issues, negatively framed ads are found to be more effective in appealing to individuals, for loss aversion reasons (Smith, 1996). For the purpose of this study, the definitions of positive or negatively framed messages as provided by Grewal, Gotlieb & Marmorstein will be adopted (1994). When talking about positively-framed messages, we will refer to *"communications that emphasize a brand's advantages or the potential gains to consumers in a situation"* (Grewal, Gotlieb & Marmorstein, 1994, p. 146). On the other hand, negatively-framed messages are characterized as *"communications that point out a brand's disadvantages or the potential losses to consumers in a situation"* (Grewal, Gotlieb & Marmorstein, 1994, p. 146). Examples of positively-framed advertisement showcase benefits of using a product, on a general level or in a comparative manner (Grewal et al., 1994). Negatively-framed ads, on the other hand, show the negative aspects of using or not using a specific product and leverage on consumers' risk-aversion (ibid.).

The framing effect can also be enhanced by personal factors related to the public, as it was observed that the level of familiarity or knowledge of a product or issue, or even the education level of individuals, can affect the way people respond to framed advertisements (ibid.). Interestingly, it has also been observed that using a positive or negatively framed message influences the risk related to the price of a product since the framing helps present in a different way the relationship between price and perceived product performance (Grewal et al., 1994). The study suggests that, when advertisements are framed negatively, consumers tend to have a higher perceived performance risk as influenced by price (ibid.). In the next section, the way in which consumers process the information contained in advertisements will be presented.

2.2.3 Information-processing of advertisements

After having presented some key factors that can affect individuals' perception of advertisements, in this section, some important models analyzing how consumers process the information contained in advertisements will be presented. The purpose of this section is to describe the process that individuals go through after having given their attention to a specific stimulus. Although the main focus of this study is on attention and no direct focus will be given to the process that follows first attention to a stimulus, it is nevertheless relevant to talk about the information-processing step, in order to reinforce the importance of attention and provide an understanding of the reasons why obtaining consumers' attention is of such importance for marketers.

An important model that covers the main steps concerning the way consumers go about processing information after attending to a stimulus is the Elaboration Likelihood Model (ELM), which is defined as a "general framework for organizing, categorizing and understanding the basic processes underlying the effectiveness of persuasive communications" (Petty & Cacioppo, 1986, p. 125). Given the focus of this study on advertising, which can be identified as a prime example of 'persuasive communication', this model is considered extremely relevant (Dahlen & Rosengren, 2016; Petty & Cacioppo, 1986).

The ELM provides a complete and detailed overview of the process that leads from the initial receiving of a persuasive communication message to a final positive or negative *attitude change*, which is defined as a change in the general evaluations people have of a person, object or problem (Petty & Cacioppo, 1986).

This information-processing journey can be summarized in some key steps. The authors identify two so-called routes that can be taken by individuals (ibid.). The first route is called 'central' and takes place when variables linked to persuasion ensure a high likelihood that stimuli are elaborated and is, therefore, based on an active and conscious evaluation of information (ibid.). The second route is called 'peripheral' and takes place instead when the likelihood of elaboration is low, due to the different variables in the persuasion context, and is hence based on a simpler and associative evaluation of the available information (ibid.). Variables that can affect the process are, for example, the nature of the message, the relevance of the message and the individual's prior knowledge (ibid.). For the purpose of this study, the peripheral route will be the most relevant, since the focus will not be on the attitude change generated by the presence of a strong message, but rather on a message characterized by a low-elaboration likelihood, given the nature of the pre-roll video ads we are considering (ibid.).

Another model that gives interesting insights regarding the information processing behavior of individuals in regard to advertising are the four steps of message processing identified by Percy & Rosenbaum-Elliot (2016).

The first step is *attention*. The authors state: *"Before anything else can occur, you must first pay attention to the advertising"* (Percy & Rosenbaum-Elliot, 2016, p.251). They argue that even though individuals are exposed to an ad, that only means that they had the opportunity to process it but not that they indeed started processing it (Percy & Rosenbaum-Elliot, 2016). They highlight that it is necessary that individuals pay *attention* to the ad, as the first step in the processing of the information contained in it (ibid.).

After attention, they identify two more steps through which individuals go through when processing an advertisement (Percy & Rosenbaum-Elliot, 2016). The second step is *learning*, which entails that, after having paid attention to the ad, people now familiarize themselves with the content of the ad and can now learn something

from the information that is presented (ibid.). The third step is *acceptance*, which requires that, when individuals have learned something from the ad, they can now decide whether to accept it or reject it, meaning they can perceive the message as true or false (ibid.).

The fourth step is *emotion*. Emotion, however, does not follow the previous steps chronologically but rather combines with the results of learning and acceptance (Percy & Rosenbaum-Elliot, 2016). By emotion, it is meant the emotional response individuals have after having paid attention to an advertisement (ibid.). These responses can be automatic and happen at a nervous level, elicited by a specific part or the whole of the ad (ibid.). This emotional response acts as a mediator of learning and acceptance of the ad's message (ibid.).

Another important model, from which Percy and Rosenbaum-Elliot have taken inspiration in defining the above-mentioned steps, is McGuire's information processing model (Percy & Rosenbaum-Elliot, 2016). McGuire identified six steps through which any persuasive message, such as an advertisement, has to go through in order to be fully processed (ibid.). The first step is that the message must be initially *presented* to the target audience (ibid.). Then, the audience must *pay attention* to it and subsequently *comprehend* what the message is (ibid.). The audience must then *yield* to what is communicated and successfully *retain* the message, their understanding of it and the fact that they have yielded to the arguments (ibid.). Finally, the last step entails that members of the target audience, in fact, *behave* according to what was initially communicated by the message (ibid.).

McGuire links these steps in a hierarchical way, meaning that all steps must occur, and they must do so in the established order (Percy & Rosenbaum-Elliott, 2016). He also identifies the probability that a member of the target audience successfully buys the product presented in the advertisement as the result of compounding probabilities, meaning the multiplication of all the probabilities that the six above-mentioned steps would occur (ibid.) This is represented below:

$$P = P(p) \times P(a) \times P(c) \times P(y) \times P(r) \times P(b)$$

Where:

$P(p)$ = probability of being presented the message

$P(a)$ = probability of paying attention to the message

$P(c)$ = probability of comprehending the message

$P(y)$ = probability of yielding to the message

$P(r)$ = probability of retaining the intention

$P(b)$ = probability of behaving

(source: Percy & Rosenbaum-Elliott, 2016, p. 64).

The importance of this model lies primarily in the link that McGuire identifies between attention and, through intermediate steps, purchasing behavior. The identification of this link reinforces the importance of attention, as an essential step without which the message cannot be processed.

Another model which highlights the importance of attention and links it to the purchasing behavior, by establishing a hierarchy of effects, is the AIDA model (Wijaya, 2012). AIDA stands for Attention, Interest, Desire, and Action and identifies these as the four steps through which a persuasive message, hence also an advertisement, goes through when processed by an individual (ibid.). Attention to the message is the first and unavoidable step, followed by developing an interest in the message (ibid.) Subsequently, the individual might develop the desire to act as urged by the ad and finally take action, such as, for example, the decision to purchase the product presented in the ad (ibid.).

Combining the above-mentioned models, it can be observed that attention is and must be the first and unavoidable step of every information-processing journey. Consumers need to pay attention in order to start processing the message contained in an advertisement. As suggested by the Elaboration-Likelihood Model, be it through the central or the peripheral route, the message must be elaborated and as further suggested by McGuire's information processing model, this cannot happen without attention (Petty & Cacioppo, 1986; Percy & Rosenbaum-Elliott, 2016). Although exposure is sometimes referred to as the first and unavoidable step in the elaboration of an advertisement, the real first core step, as suggested by Percy & Rosenbaum-Elliot and as shown in the AIDA model, is attention (2016). Thus, attention is a paramount factor that needs to be established in order for the advertisement to be processed by consumers. Moreover, by adopting the concept of compounding probabilities when evaluating the probability that an advertisement is successfully processed, attention becomes even more important in ensuring that this probability is as high as possible, given the difficulty of grabbing people's attention in today's world, in which individuals are overwhelmed by marketing-related content on a daily basis (Milosavljevic & Cerf, 2008).

2.2.4 Attention

After having argued for the importance of attention as the first unavoidable step for the successful processing of advertisements, in this section, the concept of attention will be further investigated and analyzed.
The latest technological developments have created a substantial number of new communication channels, as, for example, social media, which companies use to reach consumers and spread marketing messages (Mangold & Faulds, 2009). This entails that individuals are exposed to thousands of marketing messages on a daily basis (Milosavljevic & Cerf, 2008). Not all of them, however, can be processed, given the brain's limits in terms of information processing capabilities (ibid.). Researchers have argued that we live in an attention economy, where there is an abundance of knowledge and information, but an evident scarcity of human attention (Dav-

enport & Beck, 2002). It is, therefore, of paramount importance for companies to engage in attention management efforts. (ibid.). However, before going more in-depth into how marketers should take this into consideration, it is useful to define what researchers mean with attention. Given the overwhelming number of items we are exposed to daily, people cannot pay attention to all of them, but they will pay attention to certain individual items (Connor, Egeth & Yantis, 2004).

What attention exactly is has been extensively debated, a traditional definition attributed to the field of psychology, describes attention as *"the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought"* (James, 1890, ch.11). This definition portrays attention as a sort of choice, through which the human brain decides to focus on a specific object or item amongst several others. In his definition, James continues: *"It implies withdrawal from some things in order to deal effectively with others"* (James, 1890, ch.11). This further reinforces the view of attention as a choice, where some things must be disregarded in order for others to be processed fully. This is in line with Milosavljevic & Cerf's view, who attribute attention as a result of the limited human brain capacity, which entails that people are forced to choose which specific object to attend to (2008).

Which exact items individuals will pay attention to depends on two different mechanisms: bottom-up and top-down (ibid). Bottom-up attention is an automatic process, where individuals attend to certain stimuli almost unconsciously and instinctively, due to the visual saliency of those specific items with respect to the others (Connor et al. 2004; Pieters & Wedel, 2004). Visually salient features have been grouped in three different areas, namely brand, pictorial and text elements (Pieters & Wedel, 2004). Specific elements belonging to the three different areas have a different effect on individuals and can have different hierarchy levels depending on the person (ibid.). Top-down attention, on the other hand, is a longer-term and cognitive process, where people pay attention to certain stimuli based on internal personal factors, such as brand familiarity or specific needs. (ibid.).

Apart from bottom-up and top-down, researchers have identified another categorization, which divides attention into high and low. High attention refers to a state in which people are maintaining their attention on a specific object in an active and voluntary way (Genco, Pohlmann & Steidl, 2013). On the other hand, low attention refers to the passive state in which people browse and look around them, often without having awareness of it (ibid.). People often only become aware of low attention only when external factors cause it to turn into high attention (ibid.). The difference between bottom-up and top-down and high and low attention, lies in the fact that bottom-up and top-down are mechanisms through which people pay attention to objects around them and finally may arrive in a state of high attention, while high and low are indeed states in which a person

can be either before, as in the case of low attention, or after, in the case of high attention, the result of a bottom-up or top-down process (ibid.).

2.2.5 Emotions

As presented in the information-processing section, another important concept that plays a key role in mediating individuals' processing of advertisements is emotion.

Emotions can be described as autonomous, unconscious, and unrestrained initial responses to environmental stimuli, which can either be manifested through an internal variable (e.g., thought, cognitive process, memorial recollection) or an external variable, for example, viewing a picture, hearing a sound, and experiencing a certain event (Hansen and Christensen, 2007). Emotions appear rapidly and dissipate within several seconds of residing in the subconsciousness whereas feelings can evolve over time and enter into conscious states of awareness (Oatley et al, 2006). These autonomous, behavioral, and even glandular emotional responses embody themselves as distinct reactions at the physiological and cognitive level, for instance, alterations in facial expressions, increased heart rate or blood pressure, and conducting avoidance or engagement behaviors are all different expressions of emotional repercussions (Hansen and Christensen, 2007; Baars and Gage, 2013).

In conventional neuroscientific theory, the two most fundamental concepts in relation to emotion are valence and arousal, these deeply interrelated approaches demonstrate the following principles: Emotional valence illustrates the degree or direction of the emotional context, ranging from negative or unpleasant to positive or pleasant, in other words, emotions that are considered as positive (e.g., joy, happiness, contempt) are of positive valence, whereas negative emotions (e.g., disgust, anger, sadness) have a negative valence (Oatley et al, 2006; Lang, Dhillon, & Dong, 1995; Genco et al, 2013). Emotional arousal refers to the intensity or potency of the emotional state, arousal is usually ranging from low to high but varies greatly from individual to individual in terms of what triggers emotional arousal responses and their separate level of intensity (ibid). Valence and arousal have the capacity to interact with one another as illustrated by Ochi and Nobata (2005), the memorial recollection of images is facilitated by high arousal levels in both negative and positive emotional valences in comparison to low arousal images of identical emotional valences. A third concept is occasionally utilized is emotional motivation referring to the behavioral and actionable component of an emotional response (eg., avoidance or approach) (Genco et al, 2013; Elliot and Convington, 2001; Elliot et al, 2013). Occurrences that elicit negatively valenced emotional responses have the ability to induce avoidance motivation in individuals, whereas positively valenced encounters have the opposite effect of inducing approach motivation (Elliot and Convington, 2001; Elliot et al, 2013). Constituents considered to have attributes of cleanliness, purity, or aesthetically pleasing are acknowledged to aid in inducing approach motivation, however, constituents of filthiness, impurity, or aesthetically unpleasing instead induce avoidance motivation (Elliot, 2013).

The aforementioned emotional components appear to be paramount factors in various aspects of consumer behavior and in advertisement performance (Percy & Rossiter, 2016; Lee et al, 2009). According to Percy & Rossiter, it is often difficult for advertising managers to acknowledge that generally, it is not the informational component of an advertisement that leads consumers to favor and cognitively engage with it, but it is the positive motivational components that predominantly have an effect advertising performance (Percy and Rossiter 2016, p. 188). Emotional contexts play a definite role in involvement, although the conscious brain is seldom aware of the influence, moreover, as the mind processes information outside of an individual's awareness powerful impressions is formed at the subconscious level (Hayashi, 2001; Kahneman, 2002). Furthermore, emotions are an influential aspect in the decision making of consumers and their perception of external stimuli as emotional systems have the ability to reduce cognitive inconsistency, impact visual attention preferences, and alter the satisfaction in regards to the observed context (Lee et al, 2009, p. 184-185; Hayashi, 2001; Sherman et al, 1997, p.373). Humans are highly optical creatures utilizing their sight to navigate and interpret the world around them, accordingly, visual stimuli plays a prominent part in educing emotional valence since neuro-anatomically, pleasant visual observations engages cerebral regions related to attractiveness whilst unpleasant visual stimuli contain the ability of activating regions related to the danger recognition system (Paradiso et al, 1999, p. 1618). Although multiple sensory instruments (i.e., palate, olfactory, auditory, touching) are also capable of influencing perception and preference in physical environments (Helmefalk & Hultén, 2017, p.1), in digital environments many multisensory cues are limited, thus, visual and auditory stimuli are accordingly of the highest significance. Apparently, emotional valence is capable of affecting visual attention, for instance, the probability of evoking bottom-up attention is higher if the observed content is of high emotional relevance (Genco et al, 2013). The correlation between emotion and attention is thoroughly explored in the following section.

2.2.6 Emotion and attention

After having defined attention and emotion, we will now try to connect the two aspects. In particular, we will investigate the connection that exists between visual attention and emotional stimuli.

On a general level, it can be observed that emotion and attention are strictly linked, as shown by neuromarketing research. As suggested by Genco, Pohlmann & Steidl, *"In a visual field of many objects, the one that is most emotionally relevant is likely to pull our attention toward it"* (2013, p.99). This finding helps to establish the nature of the connection between the two aspects, as it suggests that it is attention that, in fact, is affected by the emotional nature of objects and not vice versa (ibid.). Moreover, it also suggests that there is an important difference in terms of attention given to emotionally relevant and emotionally irrelevant objects (ibid.). The authors continue in this direction by pointing out that *"Emotional markers can trigger attention toward*

one object at the expense of other, less emotionally relevant objects" (Genco et al. 2013, p.99). This observation links emotion as an important influencer of the attentional process of choosing on which specific object to pay attention to among many different possibilities, which was defined earlier in the text.

Furthermore, the above-mentioned study also suggests a relationship between emotional valence and attention (Genco et al., 2013). The authors point out that, as the emotional valence of an object increases, in turn, attention towards it increases too (ibid.). Similarly, the authors also suggest a relationship between emotional arousal and attention of the same nature (ibid.). As emotional arousal increases, individuals become better at filtering out noise and at focusing their attention towards a specific action (ibid.). However, it should be also pointed out that if emotional arousal becomes too high, people will become less able to filter out and direct attention (ibid.).

Carrietè et al. conducted an extremely relevant experiment, which attempted to measure initial attention to emotional stimuli on a neural activation level (2004). Interestingly, they observed a significant difference in terms of automatic attention given to emotional and neutral stimuli (ibid.). Furthermore, the researchers observed that negative stimuli are the first ones to capture individuals' automatic attention, in the first 105 milliseconds after the appearance of the stimulus (ibid.). Then, after 180 milliseconds, attention is maintained only by emotional stimuli, both positive and negative, and subsequently, in the next 240 milliseconds, attention is captured only by positive or neutral stimuli, while it is lost for negative stimuli (ibid.). The findings interestingly identify a difference in terms of attention when emotional or neutral stimuli are shown to individuals, and further distinguish between positive and negative stimuli (ibid.). This latter distinction is in line with the observation that, for evolutionary reasons linked to survival, humans behave differently when exposed to stimuli which are perceived as favorable or unfavorable (Cacioppo & Gardner, 1999). The positive stimulus chosen for this experiment was a nude image of the opposite gender, while the negative stimulus showed a growling wolf with its mouth open (Carretè et al., 2004).

In another attempt to connect attention and emotion, Vuilleumier suggests that, in an environment where individuals are exposed to a large number of stimuli, emotional stimuli are attended to faster than neutral stimuli (2005). Moreover, he discusses that the emotional nature of a stimulus acts as a saliency feature, exactly like, for example, color or contrast and that it plays a role in affecting individuals' attention even when their task is not related to emotion, in an almost involuntary effect (ibid.). In essence, he suggests that, in a situation where attention resources are limited, emotional stimuli are prioritized and have a faster and privileged route to attention (ibid.).

Another effort to review the nature of the connection between emotional stimuli and attention has been conducted by Anderson, who, in line with the previously mentioned findings, suggests that emotional stimuli are

attended to in a different way with respect to neutral ones, identifying it as the *"attention-grabbing power of emotional stimuli"* (Anderson, 2005, p.259). He also suggests that the emotional nature of stimuli, not only affects attention but also influences the information processing of stimuli at other stages (ibid.). It is also interesting to note that, in his experiment, Anderson did not use positive or negative images, as in the previous case, but words, which shows that our brain attributes an emotional connotation to different types of stimuli (ibid.).

Another important study which investigated the ties between emotion and attention is represented by Hill's efforts in analyzing the role of emotions in advertising (2011). He observes that attention is closely linked to the emotional state which is evoked in the viewer by the advertisement and he identifies different roles that the various emotions play in attracting and maintaining attention (ibid.). He suggests that only by evoking positive emotions such as happiness or surprise advertisers will be able to ensure a high level of attention to advertisements (ibid.). On the other hand, he observes that on average negative emotions, such as fear or disgust, will cause viewers to lose interest and drive them away from the advertisement, in turn causing a lower level of attention (ibid.).

In the chart below are summarized Hill's findings regarding the role of different emotions on consumers' behavior, of which attention is an important aspect.

Primary Emotional States						
		Happiness	Surprise	Anger	Fear	Sadness	Disgust
Behavioural Result	Outcome Orientation	High focus on receiving reward	Split focus between reward & punishment	High focus on receiving reward	Split focus between reward & punishment	High focus on receiving reward	High focus on avoiding punishment
	Level of Attention	High	High	Medium	Medium	High	Low
	Action Bias	High: strive for results	High: strive for results	High: prompts retaliation	Low: delay/ freeze	Low: delay/ freeze	High: engage in avoidance
	Risk Tolerance	High risk, low reward	NA	High risk, high reward	Low risk, low reward	High risk, high reward	NA
	Decision Making	Quick (not concerned)	Cautious (uncertain)	Quick (impulsive)	Cautious (wary of outcome)	Cautious (delays)	Quick (not concerned)

Source: Hill (2011, p. 84)

The above-mentioned research, by making use of different procedures and by building on different bodies of knowledge, has tried to analyze the effect of emotional content on attention. However, none of the studies have adopted the concept of visual attention and have used it as an indicator of advertising effectiveness. The aim of this research is to analyze, by making use of the eye-tracking technique, the effect that the presence of

positive or negative emotional content has on visual behavior. Moreover, the most recently developed advertising formats, such as pre-roll advertisement, have not yet been object of studies trying to link the emotional and attentional components.

The study that more closely aligns with the purpose of this thesis, though presenting differences in the methodology and the choice of stimuli, was conducted by Teixeira, Wedel & Pieters (2012). The purpose of their study was to investigate the connection between emotion, attention, and ad avoidance behavior (ibid.). To do so, they exposed participants to video advertisements containing emotionally arousing stimuli and they simultaneously analyzed their attention allocation by means of a screen-based eye-tracker, their emotional response through facial expression analysis and ad avoidance via the observation of their zapping behavior (ibid.). Their focus was on positive emotions, specifically joy and surprise, and they observed that these two emotions are effective in concentrating attention and retaining viewers (ibid). The main differences between their study and this thesis, however, lie firstly in the fact that only positive emotions were chosen and no comparison was done with negative emotions, and, secondly, that only a series of ads were shown, while in our study we will aim to include the pre-roll advertisements in their natural setting, meaning before the viewers' desired content. A neuromarketing approach would support conveying potential correlations between the two aforementioned variables of attention and emotion, hence, neuromarketing and its approaches will be discussed in the next section.

2.3 Neuromarketing

The aim of this research is to gain a deeper understanding of how consumers allocate attention when exposed to pre-roll video advertisements. For this reason, a neuromarketing approach can lead to interesting insights. Neuromarketing has been defined as a field of study which aims to understand human behavior when individuals are exposed to marketing stimuli, through the use of neuroimaging techniques (Lee et al., 2007). Such neuroimaging procedures enable the observation and recording of individuals' brain activity and include procedures such as electroencephalography (EEG) and Functional Magnetic Resonance Imaging (fMRI), to mention to most prominent (Lee et al., 2007; Vlasceanu, 2014; Morin, 2011). Other techniques, which enable the measurement of psychological and physiological reactions to marketing stimuli, are also employed in neuromarketing studies (Vlasceanu, 2014). These procedures include eye-tracking, galvanic skin response (GSR) technology, and facial expression analysis and differ from the above-mentioned neuroimaging techniques since they do not rely on the direct observation of brain activity, but on the measurement of the body's reaction to stimuli (Vlasceanu, 2014; Lee at al. 2007). Among these techniques, eye-tracking is the most relevant tool to analyze people's visual behavior when presented with visual stimuli (Duchowski, 2007).

2.3.1 The human eye and eye-tracking techniques

Eye-tracking is defined as a technique which employs eye-tracking devices, known as eye-trackers, to measure eye movements (Duchowski, 2007). Eye movements can be divided into two categories: fixations and saccades (Wedel & Pieters, 2008). Saccades are extremely rapid movements of the eyes, which last approximately 20-40 milliseconds, and are made so that the eyes can target specific locations in the person's surroundings (ibid.). Fixations are the instances in which the eye is still and focused on a specific stimulus and last around 200 to 500 milliseconds (ibid.). Humans continuously combine saccades and fixations and eye-tracking devices are able to capture such movements and revert important measurements related to their eye movements, the analysis of which can be used to understand human behavior and provide insights that can then be exploited to optimize companies marketing efforts related to visual stimuli (Duchowski, 2007; Wedel & Pieters, 2008).

Most eye-tracking devices work by directing infrared light into the subject's retina, which is then reflected and makes both the subject's pupil and cornea visible (Poole & Ball, 2006). Once the device is able to locate these two elements, it will be able to obtain data regarding the person's eye movements and record them independently from the person's head movements (ibid.). For eye-trackers to work, a calibration process is needed before every subject takes part in an experiment (ibid.).

Eye-tracking devices offer a wide range of measurements that can be used to capture different aspects of an individual's eye movements and viewing behavior (Holmqvist et al., 2011). On a general level, eye-trackers measure gaze points, which are raw and quick measures of where the participant's gaze is directed (ibid.). If more gaze points are concentrated in a specific area for a longer time, a fixation occurs, which usually lasts between 100 and 300 milliseconds (ibid.). Eye-trackers also measure the saccades, meaning the eye movements that occur between fixations (ibid.).

Combining the three above-mentioned measurements, eye-trackers offer a wide range of identifiable metrics. On a basic level, eye-trackers identify fixation sequences, meaning sequences of at which specific point and for how long people looked within a stimulus (Holmqvist et al., 2011). They also offer the possibility of identifying Areas of Interest (AOIs), which are specific areas within the entire stimulus, which can be customarily selected by researchers, based on the nature of the study (ibid.). After having defined AOIs, eye-trackers can measure Time to First Fixation (TTFF), which shows the time it took for participants to look at a specific AOI (ibid.). Moreover, it is also possible to measure how much time individuals spent looking at a specific AOI, also called total fixation time (ibid.). Finally, it is also possible to measure how many participants out of the total, in fact, reverted their gaze towards specific AOIs (ibid.)

2.3.2 Attention in neuromarketing

In recent years, the number of neuromarketing studies which have employed eye-tracking techniques in order to study individuals' behavior when exposed to stimuli has been consistent (Santos, Oliveira, Rocha & Giraldi, 2015; Wedel & Pieters, 2006). These studies have been conducted using a wide range of devices, from screen-based eye-trackers to eye-tracking glasses, and utilizing an even wider range of stimuli, from real-life products to images and videos (ibid.). Moreover, some experiments have been conducted in a laboratory, but others have been conducted in a real-life purchasing situation, such as inside a supermarket (ibid.) We will now try to present some examples of these different typologies of studies.

An important wave of studies that have been conducted in recent years has utilized eye-tracking devices to obtain insights into consumers' in-store purchasing behavior. Gidlof, Wallin, Dewhurst & Holmqvist, conducted an in-store experiment with the aim of studying individuals' visual behavior in a natural purchasing setting (2013). Particularly, they observed differences in the participants' visual behavior based on the tasks they were carrying out, namely decision-making as opposed to a search task, observing, for example, a higher number of re-dwells during the decision-making task (ibid.). Clement, Kristensen & Gronhaug analyzed the impact of physical design features of product packaging, as well as other aspects, such as time pressure, on consumer's visual attention, conducting both an in-store and an in-lab experiment (2013). Another experiment conducted by Clement investigated the impact of packaging features on in-store purchasing decisions (2007).

Although these studies focus on purchasing behavior and not on advertising, as will be the focus of this study, they provide useful insights regarding the impact of visually salient features, such as colors and shapes, on individuals' visual attention, which can have an impact on the effectiveness of advertisements (Clement et al., 2013; Clement, 2007). Such findings are reinforced by other non-neuromarketing studies, such as Labrecque, Patrick and Milne's study on the role of colors in marketing activities, from advertising to brand materials and packaging, which identified that the choice of color significantly affects consumers' perceptions and choices (2013). For what concerns shapes, Bar & Neta have observed that the use of rectilinear or curvilinear shapes affects consumer's attitudes towards objects, with individuals holding a significant preference for curvilinear shapes (2006).

A second group of studies which employed eye-tracking procedure to study individuals' visual behavior is the studies which focused on visual attention in relation to advertising. An early eye-tracking study, which paved the way for future studies, was conducted by Pieters and Wedel (2004). The authors categorized print advertisements in terms of their three main areas, namely brand, pictures and text and they analyzed the impact that the surface size of each element had in attracting attention to the entire advertisement (ibid.). The study generated interesting insights regarding the different elements, identifying distinct effects for each element, such

as, for example, observing the importance of the brand element in transferring attention to the rest of the ad (ibid.).

