**To fit in or to Stand out? An Eye-Tracking Study Investigating Online Banner Effectiveness in a Media Multitasking Context.**

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**Abstract**

Online advertising banners often suffer from banner blindness*,* meaning that people avoid looking at them. The current study examines whether web surfing while watching television, also known as media multitasking, influences how people respond to online banners. The experimental study examines whether people respond differently to an online banner that thematically fits with the website content (i.e., banner congruity) and that is animated (i.e., banner animation), taking into account the relevance between media tasks (whether the content of the television program and the website are related). Individuals’ cognitive (visual attention paid to the banner, measured by eye-tracking technology) and attitudinal (online banner irritation) advertising responses are measured as dependent variables. The results indicate that during media multitasking with high task relevance, higher visual attention was obtained for an incongruent (versus congruent) banner. When task relevance was low, no such differences were found. This two-way interaction effect was not significant for banner irritation. Further, a significant three-way interaction with task relevance, banner congruity, and banner animation was found on banner irritation but not on visual attention. Concretely, the lowest levels of banner irritation were obtained for a congruent, animated banner in a media multitasking context with high task relevance.

**Keywords**: Media Multitasking, Eye-Tracking, Task Relevance, Advertising Congruity, Banner Animation, Advertising Effectiveness

Engagement in two or more media activities at the same time, also referred to as media multitasking, is becoming the most common form of media consumption behavior today (Segijn and Eisend 2019). According to the latest Nielsen media report (2018), U.S. adults spend more than 10 hours per day on media use and 88% report multitasking (sometimes or always) with a digital device (laptop, tablet, mobile phone) when watching TV. This media multitasking behavior, however, raises concerns among advertisers because their advertisements are often consumed under conditions of divided attention. Indeed, media multitasking studies examining advertising effectiveness report negative effects on cognitive advertising outcomes, such as attention paid to ads or brand recall (Angell et al. 2016; Kazakova et al. 2016; Segijn and Eisend 2018; Zhang, Jeong, and Fishbein 2010). In contrast, positive effects are found on attitudinal advertising outcomes, such as brand attitudes and lower degrees of irritation toward the ads (e.g., Beuckels, Cauberghe, and Hudders 2017; Jeong and Hwang 2012; Jeong and Hwang 2016; Segijn, Voorveld, and Smit 2016).

The combination of watching television and online surfing is claimed to be the most common form of media multitasking (Deloitte 2016; Garaus, Wagner, and Bäck 2017; Pilotta and Schultz 2005). In a Nielsen study (2018), 71% of the times when individuals simultaneously watched television and used a digital device, they reported searching for related information online. The diary study by Voorveld and Van der Goot (2013) confirmed these results. Investigating the age differences in media multitasking, they found that watching television while exploring websites was popular among all age groups, except for youngsters (age 13–19). The likelihood that media users will be exposed to online banner advertising while watching television is therefore considerably high. In terms of cognitive outcomes, an array of studies (all in a single-medium exposure context) have suggested that media users possess the tendency to avoid fixating their eyes on banner advertisements (Burke, Marlow, and Lento 2010; Chatterjee 2008; Harms, Bijmolt, and Hoekstra 2019; Sanghavi, Greenzeiger, and Phulari 2017), while, in terms of attitudinal outcomes, studies show that banner advertisements often lead to higher levels of perceived intrusiveness or irritation (Chatterjee 2008; Kononova, Quilliam, and Richards 2016). A media multitasking context, in which different media streams constantly compete for attention, might present an even greater challenge for advertising banners, especially in terms of attention-grabbing potential. Conversely, given the cognitive constraints of media multitasking individuals, the perceived intrusiveness or irritation of embedded banners might be reduced (Beuckels, Cauberghe, and Hudders 2017).

The current study aims to add value to the existing knowledge about banner advertising by examining the process of attention allocation for a banner ad on a website while consumers watch a television program. Previous research has revealed that media consumption behavior happens predominantly automatic, habitual, and thus subconscious (LaRose 2010), whereby media users show little self-insight concerning their distribution of attention when media multitasking (Brasel and Gips 2017). Therefore, in line with previous media multitasking research (e.g. Segijn, Voorveld, Vandeberg, and Smit 2017; Kätsyri et al. 2016), the current study uses an eye-tracking device to measure attention as it allows for the assessment of subconscious attention allocation (in contrast to self-reported measures), which is meaningful in a media multitasking context. Additionally, the study aims to examine the circumstances under which banners ads can increase their attention grasping potential based on features of the banner ad, such as task relevance between the two media streams, banner-website congruency, and banner animation.

While previous research often focused on features of the media tasks or individual traits to explain media multitasking effects, Duff and Segijn (2019) found that only a few studies explored the role of features related to the advertisement itself (e.g., Kazakova et al. 2016). In a media multitasking context, even more than in traditional advertising research, the features of plural media tasks and embedded advertisements coexist, and they could interact with each other in affecting advertising outcomes (Jeong and Hwang 2016; Segijn, Voorveld, and Smit 2017; Smit et al. 2017; Wang et al. 2015). An eye-tracking study by Guitart, Hervet, and Hildebrand (2019) revealed that media multitasking narrows one’s visual field, whereby many ads are not being looked at directly in this context; however, no research has been devoted to how the characteristics of the advertisements and media tasks affect advertising outcomes in terms of cognitive and attitudinal outcomes. Therefore, the current study will consider the features of both advertisements and media tasks and their relatedness to each other in explaining advertising outcomes as visual attention and banner irritation.

The first level of relatedness that will be considered in the current study is “task relevance,” as research has suggested that the level of task relevance determines cognitive demand during media multitasking behavior (Segijn, Voorveld, and Smit 2017; Wang et al. 2015). Task relevance refers to whether the simultaneously consumed media tasks are thematically congruent (e.g., watching a cooking show while searching additional information about ingredients) or not, and is therefore unique to media multitasking contexts (Segijn, Voorveld, and Smit 2017). More specifically, it is argued that highly task-relevant media multitasking contexts represent a less cognitively demanding situation compared to less relevant ones (Wang et al. 2015). Task relevance is therefore considered an important factor driving advertising effectiveness (Segijn, Voorveld, and Smit 2017; Segijn and Eisend 2019) as it might determine whether the media user has the ability to efficiently process advertising cues when media multitasking. Therefore, we expect it to have a moderating impact on the effectiveness of banner congruity and banner animation, which are both commonly used advertising strategies.

The second level of relatedness that the current study will investigate entails the (in)congruity between advertising content (i.e., the banner) and the surrounding media context (i.e., the website) (e.g., advertising knives when surfing on a cooking website; hereafter referred to as banner congruity). While advertising studies in a single-medium tasking context (e.g., Lee and Shen 2009; Lewis and Porter 2010) report findings both in favor of congruity (Newman, Stem Jr, and Sprott 2004) and incongruity (Fleck and Maille 2010), it is argued that the direction of these effects could depend on the availability of cognitive resources when processing cues regarding (in)congruity (Lee and Shen 2009; Lewis and Porter 2010). Therefore, we believe that task relevance could moderate the processing and effectiveness of banner (in)congruity, as it has been shown to predict the availability of these resources.

Another common strategy that could be affected by the level of task relevance during media multitasking is banner animation. Animation is often created through GIF files, which repeatedly show a number of still images to create the illusion of movement. However, past studies are inconclusive about the impact of banner animation. Single-medium tasking studies reveal positive (e.g., Yoo, Kim, and Stout 2004), negative (e.g., Lee and Ahn 2012) or no effects (Kuisma et al. 2010) of banner animation on attention. Concerning attitudinal outcomes of banner advertising, studies indicate that animation can be perceived as highly intrusive and therefore irritating (Spool et al. 1999; Lee and Ahn 2012) and it is additionally argued that cognitive depletion would reinforce these effects (Yoo, Kim, and Stout 2004). However, to the best of our knowledge, media multitasking studies have not yet investigated the effectiveness of banner animation. As we reasoned above, even though media multitasking contexts are characterized by a high cognitive load, task relevance could moderate that effect (Segijn, Voorveld, and Smit 2017). Therefore, the concluding goal of this study is to investigate how banner congruity, banner animation, and task relevance interact with each other in affecting visual attention and banner irritation.

THEORY AND HYPOTHESES DEVELOPMENT

Banner Advertising in a Media Multitasking Context

Research has shown that individuals have a high tendency to avoid banner ads, an act that is referred to as banner blindness (e.g., Benway 1998). Past research has shown that consumers are often irritated by online banners and tend to avoid looking at them (Spool et al. 1999). However, despite the growing concern about banner blindness (Pagendarm & Schaumburg 2006), global internet advertising revenues are still exponentially increasing (Kononova, Joo, Lynch, & Kim 2017). Research has shown that although banner click-through rates are low, banners impact advertising effects based on incidental exposures (Yoo 2009).

Particularly in a media multitasking context, where attention is unavoidably divided and which is known to be cognitively demanding, we believe that it is relevant to investigate the factors that could counter banner blindness and increase advertising effectiveness. Several theoretical models argue that human information processing is restricted by the limited pool of mental resources available at a given moment in time (Kahneman 1973; Lang 2000). The availability of cognitive resources has been a central concept in numerous media multitasking studies investigating advertising effects, as processing resources that are allocated to multiple media tasks will most likely occur at the expense of processing resources for the advertising content (e.g., Beuckels et al. 2019; Jeong and Hwang 2016; Kazakova et al. 2016). Hence, when investigating banner effectiveness in a media multitasking context, the amount of limited cognitive resources might play an important role.