An interesting study by Pieters, Wedel & Batra analyzed the effect of the visual complexity of print advertisements on their effectiveness in grabbing individuals' attention (2010). They define ads as visually complex when they have either feature complexity, meaning a dense number of features, or design complexity, meaning a creative and rich design (ibid.). The findings suggested that feature complexity has a bad impact on both attention and attitude towards the ad, while design complexity has a favorable impact in attracting attention to the entire ad and promoting a positive attitude (ibid.).

Another example, this time in an online environment, is Sajjacholapunt & Ball's study, which analyzed how the inclusion of human faces and the direction of the gaze influenced the effectiveness of banner advertisements in attracting individuals' attention (2014). Interestingly, they observed that the inclusion of faces increased banner effectiveness and that, in particular, the inclusion of a face with averted gaze, meaning not looking directly at the viewer, further increased effectiveness (ibid.).

Some studies have also employed eye-tracking devices to analyze visual attention when individuals are exposed to video advertisements. The dynamicity of video ads, given their constant change and movement of images, makes the collection and analysis of data more challenging than for static advertisements, since the eyes of participants and the images are moving at the same time (Pieters & Wedel, 2017). However, some researchers have chosen to utilize dynamic stimuli, such as Aoki & Itoh, who conducted an eye-tracking study to analyze eye-movements when individuals are exposed to TV commercials (2000). They observed that attention to the commercials was interestingly affected by bottom-up factors, particularly scene-change frequency and the use of celebrity endorsers (ibid.).

Another relevant eye-tracking experiment which utilized dynamic stimuli was conducted by Carmi & Itti (2006). For this study, the authors designed video clips by combining different dynamic video scenes and used them in an in-lab eye-tracking experiment, with the aim of unveiling the causes of attentional orientation to visual cues in a natural vision setting (ibid.). Interestingly, they found that, on average, dynamic visual cues are more effective in attracting attention, intended in its bottom-up connotation, than static cues (ibid.).

2.4 Conclusion of the literature review

In this chapter, the authors have presented the relevant literature, with the purpose of exploring some of the key areas which provide important insights regarding the scope of the research outlined in the introduction.

The first section presented an overview of the phenomenon of advertising and the benefits and challenges that advertisers face. The section then proceeded to elaborate on the interesting changes and opportunities brought about by the diffusion of advertising in an online context. Moreover, the scope was then narrowed down to video advertisements, elaborating on their great potential in achieving a high degree of personalization, but also on the threat posed by individuals' perceived intrusiveness of this newly-developed advertising format.

The second section, building on the advertising literature previously reviewed, elaborated on the way consumers react and behave in relation to advertisements, as well as the steps that they take when processing the information presented within the ads. The key concepts of attention and emotion were outlined and defined and, finally, the two concepts were brought together in terms of the attention given to emotional stimuli. Interestingly, the literature suggested that emotional stimuli have a privileged and faster route to attention and that emotionally-valenced stimuli outperform neutral stimuli in terms of attracting individuals' visual attention (reference).

The third section then gave an overview of the field of neuromarketing and the different techniques used by researchers in the field, focusing on eye-tracking as one of the most suitable and insightful tools to analyze visual attention. Some eye-tracking studies were then presented, as to show the possible applications and usage of eye-tracking in relation to marketing stimuli.

3. METHODOLOGY

The objective of this study is to provide an answer to the research question related to the influence of emotional valence on the visual attention directed to pre-roll advertisements, as stated in Chapter I. In this chapter, the steps are taken to address the questions and the utilized instrumentation to measure these variables will be presented. The chapter is organized in the following manner: firstly, the applied scientific philosophy and epistemological approach are defined. Secondly, the research question is divided into the hypotheses that will be examined. The third section involves the limitations and delimitations of the study, followed by an elaborate description of the experiment structure and its components. Lastly, the validity, reliability, and the benefits and drawbacks of the experiment will be discussed.

3.1 Philosophy of Science

The differentiation and definition of methodological businesses paradigms can be comprehended by the fundamental assumptions in the nature of reality and acknowledged wisdom, that is, ontology and epistemology. The scientific philosophy employed in empirical and theoretical research navigates the structure and selection of methods, how the data is collected, and the theorization of the results or findings, hence, the philosophy illuminates the determined perception of reality and process of knowledge development (Saunders, Lewis, and Thornhill, 2016; Bryman and Bell, 2005). Qualitative and quantitative research methods can equally be utilized in each and every philosophy, though with certain dispositions and inclinations and, accordingly, research methodology is of secondary importance in relation to the applied philosophy (Saunders, Lewis, and Thornhill, 2007; Guba and Lincoln, 1994). In the subsequent section, the applied research philosophy and experiment design are explained in terms of the selected study structure and its coherency with previous research and theory. Additionally, the choice of instrumentation and examined variables will be illustrated along with their significance. The reliability and validity of the study are considered and ultimately the potential benefits and drawbacks of the methodological approach are discussed.

3.1.1 Positivist Epistemology

The underlying paradigm of epistemology employed in this study is one of a positivistic philosophical perspective. The reasoning is based on a number of factors that are distinct but often linked. For instance, the positivistic methodology presupposes that only phenomena which can be examined and observed through factual measurements or the senses are deemed as trustworthy (Bryman & Bell, 2005; Saunders, Lewis, and Thornhill, 2015). Accordingly, the study concentrates on variables that are decidedly provided, which means the phenomena, concepts, and attributes are capable of being documented and measured. In positivism, feasible

hypotheses (or research questions) are generated in order to be tested (deductively) through the acquired quantifiable results driven by a number of statistical analyses (ibid.). Thus, a quantitative research methodology is generally more appropriate when adopting the aforementioned research principles (ibid.).

3.1.2 Implications of Positivism

Contrary to an interpretive or normative subjective positioning, in a positivistic perspective, the phenomena are investigated externally, that is, objectively, whereas the researcher operates independently from the studied field and does not affect or interfere with the experiment (Saunders, Lewis, and Thornhill, 2015). The reality is expected to be observable, therefore, the authors partake a position of objective analysts, as opposed to appending personal interpretation as would be imperative in focus groups and personal interviews. With such an approach the acquired results are disassociated from the perpetrators. In other words, the body of research ought to be capable of being replicated by separate researchers whilst yielding the same results (ibid). The validity and reliability of the research are consequently important conducts to facilitate analogous duplication and sound research structure.

Modern perspectives, such as interpretivism and subjectivism, acknowledge the existence of subjective realities and indicate that objective instrumentation or methodology in social sciences have limitations whilst studying humans beings, for instance, we ascribe a subjective interpretation to our environment in comparison to as an example, a tree or plant (Saunders, Lewis, & Thornhill, 2015). This demonstrates a limitation of the applied positivistic approach since the aforementioned perspectives reject a number of assumptions submitted by a positivistic perspective, as they operate in a domain where human beings distinctively interpret their surroundings and contain a separate individuality of person, the objective research practice is not an existential possibility (ibid). Furthermore, social sciences ought not to concentrate on elaborating and understanding effectual causes as natural sciences but instead on illuminating the tendencies of human behavior (ibid). Phenomena residing in independent subjective realities such as human interpretations, emotions, or feelings are legitimate factors for research when applying subjective perspectives (ibid). Although this study does include emotions, the examination is not concentrated on the degree of emotional induction nor is it about the interpretation of emotional context but simply as the influence of varied emotional stimuli on the attention given to an advertisement. Hence, a positivistic approach is appropriate as the authors intend to objectively measure and evaluate attention as the outcome. In other words, attention is the measured output and the emotional image stimuli are the applied input to observe its effects on attention.

These philosophical perspectives demonstrate epistemological contradictions in regards to the intents of the thesis, as on one side of the spectrum it aims to illuminate and explain the social phenomena involving humans

and advertising, whereas on the other side the examination of neuroscientific eye-gazing reactions is conducted employing solely a positivistic methodology. Accordingly, it is perhaps necessary to acknowledge that a completely objective perspective while researching human behavior is solely achievable in theory and not in practice in order to take required precautions to enhance objectivity and not take it as a given. Regardless, if genuine objectivity can be attained in such experiments, the structure of the experiment is conducted in such a way that makes every effort to be as close to objective as possible. The intent is to construct a research study that aims to be exempt from subjective biases and that can be replicated by following the implemented guidelines. Ultimately, the selected approaches and attained results ought to be valid and credible through the usage of legitimate and acknowledged methods. Further elaboration on how the authors intended to achieve such conditions can be found in the experiment design section.

3.1.3 Deductive Approach

The thesis employs a deductive research approach as this methodology is in coherence with conducting a highly structured experiment to investigate the correlation of emotional framings and attention spans in preroll advertisements (Gill and Johnson, 2002). The orderly structure facilitates further replication and ensures enhanced research reliability (ibid). Furthermore, the researcher ought to operate independently and objectively to what is being investigated in conformity with the presented positivist philosophy. Nonetheless, some subjectivity can still prevail in the researchers' selection of questions and in their adopted phrasing (Saunders, Lewis, & Thornhill, 2015).

A deductive approach is complementary to this thesis as initially the assessment of previous theory is conducted to formulate hypotheses in order to test the relationship between two or more variables (ibid). Such an approach is consistent with the research principle of reductionism in which the complex studied phenomenon is reduced to its fundamental or simplified elements to obtain a better understanding of it (ibid). Followingly, the researched concepts and hypotheses ought to be operationalized in a manner that precisely indicates and permits the examined data variables to be measured quantitatively. However, this is not to claim deductive approaches are solely limited to the use of quantitative data, but it is often a preference (ibid). Ultimately, a deductive approach is additionally an appropriate fit for the thesis as the examination of the researched outcome can be either confirmed, in need of a modification, or neglected. In addition, statistical generalizations on human tendencies can be drawn, given that the studied sample is sufficient in size (ibid).

3.2 Hypotheses

Considering the epistemological assumptions discussed above and going more in-depth in attempting to answer the research question, which aims to investigate *"How pre-roll advertisements containing emotionally valenced elements influence individuals' visual behavior"*, four hypotheses are set. These hypotheses are then tested by conducting an in-lab eye-tracking experiment. An eye-tracking experiment has been chosen due to its direct applicability in measuring visual attention, which is at the center of this study.

H1 – Individuals who are exposed to positively-framed emotional stimuli will have a higher fixation duration to the pre-roll advertisement.

The first hypothesis concerns the difference in people's visual behavior based on the valence of the emotional stimulus. From previous research, it has been found that emotionally valenced stimuli play a role in affecting visual attention and that a significantly different behavior can be observed when compared to neutral stimuli (Vuilleumier, 2005; Carrietè et al., 2004). For this reason, it was decided not to utilize neutral stimuli in this study, as the primary objective is to observe the differences or similarities in terms of the individuals' visual attention when comparing the effects of a positive against negative emotional stimuli within the pre-roll advertisements. In particular, our assumption is that individuals who are presented with a positively valenced framing will be more likely to pay attention to the advertisement. This is in line with previous findings in advertising literature suggesting that positive emotions are a crucial component in evoking high attentional levels to advertisements (Hill, 2011, p. 84; Teixeira, Wedel and Pieters, 2012). An advertisement's positive motivational components are also believed to support cognitive engagement to the ad (Percy and Rossiter, 2016). Moreover, positively valenced emotional responses are associated with eliciting approach motivation (Elliot and Convington, 2001; Elliot et al, 2013), and pleasant visual observations have further been shown to captivate the viewer by activating brain areas related to attractiveness (Paradiso et al, 1999, p. 1618). This will be analyzed using eye-tracking in terms of total fixation time.

H2- Individuals who are exposed to positively-framed emotional stimuli will have a higher liking for the content that follows the pre-roll advertisement.

Digital advertisements that are recognized as intrusive, negatively influence attitudes and intentions towards the advertised brand and the host webpage (Goodrich et al, 2015), demonstrating a spillover effect in negative connotations. Pre-roll advertisements are likewise perceived as highly intrusive and in addition, are eligible for negatively impacting viewer experience (Dorai-Raj et al, 2011; Dorai-Raj et al, 2012; Campbell et al, 2017). Thus, it is likely that a negative or positive spillover effect could be present on the content showcased

after the intrusive pre-roll advertisement viewed. Negatively valenced stimuli provoke avoidance, unpleasantness, and aversiveness, whereas positively valenced stimuli have been linked to approach, pleasantness, and attractiveness (Paradiso et al, 1999; Elliot and Convington, 2001). In this sense, the established assumption is that there will be a difference in the participants' perception of the trailer content if the advertisement stimuli are framed in a positive or negative manner. As pre-roll advertisements may have existing negative connotations towards the format, the authors will consider that the presence of positive stimuli will increase the liking for the following content, while the inclusion of negative stimuli will result in a lower liking.

H3 - Individuals who are exposed to the negatively-framed emotional stimuli will have a higher total fixation duration on elements outside of the advertisement.

Previous literature has demonstrated how negative visual observations engage cerebral regions associated with the danger recognition system (Paradiso et al, 1999, p. 1618). In addition, negatively valenced emotional responses also evoke aversiveness by means of producing avoidance motivation in subjects (Elliot and Convington, 2001; Elliot et al, 2013). Negative emotions (i.e., anger, disgust, and fear) in advertisements can create disengagement towards the ad (Hill, 2011), hence, the residual attention is expected to be redirected elsewhere in the subject's field of vision. In contrast, pleasant observations activate cerebral areas related to attractiveness and emotional responses that are positively valenced instead supports approach motivation (Paradiso et al, 1999; Elliot and Convington, 2001; Elliot et al, 2013). It is further mentioned that it is the positive motivational components of an advertisement that facilitate viewers cognitive engagement with an ad and not its negative motivational or informational components (Percy and Rossiter, 2016). Accordingly, the induced aversiveness and disinvolvement related to perceiving the negatively valenced stimuli are assumed to redirect the participant's attention to areas outside of the pre-roll advertisement, that is to say, increased total fixation duration to the background components in respect to negative valence. The engagement, attractiveness, and approach tendencies elicited by the positively valenced stimuli ought to contradict the negative findings in practice, by having less total fixation duration towards elements outside of the advertisement.

H4 - Individuals who are exposed to the negatively-framed emotional stimuli will have a higher fixation time to the countdown button.

The forced viewership of pre-roll advertisements is experienced as disruptive and unpleasant by individuals (Dorai-Raj et al, 2011; Dorai-Raj et al, 2012; Campbell et al, 2017). Correspondingly, it can be hypothesized that participants will have some visual interaction with the countdown button as it displays when the duration of the viewing constraint is going to end. Subsequent to the theory provided in hypothesis 3, the potential of

disengagement or aversiveness capable of being manifested by the negatively valenced stimuli could also interact with the fixation towards the countdown button, that is, when participants are presented to a negative stimuli their enhanced aversiveness towards the advertisement will as a consequence redirect their attention to the informative countdown button, hence increasing its total fixation duration. The positively valenced advertisements are expected to engage and attract the participants, resulting in a lower total fixation duration being allocated to the countdown button.

In the following sections, the limitations and delimitations in relation to the overall study and experiment design will be presented. Secondly, the experiment design and its structure are thoroughly elaborated followed by a discussion of its validity, reliability, and benefits and drawbacks.

3.3 Limitations

3.3.1 Participants

In terms of the selection of participants, a limitation of this study is the fact that only university students in the age range 21 to 31 years old participated in the study. The obtained sample is not an adequate representation of the overall population of pre-roll advertisements viewers and, therefore, poses limitations in terms of generalizability of the study.

Another limitation can be identified in the fact that business school students, particularly if specializing in marketing-related subjects, might have prior knowledge of eye-tracking studies or might have been exposed to some of the knowledge on which this study was built. This, in turn, can have an impact on the external validity of the obtained results.

Moreover, participants were not screened based on their usage of video platforms, such as YouTube, and, therefore, their usual exposure to pre-roll ads, as well as their usage of ad blockers, which may prevent them from being exposed to online advertisements. The rationale behind this choice was to keep participants naïve regarding the real purpose of the study, but, at the same time, it represents a limitation since usual ad viewers and people who are never exposed to them can present substantial differences in their reactions and visual behavior. In other words, the rare or frequent usage of the platform can represent a confounding factor that affects the participants' reactions and behavior.

Another limitation can be identified in the fact that each participant might have been subject to the emotional framing to a different extent, given each person's different perceptions of the images or different experience and knowledge regarding the issue that was outlined in the advertisement. For example, for personal reasons,

some participants can be more heavily touched than others by the image portraying bad teeth, therefore, being affected in their visual behavior towards the ad.

Concerning the measurement of the eye-tracking data, it should be noted that, for some of the participants, the eye-tracker in some instances lost contact with the eyes, be it because of the participant moving their head outside of the scope of the eye-tracker or for other external factors. This can have an impact on the quality and completeness of the data as well as on the findings of the study.

3.3.2 Stimuli

Regarding the choice and design of the stimuli, a limitation can be posed by the fact that the positive and negative images that were selected to conduct the emotionally-valenced framing of the advertisement were chosen exclusively according to the authors' evaluation. Other studies (e.g. Teixeira et al., 2012) conducted pretests with a different pool of participants to ensure that the stimuli to be utilized in the study elicited the desired emotions. The absence of this pretest could have resulted in misalignments between the authors' and the participants' perception of the emotionally valenced elements employed in the experiment. Hence, making the participants perceptions of the emotionally valenced stimuli unidentified.

Another limitation can be posed by the fact that, for all participants, the different pre-roll advertisements were always followed by the same movie trailers. Following the same reasoning that led to the choice to randomize the order in which the stimuli were presented to each participant, also the trailers shown after each add could have been randomized. This randomization would prevent specific movie trailers from having a spillover effect on the pre-roll advertisements, and vice versa. It should also be noted that this effect could potentially be observed not only on the ad shown before the trailer but also on the one following. For example, an exciting trailer could evoke positive feelings in participants, and this could play a role in affecting their visual behavior with respect to the following ads. Ultimately, a limitation can be present in varying sizes in a few of the advertisement and trailer scenes being smaller or larger in screen size than others, such variances may be perceived differently by participants and perhaps could impact the visual attention at that frame.

3.4 Delimitations

3.4.1 Experiment

The experiment has been conducted in an in-lab environment, using a screen-based eye-tracking device for the gathering of data. Despite taking place in a laboratory, the setting is not too far from the usual viewing situation of pre-roll advertisements, which are normally viewed indoors and on a computer screen that is similar to the screen-based eye-tracker utilized for the experiment. For this reason, an in-lab eye-tracking study can be considered an adequate, though not perfect, representation of reality.

However, it should be pointed out that a significant share of the users of video platforms such as YouTube consume content not only on a fixed-screen computer but also on laptops and mobile devices, which present substantial differences in viewing conditions. For the purpose of this study, the focus will be put on monitor-based viewing conditions, for reasons related to the availability of eye-tracking equipment. Further research could replicate or use similar stimuli to test the phenomenon on portable devices.

3.4.2 Stimuli

Concerning the design of the stimuli that were utilized for the experiment, a delimitation can be identified in the choice of products that were showcased in the selected advertisements. The products were all low-involvement and utilitarian products, while no high-involvement products were chosen, which could have been used to compare the results and reinforce the findings. This selection can be addressed in further research. Another delimitation that was made concerns the use of unknown brands in the selected advertisements. The rationale behind this choice was to prevent brand familiarity from having an effect on the participants' visual behavior.

A considerable delimitation includes not measuring the emotional valence of the employed framing stimuli. For instance, if the framing's valence was assessed, it would more clearly indicate if the participants' perception of the utilized framing was in coherence with the reviewed literature. For example, it would have demonstrated if a framing that was defined by the researchers as of positive valence, in actuality was one of neutral valence for the participants. Nevertheless, when the opposing framing images are presented side by side and were further based on the literature of emotional responses, it can clearly be determined that one version elicits more positive or negative valence than the other stimuli image.

Another important delimitation consists in the choice to use non-skippable pre-roll advertisements. The main reason behind this choice is the fact that non-skippable ads are of fixed length and cannot be avoided in any way by viewers. On the other hand, including a skippable ad with a working skip button, would have resulted in participants being exposed to the advertisements for different durations, depending on whether a participant had chosen to skip the ad as soon as it was allowed, or alternatively, had decided to continue watching. This scenario would have created issues in terms of validity and reliability since the length of the exposure to the ad would have been outside of the authors' control.

Moreover, the fact that only emotionally-framed stimuli were used, and no neutral stimuli were used for benchmarking and comparison purposes characterize another delimitation. Strictly emotionally-framed stimuli were designed in accordance with previous research, which identified significant differences in visual attention between emotional and neutral stimuli (Carrietè et al., 2004). However, the use of neutral stimuli could have

reinforced the findings. It should be noted that a neutral stimulus, or, in other words, not presenting the emotional framing, was designed, but it was used as a control stimulus and eye-tracking data related to it were not collected.

A delimitation can be identified in the fact that the emotional element, i.e. the positive or negative picture, was shown for only 2 seconds. It should be pointed out that some participants could have missed the emotional framing and their data might have been exempt from the intended framing. Moreover, it should be noted that real-world pre-roll advertisements normally do not present static images as it was done in this case. However, for the purpose of this study, static images were used to allow the comparison and the analysis of the effect of the positively and negatively valenced framing.

3.4.3 Analysis

Concerning the analysis of the eye-tracking data, a delimitation can be identified in the fact that the authors focused on Total Fixation Duration (TFD), while they did not focus on other eye-tracking variables. For example, Time-to-First-Fixation (TTFF) could have provided interesting insights regarding the speed at which participants fixated on the countdown button or on the emotional element. Similarly, the measurement of fixation patterns or fixation count could have identified interesting viewing patterns. Nonetheless, TFD has been deemed a relevant indicator of the allocation of visual attention to the distinct part of the pre-roll advertisement and the surrounding web-page.

Moreover, it should be noted that considering the focus of the study on the emotional valence of the stimuli, an appropriate measurement of emotion offered by eye-tracking devices is pupil dilation, which could have helped identify the emotional responses to the positive or negative images. Combined with the eye-tracking data, also a facial expression analysis could have provided interesting insights regarding the emotions elicited in the participants by the inclusion of the emotional framing. However, the purpose of this study is to analyze visual attention as influenced by the inclusion of emotionally-valenced framing, while the emotional arousal generated by the positive or negative images, which can be measured through pupil dilation or a facial expression analysis, is out of scope and could be addressed in future research.

3.5 Experiment Design

Since the subject is heavily under-researched in relation to the variables' appliance in pre-roll ads, a great emphasis was set on constructing a suitable experimental design. Thus, in this section, the experiment design and methodology supporting it will be elaborately illustrated by utilizing the literature review as a relevant foundation. Demonstrating the exercised structure is significant so future researchers within the field can adopt this methodology as a basis and also comprehend which variables can be altered to investigate different aspects (e.g., framing, ad inputs, duration, products, etc).

3.5.1 Participants

A total of 51 participants were invited to take part in an eye-tracking experiment, which took place in the university's neuromarketing laboratory. The participants were selected based on availability and proximity and they were all university students in the age group of 21 - 31 years old. All participants had a normal or corrected-to-normal vision and no compensation, be it monetary or else, was offered for participation in the experiment.

All the participants were primed to believe they were going to watch movie trailers and were kept naive about the pre-roll advertisements being presented to them. Such an approach was utilized to simulate the goal-directed state of online environments which influences the perception of pre-roll ads, as the participants were not expecting the appearance of ads and were instead in a goal-directed state expecting to view a content (trailer), and the pre-roll ads were presented in accordance with their natural setting (Campbell et al, 2017).

3.5.2 Instrumentation/Equipment

The equipment that was used for the experiment is a Tobii T60 XL screen-based eye-tracking device. The stimuli were shown on a 24 inches screen with a 1920 x 1200 pixels definition. For each participant, calibration of the eye-tracking device prior to the start of the experiment was performed, to ensure the correct gathering of the eye-tracking data. Participants were asked to look at the screen and interact via the use of a mouse connected to the screen. Moreover, the iMotions biometric research platform, connected to the eye-tracker, was used to design the study and gather the eye-tracking data.

3.5.3 Stimuli

The stimuli that were utilized for the experiment were prepared as follows. Each stimulus consisted of a video composed of two parts: first, a 15-second pre-roll advertisement, which was created and modified specifically for this experiment making use of footage and pictures available on the internet. The short format duration was

selected as the non-skippable pre-roll duration on YouTube is either 15 or 20 seconds (YouTube Help), moreover, video ads and pre-roll ads with longer durations are perceived as overly intrusive by viewers instead of its ordinary perception (World Advertising Research Center B, 2019; Campbell et al, 2017). Secondly, a movie trailer of approximately 30 seconds, was downloaded from the internet and was not modified in shape or form (see figure 2).

The video advertisements were not shown in full-screen but, rather, they were embedded on the left side of a frame that was taken as a screenshot from an authentic YouTube video-viewing page. The size and the positioning of the video stimuli frame were kept equal to the regular size and position identical to those on YouTube. The rationale behind this choice is to ensure the closest possible viewing conditions and experience to the usual viewing format in which people find themselves when watching a YouTube video, despite the experiment not being conducted directly in the platform. Additionally, the YouTube background was chosen in contrast to a full-screen to imitate the real world high-noise internet environment with multiple stimuli (i.e., search box, browser, bookmarks, content, etc) that businesses must confront when running advertisements (Woodside & Glensek, 1984). The chosen YouTube background was the same for all videos, as to avoid the introduction of new content and information on the screen that could deviate the results by presenting distinctive background stimuli.
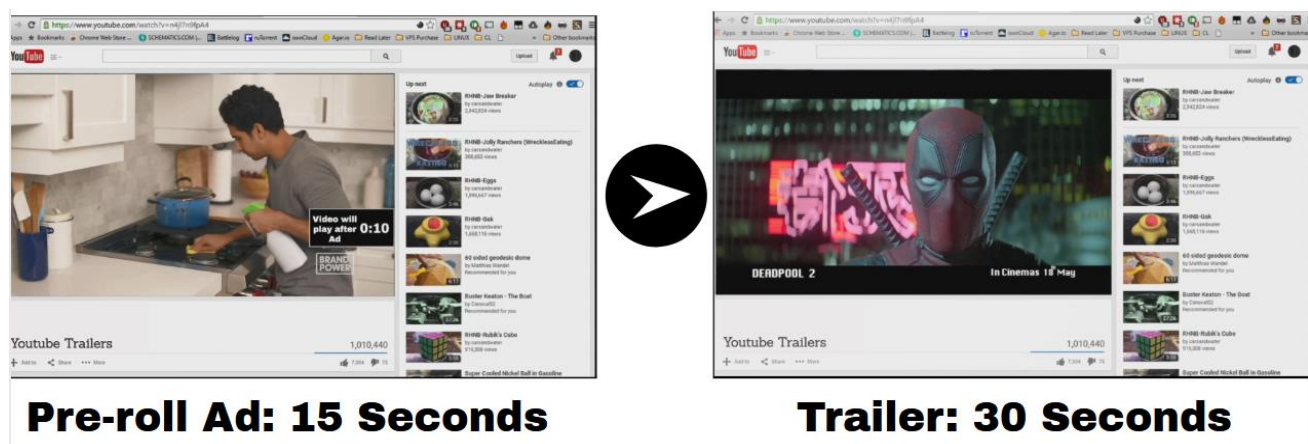
(Figure 2): Pre-roll advertisement and trailer structure.

The 15-seconds advertisements consisted of the following three main parts:

Part 1: The initial 2 seconds consisted of an image of a product, shown at the center of the video frame on a neutral white background (see Figure 3). The purpose of the first part was to introduce the product to the participants and evidently show that the footage in question was a pre-roll advertisement and enable participants to familiarize with the context while showing a still product image.
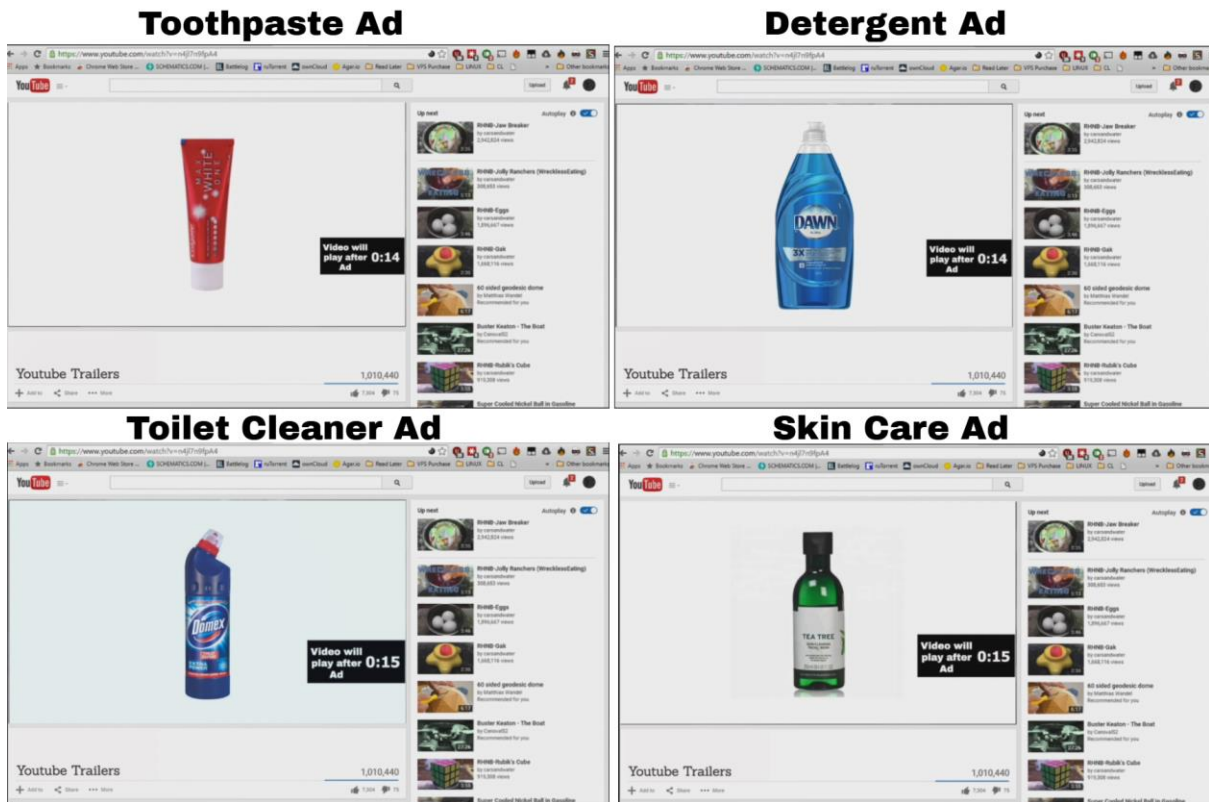
(Figure 3): PART 1 - Pre-roll Advertisement Product Components

Part 2: The second part, which lasted 3 seconds, consisted of a picture that was specifically chosen as a way of achieving a 'framing effect' for the advertisement. Two types of pictures were selected, which had either a positive or negative emotional connotation to them and were related to the function of the product that was initially shown (see Figure 4). Thus, for every video advertisement, a version with a positive emotional picture and another version with a negative emotional picture, included as the second part of the advertisement, were created. The positive and negative images were carefully selected to make sure the positive or negative emotional connotation was evident and could not be misinterpreted by participants, whilst being in accordance with constituents acknowledged to elicit either approach or avoidance motivation (Elliot, 2013).
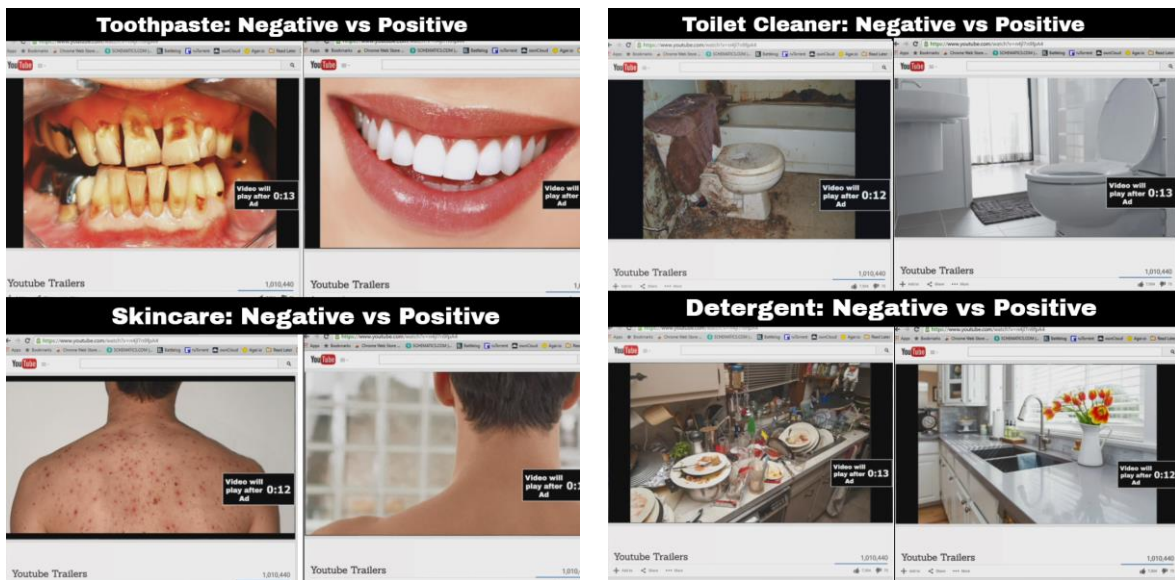
(Figure 4): Part 2 - Pre-roll Advertisements Emotional Framing

Part 3: The third part, with the remaining 10 seconds of the ad then consisted of standard advertisement foot-age for the product, with a similar ad composition and structure throughout all the ads in order to ensure the ads did not differ greatly from one another, which could perhaps have affected the results (see Figure 5). Throughout the three parts of the ad, a black-boxed countdown button with a working countdown of 15 seconds was inserted in the bottom-right area of the frame, as to mimic the aesthetics and positioning of 'skip' and 'countdown' buttons in use for pre-roll advertisements on video platforms such as YouTube.
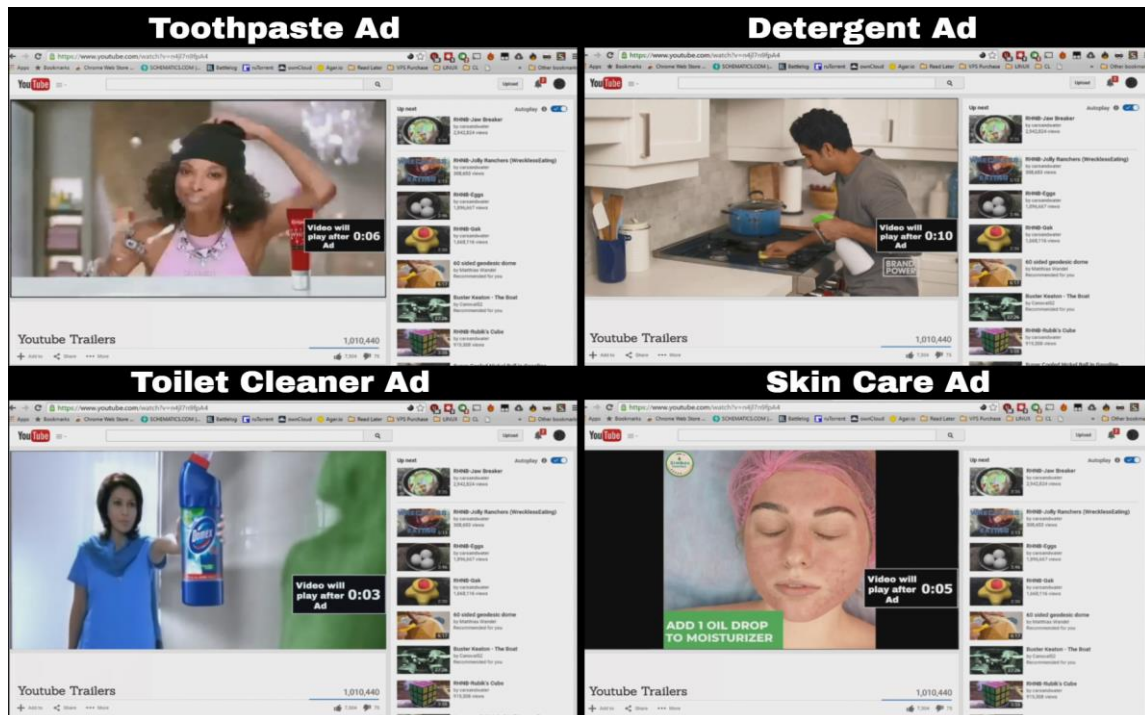
(Figure 5): Part 3 - Product Advertisement Footage

Accordingly, five different advertisements were designed. One additional advertisement was created as a control and was made up of only part 1 and part 3. The control ad was shown as the first stimulus to all participants, regardless of the group. Out of the four other advertisements, however, two different versions were created for each ad, where the first part and third part remained unchanged and consistent whilst the second part, that is, the emotional framing was manipulated. For a more comprehensive illustration of each individual advertisement component and their respective trailers see Appendix A.

The video stimuli consisting of the ad followed by the trailer were intermitted by text screens designed on the iMotions platform. The first screen viewed by the participants consisted of an introductory message about the study and was followed by a second screen where two questions were asked for the participants to respond using the mouse on a horizontal continuous scale bar ranging from '0' to '5>'. The questions were the following: *"How many times do you usually go to the cinema per month?"* and *"How many movies do you usually watch per week?"* (see Appendix B, 1 & 2) . The answers to these questions were not measured and served merely as an introduction in accordance with the priming of presenting the experiment as a study about movie trailers. At this point the control stimulus was initially shown and was followed by the four remaining video stimuli described above, which were displayed in a randomized order. After every video, a text screen was shown, with the three following questions: *"1 - How do you like this type of movies (genre) in general?"*, *"2 - How much did you like this trailer?",* and *"3 - How likely are you to recommend it to a friend?"* (See Appendix B, 3). The participants were asked to answer on a continuous scale bar, the scores of the bar were enumerated from 0 to 10, the answers ranged from lowest scores and liking (#0 - ''Not at all'') to the neutral opinion (#5 - ''Neither Nor'') and ending at the highest preference (#10 - "Very much/Very likely"). The results for the first two questions were collected and were analyzed to understand whether there would be a difference in the liking of the trailer depending on the positive or negative framing of the ad while adhering to the participant's opinions on the genre. To control for the individual differences in preference for different movie genres, we used the general liking of the genre as a benchmark and computed the difference between liking of the genre and liking of the trailer to be used as the variable of interest. The third question was employed as filler, and its answers were therefore not analyzed or of interest. The last screen that was shown to the participants was a text screen indicating that the experiment had ended and thanked them for their participation.

For a structured overview of the employed sequence consisting of all the text screens, the pre-roll advertisements, and trailers see figure 6 in the procedure section.

For the advertisements, only low-involvement and utilitarian products such as toothpaste, detergent, soap, and personal hygiene products were used as objects of the selected advertisements, as to avoid the subjectivity of generating a bias for participants. In general terms, involvement is defined as *"a person's perceived relevance of the object based on inherent needs, values, and interests"* (Zaichkowsky, 1985, p. 342). For high-involvement products, meaning products with a high perceived relevance, information processing is usually active and affects preference and purchase intention (Holmes & Crocker, 1987). On the other hand, the consequence of choosing low-involvement products are considered unimportant and individuals are usually passively exposed to information (ibid.). Furthermore, utilitarian products are defined as goods that are selected to perform a functional need, and these types of goods are consumed solely out of necessity and rarely elicit potent associations in consumers (Khan et al, 2004; Kempf, 1999). However, in contrast, hedonic goods are selected for personal desires and are capable of evoking strong emotional arousal although necessity may not be existent (ibid).

Therefore, for the purpose of this experiment, low-involvement and utilitarian products were selected, as to avoid an influential perceived relevance on the products themselves which could result in distortions in informational processing and how individuals actively pay attention to the advertisements due to personal subjectivity, causing a less-neutral advertising viewing behavior.

Moreover, the selected brands were fictitious and unknown to the participants. The reason for this choice is to mitigate the effect of brand familiarity. Brand familiarity is defined as "*the number of product-related experiences that have been accumulated by the consumer"* (Alba & Hutchinson, 1987, p.411). In every situation, consumers tend to prefer and familiarize with what they already know and therefore, are attracted to brands they already have knowledge of (Hill, 2011). This previous contact with the brand, in turn, affects and modifies the way individuals behave when confronted with the brand (Campbell & Keller, 2003). Accordingly, to avoid brand familiarity effects, unfamiliar brands and products have been used in the design of the video stimuli.

3.5.4 Procedure

Of the totaling eight advertisements with a framing, two experimental groups were divided, hence, four of these different ads were shown to each group, where two contained the positive and two contained the negative framing, with a non framed control ad being the first shown in both groups. If one group was shown one version of an ad, i.e. positive, the second group was shown the opposite version, i.e. negative. This was done for all four ads, ensuring that each participant was shown two positive and two negative variations of the ads. Each participant belonged to only one of the two groups and was exposed to only one of the unique versions of the experiment. The order of the stimuli, while keeping only the control stimulus in the same first position for all participants, was randomized using iMotions, as to avoid that the order and the position of the stimuli could result in a bias for participants and to ensure a higher level of validity of results (Gravetter & Forzano, 2018).

Participants were asked to proceed within the experiment by clicking the 'Next' button situated at the bottom-center of the screen. The steps where video content was shown were of fixed length and participants had no possibility of proceeding with the experiment without viewing the entire video stimuli as in correspondence with non-skippable pre-roll advertisements.

To summarize the whole research structure that was previously presented: The participants first viewed the introductory text screen, followed by a second text screen with control questions about movies. Then the participants were presented to the control ad and its trailer content, followed by the text screen shown after all videos asking about the viewed trailer. Followingly, the participants were presented to the four emotionally valenced advertisements, each containing their respective trailer and all followed by the text screen asking about the viewed trailer. Lastly, the end screen thanking the participants for their participation was shown. The entire structure and sequence of the study can be seen in Figure 6.
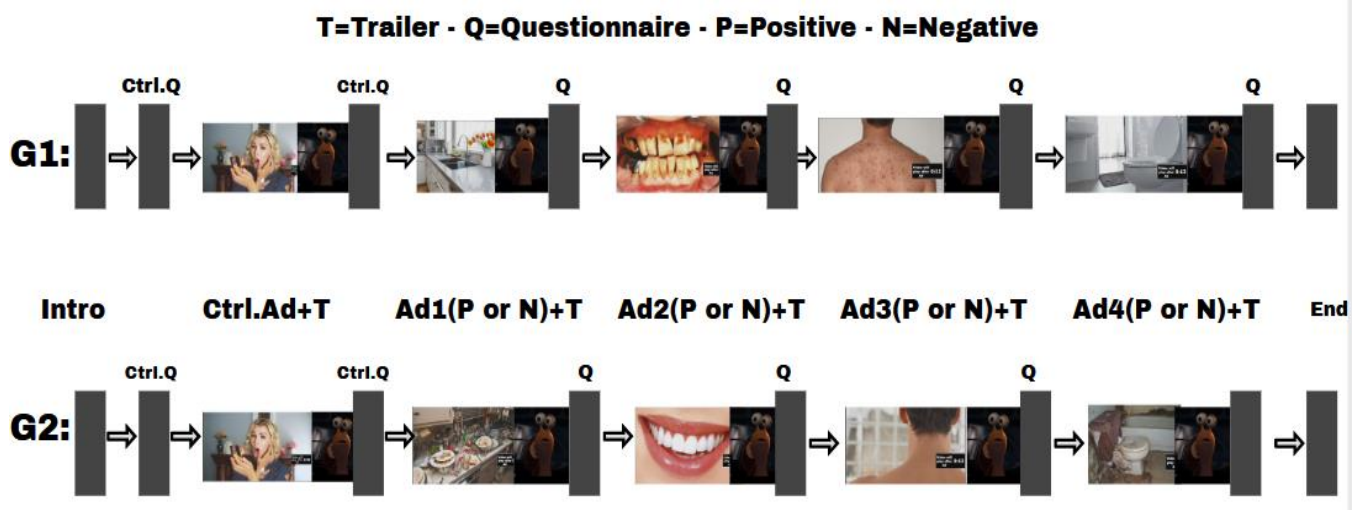
(Figure 6: Sequence and Structure of Research Experiment)

3.5.5 Areas of Interest (AOIs)

In order to guide the analysis, three Areas of Interest (AOIs) have been identified. The AOIs have been set according to the nature and structure of the stimuli and align with the different components of pre-roll advertisements and their natural environment, in this case, a reproduced YouTube page, outlined in the above-stated hypotheses. The AOIs were designed in iMotions and were used to analyze the eye-tracking data.

The first AOI included the video box on the left of the screen, where the pre-roll advertisement and subsequently the movie trailer was shown but excluded the black-boxed countdown button on the bottom right of the video box.

Naturally, the second AOI consisted in the countdown button, which presented a working countdown of 15 seconds and the text 'Video will play after Ad', as to mimic the buttons used on YouTube.

Finally, the third AOI encompassed the YouTube-like web page which surrounded the video box and included elements such as the video title, the correlated videos on the right side and the search box at the top. The three AOIs are shown in the image (figure 7) below:
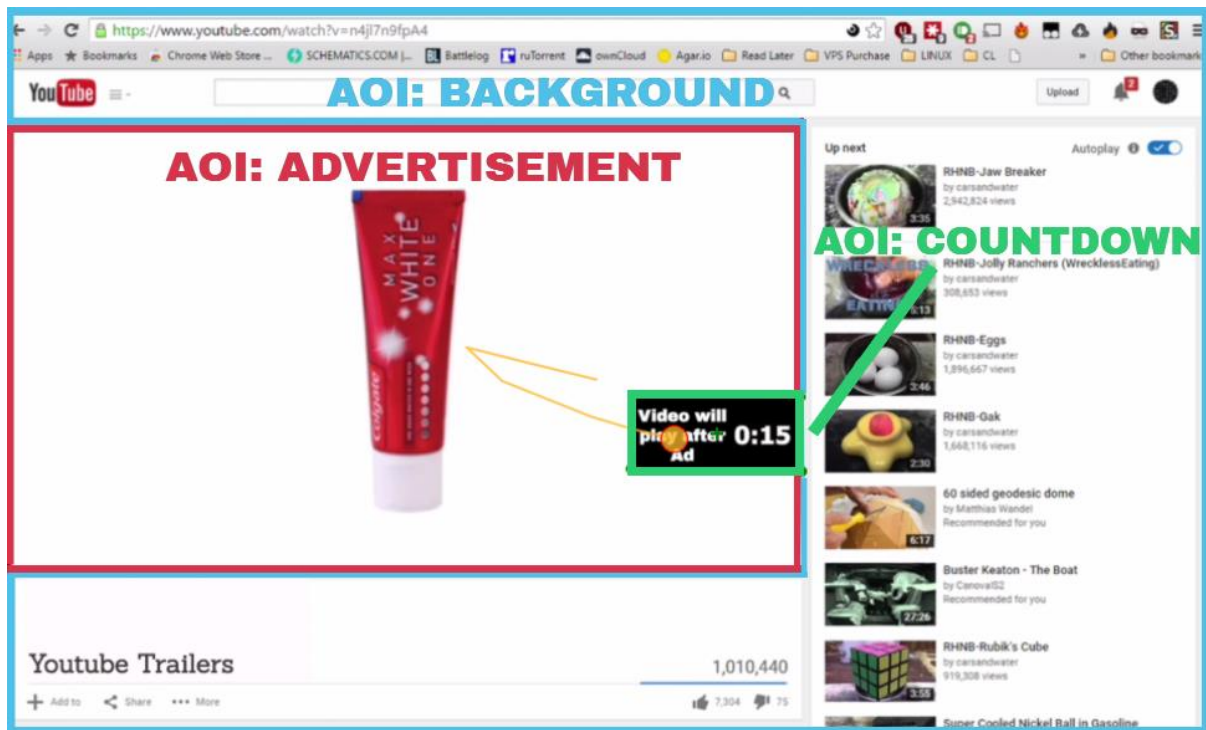
(Figure 7): The 3 examined AOIs

3.6 Reliability

Reliability refers to the extent to which the applied measurements ensure consistency throughout time and also the replicability of the experiment. Hence, if the experiment was to be repeated under the same circumstances or on repeated occasions, the research instrumentation, data collected, or analysis should provide the same results (Saunder, Lewis, and Thornhill, 2016; Zikmund and Griffin, 2019). The selected eye-tracking instrumentation has been employed to measure fixations on numerous occasions, demonstrating it to be a reliable tool, given that the external and internal research conditions remain constant. Furthermore, transparency is present in the employed approach to evaluate raw data, since the statistical analyses function within the same norm regardless of who conducts them. The research also employs a highly structured methodology to support replication and ensure reliability (ibid). Alterations in the collected data can, however, arise as there is a possibility for participant bias and participant error in this study and on repeated occasions (Saunders, Lewis, and

Thornhill, 2016). That is, participants could have a disposition or inclination towards a specific product resulting in variations of data due to personal and subjective preferences (Zikmund and Griffin, 2003). The authors have attempted to mitigate this reliability threat by selecting product categories of low subjective appeal and user involvement, although it is acknowledged that complete product objectivity may not have been achieved. Additionally, participant bias or participant error can also be present in relation to the emotional framing, since no two subjects are alike and their perception on the intensity of the negative and positive framings may differ (Saunders, Lewis, and Thornhill, 2016). For example, a dentist participant might not perceive the emotional negative framing of rotten teeth used in the toothpaste advertisement as negatively as a regular participant. Although the investigation of the emotional degree or intensity of the framing is out of scope for this study, a reliability concern might arise as the emotional intensity is not measured and, thus, reliability distortions may emerge if a correlation between the emotional intensity and attention spans exists (e.g., pre-roll framings perceived as highly negative increase ad attention). However, such a topic could be examined in further research.

3.7 Validity

Validity refers to the extent to which the research instrumentation and results accurately measure what they are intended to measure (Saunder, Lewis, and Thornhill, 2016). Validity is often divided into two distinct areas, namely, internal validity and external validity. Internal validity refers to the warranted inferences that can be drawn from the study (ibid). Experiments conducted in a laboratory setting greatly facilitate internal validity by minimizing the threats associated with the context in which the experiment occurs and by obtaining greater control over the experiment ambiance (ibid). However, in the interpretation of results in an eye-tracking study the validity of declaring that eye movement equal attention is at times not completely indisputable (Deubel and Schneider, 1996; Deubel, 2008). For instance, a saccade continuously foreshadows an alteration in attention, demonstrating that some eye movements and attention are extremely closely correlated (Deubel and Schneider, 1996). Nevertheless, Deubel (2008) illustrated that dissociations of attention and fixation of up to 250ms are capable of occurring as attention can shift prior to the end of a fixation. Although fixations and attention in some circumstances may not be perfectly connected, eye-tracking is perhaps one of the most valid instrumentations in the estimation of attention (ibid).

On the other hand, external validity indicates the experiment's capacity to generalize its results, that is, whether the findings are similarly applicable in other research settings (Saunder, Lewis, and Thornhill, 2016). The fact that external validity is more difficult to establish than internal validity, is in accordance with this study (ibid). This experiment includes a small segment of the population, excluding older age groups, participants outside of the student sphere, and other demographic categories. Therefore, it is not possible to generalize the findings to the entire population of pre-roll advertisement viewers. Moreover, the categorization and reactions towards emotional stimuli can be very different from one individual to another (Brosch, Pourtois, and Sander, 2010).

Consequently, with the inadequate systematic measurements of the emotional stimuli perception and given sample size, it is inappropriate to generalize the findings to the overall population.

3.8 Benefits and Drawbacks of Methodology

The approach that the authors selected to investigate further the phenomenon outlined in the research question was that of an eye-tracking experiment. In this section, some of the benefits but also the drawbacks of utilizing this approach will be presented.

A significant benefit of eye-tracking lies in the fact that the equipment is capable of gathering data about individuals' reactions and behavior without them interfering or being able to mask or alter the results. Traditional research methods, such as surveys, questionnaires or interviews, rely heavily on the openness and honesty of participants, therefore, taking some power and control away from the researchers and giving it to the participants (Genco et al., 2013). On the other hand, eye-tracking is able to capture even the smallest nuance and automatic bodily reaction in real-time and to eliminate the interference of words, which are no longer the means by which participants communicate with the researchers, thus giving power and control back to the researchers (ibid.).

However, a significant drawback of conducting an eye-tracking experiment consists in the quality of the data that the eye-tracking device renders. Multiple factors can affect the quality of data, such as the participants, the recording environment, the design of the study and the researcher (Holmqvist et al, 2011). Participants can compromise the quality of the data by, for example, not looking at the screen for the entire duration of the experiment, moving their head or changing position, or even not following the instructions given by the researcher. The environment, which can be a laboratory or a real-world setting, such as a store or a shop, also affects the quality of the data, in terms of the lighting conditions, the presence of distractions or noise, or even the accuracy in replicating the real-world situation in which participants would be presented with similar stimuli to the ones employed in the experiment. Moreover, the design of the experiment, in terms of the stimuli and the tasks participants must perform, can be substantial factors affecting the quality of the data.

For what concerns this study, the researchers have successfully managed to mitigate many of the factors that can diminish the quality of the data. For example, the in-lab environment was chosen as to eliminate distractions and it should be noted that the chosen environment is extremely similar to the usual conditions in which participants would have been exposed to pre-roll advertisements, that is on a computer screen and in a private environment. Moreover, the design of the stimuli was studied carefully and standardized, as to enable a single manipulation, i.e. the emotionally-valenced framing, while keeping the rest constant. Also, the task assigned to participants was straight-forward and duly explained, so as not to represent a confounding factor. However, it should be noted that there are some limitations to the quality of the data posed by the participants, which have been discussed in more detail in the limitations section.

4. RESULTS

To explore the data of 51 participants which were exposed to the 8 variations of advertisements containing the emotionally valenced framings, a repeated measures linear mixed effect model test was employed. Significance was accepted at the standard set alpha level of $< .05$. Data are expressed as mean $\pm$ standard deviation unless otherwise indicated. Moreover, for the statistical significance of the explored two-way interactions and simple simple main effects, a Bonferroni-adjusted alpha level was affirmed resulting in statistical significance being accepted at $p < .025$ level for the analyses of all the following hypotheses in the analysis section. For the complete regressions and the JMP computations see Appendix C.

4.1 Hypothesis 1

When investigating the total fixation duration (TFD) to the pre-roll advertisement, the data analysis revealed a significance in relation to the advertisement category, *category*: $F(3, 100.5) = 6.3938$, $p < .0005$. More relevantly to the hypothesis, the emotionally valenced framing also demonstrated a statistical significance, *valence*: $F(1, 47.26) = 6.8366$, $p = .0119$. However, no significance was present in the two-way interaction effect between the product category and the valence of the framing, *category*valence*: $F(3, 101.3) = 0,3679$, $p = .7763$. The squared correlation proved to be rather high, ($R^2 = 0,79542$) implying an explanation of nearly 80% data variance out of the 201 observations. The variables and their p-values are illustrated in (Table 1). Thus, these findings clearly demonstrate that not only the product category but also the emotionally valenced framing has a significant impact on how long consumers spend watching the pre-roll advertisement.