Task Relevance during Media Multitasking

Academic literature suggests that the level of cognitive depletion during media multitasking is related to the level of task relevance to the media with which one is multitasking. Salvucci and Taatgen (2008) developed the threaded cognition theory as a domain-independent framework to understand and predict the performance of concurrent tasks. They propose that people organize information and tasks into so-called “cognitive threads.” This implies that, when multitasking with various goals, multiple threads compete for cognitive resources, which consequently increases cognitive load. Wang et al. (2015) extended these arguments to the media multitasking domain and argued that multitasking with media serving a common goal is cognitively less demanding than multitasking with media serving different goals. As such, a meta-analysis of 49 studies of Jeong and Hwang (2016) revealed that multitasking studies using media tasks with low task relevance (versus high task relevance) showed greater negative effects on cognitive outcomes such as comprehension, recall and task performance. In addition, the study of Segijn, Voorveld, and Smit (2017) revealed that highly task-relevant media multitasking contexts showed positive effects for both cognitive and attitudinal advertising outcomes. They proposed that task relevance positively affected respondents’ involvement with the television program they were watching, resulting in better advertising attitudes. Given that task relevance could facilitate the processing of advertising messages due to fewer cognitive restraints in a media multitasking context, we expect it to have a moderating impact on the effectiveness of two commonly used advertising strategies, namely banner congruity and banner animation, for both cognitive (i.e., visual attention) and affective (i.e., perceived irritation) advertising outcomes.

How Banner Congruity and Task Relevance Affect Visual Attention during Media Multitasking

 In the past, researchers have studied how and why (in)congruity between advertisements and the context they are placed in affects advertising processing in a single-medium context (Fleck and Quester 2007). The results of these studies are inconclusive, indicating positive (e.g., Newman, Stem Jr, and Sprott 2004) or negative (e.g., Moore, Stammerjohan, and Coulter 2005) effects of context congruity on advertising effectiveness. Two conflicting theories, cognitive priming and cognitive interference theory (Furnham and Goh 2014), explain these inconclusive results.

The *cognitive priming* theory claims that an advertisement placed in a congruent context will be perceived more positively and better remembered than when placed in an incongruent context (e.g., Higgins, Bargh, and Lombardi 1985; Yi 1990). According to this theory, the activation of a concept in our memory primes the memory of other concepts that are either conceptually or semantically related to that original concept (Furnham, Bergland, and Gunter 2002; Sanbonmatsu and Fazio 1991; Moorman, Neijens, and Smit 2002; Yaveroglu and Donthu 2008). Studies in favor of the congruity effect contend that the information related to the theme of an advertisement is more accessible when it is primed by thematically congruent programs, which makes the advertisement easier to process (Martín-Luengo, Luna, and Migueles 2015) and valued more highly (Fleck and Maille 2010).

The *cognitive interference* theory, in contrast, argues that congruity between advertisements and their surrounding content risks resulting in the blending of the two (Bandura, Bryant, and Zillmann 1994). The incongruity between two distinct information parts creates tension and triggers a human desire to relieve this tension (Festinger 1962). Hence, a more elaborate way of information processing is activated to resolve or make meaning of the incongruity (Lee and Schumann 2004). It is therefore claimed that (a moderate level of) incongruity has the greatest potential to draw people’s attention and encourage people to process information more elaborately (Fleck, Korchia, and Le Roy 2012; Lee and Schumann 2004; Mandler 1982).

However, the study by Fleck and Maille (2010), reviewing thirty years of advertising (in)congruity studies, proposed that scholars devoted insufficient attention to possible moderating factors that could predict the effectiveness of either congruity or incongruity. As such, previous research argues that the availability of cognitive resources (Lee and Shen 2009; Lewis and Porter 2010) and the level of distraction (Nowlis and Shiv 2005) could determine whether congruent or incongruent ads attract more attention. The processing of incongruent information unavoidably requires more elaboration and therefore demands more cognitive effort and resources compared to processing congruent information (Lee and Schumann 2004; Lewis and Porter 2010). This is presumably the case because processing unrelated content demands the activation of a new and different schema (Higgins, Bargh, and Lombardi 1985), which is an act that demands cognitive resources. It is therefore suggested that the advantage of incongruent information will only occur when the perceiver has sufficient resources available to process it (Lee and Shen 2009). When one is distracted by another task, his/her resources will be limited and consequently interest in incongruity will vanish (Fleck and Maille 2010; Nowlis and Shiv 2005). Given the fact that multitasking with media demands less cognitive effort when task relevance is high, we expect that an incongruent banner will outperform a congruent banner in attracting attention in such a context.

Conversely, when task relevance is low, levels of distraction and cognitive load increase (Wang et al. 2015). In this context, it is plausible to expect that levels of banner congruity or incongruity risk being ignored altogether (Lee and Schumann 2004; Petty and Cacioppo 1986; Houston, Childers, and Heckler 1987). The study by Lewis and Porter (2010) revealed that the high cognitive load of complex virtual gaming environments restrained people from fully processing incongruent advertising cues. Furthermore, it is argued that people under cognitive restraints have few to no resources available and therefore could be unmotivated to process congruity or incongruity cues (Petty and Cacioppo 1986; Fleck and Maille 2010). In addition, research has shown that high levels of distraction might limit people’s processing opportunities (MacInnis and Jaworski 1989; Mitchell 1980). As media multitasking with low task relevance typically represents a context characterized by distraction, it is plausible to expect that this media experience would completely prevent media users from processing (in)congruity cues. Therefore, we believe that there will be no significant differences in attention due to banner congruity or incongruity in a low task-relevant media multitasking context.

**H1:** When task relevance is high, banner incongruity will lead to more attention compared to congruity. When task relevance is low, we expect no difference in attention for an incongruent versus a congruent banner.

How Banner Congruity and Task Relevance Affect Banner Irritation During Media Multitasking

The research investigating the processing of advertising congruity versus incongruity suggests differential effects in terms of attention versus attitudes to the ad (e.g., Moore, Stammerjohan, and Coulter 2005; Meyers-Levy and Tybout 1989). Even though advertising incongruities might have a higher attention-attracting ability (under conditions of low cognitive load), they may seem out of place, leading to negative attitudes among media users (Russell 2002). The cognitive effort to dissolve the incongruity in itself might evoke negative evaluations of the information. In addition, the critical reflection or activation of counterarguments regarding the misfit of the banner with the content of the website demands cognitive resources (Lee and Shen 2009; Lee and Schumann 2004). Hence, these effects will be stronger when cognitive resources are available, as is the case during media multitasking with high task relevance in comparison with that of low task relevance. In contrast, congruent information is perceived to fit better with the schema and expectations of consumers and is therefore evaluated more positively (Mandler 1982). Information processing ease is higher, resulting in more positive attitudes toward the information. In the context of Internet sponsorship, for example, sponsoring companies that were congruent with the website received more favorable attitudes than incongruent ones (Rodgers 2003). However, as argued previously, in a cognitively demanding media multitasking context, the low task relevance between the content on the television and the content on the website will be so demanding that media users will not have sufficient resources at hand to detect and process the levels of congruity. Therefore, we hypothesize as follows.

**H2:** When task relevance is high, banner incongruity will lead to more banner irritation compared to congruity. When task relevance is low, we expect no difference in banner irritation for an incongruent banner versus a congruent one.

How Banner Animation, Banner Congruity, and Task Relevance Affect Visual Attention During Media Multitasking

Adding animated elements to an online banner is another common tactic to attract media users’ attention. Advertisers and web designers believe that the inclusion of animation in advertising banners can break through the advertising clutter (Yoo, Kim, and Stout 2004). Even though the effectiveness of banner animation has been extensively studied in a single-medium context, the results are inconclusive. Some studies found positive advertising results of banner animation on attention (Yoo, Kim, and Stout 2004; Hong, Thong, and Tam 2004), while others failed to find any impact (Kuisma et al. 2010) or revealed negative effects (Lee and Ahn 2012). Kuisma et al. (2010) argued that the effectiveness of animated features on visual attention depends on the format of online advertisements. While animation may attract attention to vertically placed online ads (also called skyscrapers), it decreases attention for the most commonly used horizontally placed advertisements (also called banners). Tavassoli (2007), in turn, argues that the use of flashing objects or motion in banner ads can devalue advertisements (due to the high level of intrusiveness) to such an extent that people try to ignore them even more. Similarly, the eye-tracking study conducted by Lee and Ahn (2012) showed that, even though animation is used as an attention-grabbing tool, Internet users tend to allocate less attention to animated banner ads compared to static ones. More specifically, they found that static banners resulted in longer fixation durations than animated banners. According to the authors, the animated features in a banner serve as a cue to alert people about the presence of commercial content. This is in line with the theoretical framework of Fransen, Smit, and Verlegh (2015), which argues that people dislike being persuaded and therefore adopt coping strategies to resist persuasive attempts. One of these strategies entails the avoidance of a persuasive message and is often employed when people feel like these messages are trying to change their existing attitudes or to deceive them. It is expected that a media multitasking context creates a perfect situation for media users to engage in this avoidance strategy, as they have plenty of other media content accessible to occupy their attention.

Banner animation may raise people’s awareness about the presence and persuasive strategies of advertising content, which could consequently trigger them to avoid paying attention to the banner. However, this is a process that requires cognitive control and effort, since individuals need to reflect upon the persuasive intentions of moving images and redirect their visual attention accordingly. Avoiding the banner in this context thus involves both one’s ability to willfully focus attention on the other media content and also to perform inhibitory control to ignore the disagreeable persuasive content (Eisenberg et al. 2004; Hamilton et al. 2011). In addition, avoiding the animated banner by focusing on the surrounding media context implies that the flickering animation is still nearby and most likely being perceived through peripheral vision. While most content perceived by peripheral vision can be effortlessly ignored, moving objects are known to maintain constant awareness even when perceived peripherally (Gillies and Dodgson 2002). Therefore, ignoring an animated banner is possibly more effortful because it demands continuous inhibitory control due to permanent awareness (Kahneman 1973; Gillies and Dodgson 2002). We expect that this avoidance strategy in response to animation will only be executed effectively under conditions of high task relevance and not low task relevance, due to insufficient resources. However, while the availability of cognitive resources during media multitasking with high task relevance makes it practically possible for media users to use animation cues to avoid banners, they will not always be motivated to do so. We argued above (cf. H1) that incongruent banners might spark interest among media users in a high task-relevant context. Under such conditions, therefore, it is plausible to expect that they will not be intrinsically motivated to apply the avoidance strategy, as they are attracted by the incongruity level. On the contrary, adding animation to the banner under these circumstances might motivate users even more to resolve the appealing incongruity. Conversely, we argued that a congruent banner under conditions of high task relevance is less compelling. Therefore, we expect that media users would be more inclined to use the animated features of the banner as a cue to avoid the banner under these circumstances.