Source	LogWorth		PValue
Category	3,283		0,00052
Valence	1,923		0,01195
Category*Valence	0,110		0,77631

(Table 1): H1 Variables & P-values

4.1.2 Category

The category results had more relevant significance in comparison to the emotional valence in affecting participant attention and total fixation duration. The advertisement category of toilet cleaner showcased the largest mean of 10446.6 in TFD measured in milliseconds out of the total duration of 15000ms in the pre-roll advertisements. The secondary and third category in terms of total fixation duration was the toothpaste and detergent, moreover, their means remained closely at 9084.7 and 8852.6, respectively. The category that received the lowest means of 8385.3 in TFD was skincare (see Figure 8). These observations demonstrate a greater attentional direction towards the toilet cleaner and toothpaste advertisement categories, whilst the detergent is

closely accompanying toothpaste and the skincare category has the most deficient performance in relation to overall TFD.
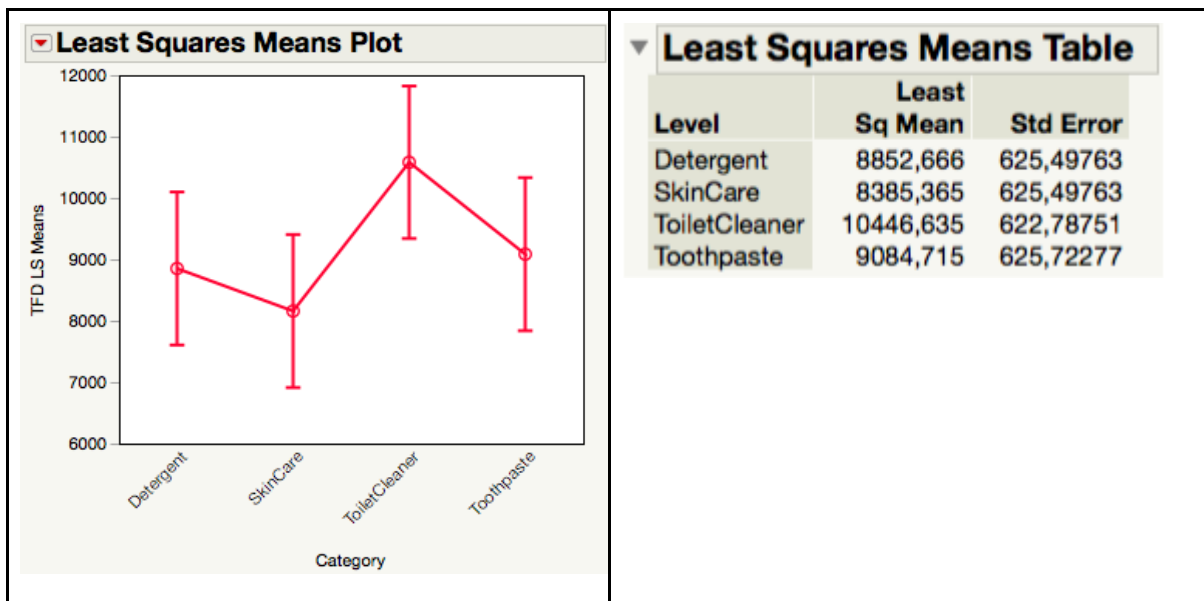
(Figure 8): H1 Category - TFD LS Means

4.1.3 Valence

As was seen in (Table 1), a connotation is present at a significant level in respect to all the pre-roll advertisements consisting the negatively valenced stimuli achieved a greater TFD in comparison to their positively valenced counterparts.

It can be noted that the sum of positively framed pre-roll advertisements had a TFD mean of 8649.9ms while the negatively framed stimuli attained a higher TFD mean of 9734.8ms. The difference on average equals 1084,9ms of TFD being in favor of the negatively valenced stimuli across all pre-roll advertisements (see Figure 9). Such increase of the mean in TFD for the negatively framed stimuli is 12.54% higher than the means of positive stimuli employed in the study, indicating that participants on average fixated longer at the pre-roll advertisement when the framing was negative. Moreover, the aforementioned $p = .0119$ further establishes the significance between the applied pre-roll advertisement valencies and the generated visual attention. Simply put, the pre-roll advertisements that contained a positively valenced framing had lower total fixation durations. Consequently, an indication appears to exist in the context of pre-roll advertisements that negatively valenced framings on average demonstrate a better capability to maintain larger total fixation durations. As the overall valence results achieved statistical significance, the results do coincide with the reviewed literature implying the importance of emotional stimuli for advertisements, as this variable is capable of generating specific outcomes that are of utmost relevance to advertisers (Percy & Rossiter, 2016; Cecil, 2013; World Advertising Research Center A, 2019).
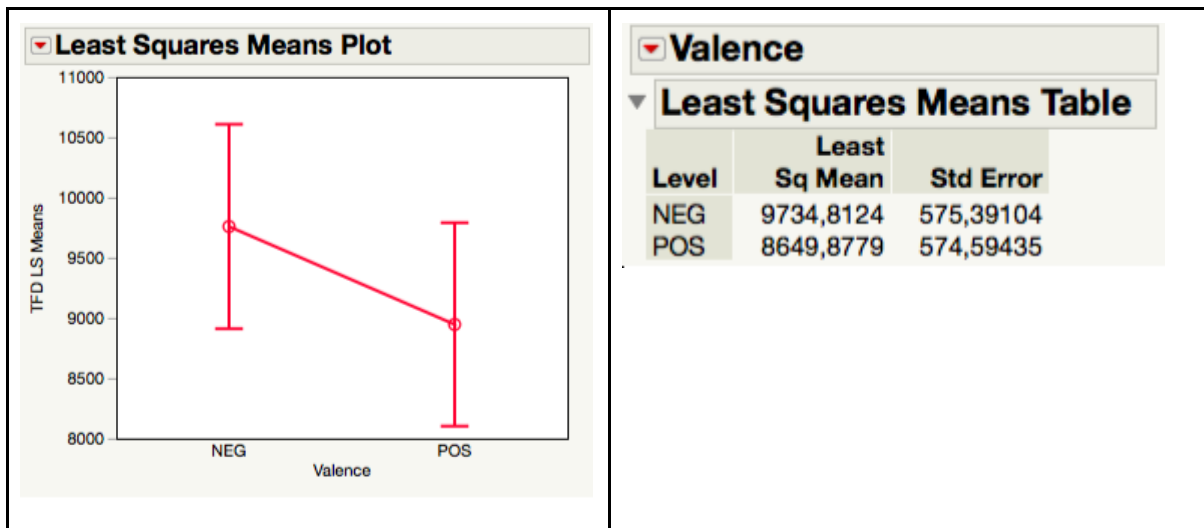
(Figure 9): H1 Valence - TFD LS Means

4.1.4 Category and Valence

Nevertheless, although the significance in TFD was clearly present for the categories and valencies separately, as previously shown by the p = .7763, no overall significant distinction in TFD was demonstrated by the conjunction between the categories and in respect to the particular emotionally valenced stimuli. The only significant difference was at the individual level and mainly for the framing in the negative toilet cleaner advertisement in regards to other ad categories and valencies. Hence, to investigate whether there were any significant differences within the same category (while comparing different valences), we ran a Tukey HSD test for pairwise comparisons (Appendix C). The data only revealed a significant difference for toilet cleaner advertisements, p =.0094. For all other categories, the pairwise comparisons were not significant. For instance, as previously mentioned, the toilet cleaner category had the highest mean in overall duration as compared to the other advertisement categories. Captivatingly, as displayed in (Table 2), the toilet cleaner category, in addition, showcased the largest segregation between its positively and negatively valenced framing, that is, the TFD means of toilet cleaner negative was 11332,2ms whereas the LSM of toilet cleaner positive was 9561ms, resulting in a difference of %18.5 and with p=.0094 being the only statistically significant combination within the same category. The percentage differences of all pairwise comparisons can also be seen in Table 2. Such increases of percentage differences are displayed all across the four advertisement categories, however, the toilet cleaner negative framing had largest percentage difference and in addition to having a significant p-value to its own counterpart. The second advertisement to achieve a notable percentage difference was the toothpaste ad, which exhibited means in TFD of 9615,3ms negative valenced version comparison to the positives 8553,5ms. Resulting in an increase of %12.41 in TFD from positive to negative. Additionally, the negative valenced stimuli of the detergent and skincare advertisement also had slightly lower increases of TFD compared to the positive framing. Nevertheless, no p-value significance is present the comparison of negative to positive valence in the same advertisement category apart from the toilet cleaner ads.

Category	TFD(ms) POS Valence	TFD(ms) NEG Valence	Diff(%)
Toilet Cleaner	9561	11332.2	18.5
Toothpaste	8553.3	9615.3	12.41
Detergent	8522.8	9182.5	7.74
Skin Care	7962.2	8808.5	10.62
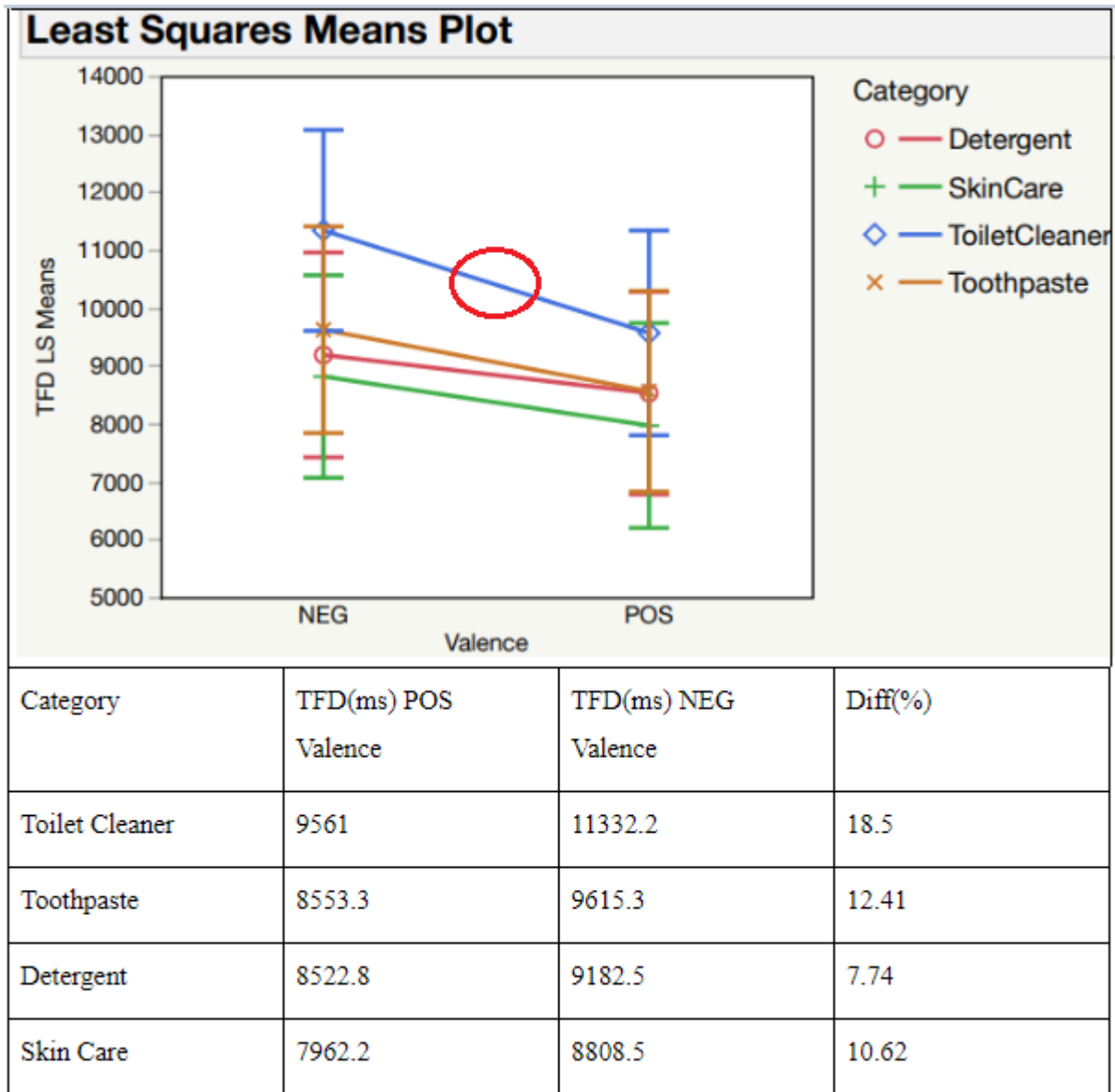
(Table 2): H1 Category*Valence - Plot Segregations & TFD Percentage

4.2 Hypothesis 2

To facilitate the analysis and legitimize the effects of the data, the questionnaire asking for the liking of the trailer was coupled with the participant's likeability of the certain trailer genre as to nullify scores deviating based on genre preferences. This remark was included in the data as mentioned in the research structure section. The difference was calculated with respect to the liking of the content. In other words, to compute the self-reported liking of the trailer while also accounting for the liking of the genre, we subtracted the latter response from the former, i.e., liking(response) = liking(trailer) - liking(genre). Thus, individuals that scored the genre as higher in likeability and the trailer as lower would receive a negative number in difference (i.e., trailer

score:4 - genre score:6 = difference -2) and vice versa, meaning that positive difference scores meant that participants liked the trailer more than the genre, the neutral score is accordingly 0.

No significance was demonstrated from the analysis in influencing the participants' opinion of the content subsequent to the pre-roll advertisement through the advertisement *category*: $F(3, 103.1) = 3.1643$, $p = .21027$. Moreover, no statistical significance was present from the two-way interaction combining the advertisement category and the valence of the framing, *category*valence*: $F(3,102) = 2,3291$, $p = .73849$. More importantly to the hypothesis, the results of how the emotional valence affected the liking of the content also showed no significance, *valence:* $F(1, 55,05) = 5.5826$, $p = 0.90906$, variables and their p-values are illustrated in (Table 3). The results do not showcase any statistical significance in the aforementioned variables ability to impact the participant's opinion on the trailer content presented after the pre-roll advertisement. The category to receive the lowest trailer liking scores is the toothpaste advertisement, although insignificant, its negatively valenced version had the lowest all around trailer score. The emotionally valenced framings had no large differentiation in scores amongst each other with insignificant mean disparities.

Source	LogWorth		PValue
Category	0,677		0,21027
Valence*Category	0,132		0,73849
Valence	0,041		0,90906

(Table 3): H2 Variables & P-values

4.3 Hypothesis 3

In the examination of the total fixation duration given to the background elements, there was a statistically significant interaction as the emotional valence proved to be the most important factor in this regard, *valence*: $F(1, 103.1) = 5.5826$, $p = .02170$. The advertisement category also demonstrated a significance in affecting the TFD to components outside of the pre-roll advertisement, *category*: $F(3, 103.1) = 3.1654$, $p = .02764$. The data analysis revealed no significant two-way interaction between the advertisement category and the valence in regards to the background TFD, *category*valence* $F(3, 102) = 2,3291$, $p = .07886$, but perhaps only at a trend level. Out of the 303 observations, the variables and their p-values are illustrated in (Table 4). Accordingly, the findings demonstrate that not only the framings emotional valence but also the advertisement category has a statistically significant impact on the duration given to the background components of the screen.

Source	LogWorth		PValue
Valence	1,664		0,02170
Category	1,558		0,02764
Category*Valence	1,103		0,07886

(Table 4): H3 Variables & P-values

4.3.1 Valence

As a matter of fact, the emotional valence of the pre-roll advertisement did sway the visual attention to the background as anticipated by the hypothesis $p = .02170$, however, to the contrary of the literature, it was not negatively valenced framings that resulted in the participants fixating away from the pre-roll advertisement. On the other hand, it was the advertisements containing a positively valenced stimulus that had the highest total fixation duration to features outside of the video advertisement. As illustrated in the curve of figure 10, the means of background total fixation duration of the emotionally positive framing accounts for 1908,5ms compared to negative framings only reaching 1556ms. In general that difference accounts for an increase of 22.6 percent on background fixation when a positively valenced framing is employed in comparison to a negatively valenced framing.

Least Squares Means Plot

Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG	1557,0208	171,72456
POS	1908,5291	161,33374
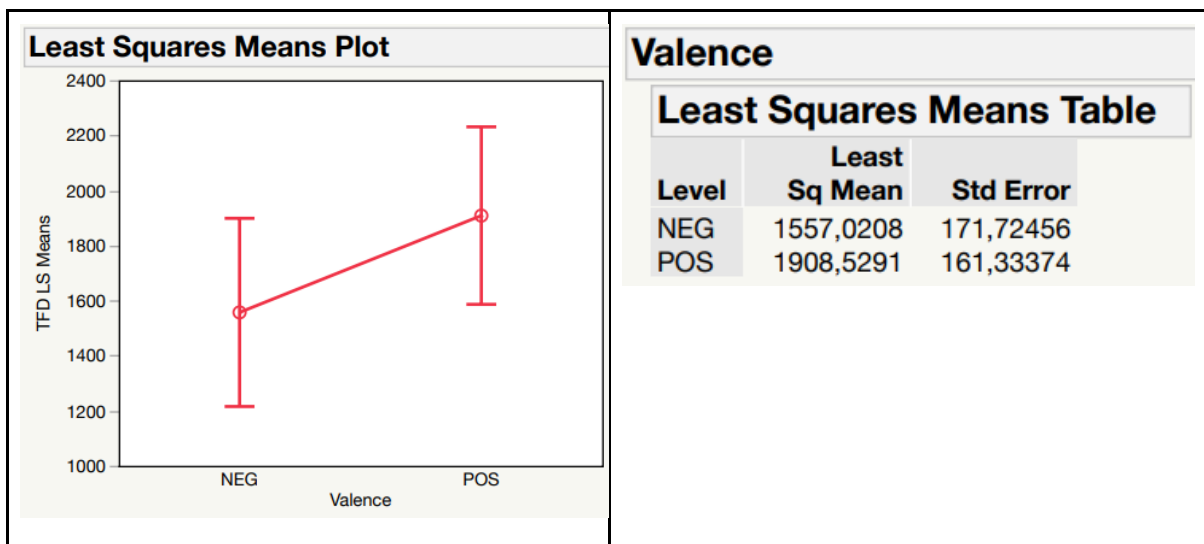
(Figure 10): H3 Valence - TFD LS Means

4.3.2 Category

The advertisement category did demonstrate a significance in affecting the participant's fixation to elements in the background, $p = .02764$. The findings indicate that once again the category to achieve the highest mean in TFD is the toilet cleaner category, reaching 2131.2ms being directed to the outside elements. Furthermore, the remaining categories also follow a similar tendency to H1, in which toothpaste is the second category in means at 1705ms being closely accompanied by the detergent category at 1652,7ms. In this analysis, the skincare

category is still slightly behind the other categories in TFD, simply reaching 1442ms. Such observations show-case a tendency for the pre-roll advertisement of toilet cleaner to better deviate the participant's attention to the background features of the screen. The toothpaste and detergent categories portray similar results to one another in reorienting the participants. However, contrary to the indications in the findings of hypothesis 1, wherein the skincare category had the lowest TFD to the pre-roll advertisement, in turn one could expect a higher TFD being directed to outside elements. Nevertheless, repeatedly this category also shows the lowest TFD to elements outside of the advertisement. These discrepancies can be viewed in the plot of (Figure 11) and their similarities to (Figure 8) are well evident.

Least Squares Means Plot

Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent	1652,7654	239,78844
SkinCare	1442,0480	196,93113
ToiletCleaner	2131,2341	195,48604
Toothpaste	1705,0522	193,92254
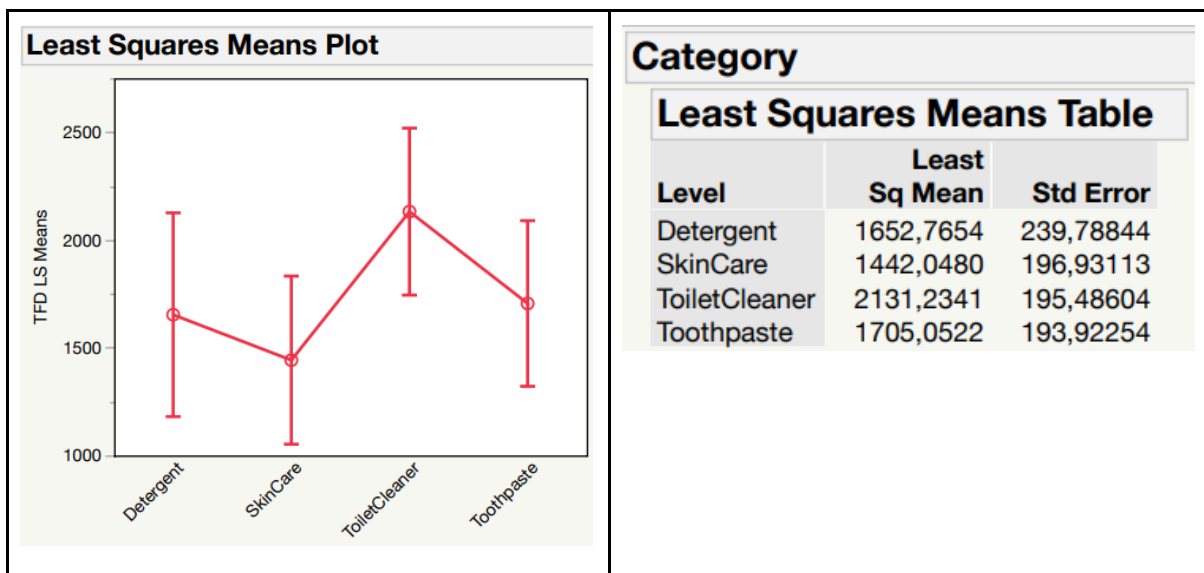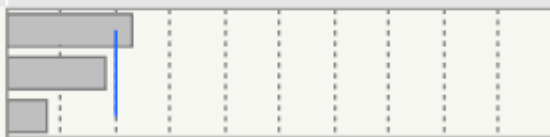
(Figure 11): H3 Category - TFD LS Means

4.3.3 Category and Valence

As previously mentioned, in the overall data no significance was present in the interaction of category and valence in affecting participants TFD to the background elements, p = .07763. The value could indicate an interaction solely at the trend level, moreover, although the overall sample did not show any significance, at the individual level a few ineffectual significances occurred. Nevertheless, opposite to the findings of *category*valence* in the first hypothesis, no significance was observed in the means of TFD in Tukey pairwise comparisons and only a few were present in-between categories.   Although no significance was present, the only eye-catching observations from this analysis are that the positive toilet cleaner advertisement attained the longest TFD being directed to the background of 2565.7ms, followed by second combination in TFD the positive toothpaste framing at 2073.3ms.

4.4 Hypothesis 4

While investigating the total fixation duration given to the pre-roll advertisements countdown button, the variable that achieved the most substantial significance in the TFD was the *valence*: $F(1, 44.85) = 8.8366$, p = .00474. The variable that demonstrated the second best significance in affecting the TFD given to the countdown button was the category $F(3, 90.15) = 3.6888$, p = .01479. The two-way interaction of the TFD in terms of advertisement category and the valence of the framing showcased no significance in the TFD duration given to the countdown, *category*valence* $F(3, 93.13) = 1.6748$, p = .01178. The squared correlation of ($R^2 = 0.45657$) implies an explanation of 45% of data variance out of the 171 observations, the sources and their p-values are illustrated in (Table 5). These results clearly demonstrate the ability of the emotional valence to influence the duration participants devote to the countdown button. Furthermore, the product category also has a significant impact on how long participants fixate on the button.

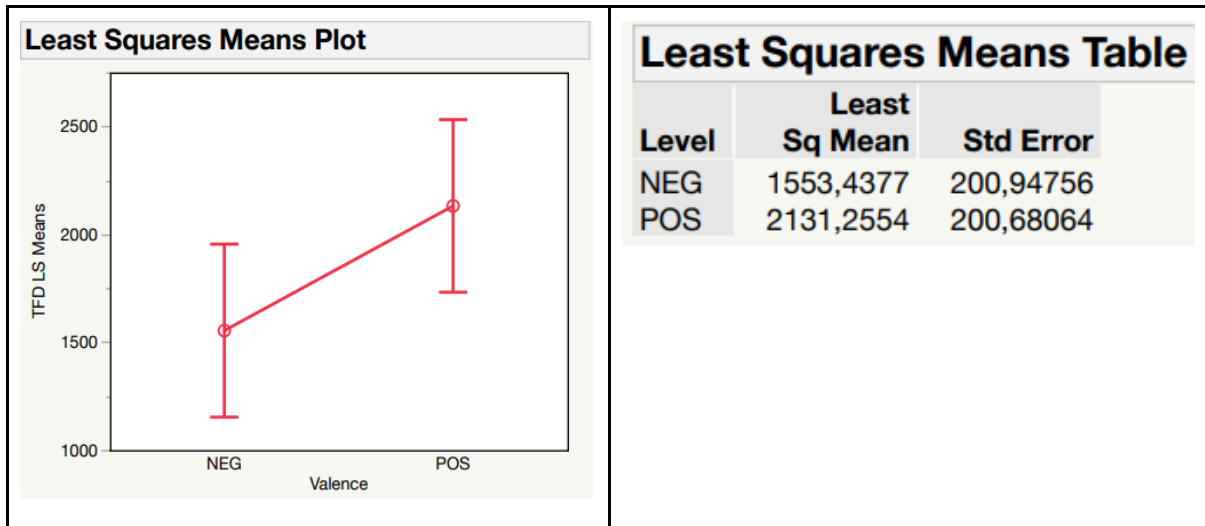| Source	LogWorth		PValue
Valence	2,325		0,00474
Category	1,830		0,01479
Category*Valence	0,750		0,17779

(Table 5): H4 Variables & P-values

4.4.1 Valence

Once more, the results suggest the emotional valences ability to reorient the participant's visual attention to distinct screen features, on this occasion the redirection is prescribed to the countdown button as expressed by the most influential p-value obtained in the study in relation to the valence, p = .00474. Nonetheless, similarly to H3, the opposite of the anticipated hypothesis and reviewed literature appears to be the case here as well, that is, in general the pre-roll advertisements that employed a positively valenced framing had the highest total fixation duration given to the countdown button. Accordingly, contrary to the expectations negatively valenced framings had a lower TFD to the countdown button. In particular, the means in TFD of the negatively valenced framing reached an estimate of 1553.4ms in comparison to the positively valenced stimuli obtaining 2131.2ms, as further illustrated by figure 12, the disparities in fixation, as a result, the valence can easily be witnessed in the plot. The difference in percentage in terms of the countdown fixation accounts for a 37% increase when the utilizing framing is of positive valence in comparison to a negatively valenced framing.

Least Squares Means Plot

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG	1553,4377	200,94756
POS	2131,2554	200,68064

(Figure 12): H4 Valence - TFD LS Means

4.4.2 Category

As previously mentioned, the second most relevant variable in affecting the participant's fixation given to the countdown button was the advertisement category, $p = .01479$. The results coincide with the other hypotheses, as once more the category to obtain the largest fixation duration is the toilet cleaner category with its 2436ms being directed to the pre-roll advertisement's countdown button.

Notwithstanding with the previous findings the second category in terms of TFD is the detergent category with its 1684.3ms, however, it is being closely accompanied by toothpaste category at 1680.5ms. Generally, the category to achieve the least TFD is the skincare category and the findings are also equivalent in this hypothesis, with its TFD reaching 1568,23ms (figure 13). These results illustrate the capabilities of the toilet cleaner advertisement category to direct the subject's visual attention to the countdown button. The remaining three categories all have similar total fixation results with the skincare category being slightly behind the other two, although not by any significant amount. Additionally, the findings throughout all the hypotheses demonstrate that the categories that obtained a high TFD to the pre-roll advertisements also emerge as the categories that receive the most fixation to the background features and the countdown button, with toilet cleaner being the truly prominent category in this regard, whereas the other categories closely follow one another with the skincare ad being slightly behind the other two. In the discussion section the authors will attempt to explain and go more in-depth behind the reasoning of the fixation discrepancies and correlations present in the categories.

Least Squares Means Plot

Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent	1684,3946	254,99541
SkinCare	1568,2414	247,87801
ToiletCleaner	2436,2230	247,48260
Toothpaste	1680,5273	252,28150
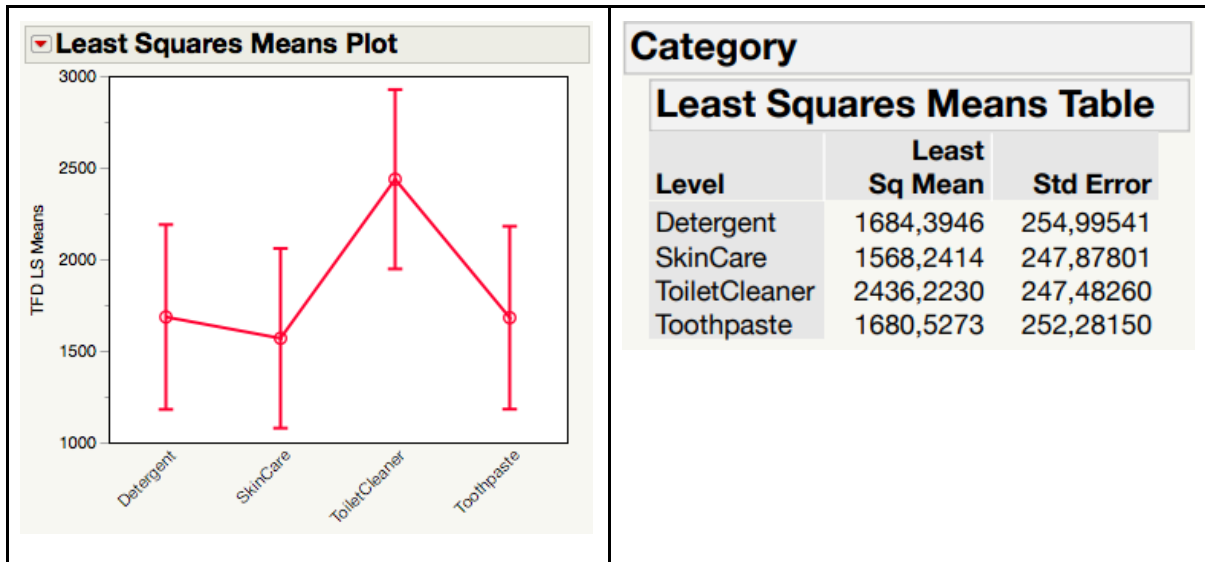
(Figure 13): H4 Category - TFD LS Means

4.4.3 Category and Valence

No significance was observed in the two-way interaction of category and valence in influencing participants fixation duration to the countdown button, p = .17779. As can be seen in table 6, at the individual level some significances did occur, but the vast majority of the p-value significance involved the toilet cleaner category of positive valency in comparison to other categories, additionally, this combination unquestionably demonstrates the highest TFD to the countdown button of 3129ms. Albeit no findings demonstrated any significance of *category*valence* in the pairwise advertisement category, the difference in TFD of the negative toilet cleaner and the positive toilet cleaner advertisements amounted for 1130.4ms, the largest within the same category. The positive toothpaste and the positive skincare advertisement also reached numerable lengths of TFD, albeit not nearly at the same degree of magnitude as the positive toilet cleaner ad and thus not achieving any significance. These observations demonstrate an interesting deviation in terms of the total fixation duration generated to the countdown button by the combination of a positive valency and toilet cleaner category being much larger than the other variations.

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value
ToiletCleaner,POS	Toothpaste,NEG	1767,086	411,4046	491,34	3042,830	0,0011*
ToiletCleaner,POS	SkinCare,NEG	1716,017	504,9424	150,22	3281,817	0,0215*
ToiletCleaner,POS	Detergent,POS	1455,618	509,9029	-125,56	3036,800	0,0942
ToiletCleaner,POS	Detergent,NEG	1434,133	411,4046	158,39	2709,878	0,0165*
ToiletCleaner,POS	SkinCare,POS	1406,041	422,3015	96,51	2715,576	0,0263*

Least Squares Means Plot

Category*Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent,NEG	1695,1369	356,79735
Detergent,POS	1673,6523	364,39853
SkinCare,NEG	1413,2535	357,42434
SkinCare,POS	1723,2293	343,54311
ToiletCleaner,NEG	1743,1759	343,18494
ToiletCleaner,POS	3129,2701	356,67161
Toothpaste,NEG	1362,1846	356,79735
Toothpaste,POS	1998,8701	356,76249

(Table 6): H4 Category*Valence & Significant P-values

5. DISCUSSION

In the previous section, the analysis and presentation of data have been reported. This chapter initially consists of a short summary of the study, followed by an elaborate discussion of the findings, and its academic and managerial implications. The purpose is to expand on the concepts that were examined in the study in an effort to further understand their possible impact on pre-roll advertisements and visual attention. Lastly, a consolidated evaluation is made on the significance of the outcomes of the study both at a practical and theoretical level.

5.1 Summary of the study

The objective of this study was to investigate the effects of emotionally valenced stimuli on pre-roll advertisements. More specifically, how positively and negatively valenced stimuli are capable of influencing the visual attention directed to pre-roll advertisements and other in-screen features. Four different ad product categories were employed each containing a negative or positive version, whilst adhering to an equal product-orientation amongst the categories (low-involvement and utilitarian). Moreover, the effect of the emotionally valenced stimuli on consumers opinions of the content exhibited after the pre-roll advertisements were also investigated. The participants' visual attention to the different elements of interest was captured and examined through the employment of the eye-tracking procedure. Particularly, the total fixation duration (TFD) given to the pre-roll advertisements, TFD on the background features, and the TFD on the countdown button, whilst utilizing a framing of either positive or negative valence in the advertisements, was measured. The AOIs associated with these three areas were measured and assessed. Additionally, to estimate the participant's opinion of the trailer content, scales were conducted following the content asking participants to score their likability of the movie genre and the trailer. After examining all of the aforementioned aspects, the researchers obtained a couple of eye-opening results and in the upcoming section a discussion of the findings will be introduced.

5.2 Discussion of Findings

5.2.1 Discussion of H1 (Rejected)

The data analysis revealed that the emotional valence of the framing had a significant impact on how long participants gazed at the pre-roll advertisement. Furthermore, contrary to what was assumed in H1, the viewing time on the advertisement was longer when the framing was negative, hence, this hypothesis was rejected. This is surprising, as, to the authors' knowledge, previous research has not investigated this correlation in the context of pre-roll advertisements. The importance of utilizing emotional stimuli or emotional context to enhance advertisement effectiveness have been previously discussed (Percy & Rossiter, 2016; Cecil, 2013;World Advertising Research Center A, 2019), albeit specifications of how to apply these emotional components and in which manner they have the ability to influence advertisements is not very well established. In this particular

scenario, where visual attention is examined, the findings are not coherent with the advertising literature indicating that positive emotions have the ability to evoke high levels of attention in advertisements in contrast to negative emotions evoking low levels of attention (Hill, 2011, p. 84). According to Hill (2011) emotions such as happiness or surprise, are effective in ensuring a high level of attention, while negative emotions, such as anger or disgust, will cause people to lose interest and render a low attention level (ibid). Positive emotions, such as joy and surprise, have also been shown to be effective in manifesting attention and captivating viewers in the video advertisement format (Teixeira, Wedel and Pieters, 2012). The presumed attractiveness that can be created through the employment of a positive visual observation did not display any enhancement in visual attention in the circumstances of this study (Paradiso et al, 1999, p. 1618). Additionally, the approach motivation which can be derived from utilizing a positively valenced emotional response did not alter the fixation duration in favor of the positive stimuli (Elliot and Convington, 2001; Elliot et al, 2013).

However, the findings are coherent with the literature in psychology and neuroscience indicating that negative stimuli have the ability to evoke more attention duration in comparison to either neutral or positive stimuli (Vuilleumier and Schwartz, 2001; Carrietè et al. 2004; Cacioppo & Gardner, 1999). Additionally, they are also coherent with the given description that human beings give more attention to negative situations since through evolutionary and biological occurrences, heightened alertness is awarded to negative events as they hold substantially more impact or danger as opposed to neutral or positive events (ibid.). The findings in this study are consistent with the presented literature in neuroscience and psychology implicating that emotionally negative stimuli indeed has the superior edge in generating visual attention. However, more alluringly and further supplementing the literature, it occurs that the aforementioned circumstances also seem to be present in the context of pre-roll advertisement format. Despite the fact that a neutral stimulus was not employed, a significant difference is present in attention when the only variable altered in the pre-roll advertisement is the positive and negative emotional framing.

The analysis illustrated a significant difference in the fixation duration generated by the different advertisement categories in regards to the pre-roll advertisement, with the toilet cleaner ad category greatly exceeding the other categories in relation to TFD, whilst the skincare category was slightly behind. The differentiation of TFD in the categories could be the result of subjectivity towards the advertised product or the perceived interest in the advertisement themselves. The employed advertisement footage of the product was of similar composition, structure, and scenes throughout the video to minimize the impact of confounding factors. Nevertheless, it may be possible that some unidentified factors in the advertisements are responsible for the present alterations in the participant's visual attention, thus, the design of the toilet cleaner advertisement could potentially have some unknown elements capable of incentivizing visual attention. The skincare category could, in turn, have a design that is less captivating in respect to visual attention. Although the product classification (i.e.,

low involvement and utilitarian) was carefully selected to not provoke inclinations and predispositions towards the advertisements, preeminent subjectivity is difficult to accomplish. Thus, it may also be conceivable that the product category of toilet cleaner elicited a stronger disposition in the selected participant's attention in contrast to the skincare category.

The analysis did not demonstrate much significance in the combination of the advertisement category and the valence of the framing, except for one category, in particular, that is, the toilet cleaner category. In terms of the negative toilet cleaner framing achieving the greatest significance amongst the remaining categories and in its pairwise valence comparison, Genco et al (2013) presents an interesting pronouncement possibly relevant to this case, that is, as the level of emotional valence or arousal in a stimuli is increased, individuals attention spans are more concentrated whilst ongoing noise is forcefully filtered out (Genco et al, 2013, p. 99). Perhaps a difference is present in the degree of emotional valence or arousal evoked by the various advertisement framings and more specifically the possibility of the negative toilet cleaner framing (dirty toilet) manifesting higher levels of emotional valence or arousal levels than the other framings, thus, resulting in the heightened attention directed to that specific category framing. Contrastingly, the negative skincare stimuli (bad skin condition) had the lowest total fixation duration of all the negatively framed stimuli, hence, it may be that this stimulus had a lower arousal level compared to the other negative framings resulting in lower amounts of visual attention being generated. However, it is unknown if it is the negative toilet cleaner framing, the potential unidentified factors within the toilet cleaner advertisement, or a combination of both that resulted in the increase of fixation duration. Such speculations can be solved in further research by ensuring that the emotional arousal and valence is measured for each stimulus in order to illuminate potential corrections of the aforementioned variables to the visual attention.

5.2.2 Discussion of H2 (Rejected)

No correlation was present in the advertisement categories or the emotionally valenced framings' ability to influence the participants' opinion of the trailer content showed after the pre-roll advertisement. Although it has been observed that advertisements that are perceived as intrusive can threaten the brand or web page by creating a negative spillover (Goodrich et al, 2015), no significant negative or positive spillover happened to the content. Pre-roll advertisements are commonly acknowledged as highly intrusive (Dorai-Raj et al, 2012; Campbell et al, 2017), however, the perceived intrusiveness of the applied advertisements and experiment is debatable and not controlled for in any way. On another note, it is entirely unknown if any of the two emotional valences have an impact on intrusiveness or are perceived as intrusive by the participants and hence opening the possibility for a spillover. Notwithstanding, this hypothesis did not seek to examine the spillover based on intrusiveness, but was based on the unpleasantness and pleasantness along with the myriad of other effectuations associated with perceiving emotionally negative and positive stimuli (Paradiso et al, 1999; Elliot and

Convington, 2001). Therefore, not only the potential for a negative spillover was examined but also for a positive spillover as participants had the option to score if they liked the trailer content. Ultimately, the effectuations produced by the selected emotional framing did not appear to impact the viewers' attitude towards the content presented after the pre-roll advertisements.

5.2.3 Discussion of H3 (Rejected)

Not only did the data analysis reveal that the emotionally valenced framing had a considerable influence on the participant's fixation to the background components, it also proved to be the most influential factor in this regard. Nevertheless, opposite to what was anticipated in H3 it was not the negative framing that the highest impact on the TFD directed to the background, but it was actually the positive framing that emerged superior in this context, rejecting the hypothesis.

Such findings also came as a surprise since the reviewed literature suggested that negatively valenced stimuli and visual observations are capable of disengaging individuals through various means, such as the creation of avoidance motivation and the enablement of brain areas connected to the danger recognition system (Paradiso et al, 1999; Elliot and Convington, 2001; Elliot et al, 2013). Additionally, this phenomenon has also been observed in the context of advertisements, whereas emotional responses that are perceived as negative would manifest aversiveness of attention towards the advertisement whilst positive responses have been linked to captivate the spectator (Hill, 2011). Vuilleumier (2005) examined a similar interplay to the one conducted in this study, the interaction between high noise environments where consumers were exposed to a large number of visual cues and how emotional stimuli could affect attention in this context. The conclusions were that emotional stimuli affected consumers attention by being attended to quicker than neutral stimuli (Vuilleumier, 2005). This study does have some relevance to our research as the utilized browser screen for the pre-roll advertisement is filled with a multitude of visual cues simulating the high noise environment proposed by Vuilleumier. However, a distinct difference is present, as their study involved around how attention is directed to emotional stimuli in such noisy environments, whereas H3 seeks to understand how emotionally valenced stimuli in pre-roll advertisements can affect the visual attention directed to background components.

Although no direct literature was found on the subject, to the authors' knowledge, the findings in the context of pre-roll advertisements to some extent contradict the implemented literature indicating that in particular, a positive emotional stimulus would attract and retain attention to the advertisement while a negative emotional stimulus would stimulate aversiveness towards the ad (Hill, 2011). At the same time, to some degree the findings do coincide with the findings of H1, that is, not only did the negatively framed stimuli evoke more attention towards the pre-roll advertisements, in addition, perchance less total fixation to the irrelevant elements of the screen (i.e., background) can be obtained by utilizing a negative framing in comparison to a positive one.

The anticipation according to the literature was that the approach tendencies and attractiveness elicited from the positive stimuli would result in less attention being redirected to the background (Paradiso et al, 1999; Eliot et al, 2013), however, contradictory to the established hypothesis, pre-roll advertisements that utilized a positive framing resulted in more total fixation duration being directed to background features. Potentially, the positive framings were less successful in captivating the participants to concentrate on the pre-roll advertisements in comparison to the highly prioritized attentional behaviors that have been associated with negative stimuli and further demonstrated in the context of this study through H1 (Vuilleumier and Schwartz, 2001; Cacioppo & Gardner, 1999).

5.2.4 Discussion of H4 (Rejected)

The results clearly demonstrated the ability of the framings emotional valence to influence the duration in which participants fixated at the countdown button. Moreover, it was not only the most significant variable in this regard, but its p-value also emerged as the most significant amongst all the hypotheses p-values regarding the valence. In the opposite of what was proposed by H4, it was not the negative framing that had the highest fixation duration to the countdown, but it was instead the positive framing emerged to be superior in this context. Although to the authors' knowledge, the literature has not been established in the context of pre-roll advertisements nor the countdown button, hence, limitations were present in examining how distinct variables can affect the attention given to such countdown features. Nevertheless, the implemented literature suggested that positive and pleasant visual stimuli are capable of attracting and captivating the observer by engaging cerebral areas associated with attractiveness (Paradiso et al, 1999, p. 1618). Furthermore, stimuli of positive valence have displayed the ability to elicit approach emotional motivation in consumers (Elliot and Convington, 2001; Elliot et al, 2013). Such observations have further been illustrated in the context of advertisements, whereas positive emotional responses captivate visual attention whilst negative result in aversion (Hill, 2011). Analogously, to H3, to some degree the findings are not in coherency with the limited applied literature in this present context, the expectation was that the aforementioned attractive tendencies of the positive framing would result in reduced fixation being given to the less relevant aspects of the screen (i.e., countdown button or background) and increased visual captivation to the framing and pre-roll advertisement. However, the analysis instead indicates that compared to the negative framing, the positive framing results in participants fixating longer in less valuable screen areas such as the countdown button or the background components. As observed by H1, the negative framing was the most successful in generating visual attention to the pre-roll advertisement, whilst H3 and H4 demonstrated that a positive framing allowed for more visual attention to be directed to the background and the countdown button.

No significance was presented in the overall combination of advertising category and the valence of the framing. However, one framing, in particular, that is, the positive toilet cleaner framing demonstrated a significance

in its ability to direct the participant's attention to the countdown button, in comparison to the other categories and valence combinations. Similarly to what was proposed in H1 in regards to the negative toilet cleaner framing, perhaps the positive toilet cleaner framing in H4, may also subject a different degree of emotional valence or arousal in relation to the other combinations. Accordingly, the framing could have influenced the visual attention given to the countdown button (Genco et al, 2013), by, for instance, having low arousal which diverged participants from the advertisement, and in turn to the countdown button. Nonetheless, as in H1, the interrelationship remains unknown until further examined.

5.3 Implications

5.3.1 Academic

Most of the theories regarding the effects of emotion on attention that were presented in the literature review section indicated that positively valenced stimuli would be superior at captivating or attracting the viewer, whereas negatively valenced stimuli had the opposite effect of aversiveness (Paradiso et al, 1999; Elliot and Convington, 2001; Elliot et al, 2013). In the context of advertisements, such observations have been further reinforced, indicating that positive emotions indeed elicit strong visual attention behaviors in consumers, whilst negative emotions evoked low levels of visual attention (Hill, 2011). Such findings had not been investigated in the context of pre-roll advertisements, however, as demonstrated by this study and further supplementing the literature it appears to be negative emotions that have the upper hand in captivating visual attention to pre-roll advertisements. The observed results are nonetheless in coherency with the literature in behavioral psychology and neuroscience, stating that negative stimuli have the most influential capacity in generating attention (Vuilleumier and Schwartz, 2001; Cacioppo & Gardner, 1999). Thus, this study can supplement academic literature by implying that in the context of pre-roll advertisements and perhaps even video advertisements in general, the effects of emotional valence on attention more accurately follows the foundations indicated by the studies in psychology and neuroscience.

Moreover, the study touches upon an area that is seldom investigated, that is, the behavior of consumers visual attention to the countdown button of pre-roll advertisements. Hence, a gap in the literature is present, although it has not been examined thoroughly, it is important to measure the attention given to the countdown button because it is one of the main components capable of redirecting the attention from the advertisements. The placement of the countdown button is within the pre-roll advertisement, but it is a less relevant area of attention in comparison to the advert. Accordingly, it would be appropriate for researchers to examine different methods of manipulating the visual attention directed to the countdown button. This study gives an initial background within that field of research by indicating that in comparison to a negatively valenced framing, when a framing

of positive valence is employed more visual attention is directed to the countdown button and perhaps more generally, also the skip button.

This study further supplies academic literature regarding online high noise environments, more specifically, it demonstrates that in the context of pre-roll advertisements, the type of emotional valence (positive or negative) has a significance on the visual attention given to the screen background. It indicates that positively valenced framings avert more fixation duration to background components than negatively valenced framings. Furthermore, it implies that the page surrounding the pre-roll advertisement has an impact on the distribution of attention and that the emotionally valenced framing of the pre-roll advertisement influences such discrepancies of visual attention.

5.3.2 Managerial

A multitude of research indicates the importance of emotional components in enhancing advertisement effectiveness by manifesting specific outcomes that can be of relevance to the individual business, advertiser, or manager (Cecil, 2013; Percy & Rossiter, 2016; World Advertising Research Center A, 2019; World Advertising Research Center A, 2018). The managerial implications of the research indicate that when conducting a marketing or advertising campaign and whilst pre-roll advertisements are a part of the media mix, more attention can be paid to the advertisement when a negative emotional framing is utilized. Additionally, perhaps there is a higher chance for the communication message to be attended by the consumer, as their visual attention is directed to the advertisements for longer durations through employing of a negative framing in comparison to a positive framing. Hence, if the marketing or advertising objective is for consumers to be highly attentive to the pre-roll advertisement, an emotionally negative framing is better suited. Nevertheless, that does not imply that the negative framing is the optimal solution to increase advertising effectiveness or is more successful at accomplishing other marketing objectives. The positive framing could very well be superior in such regards, but in terms of simply increasing visual attention to the pre-roll advertisement, the negative framing appears to have the superiority. Moreover, the employment of a positive framing resulted in more visual attention being redirected to less relevant parts from a managerial perspective, that is, the countdown button and the background components. This further indicates that, if captivating the visual attention of consumers to the pre-roll advertisement is a paramount requirement of the marketing campaign, then a positive framing should be avoided as not only does it generate less attention to the advertisement, but in addition more attention will be given to the background and countdown button by employing of such emotional framing.

5.4 Conclusion

The outstanding complexity of the creative aspects of advertisements can be a daunting task for any enterprise, as specific advertisement inputs can result in various distinct marketing outcomes. Such undertakings get further complicated by the emergence of new advertising formats with separate requirements necessary to achieve advertising effectiveness. The newly emerged advertisement format of pre-roll advertisements poses major difficulties for advertisers as it is perceived as exceedingly negative and intrusive. Accordingly, as attention scarcity is an evermore prominent phenomenon in online environments, appropriate implementations on how to captivate viewers' visual attention in the pre-roll advertisement format ought to be established.

Consequently, through the employment of an eye-tracking experiment, this research set out to examine how one of the most impactful input variables in advertising, that is, an emotional component of either positive or negative valence can influence the visual attention distributed in the pre-roll advertisement format. The thesis attempted to answer the following research question: *"How do pre-roll advertisements containing emotionally valenced elements influence individuals' visual behavior?''*

The results of the study revealed that contrary to what was proposed by the reviewed advertising literature, the positively-valenced emotional framing did not lead to increased attention to the advertisement. Thus, H1, testing whether positively-framed emotional lead to higher fixation duration to the pre-roll advertisement was rejected. On the contrary, the employment of a negatively valenced emotional framing resulted in more visual attention being directed to the pre-roll advertisement. No significance was observed in the spillover effect examined in H2, the emotionally valenced framing had no effect on the evaluation of the content showcased after the pre-roll advertisement. The findings of H3 and H4 further revealed that when a positive emotional framing is applied in the pre-roll ads, greater amounts of visual attention were directed to the background components of the screen, and, in addition, also to the countdown button of the pre-roll advertisement. Such findings were in contradiction to the suggestion that negatively-valenced stimuli would result in more visual attention being redirected to the aforementioned components. Accordingly, all the hypotheses were rejected.

It can be concluded that in the context of pre-roll advertisements, negatively-valenced stimuli are superior in captivating attention to the advertisement, moreover, perhaps the fixation to less relevant components of the screen (i.e., background and countdown button) can be prevented by employing a negative framing in contrast to a positive framing. The positively-valenced stimuli, in turn, are more optimal means to redirect the visual attention to both the pre-roll ad's countdown button or the background components of the screen. Ultimately, although the negative-framing is superior in eliciting visual attention to the pre-roll advertisement, it does not conclude that this is the preferred framing to enhance overall advertising effectiveness. It simply means that

the negative framing is the preferential input for visual attention, however, it is entirely possible that the positive framing is desirable in terms of manifesting other important marketing objectives.

5.5 Recommendations for further research

Although this experiment examined the effects of emotionally valenced stimuli on the visual attention allocated to pre-roll advertisements, other paramount advertising outcomes that are relevant to investigate, such as the valence's influence on brand equity, memorial retention, and purchase intention could be inquired into in further research. Moreover, simply because visual attention was enhanced in the study, it does not indicate that advertising effectiveness was increased, hence, more elaboration on how effectiveness can be manifested through the employment of emotional inputs in pre-roll advertisements is missing.

The research demonstrates that a negative framing is the most optimal in terms of generating visual attention; however, it does not indicate or provide specific guidelines to how this can be achieved and how the negative framing should be designed or employed. Thus, another recommendation is to examine the specific emotions such as disgust or happiness, instead of the negative and positive valence to illuminate the effects of specific emotions on the visual behaviors of consumers.

The measurement of the emotional valence of the stimuli has not been investigated and it could have supported the categorization of the particular emotional framing and its effects on the visual attention to the pre-roll advertisements, countdown button, or background. It would illuminate how perhaps a framing of high negative or positive valence affects attention and if any of the employed framings were actually of neutral valence instead of the defined emotional valence. By measuring the arousal produced by each specific framing, similar distinctions could be investigated in terms of differentiating the visual attention generated to specific components by emotional framings eliciting lower or higher levels of arousal. Further research on the two aforementioned emotional variables would aid in the establishment of instructions on how the emotional component could be utilized to manipulate visual attention with more certainty.

Variables such as the Time-to-First-Fixation (TTFF), could be investigated in further research to provide insights into when participants first fixated on the pre-roll advertisement, countdown button, or background based on the emotional framing that was employed. Ultimately, by applying facial expression analysis in combination with eye-tracking, further insights could be provided into the emotional state elicited in participants by the application of the different emotional framings, thus, assisting the understanding of how emotions are correlated to visual attention.