Following the reasoning already outlined, we expect that the heavy cognitive load that comes with low task-relevant media multitasking behavior will engage media users to process the animation cues. As for advertising congruity, we expect no significant effects of banner animation under conditions of low task relevance.

**H3:** When task relevance is high, banner animation will negatively affect attention for a congruent banner ad and positively affect attention for an incongruent banner. When task relevance is low, we expect no significantly different impact of banner animation on attention for a congruent banner versus an incongruent one.

How Banner Animation, Banner Congruity, and Task Relevance Affect Banner Irritation During Media Multitasking

As noted, a frequent concern for animated banners is the inducement of irritation (Yoo, Kim, and Stout 2004). However, previous research suggests that the attitudinal evaluation of banner animation depends on the context in which these animated features are placed.

First, under conditions of high task relevance, we believe that an interaction between banner congruity, task relevance, and banner animation will affect banner irritation. More specifically, the study by Belanche, Flavián, and Pérez-Rueda (2017) revealed that high arousal advertising stimuli negatively affected advertising attitudes when placed in an incongruent context and positively affected advertising attitudes when placed in a congruent context. These findings are supported by the reasoning that a congruent media context can unify to such an extent that it results in the so-called “meltdown” effect. This has been shown to confuse media users. They process the commercial to the same extent as the media content, which might evoke feelings of being misled and could even result in negative evaluations (Furnham, Bergland, and Gunter 2002). In such a congruent context, animation might signal that the banner contains persuasive content, which seems more honest to the media user than a static banner. As hypothesized in H3a, individuals might avoid the banner due to the signaling function of the animation, but its peripheral processing might lead to less irritation.

Contrarily, for incongruent advertisements, highly arousing stimuli have been shown to result in processing difficulties and negative advertising attitudes (Puccinelli, Wilcox, and Grewal 2015; Belanche, Flavián, and Pérez-Rueda 2017). These arousing stimuli could be perceived as yet another distraction (Edwards, Li, and Lee 2002) next to the incongruity of the content. We expect that, specifically in a media multitasking context, the perceptions of distraction and intrusiveness could be particularly high as people are already switching between different information streams. In addition, the attention evoked by the incongruity (between the website and the banner) might stimulate individuals to activate their counterarguments, which even increases their attention to the banner and thus also their negative attitudes toward the banner and its persuasive influence.

To conclude, just as for attentional outcomes, we believe that animated features will have no effect on perceived irritation in a media multitasking context with low task relevance, as the media users’ minds are already highly divided, and they will simply not have enough resources to detect or process the animated cues (Dahlén et al. 2008). Nor will they have any resources left to avoid the banner (demands inhibition) or to formulate counterarguments. The avoidance of animated banners (Gillies and Dodgson 2002; Eisenberg et al. 2004) and the formulation of counterarguments (Jeong and Hwang 2012) during media multitasking are processes that demand cognitive resources that are not at hand in a context of low task relevance. The following hypotheses are proposed.

**H4:** When task relevance is high, banner animation will negatively affect irritation for a congruent banner but positively affect irritation for an incongruent one. When task relevance is low, we expect no significantly different impact of banner animation on irritation caused by congruent and incongruent banners.

METHOD

Experimental Design and Sample

The experiment was designed to measure the interaction of task relevance, banner congruity, and banner animation on visual attention to banners and banner irritation. Therefore, a 2 (Task relevance: incongruent vs. congruent) X 2 (Banner congruity: incongruent vs. congruent) X 2 (Banner animation: static vs. animated banner) between subjects experimental design was conducted. This created eight conditions, to which participants of the experiment were randomly assigned. A total of 243 respondents (Mage = 22.6, SD = 4.82, 36% male, 77.8% students) were recruited in a European public library and were offered a €5 incentive to participate in the study.