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7. APPENDIX A - PRE-ROLL ADVERTISEMENTS AND TRAILERS

1 - Control Ad & Trailer.
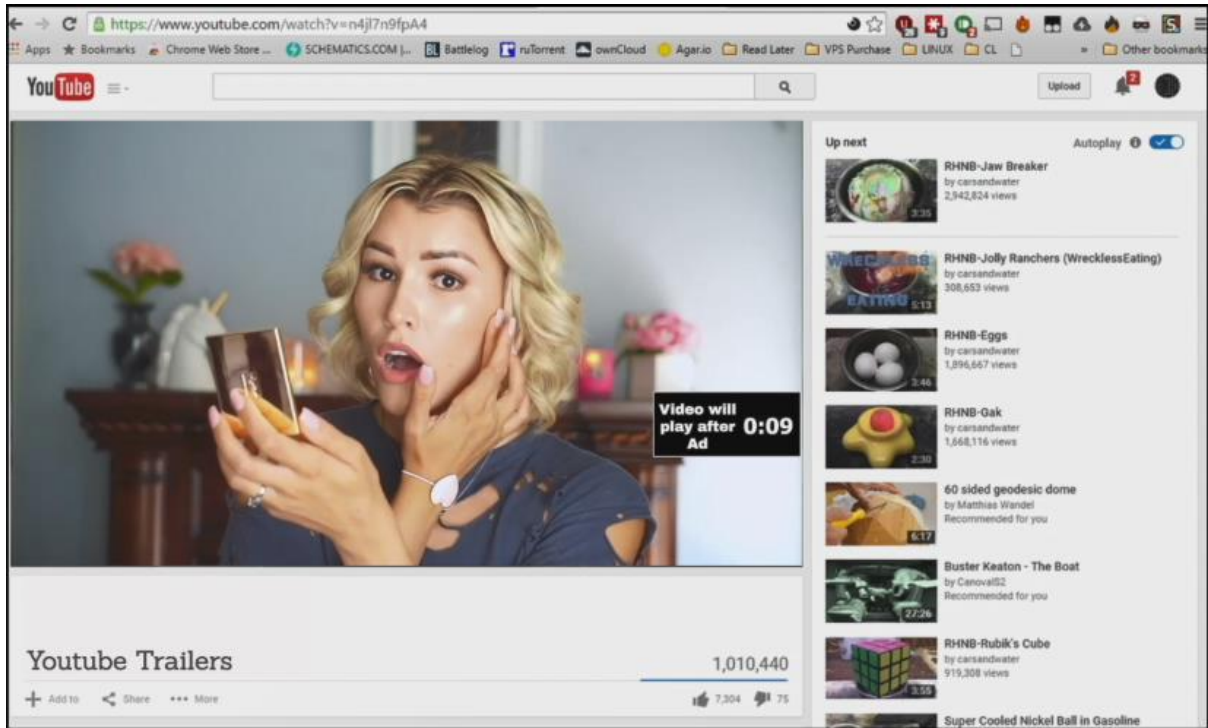
Control Ad Trailer Content: Turbo.
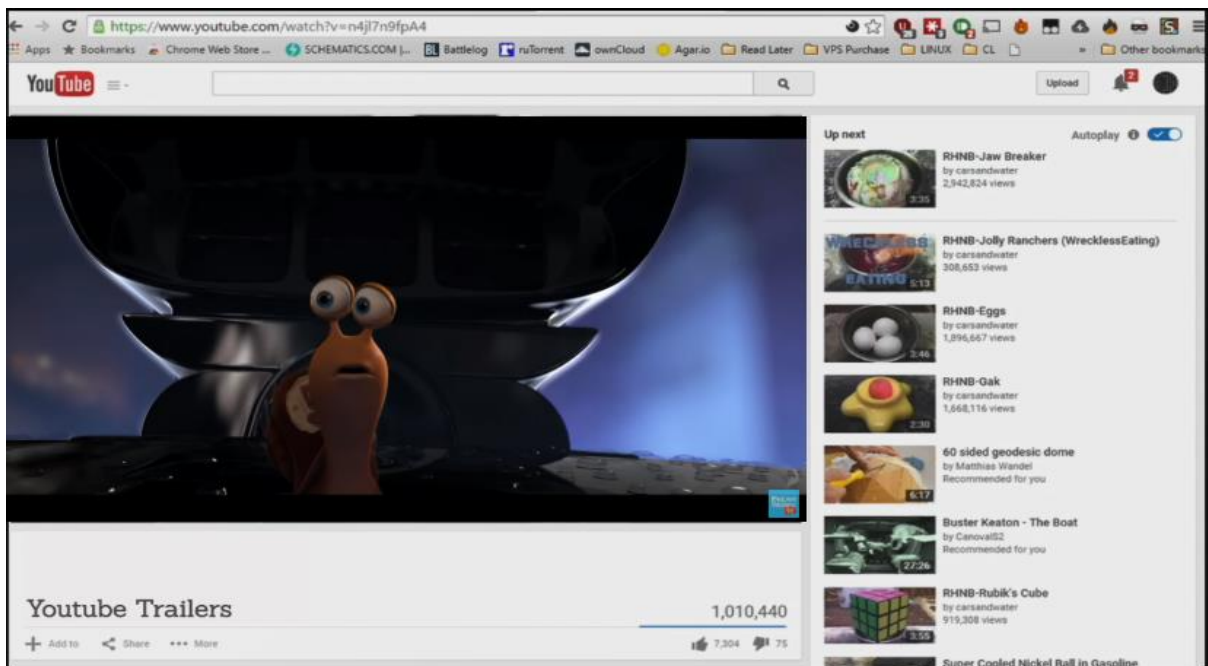
2 - Toilet Cleaner Ad & Trailer

Part 1: Product Image
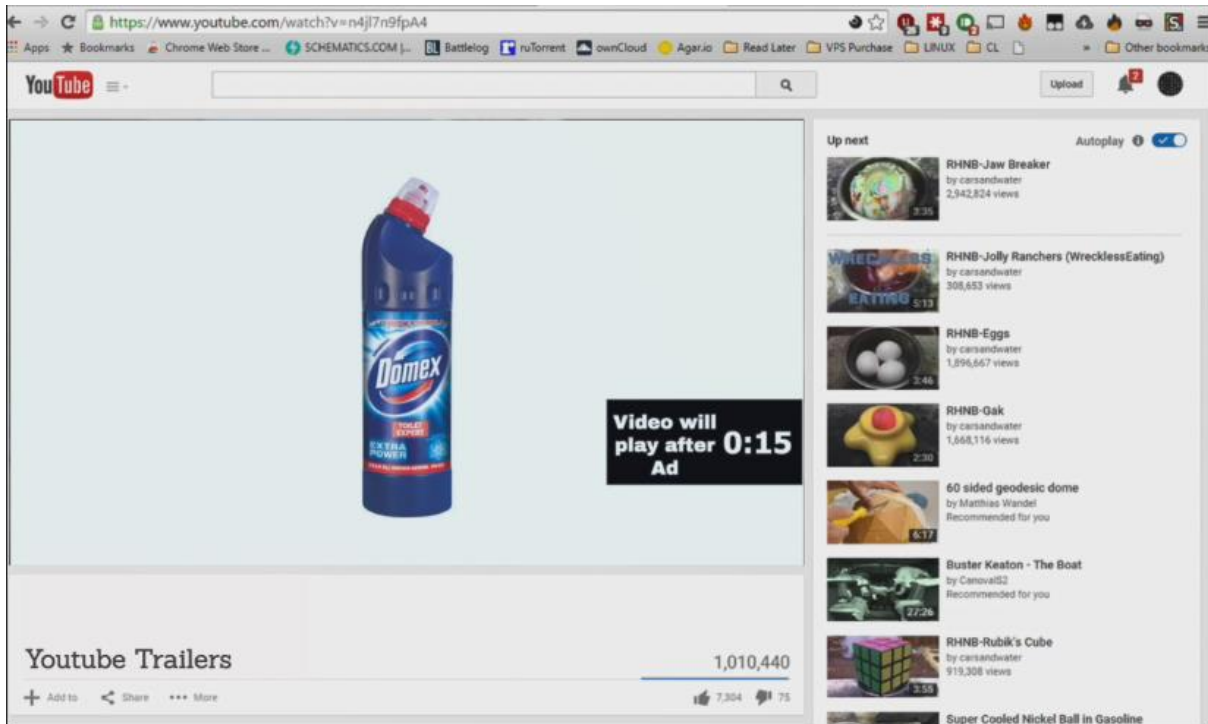
Part 2: Negative Emotional Framing
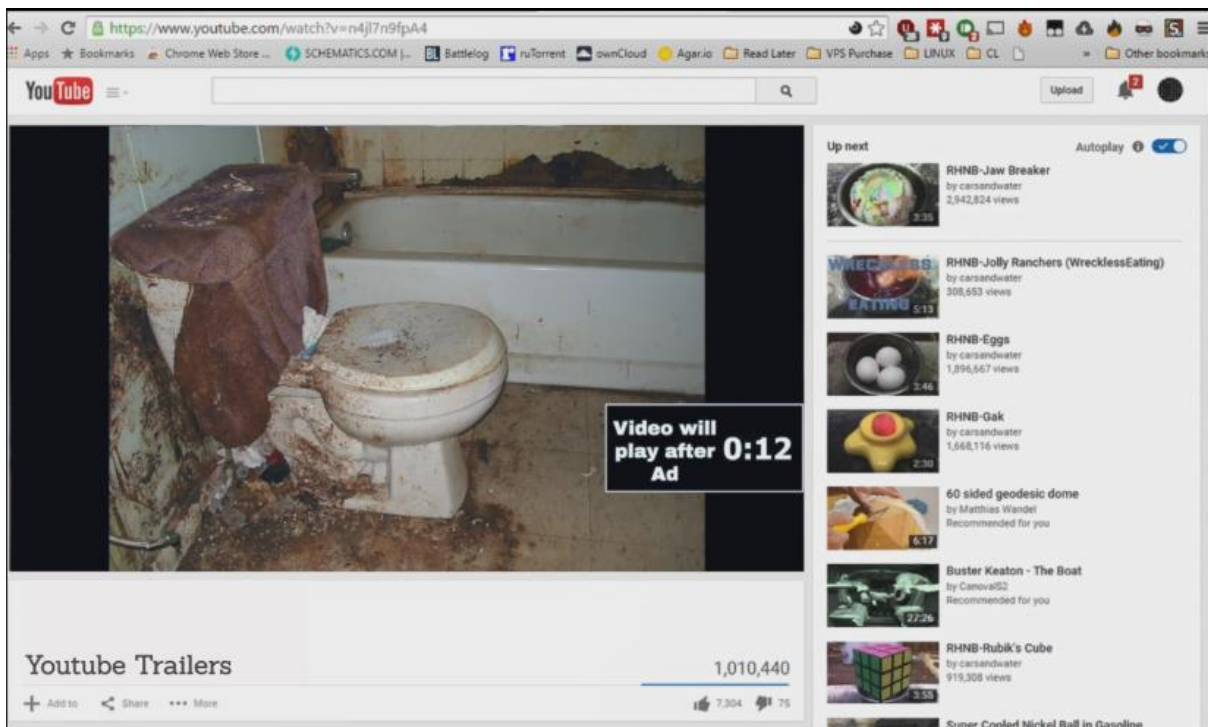
Part 2: Positive Emotional Framing
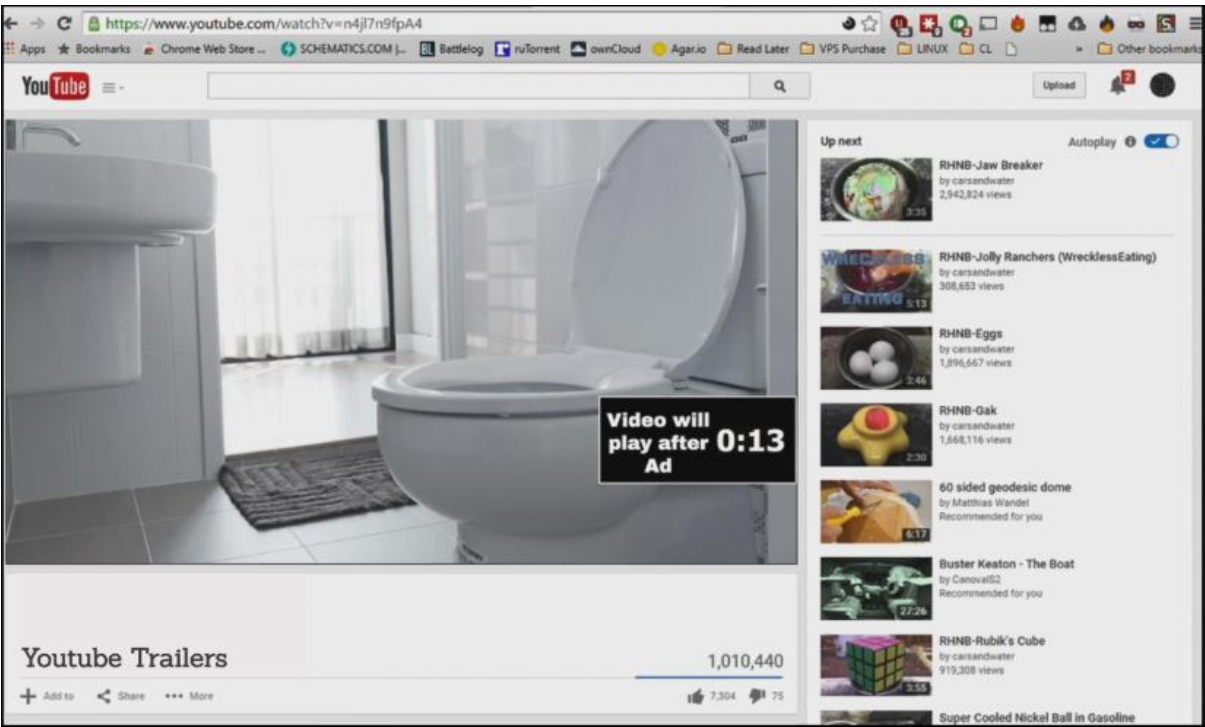
Part 3: Advertisement Content

Part 4: Toilet Cleaner Trailer Content - Beauty and The Beast
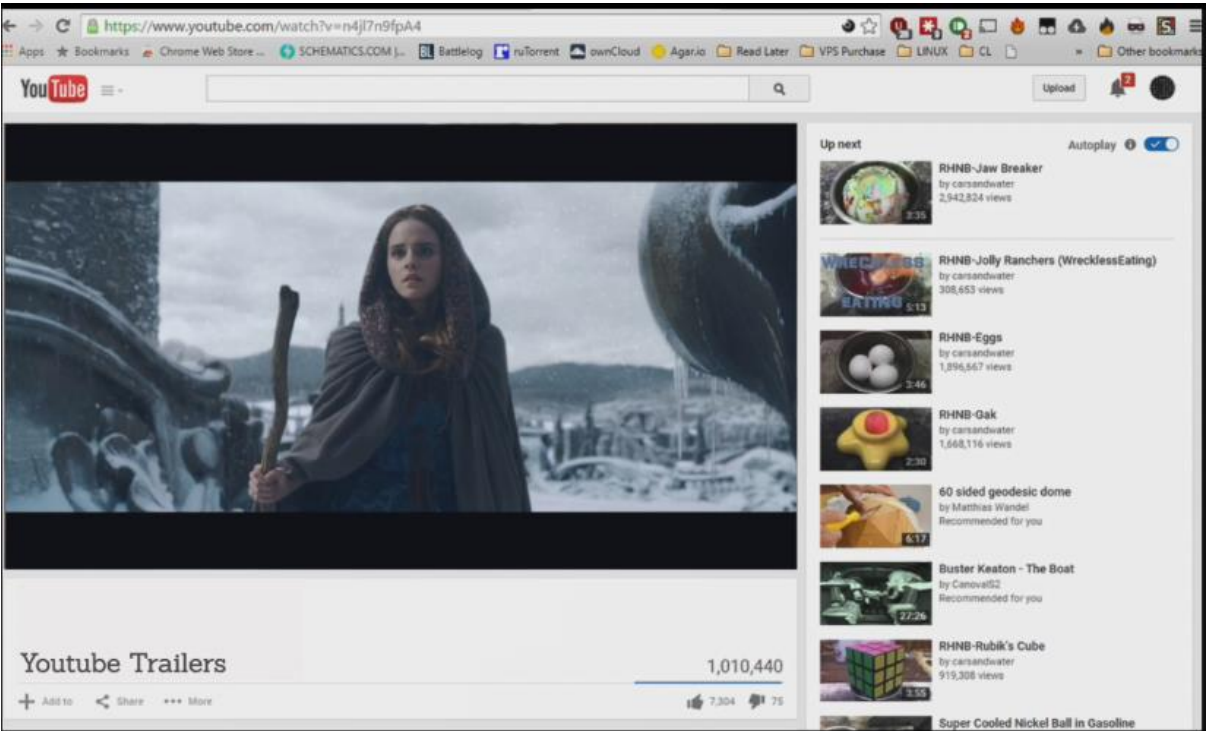
3 - Toothpaste Ad & Trailer.

Part 1: Product Image.
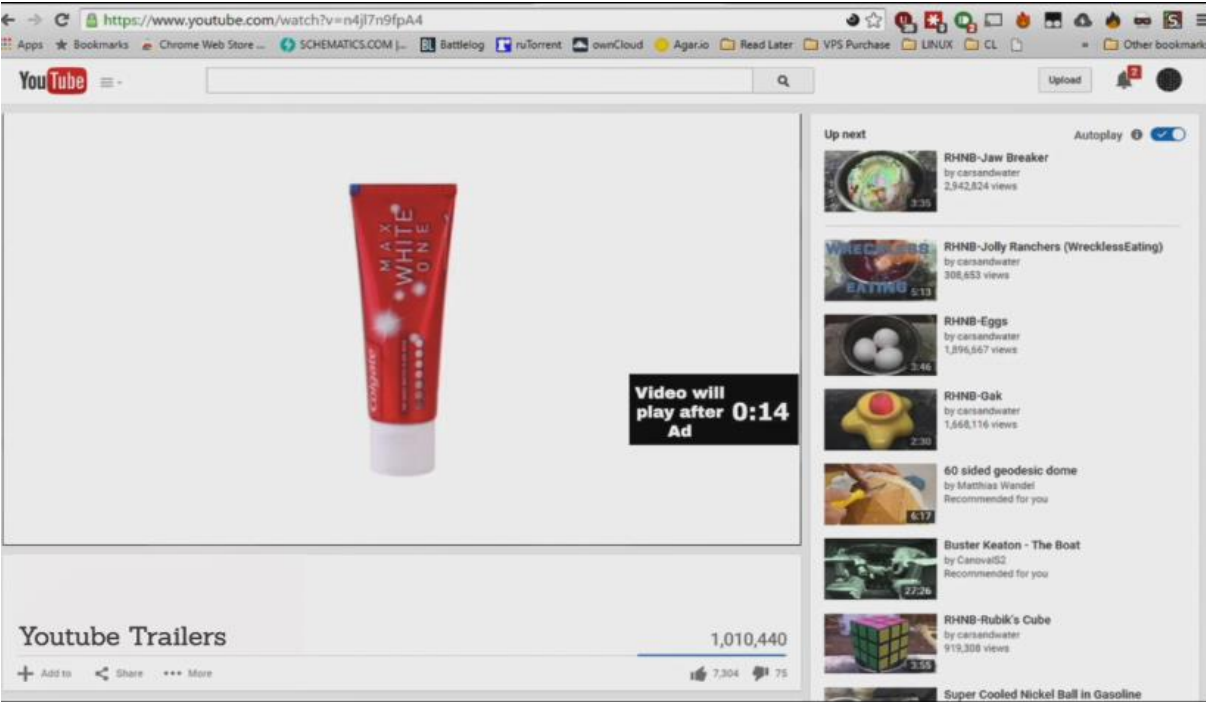
Part 2: Negative Emotional Framing
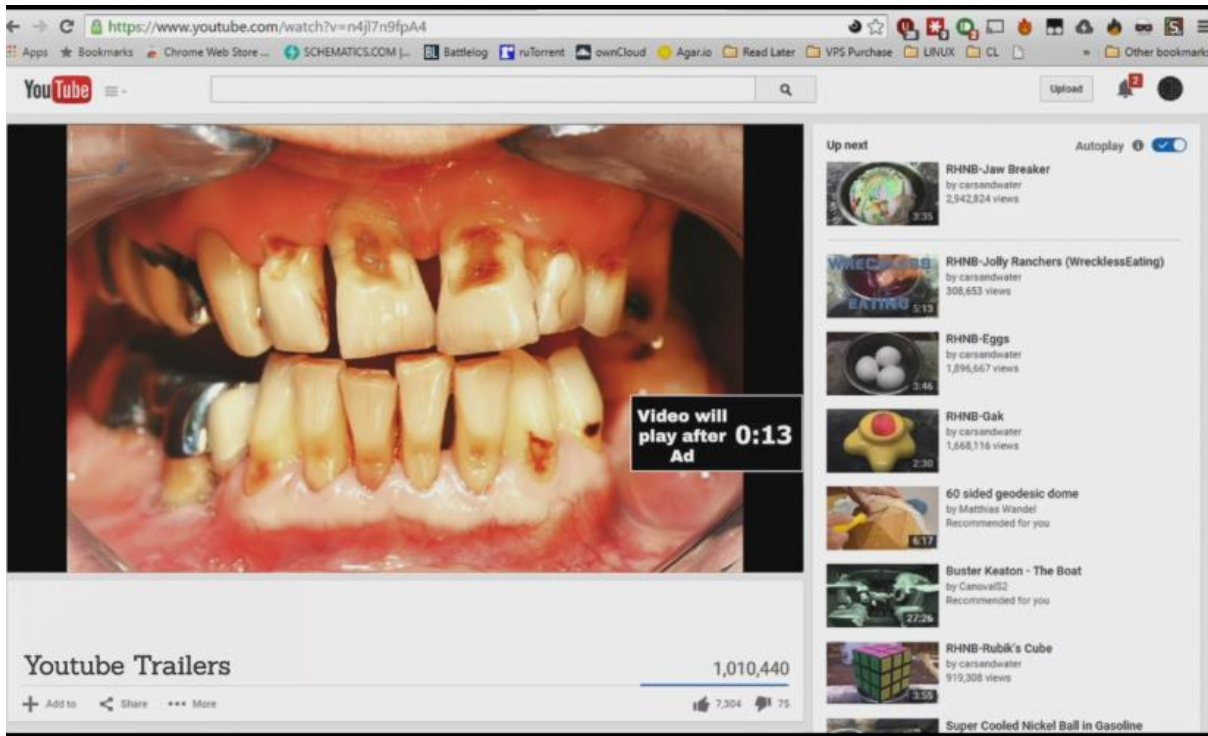
Part 2: Positive Emotional Framing
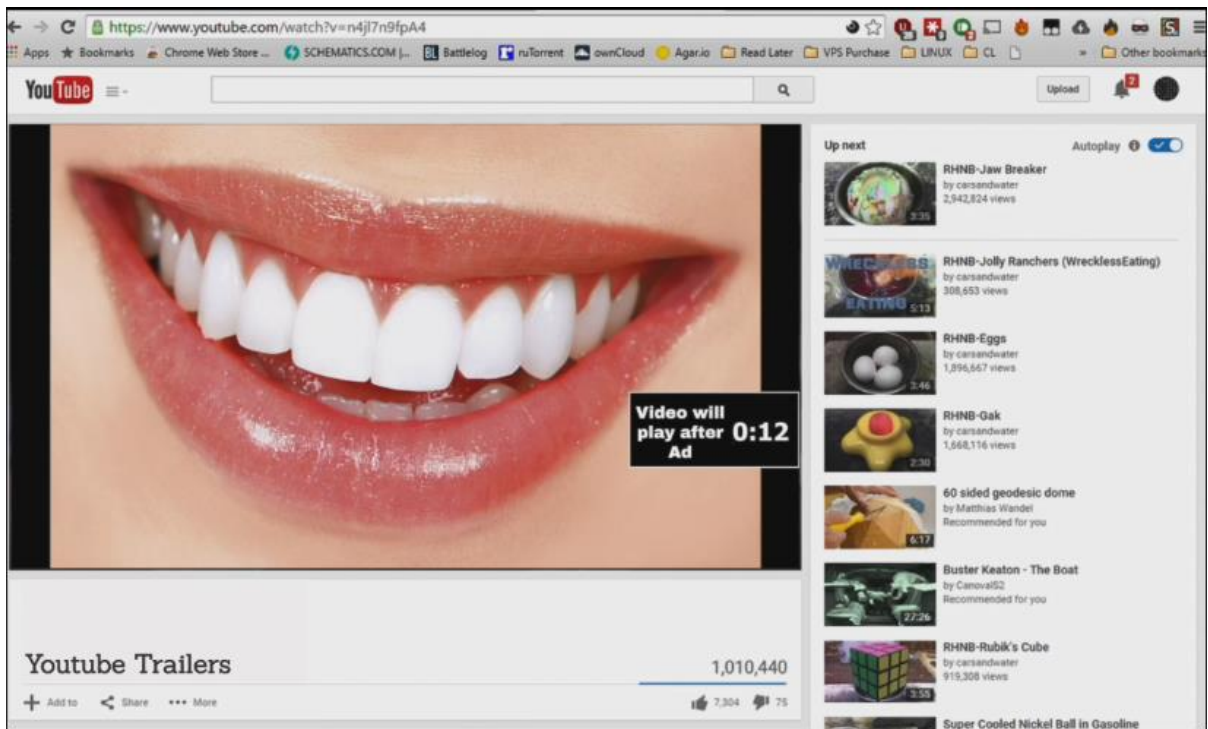
Part 3: Advertisement Content

Part 4: Toothpaste Trailer Content - Walt Before Mickey.
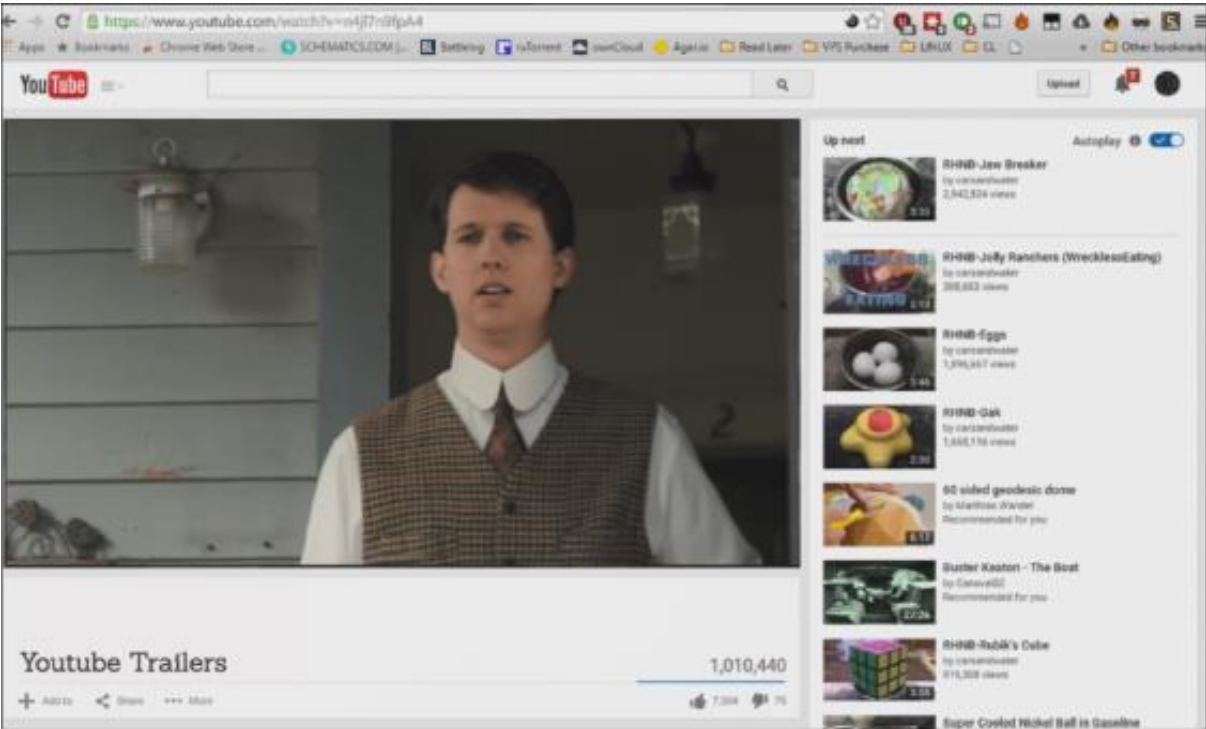
4 - Detergent Ad & Trailer.