 One experimenter recruited all participants in the public library and guided them to a waiting room. They were admitted to the media experience lab one by one. As this study is particularly interested in attentional focus while media multitasking, media exposure was conducted individually in order to control for other potential distractions. The lab imitated a real living room setting (see Appendix 1), providing a television screen and a laptop. A portable computer was chosen as a second medium, as one of the most prevalent media multitasking combinations is television-laptop (Segijn et al. 2017; Brasel and Gips 2011). Moreover, the use of a laptop allowed us to utilize a remote eye-tracking device attached to the screen, which is less obtrusive than wearing eye-tracking glasses. After a short calibration of the eye-tracking software, all participants were instructed to imagine the following scenario: they were watching a television show at home and began to feel hungry. Therefore, they were looking for dinner online by scrolling through the website of a local fast-food restaurant. This website was displayed on the computer as soon as the television show started. All respondents watched a television fragment while exploring the restaurant’s website for a duration of 2 minutes,33 seconds. This represents the duration of a clearly demarcated fragment of the television show with a clear beginning and end of a storyline. Besides, this time frame gave the respondents the average time needed to scroll through the presented website. When the television fragment finished, the website shut down automatically as well. After the media exposure, participants returned to the adjacent room where they completed an online questionnaire on a tablet.

Stimulus Material

On the laptop, all participants were exposed to a fictitious website of a non-existing fast-food restaurant (see Appendix 2). At the top of the web page, a 728 x 113 pixel advertising banner (see Appendix 3) appeared, either promoting a food blender (representing ad congruity) or a hairdryer (representing ad incongruity). Banner animation was manipulated by either using a GIF, making the food blender or hairdryer move, or not. Task relevance was manipulated by providing half of the participants a television show that was congruent with the content of the website. *My Pop-Up Resto*, a popular culinary television show in which couples compete in managing a pop-up restaurant for several weeks, was used in the task-relevant condition (information on cooking/food was shown in the relevant website). In the low relevant condition, a fragment of *The Mole*, a popular reality television show, was shown to the respondents. In the program, individuals need to accomplish tasks in groups, thereby increasing the amount of money they can win. However, one of the participants secretly sabotages the tasks. The person who can identify the Mole receives the amount of money the group won. A manipulation check was measured to ensure that the respondents perceived the manipulation as intended (cf. Results section).

Measures

The eye movements of participants were tracked using the SMI Mobile Eye Tracking Device IViewX RED, a contact-free eye-tracking system attached to the portable laptop. This device allowed for recording at a frequency of 250 Hz. Experiment Center software (3.7; SMI Experiment Suite 360°) was used for stimuli presentation (the online website and advertising banner) and data collection. A five-point calibration was performed before each recording session. The relevant obtained data were exported using SMI Behavioral and BeGaze Analysis software (SMI BeGazeTM), preprocessed with custom-build functions in Python and later transmitted to SPSS 24 to conduct statistical analyses.

For data export and preprocessing, we wrote a script in Python to develop our own dwell time variable. We first checked for each sample (250 samples per second) in the raw data whether a fixation or saccade happened and in which area of interest (AOI) the gaze was oriented at that time. The relevant AOI for this study was the rectangular advertisement banner, which was defined beforehand. With the aim of quantifying the visual attention devoted to the banner and comparing the evolution in attention during media exposure for each of the experimental conditions, the data was resampled to windows of 10 seconds. For each of these windows, the percentage of samples reflecting attention to the advertisement AOI in relation to the full 10 seconds was calculated. As further elaborated on in the results section, we identified a strong decrease in attention to the banner ad after the first time interval of 10 seconds. As this is in line with other research, banner advertisements were typically fixated on in the beginning of media tasks (Kuisma et al. 2010). Therefore, for further analyses testing the hypotheses, we used the proportionate attention toward the banner AOI within the first 10 seconds of media exposure only.

Immediately after stimulus exposure, a questionnaire measured **the manipulation checks,** demographic variables, and self-reported constructs, **such as perceived attention toward the ad and media involvement.** The manipulation check of task relevance was measured using three (self-constructed) items (e.g., *“The content of the website fits with the content of the TV program”*). The manipulation of banner/website congruency was measured using three (self-constructed) items (e.g., *“The advertised product in the banner and the content on the website match well”*). We additionally controlled for media involvement by the use of one (self-constructed) item asking how much the respondents *“liked the media they consumed during the experiment.”* The only self-reported construct that was used as a dependent variable within our model was *banner irritation.* This variable was measuredby a seven-item, seven-point Likert scale developed by Fennis and Bakker (2001). For a full overview of the scales and items used, see Appendix 4.

RESULTS

Manipulation Checks

Task relevance was perceived as higher when the content of the TV show and website were congruent (e.g., related to cooking) (M low task relevance = 2.16, M high task relevance = 4.62, t (235) = 20.97, p<.001). As intended, the manipulation of task relevance had no effect on the level of media involvement among the respondents t (231) = 1.49, p = .14. The manipulation of the congruency between the product advertised in the banner and website content was also measured and successful. When the banner advertised a hairdryer (on a cooking website), it was perceived as lower in congruency than when it advertised a blender (M low congruency = 1.87, M high congruency = 3.95; t (235) = 14.82, p<.001). Since the animation of the banner refers to the objective manipulation of static versus moving images, a manipulation check is not necessary.