Part 1: Product Image.
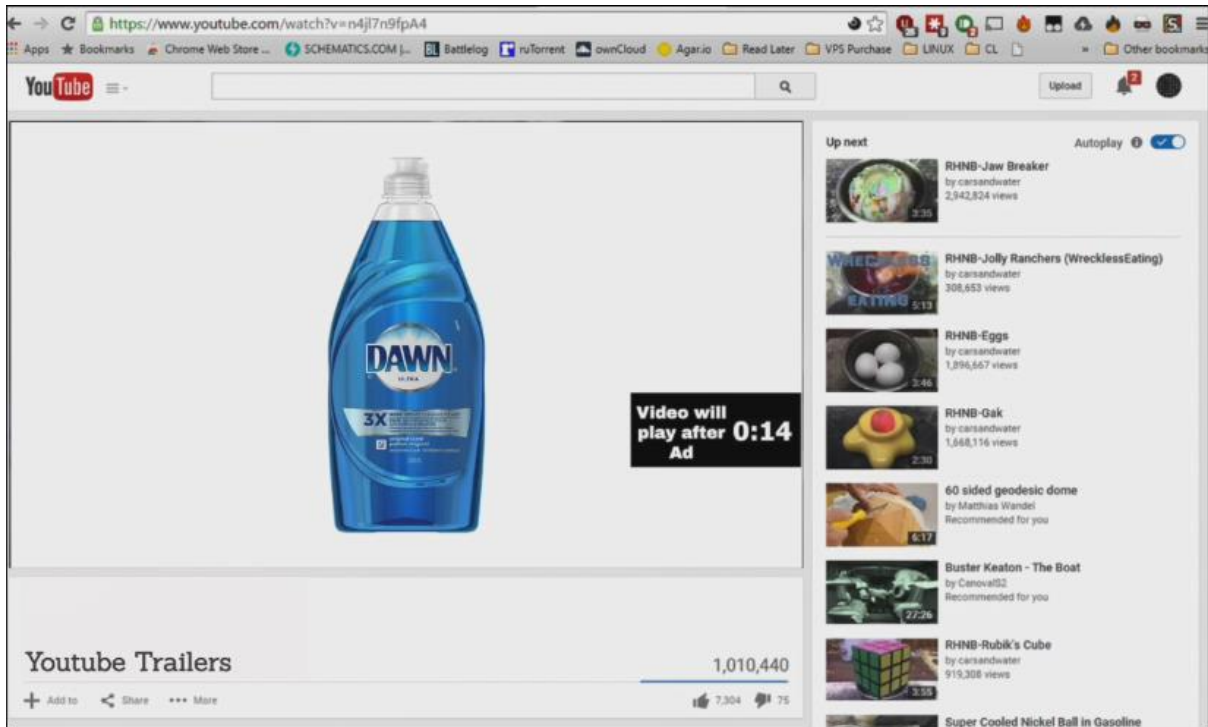
Part 2: Negative Emotional Framing
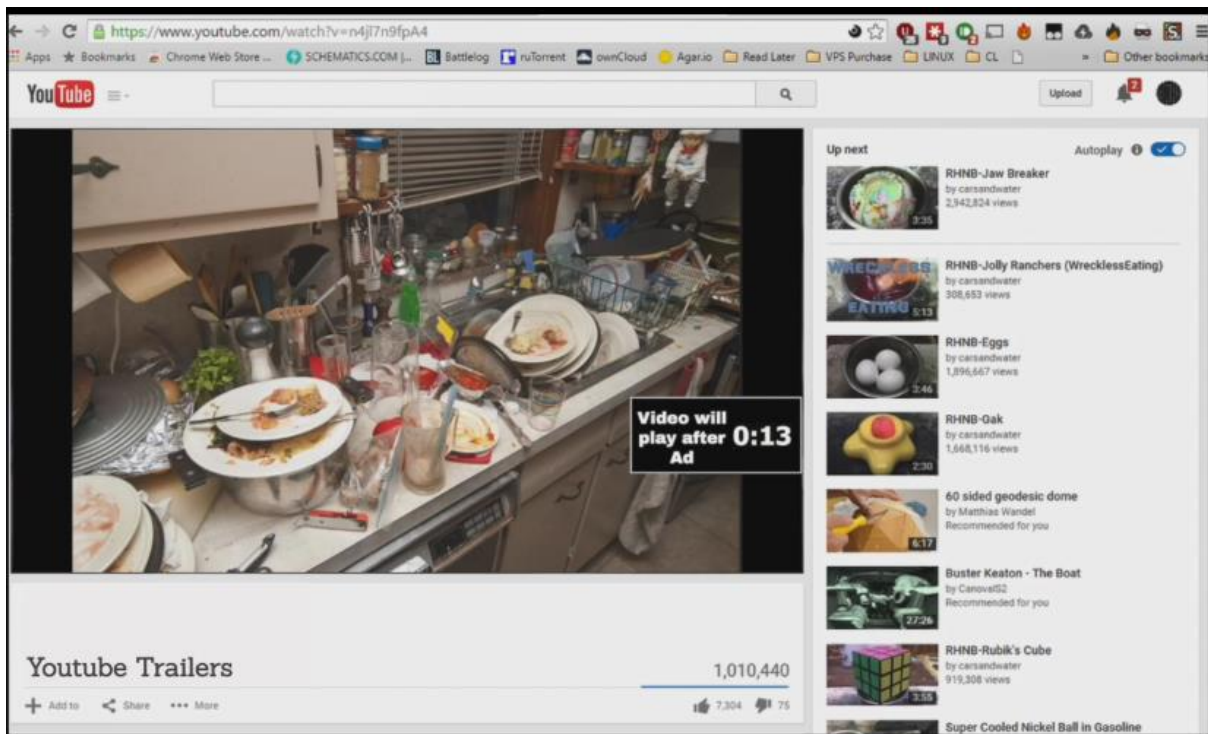
Part 2: Positive Emotional Framing
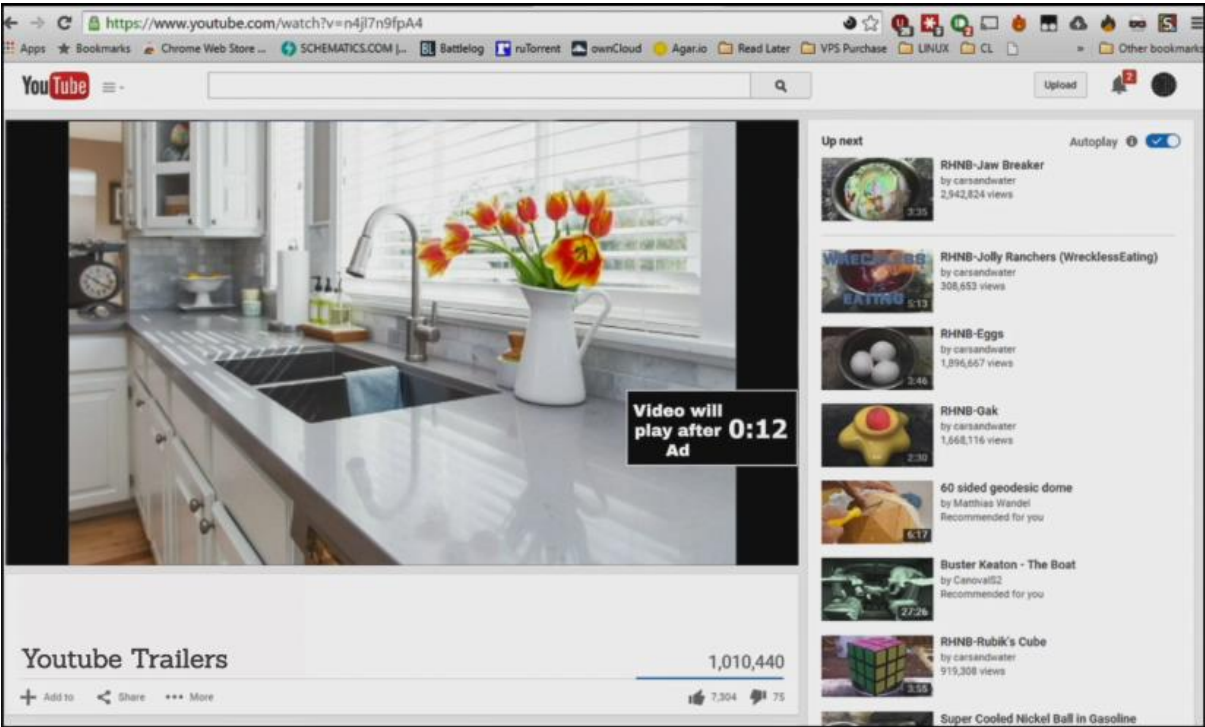
Part 3: Advertisement Content

Part 4: Detergent Trailer Content - Deadpool 2
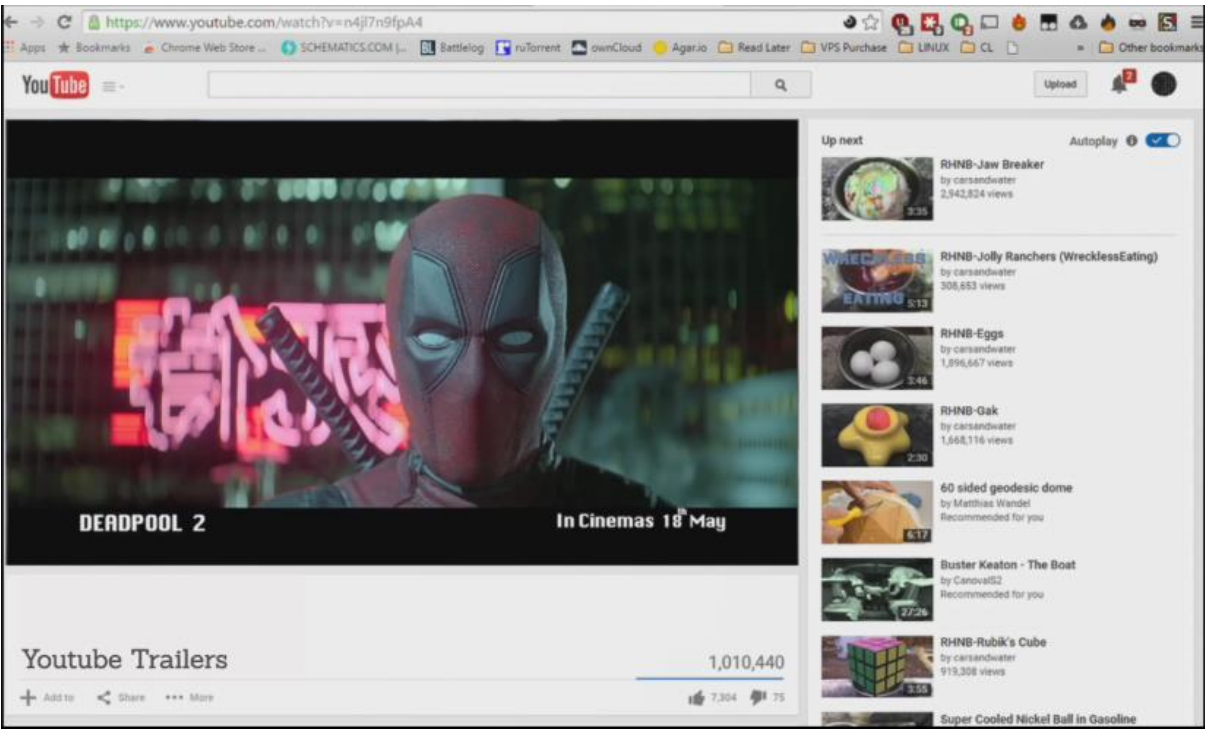
5 - Skin Care Ads & Trailer.

Part 1: Product Image
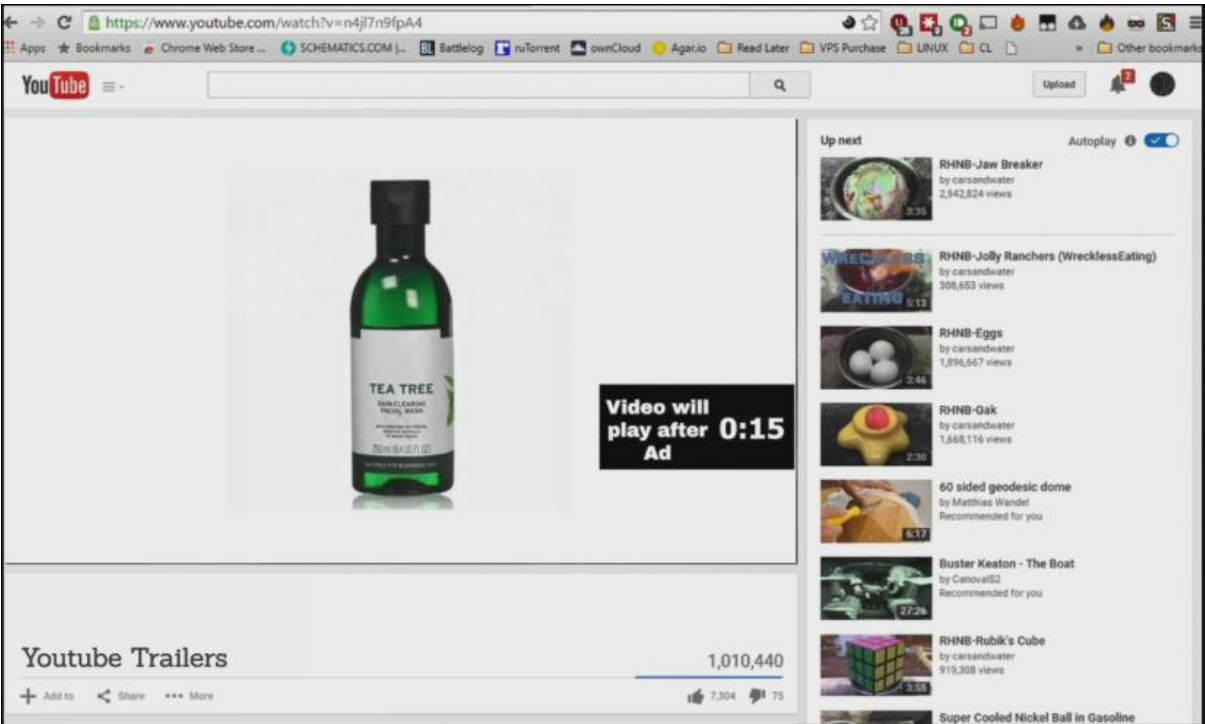
Part 2: Negative Emotional Framing
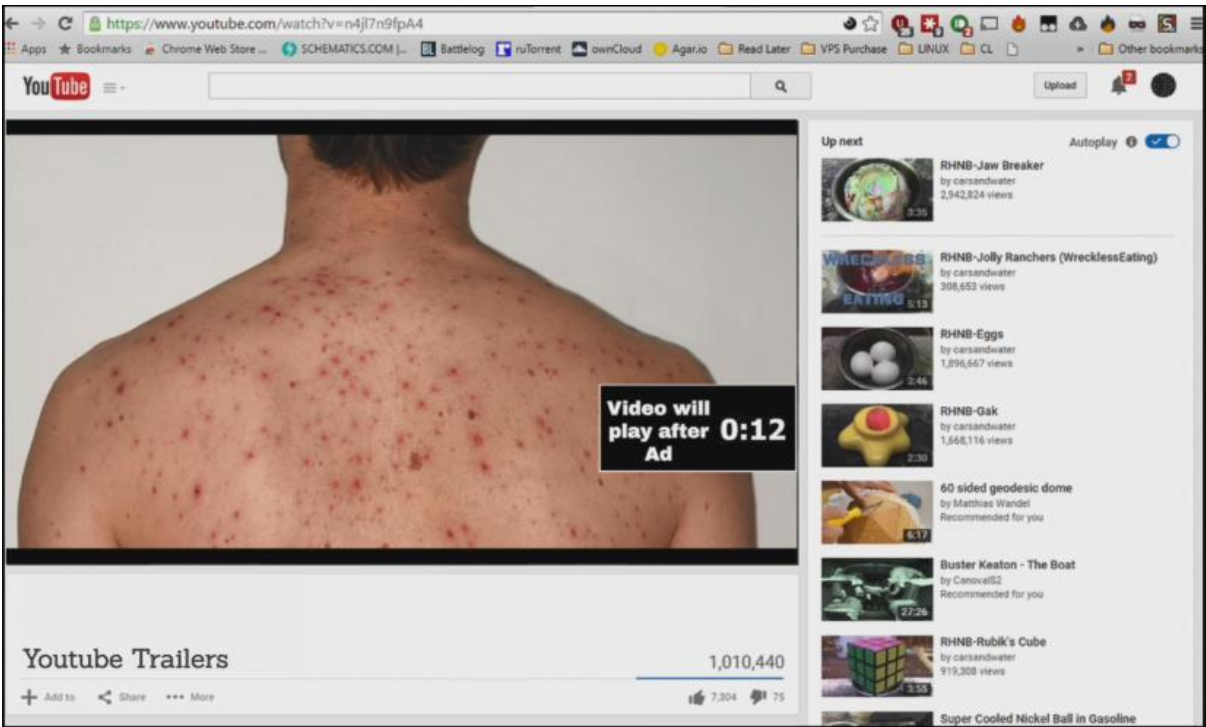
Part 2: Positive Emotional Framing
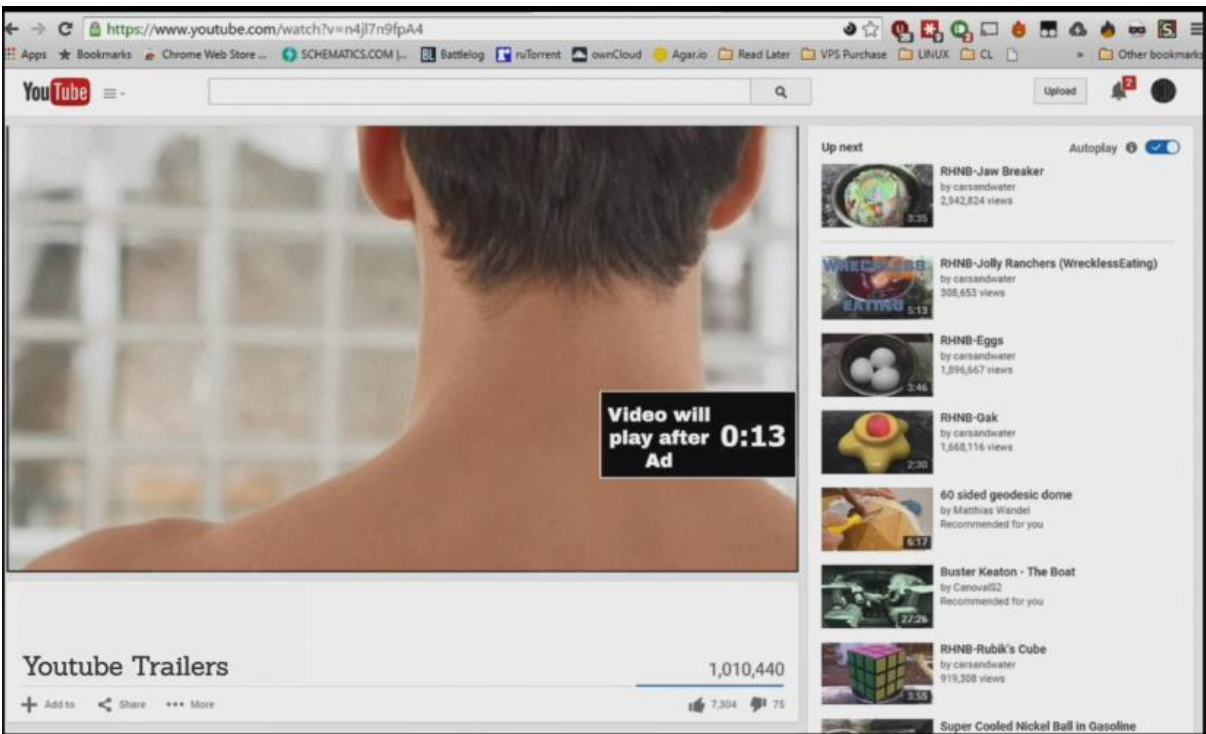
Part 3: Advertisement Content
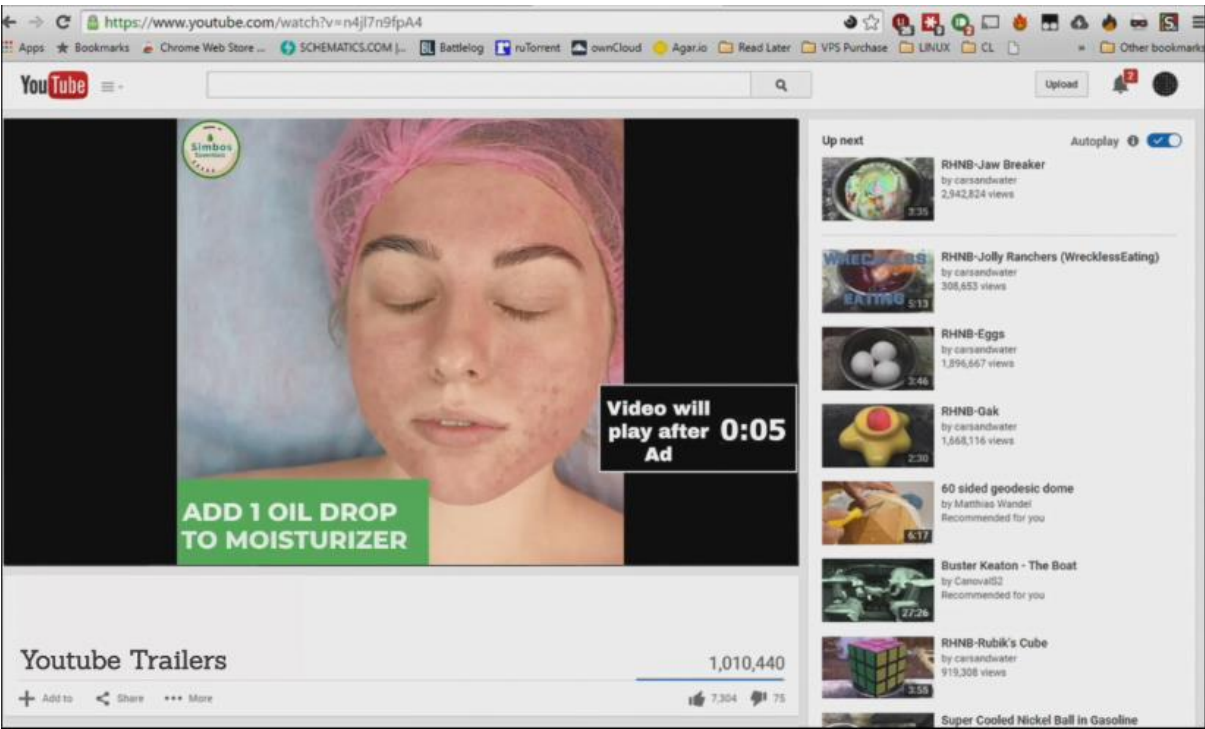
Part 4: Skin Care Trailer Content: The Expendables
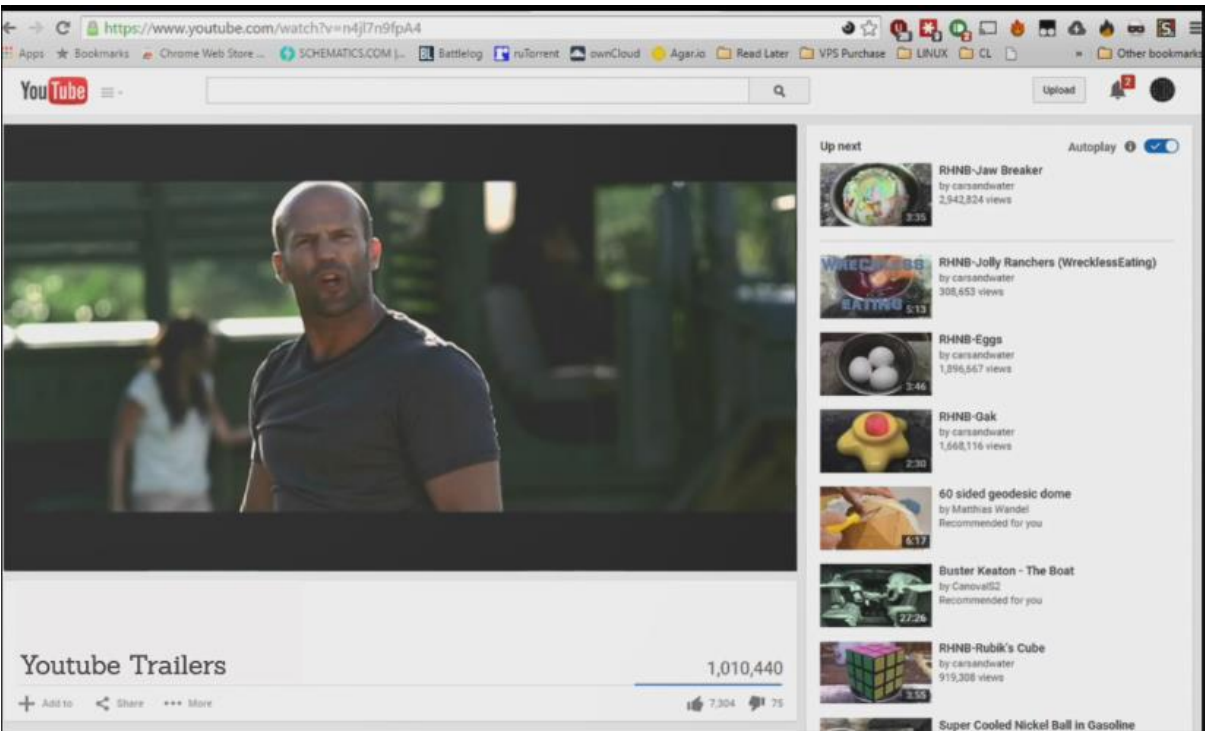
8. APPENDIX B – IN-SCREEN QUESTIONS

1 - 1st Screen: Introduction.

2 - 2nd Screen: First Questions.

3 - Post Trailer Questions:

How do you like this type of movies (genre) in general?

Not at all   Neither Nor   Very much

How much did you like this trailer?

Not at all   Neither Nor   Very much

How likely are you to recommend it to a friend?

Not at all   Neither Nor   Very Likely

Next ➡

4 - Final Screen

This is the end of the experiment.

Thank very much for your participation.

Next ➡

9. APPENDIX C - JMP COMPUTATIONS

1 - Hypothesis 1 Fit Model (Pre-roll Advertisement)

Response TFD

Effect Summary

Source	LogWorth		PValue
Category	3,283		0,00052
Valence	1,923		0,01195
Category*Valence	0,110		0,77631

Summary of Fit

RSquare	0,795442
RSquare Adj	0,788023
Root Mean Square Error	2443,347
Mean of Response	9277,995
Observations (or Sum Wgts)	201

Parameter Estimates

Term	Estimate	Std Error	DFDen	t Ratio	Prob>|t|
Intercept	9192,3451	536,2587	48,43	17,14	<,0001*
Category[Detergent]	-339,6794	321,3924	139,6	-1,06	0,2924
Category[SkinCare]	-806,9801	321,3924	139,6	-2,51	0,0132*
Category[ToiletCleaner]	1254,2895	318,7285	139,1	3,94	0,0001*
Valence[NEG]	542,46728	207,4689	47,26	2,61	0,0119*
Category[Detergent]*Valence[NEG]	-212,613	589,7537	69,48	-0,36	0,7196
Category[SkinCare]*Valence[NEG]	-119,3022	589,7537	69,48	-0,20	0,8403
Category[ToiletCleaner]*Valence[NEG]	343,16734	588,3295	68,91	0,58	0,5616

REML Variance Component Estimates

Random Effect	Var Ratio	Var Component	Std Error	95% Lower	95% Upper	Wald p-Value	Pct of Total
Name	2,0882255	12466587	3010419,8	6566273	18366902	<,0001*	63,047
Name*Valence	0,2239457	1336943	1013923,4	-650310,3	3324196,4	0,1873	6,761
Name*Category*Valence	0	0	0	0	0	.	0,000
Name*Category		5969943	877195,78	4564658,4	8144842,9	<,0001*	30,192
Total		19773473	3038683	14947005	27396426		100,000

-2 LogLikelihood = 3724,7211814
Note: Total is the sum of the positive variance components.
Total including negative estimates = 19773473
Residual is confounded with Name*Category and has been removed.