Distribution of Visual Attention toward Banners During Media Exposure

Before investigating the proposed hypotheses, an explorative insight into how the attention toward the banner ad evolved during the media multitasking experiment is given. The banner in our experiment was placed at the top of the web page, as so-called “header banners” are considered to have the highest attention-attracting ability and are therefore very desired among advertisers (McElfresh, Mineiro, and Radford 2015). With this placement, the banner disappears as the user scrolls down the page. Figure 1 shows plots of average proportional attention toward the banner over time of media exposure. We can indeed infer that the attention toward the banner considerably decreases after the first 10 seconds. Furthermore, we performed a repeated-measures ANOVA to compare the effects of our manipulations on attention over time. The results of this analysis reveal that neither the effect of banner congruity, Wilks’ Lambda = .87, F(13, 104) = 1.24, p = .26, task relevance, Wilks’ Lambda = .92, F(13, 104) = .71, p = .75 nor banner animation, Wilks’ Lambda = .91, F(13, 104) = .75, p = .71 was significantly different across the time intervals. No interactions between the three manipulations significantly explained differences in attention over the various time periods. This indicates that the effects of the different manipulations did not evolve or differ significantly over time during media multitasking. The finding that the banner captured the most attention during the first 10 seconds of media exposure is in line with other banner research indicating that this type of advertising typically receives the most attention in the beginning of media task engagement (Kuisma et al. 2010). As it was the main goal of our study to investigate how banners can be successfully manipulated to stimulate attention and attitudes, we decided it was most relevant to focus on the effectiveness of our manipulations during the time in which the potential for impact was the greatest. Therefore, the attention toward the banner within the first 10 seconds of the media multitasking experience is used in further analyses.

The correlation between the attention devoted to the banner and the perceived attention toward the banner was not significantly correlated (Pearson R =.032, p =.632). Given the more objective measurement of attention based on the eye-tracking device, this measure is used in further analyses.

--- FIGURE 1 ABOUT HERE ---

How Banner Congruity and Task Relevance Affect Visual Attention and Irritation During Media Multitasking

H1 suggested that banner incongruity would attract attention toward the online advertising banner depending on the level of task relevance when media multitasking. Therefore, the first univariate between-subjects ANOVA was run with task relevance and banner congruity as independent variables and attention toward the ad as a dependent variable. As expected, the results show no direct effect of banner congruity [F(1, 233) = .33, p = .56] or task relevance [F(1, 233) = .01, p = .94] on advertising attention. Furthermore, as hypothesized, the results did reveal a significant second-order interaction of banner congruity and task relevance on visual attention toward the banner [F(1, 233) = 5.29, p = .022]. Post hoc simple effects tests showed that banner incongruity was more successful in attracting visual attention toward the banner (M = .11, SD = .02) than banner congruity (M = .08, SD = .02; p = .044) under conditions of high task relevance. In line with H1, the results indicate that under conditions of low task relevance there is no significant difference in visual attention toward the banner for the congruent (M = .12, SD = .02) versus incongruent condition (M = .09, SD = .02; p = .22). As illustrated in Figure 2, the highest levels of visual attention to the banner were obtained when using an incongruent banner under conditions of high task relevance.

--- FIGURE 2 ABOUT HERE---

A second univariate between-subjects ANOVA with the same independent variables was run for the dependent variable advertising irritation. As expected, the results show no direct effects of task relevance [F(1, 233) = 2.06, p = .15] or banner congruity [F(1, 233) = 3.23, p = .07] on advertising irritation. Further, even though we hypothesized that task relevance would moderate the effect of advertising incongruity on perceived irritation, the results show no significant interaction term [F(1, 233) = 2.53, p = .113]. However, looking at the post hoc simple effects test (Figure 3), we see that under conditions of high task relevance, banner incongruity resulted in significantly more irritation (M = 3.27, SD = 1.23) than banner congruity (M = 2.76, SD = 1.10; p = .018). Under conditions of low task relevance, there was no significant difference in perceived irritation toward an incongruent banner (M = 3.25, SD = 1.30) versus a congruent one (M = 3.22, SD = 1.10; p = .88). The fact that the overall interaction term is not significant indicates that, even though advertising incongruity has a significant effect on advertising irritation under conditions of high task relevance but not low task relevance, the difference between those paths is not extremely large. While the interaction is not statistically significant, the differences in means are in line with and seem to indicate potential support for H2.

--- FIGURE 3 ABOUT HERE ---

How Banner Animation, Banner Congruity, and Task Relevance Affect Visual Attention and Irritation during Media Multitasking

To test the interaction of banner congruity, task relevance, and banner animation on visual attention as hypothesized in H3, a three-way between-subjects ANOVA was run. We argued above that neither task relevance nor banner congruity had a significant direct impact on visual attention. The current analysis additionally reveals that there is no direct effect of banner animation either [F(1, 229) = .05, p = .83]. Additionally, no second-order effects with banner animation on visual attention were identified. As seen in Figure 4, the results show that the three-way interaction on visual attention is not significant [F(1, 229) = .05, p = .83]. Therefore, we cannot accept H3.