Fixed Effect Tests

Source	Nparm	DF	DFDen	F Ratio	Prob > F
Category	3	3	100,5	6,3938	0,0005*
Valence	1	1	47,26	6,8366	0,0119*
Category*Valence	3	3	101,3	0,3679	0,7763

Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent	8852,666	625,49763
SkinCare	8385,365	625,49763
ToiletCleaner	10446,635	622,78751
Toothpaste	9084,715	625,72277

Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG	9734,8124	575,39104
POS	8649,8779	574,59435

Category*Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent,NEG	9182,520	889,34748
Detergent,POS	8522,811	879,80122
SkinCare,NEG	8808,530	879,80122
SkinCare,POS	7962,200	889,34748
ToiletCleaner,NEG	11332,269	872,07695
ToiletCleaner,POS	9561,000	889,34748
Toothpaste,NEG	9615,930	897,55095
Toothpaste,POS	8553,500	872,07695

Least Squares Means Plot
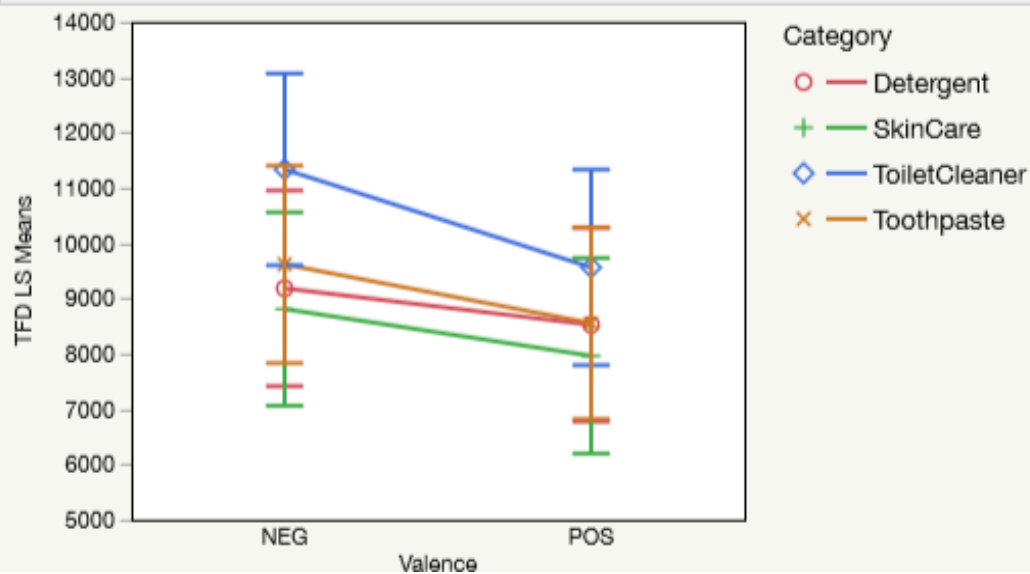
Tukey HSD:

LSMeans Differences Tukey HSD

α= 0,050 Q= 3,09529

					LSMean[j]			
Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	Detergent,NEG	Detergent,POS	SkinCare,NEG	SkinCare,POS	ToiletCleaner,NEG	ToiletCleaner,POS	Toothpaste,NEG	Toothpaste,POS
Detergent,NEG	0 0 0 0	662,91 1254,19 -3219,2 4545,01	828,408 1254,19 -3053,7 4710,51	1220,32 770,117 -1163,4 3604,06	-2419,4 1248,78 -6284,7 1445,98	-378,48 770,117 -2762,2 2005,26	-432,81 698,87 -2596 1730,4	629,02 1248,78 -3236,3 4494,37
Detergent,POS	-662,91 1254,19 -4545 3219,19	0 0 0 0	165,497 773,03 -2227,3 2558,25	557,41 1254,19 -3324,7 4439,51	-3082,3 764,079 -5447,3 -717,23	-1041,4 1254,19 -4923,5 2840,71	-1095,7 1260,03 -4995,9 2804,44	-33,89 684,887 -2153,8 2086,04
SkinCare,NEG	-828,41 1254,19 -4710,5 3053,69	-165,5 773,03 -2558,3 2227,26	0 0 0 0	391,912 1254,19 -3490,2 4274,01	-3247,8 684,887 -5367,7 -1127,8	-1206,9 1254,19 -5089 2675,21	-1261,2 1260,03 -5161,4 2638,95	-199,39 764,079 -2564,4 2165,66
SkinCare,POS	-1220,3 770,117 -3604,1 163,42	-557,41 1254,19 -4439,5 3324,69	-391,91 1254,19 -4274 3490,19	0 0 0 0	-3639,7 1248,78 -7505 225,661	-1598,8 688,291 -3729,3 531,662	-1653,1 779,587 -4066,2 759,917	-591,3 1248,78 -4456,6 3274,05
ToiletCleaner,NEG	2419,36 1248,78 -1446 6284,71	3082,28 764,079 717,227 5447,32	3247,77 684,887 1127,84 5367,7	3639,68 1248,78 -225,66 7505,03	0 0 0 0	2493,73 682,139 382,081 4605,38	1986,55 1254,64 -1896,9 5870,04	3048,38 755,161 710,938 5385,83
ToiletCleaner,POS	378,48 770,117 -2005,3 2762,22	1041,39 1254,19 -2840,7 4923,49	1206,89 1254,19 -2675,2 5088,99	1598,8 688,291 -531,66 3729,26	-2040,9 1248,78 -5906,2 1824,46	0 0 0 0	-54,333 779,587 -2467,4 2358,72	1007,5 1248,78 -2857,8 4872,85
Toothpaste,NEG	432,813 698,87 -1730,4 2596,02	1095,72 1260,03 -2804,4 4995,89	1261,22 1260,03 -2638,9 5161,39	1653,13 779,587 -759,92 4066,18	-1986,6 1254,64 -5870 1896,94	54,333 779,587 -2358,7 2467,38	0 0 0 0	1061,83 1254,64 -2821,7 4945,32
Toothpaste,POS	-629,02 1248,78 -4494,4 3236,33	33,8904 684,887 -2086 2153,82	199,388 764,079 -2165,7 2564,44	591,3 1248,78 -3274 4456,65	-3048,4 755,161 -5385,8 -710,94	-1007,5 1248,78 -4872,8 2857,85	-1061,8 1254,64 -4945,3 2821,66	0 0 0 0

2 - Hypothesis 2 Fit Model (Trailer Opinion)

Response Difference

Effect Summary

Source	LogWorth		PValue
Category	0,677		0,21027
Valence*Category	0,132		0,73849
Valence	0,041		0,90906

Summary of Fit

RSquare	0,134543
RSquare Adj	0,103315
Root Mean Square Error	2,180295
Mean of Response	0,248168
Observations (or Sum Wgts)	202

Parameter Estimates

Term	Estimate	Std Error	DFDen	t Ratio	Prob>|t|
Intercept	0,2556205	0,220531	48,82	1,16	0,2520
Valence[NEG]	0,013645	0,118848	49,27	0,11	0,9091
Category[Detergent]	0,2672382	0,248327	139,6	1,08	0,2837
Category[SkinCare]	-0,24069	0,248327	139,6	-0,97	0,3341
Category[ToiletCleaner]	0,3695795	0,24646	138,8	1,50	0,1360
Valence[NEG]*Category[Detergent]	0,0162964	0,310104	129,4	0,05	0,9582
Valence[NEG]*Category[SkinCare]	-0,097914	0,310104	129,4	-0,32	0,7527
Valence[NEG]*Category[ToiletCleaner]	0,291155	0,308645	128,1	0,94	0,3473

REML Variance Component Estimates

Random Effect	Var Ratio	Var Component	Std Error	95% Lower	95% Upper	Wald p-Value	Pct of Total
Name	0,3701449	1,7595527	0,5226341	0,7352086	2,7838968	0,0008*	27,015
Name*Valence	-0,201991	-0,960201	0,4447437	-1,831883	-0,088519	0,0309*	0,000
Name*Valence*Category	0	0	0	0	0	.	0,000
Name*Category		4,7536861	0,6811344	3,6573918	6,4318432	<,0001*	72,985
Total		6,5132388	0,8575145	5,1122349	8,5842289		100,000

-2 LogLikelihood = 900,42561289
Note: Total is the sum of the positive variance components.
Total including negative estimates = 5,5530379
Residual is confounded with Name*Category and has been removed.

Fixed Effect Tests

Source	Nparm	DF	DFDen	F Ratio	Prob > F
Valence	1	1	49,27	0,0132	0,9091
Category	3	3	103,7	1,5334	0,2103
Valence*Category	3	3	103,9	0,4208	0,7385

Effect Details

Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG	0,26926546	0,25051717
POS	0,24197548	0,25051717

Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent	0,5228587	0,33279309
SkinCare	0,0149309	0,33279309
ToiletCleaner	0,6252000	0,33003784
Toothpaste	-0,1405077	0,33003784

Valence*Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG,Detergent	0,5528000	0,47129769
NEG,SkinCare	-0,0693382	0,46998239
NEG,ToiletCleaner	0,9300000	0,46214541
NEG,Toothpaste	-0,3364000	0,47129769
POS,Detergent	0,4929173	0,46998239
POS,SkinCare	0,0992000	0,47129769
POS,ToiletCleaner	0,3204000	0,47129769
POS,Toothpaste	0,0553846	0,46214541

Least Squares Means Plot
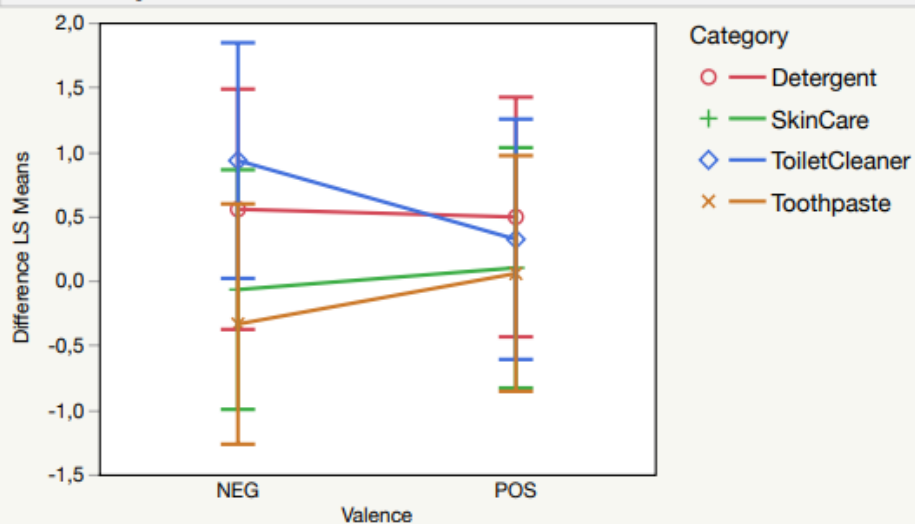
3 - Hypothesis 3 Fit Model (Background)

Response TFD

Effect Summary

Source	LogWorth		PValue
Valence	1,664		0,02170
Category	1,558		0,02764
Category*Valence	1,103		0,07886

Summary of Fit

RSquare	-0,05642
RSquare Adj	-0,08149
Root Mean Square Error	1728,624
Mean of Response	1811,485
Observations (or Sum Wgts)	303

Parameter Estimates

Term	Estimate	Std Error	DFDen	t Ratio	Prob>|t|
Intercept	1732,7749	149,083	50,03	11,62	<,0001*
Category[Detergent]	-80,00956	166,9698	213,8	-0,48	0,6323
Category[SkinCare]	-290,7269	136,4064	134,5	-2,13	0,0349*
Category[ToiletCleaner]	398,4592	136,6295	132,6	2,92	0,0042*
Valence[NEG]	-175,7541	74,38561	55,05	-2,36	0,0217*
Category[Detergent]*Valence[NEG]	218,8398	211,3852	150,7	1,04	0,3022
Category[SkinCare]*Valence[NEG]	232,43143	188,7953	100,6	1,23	0,2211
Category[ToiletCleaner]*Valence[NEG]	-258,7342	187,1248	100,4	-1,38	0,1698

REML Variance Component Estimates

Random Effect	Var Ratio	Var Component	Std Error	95% Lower	95% Upper	Wald p-Value	Pct of Total
Name	0,2676237	799697,56	220033,45	368439,91	1230955,2	0,0003*	21,112
Name*Category	-0,105782	-316091,8	243719,23	-793772,7	161589,09	0,1946	0,000
Name*Valence	-0,063631	-190138,9	138829,54	-462239,8	81961,963	0,1708	0,000
Name*Category*Valence	-0,058819	-175760,5	20473,924	-215888,7	-135632,3	<,0001*	0,000
Residual		2988141,8	348081,55	2408082,5	3807524,1		78,888
Total		3787839,3	401953,82	3108768,3	4717834,3		100,000

-2 LogLikelihood = 5255,824622
Note: Total is the sum of the positive variance components.
Total including negative estimates = 3105848,1

Fixed Effect Tests

Source	Nparm	DF	DFDen	F Ratio	Prob > F
Category	3	3	103,1	3,1654	0,0276*
Valence	1	1	55,05	5,5826	0,0217*
Category*Valence	3	3	102	2,3291	0,0789

Effect Details

Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent	1652,7654	239,78844
SkinCare	1442,0480	196,93113
ToiletCleaner	2131,2341	195,48604
Toothpaste	1705,0522	193,92254

Least Squares Means Plot
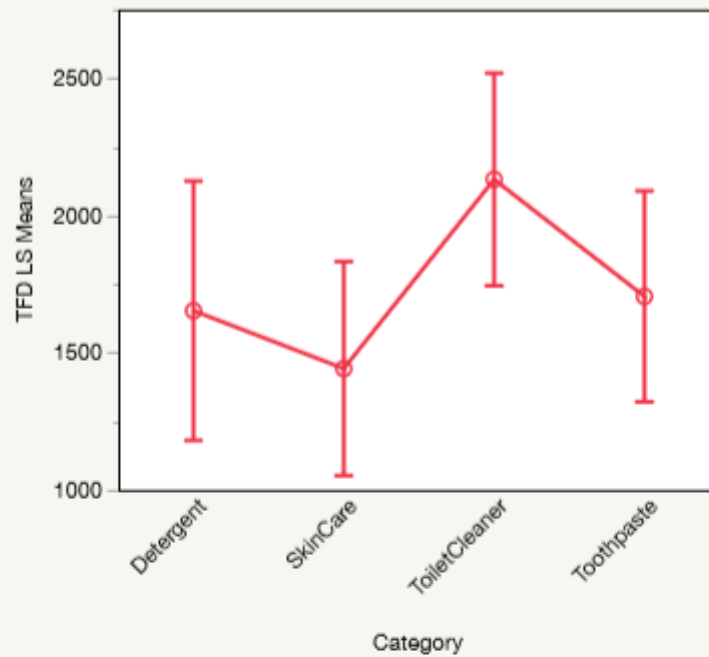
LSMeans Differences Tukey HSD

α= 0,050 Q= 2,61143

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif		Detergent	SkinCare	ToiletCleaner	Toothpaste
	Detergent	0	210,717	-478,47	-52,287
		0	249,824	250,174	264,036
		0	-441,68	-1131,8	-741,8
		0	863,115	174,843	637,224
LSMean[i]	SkinCare	-210,72	0	-689,19	-263
		249,824	0	228,945	206,875
		-863,11	0	-1287,1	-803,24
		441,68	0	-91,312	277,236
	ToiletCleaner	478,469	689,186	0	426,182
		250,174	228,945	0	207,04
		-174,84	91,3124	0	-114,49
		1131,78	1287,06	0	966,854
	Toothpaste	52,2868	263,004	-426,18	0
		264,036	206,875	207,04	0
		-637,22	-277,24	-966,85	0
		741,797	803,244	114,49	0

Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG	1557,0208	171,72456
POS	1908,5291	161,33374

Least Squares Means Plot
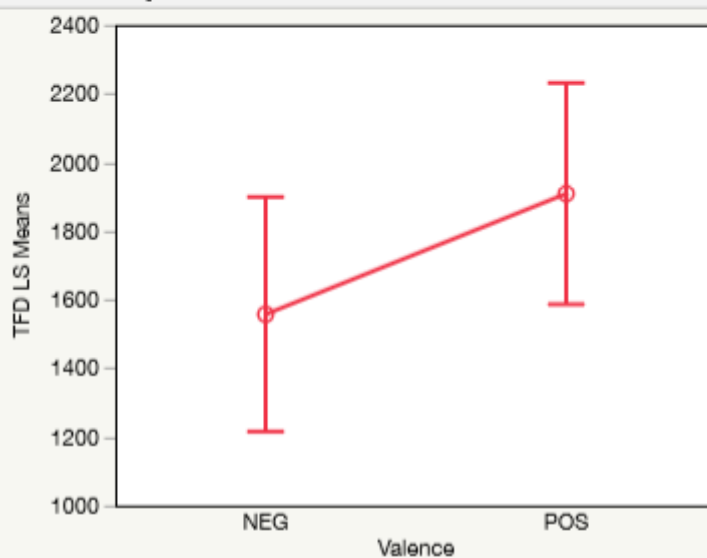
LSMeans Differences Student's t

α= 0,050

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	NEG	POS
NEG	0 0 0 0	-351,51 148,771 . .
POS	351,508 148,771 . .	0 0 0 0

Level		Least Sq Mean
POS	A	1908,5291
NEG	A	1557,0208

Levels not connected by same letter are significantly different.

Level	Least Sq Mean	Std Error
Detergent,NEG	1695,8510	380,74428
Detergent,POS	1609,6797	291,59523
SkinCare,NEG	1498,7253	279,99088
SkinCare,POS	1385,3707	277,00647
ToiletCleaner,NEG	1696,7458	270,67282
ToiletCleaner,POS	2565,7225	282,12657
Toothpaste,NEG	1336,7611	272,68117
Toothpaste,POS	2073,3433	275,80570

LSMeans Differences Tukey HSD

α= 0,050 Q= 3,09478

Mean[i]-Mean[j] / Std Err Dif / Lower CL Dif / Upper CL Dif	Detergent,NEG	Detergent,POS	SkinCare,NEG	SkinCare,POS	ToiletCleaner,NEG	ToiletCleaner,POS	Toothpaste,NEG	Toothpaste,POS
Detergent,NEG	0	86,1713	197,126	310,48	-0,8947	-869,87	359,09	-377,49
	0	479,577	472,611	391,412	467,151	400,124	410,122	470,144
	0	-1398	-1265,5	-900,86	-1446,6	-2108,2	-910,15	-1832,5
	0	1570,36	1659,75	1521,82	1444,84	368,428	1628,33	1077,5
Detergent,POS	-86,171	0	110,954	224,309	-87,066	-956,04	272,919	-463,66
	479,577	0	310,555	402,194	300,414	405,738	399,228	332,655
	-1570,4	0	-850,15	-1020,4	-1016,8	-2211,7	-962,61	-1493,2
	1398,02	0	1072,05	1469,01	842,652	299,628	1508,44	565,833
SkinCare,NEG	-197,13	-110,95	0	113,355	-198,02	-1067	161,964	-574,62
	472,611	310,555	0	393,862	319,266	397,48	390,832	296,243
	-1659,8	-1072,1	0	-1105,6	-1186,1	-2297,1	-1047,6	-1491,4
	1265,5	850,145	0	1332,27	790,04	163,118	1371,51	342,191
SkinCare,POS	-310,48	-224,31	-113,35	0	-311,38	-1180,4	48,6096	-687,97
	391,412	402,194	393,862	0	387,294	328,226	288,841	390,898
	-1521,8	-1469	-1332,3	0	-1510	-2196,1	-845,29	-1897,7
	900,857	1020,4	1105,56	0	887,215	-164,56	942,511	521,773
ToiletCleaner,NEG	0,89472	87,0661	198,02	311,375	0	-868,98	359,985	-376,6
	467,151	300,414	319,266	387,294	0	390,972	384,212	288,763
	-1444,8	-842,65	-790,04	-887,22	0	-2079	-829,07	-1270,3
	1446,63	1016,78	1186,08	1509,97	0	340,998	1549,04	517,06
ToiletCleaner,POS	869,871	956,043	1067	1180,35	868,977	0	1228,96	492,379
	400,124	405,738	397,48	328,226	390,972	0	296,782	394,543
	-368,43	-299,63	-163,12	164,563	-341	0	310,487	-728,65
	2108,17	2211,71	2297,11	2196,14	2078,95	0	2147,44	1713,4
Toothpaste,NEG	-359,09	-272,92	-161,96	-48,61	-359,98	-1229	0	-736,58
	410,122	399,228	390,832	288,841	384,212	296,782	0	387,845
	-1628,3	-1508,4	-1371,5	-942,51	-1549	-2147,4	0	-1936,9
	910,148	962,605	1047,58	845,291	829,068	-310,49	0	463,715
Toothpaste,POS	377,492	463,664	574,618	687,973	376,598	-492,38	736,582	0
	470,144	332,655	296,243	390,898	288,763	394,543	387,845	0
	-1077,5	-565,83	-342,19	-521,77	-517,06	-1713,4	-463,71	0
	1832,49	1493,16	1491,43	1897,72	1270,26	728,646	1936,88	0

4 - Hypothesis 4 (Countdown Button)

Response TFD

Effect Summary

Source	LogWorth		PValue
Valence	2,325		0,00474
Category	1,830		0,01479
Category*Valence	0,750		0,17779

Summary of Fit

RSquare	0,45657
RSquare Adj	0,433233
Root Mean Square Error	1371,577
Mean of Response	1916,222
Observations (or Sum Wgts)	171

Parameter Estimates

Term	Estimate	Std Error	DFDen	t Ratio	Prob>|t|
Intercept	1842,3466	175,7287	46,59	10,48	<,0001*
Category[Detergent]	-157,952	180,7155	119,8	-0,87	0,3838
Category[SkinCare]	-274,1052	176,916	122,6	-1,55	0,1239
Category[ToiletCleaner]	593,87642	178,2228	124,8	3,33	0,0011*
Valence[NEG]	-288,9089	97,18926	44,85	-2,97	0,0047*
Category[Detergent]*Valence[NEG]	299,65119	232,8947	107,1	1,29	0,2010
Category[SkinCare]*Valence[NEG]	133,92096	230,8595	102,9	0,58	0,5631
Category[ToiletCleaner]*Valence[NEG]	-404,1382	229,4257	104,6	-1,76	0,0811

REML Variance Component Estimates

Random Effect	Var Ratio	Var Component	Std Error	95% Lower	95% Upper	Wald p-Value	Pct of Total
Name	0,5380966	1012280,6	317432,97	390123,43	1634437,8	0,0014*	34,985
Name*Valence	-0,086784	-163259,4	230005,26	-614061,4	287542,66	0,4778	0,000
Name*Category*Valence	0	0	0	0	0	.	0,000
Name*Category		1881224,7	299015,5	1409443,1	2638310,8	<,0001*	65,015
Total		2893505,3	432327,62	2203092,3	3970030,9		100,000

-2 LogLikelihood = 2891,5117092
Note: Total is the sum of the positive variance components.
Total including negative estimates = 2730246
Residual is confounded with Name*Category and has been removed.

Fixed Effect Tests

Source	Nparm	DF	DFDen	F Ratio	Prob > F
Category	3	3	90,15	3,6888	0,0148*
Valence	1	1	44,85	8,8366	0,0047*
Category*Valence	3	3	93,13	1,6748	0,1778

Category

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent	1684,3946	254,99541
SkinCare	1568,2414	247,87801
ToiletCleaner	2436,2230	247,48260
Toothpaste	1680,5273	252,28150

Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
NEG	1553,4377	200,94756
POS	2131,2554	200,68064

Least Squares Means Plot
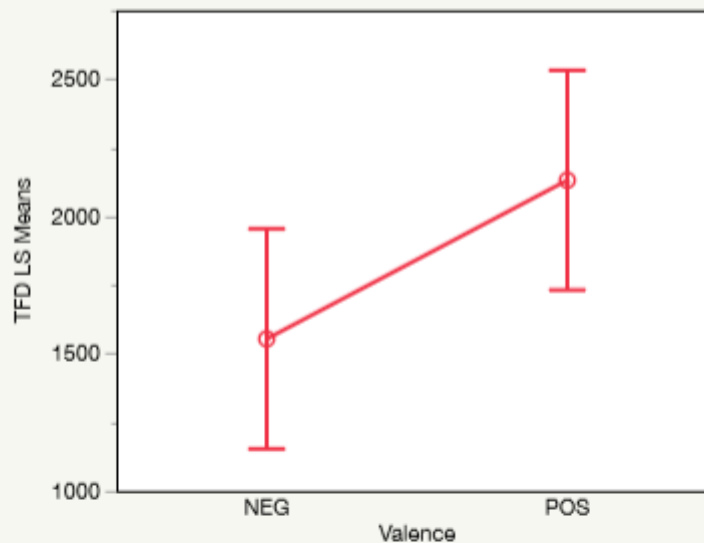
Category*Valence

Least Squares Means Table

Level	Least Sq Mean	Std Error
Detergent,NEG	1695,1369	356,79735
Detergent,POS	1673,6523	364,39853
SkinCare,NEG	1413,2535	357,42434
SkinCare,POS	1723,2293	343,54311
ToiletCleaner,NEG	1743,1759	343,18494
ToiletCleaner,POS	3129,2701	356,67161
Toothpaste,NEG	1362,1846	356,79735
Toothpaste,POS	1998,8701	356,76249

LSMeans Differences Tukey HSD

α= 0,050 Q= 3,10095

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	Detergent,NEG	Detergent,POS	SkinCare,NEG	SkinCare,POS	ToiletCleaner,NEG	ToiletCleaner,POS	Toothpaste,NEG	Toothpaste,POS
Detergent,NEG	0	21,4847	281,883	-28,092	-48,039	-1434,1	332,952	-303,73
	0	509,991	505,031	399,226	495,056	411,405	423,278	504,563
	0	-1560	-1284,2	-1266,1	-1583,2	-2709,9	-979,61	-1868,4
	0	1602,94	1847,96	1209,89	1487,1	-158,39	1645,52	1260,89
Detergent,POS	-21,485	0	260,399	-49,577	-69,524	-1455,6	311,468	-325,22
	509,991	0	414,14	500,808	408,248	509,903	509,991	433,477
	-1602,9	0	-1023,8	-1602,6	-1335,5	-3036,8	-1270	-1669,4
	1559,97	0	1544,62	1503,4	1196,43	125,565	1892,92	1018,97
SkinCare,NEG	-281,88	-260,4	0	-309,98	-329,92	-1716	51,069	-585,62
	505,031	414,14	0	495,756	418,366	504,942	505,031	410,482
	-1848	-1544,6	0	-1847,3	-1627,3	-3281,8	-1515	-1858,5
	1284,19	1023,83	0	1227,34	967,411	-150,22	1617,14	687,266
SkinCare,POS	28,0924	49,577	309,976	0	-19,947	-1406	361,045	-275,64
	399,226	500,808	495,756	0	485,59	422,301	399,226	495,279
	-1209,9	-1503,4	-1227,3	0	-1525,7	-2715,6	-876,93	-1811,5
	1266,07	1602,56	1847,29	0	1485,84	-96,506	1599,02	1260,19
ToiletCleaner,NEG	48,039	69,5236	329,922	19,9466	0	-1386,1	380,991	-255,69
	495,056	408,248	418,366	485,59	0	494,965	495,056	401,274
	-1487,1	-1196,4	-967,41	-1485,8	0	-2921	-1154,2	-1500
	1583,18	1335,48	1627,26	1525,74	0	148,767	1916,13	988,637
ToiletCleaner,POS	1434,13	1455,62	1716,02	1406,04	1386,09	0	1767,09	1130,4
	411,405	509,903	504,942	422,301	494,965	0	411,405	504,474
	158,389	-125,56	150,216	96,5056	-148,77	0	491,341	-433,95
	2709,88	3036,8	3281,82	2715,58	2920,96	0	3042,83	2694,75
Toothpaste,NEG	-332,95	-311,47	-51,069	-361,04	-380,99	-1767,1	0	-636,69
	423,278	509,991	505,031	399,226	495,056	411,405	0	504,563
	-1645,5	-1892,9	-1617,1	-1599	-1916,1	-3042,8	0	-2201,3
	979,611	1269,99	1515,01	876,934	1154,15	-491,34	0	927,938
Toothpaste,POS	303,733	325,218	585,617	275,641	255,694	-1130,4	636,686	0
	504,563	433,477	410,482	495,279	401,274	504,474	504,563	0
	-1260,9	-1019	-687,27	-1260,2	-988,64	-2694,7	-927,94	0
	1868,36	1669,41	1858,5	1811,48	1500,02	433,948	2201,31	0

Level			Least Sq Mean
ToiletCleaner,POS	A		3129,2701
Toothpaste,POS	A	B	1998,8701
ToiletCleaner,NEG	A	B	1743,1759
SkinCare,POS		B	1723,2293
Detergent,NEG		B	1695,1369
Detergent,POS	A	B	1673,6523
SkinCare,NEG		B	1413,2535
Toothpaste,NEG		B	1362,1846