--- FIGURE 4 ABOUT HERE ---

To conclude, another three-way interaction of banner congruity, task relevance, and banner animation was tested for the dependent variable advertising irritation (cf. H4). Here again, no main effect of banner animation [F(1, 229) = 1.15, p = .29] on advertising irritation was found. No second-order effects with banner animation on perceived irritation were identified. As predicted, the results did reveal a significant three-way interaction of the different independent variables on advertising irritation [F(1, 229) = 10.18, p = .002]. A pairwise comparison of the conditions reveals that under conditions of high task relevance and banner congruity, a static banner was perceived as significantly more irritating (M = 3.08, SD = 1.35) compared to an animated banner (M = 2.45, SD = .70; p = .04). Reversely, under conditions of high task relevance and advertising incongruity, an animated banner was perceived as significantly more irritating (M = 3.64, SD = 1.24) compared to a static banner (M = 2.90, SD = 1.10; p = .015). As expected, in the remaining conditions of low task relevance and banner congruity and low task relevance and advertising incongruity, there was no significant impact of banner animation on advertising irritation. H4 can thus be accepted.

--- FIGURE 5 ABOUT HERE ---

Discussion

Discussion of Results

The descriptive results about the media users’ visual attention to the banner revealed that attention sharply decreased after the first 10 seconds of media exposure. This is not surprising, as the banner was placed at the top of the web page and disappeared after scrolling down. Nevertheless, this placement is among the most popular (McElfresh, Mineiro, and Radford 2015), and it is interesting to gain insights into manipulating the content of such banners to attract optimal attention within a short time frame. To do so, we investigated how changing banner congruity and task relevance could affect the amount of (visual) attention and the perceived irritation toward the banner when media multitasking.

The perceived (self-reported) attention to the ad was not significantly correlated with the more objectively measured attention based on eye-tracking data. This result is in line with Brasel and Gips (2011), who state that the devotion of attention occurs as a subconscious process when media multitasking. It is argued that media consumption behavior in global (LaRose 2010) and especially media multitasking behavior occurs highly automatic and spontaneous, whereby it is hard for people to remember their actions afterwards and to accurately self-estimate their attention division and timing (Brasel and Gips 2017).

 The first hypothesis of this study investigated how manipulating banner congruity and task relevance affects visual attention and perceived irritation toward a banner in a context where media users are constantly shifting their attention between two different media streams. The results confirmed that there is a significant interaction effect between task relevance and banner congruity on visual attention to the banner. In line with our hypotheses, banner incongruity (versus congruity) attracts more attention under conditions of high task relevance. Under conditions of low task relevance, banner (in)congruity did not significantly affect visual attention. More concretely, when people were navigating a website that was thematically related to the television show they were watching (representing high task relevance), an incongruent banner attracted significantly more attention than a congruent advertising banner. When people were surfing on a website that was thematically unrelated to the television show they were watching (representing low task relevance), they did not allocate more attention to an incongruent banner than to a congruent one. These findings suggest especially that incongruity has the capability to attract visual attention to the banner, but processing this incongruity demands considerable resources (Lee and Shen 2009), which are more accessible when media multitasking with high task relevance compared to low task relevance (e.g., Wang et al. 2015).

 The second hypothesis argued that task relevance would moderate the impact of banner (in)congruity on the media users’ perceived irritation. The overall non-significance of the ANOVA analyses’ interaction term did not allow us to support H2. This result suggests that the cognitive resources and/or the motivation to critically process the in/congruent banner are equally high among the low and high task relevance conditions. However, the post hoc simple test showed a significant difference in banner irritation when a congruent banner was placed in a low versus high relevance task condition. More specifically, under conditions of high task relevance, a congruent banner ad resulted in fewer feelings of irritation than an incongruent banner. As theorized before, this aligns with previous studies asserting that even though banner incongruity has a higher capability to attract attention, the advertisements may seem unsuitable within the context and thus are more negatively perceived in comparison to congruent banners (Russell 2002). Here again, under conditions of low task relevance, no significant impact of banner congruity versus incongruity was found for irritation. This supports the expectation that media users will not have sufficient cognitive resources available under conditions of low task relevance to optimally process (in)congruity cues. Given the lack of significance of the overall interaction effect, the underlying mechanisms of cognitive load and motivation to critically process the banner should be examined more in depth.

 The current study questioned whether banner animation, a technique often used to break through the advertising clutter, would be effective in a context in which people’s minds are already divided and overloaded by a multitude of stimuli. A three-way interaction of banner congruity, task relevance, and advertising animation confirmed that there was no significant direct effect of animation; neither was there a significant three-way interaction with the other manipulations on visual attention as hypothesized in H3. Looking at the direction of the effects (Figure 5), we can infer that, regardless of the level of animation, incongruent banners receive more attention than congruent banners under conditions of high task relevance. This suggests that the attention-attracting ability of incongruity outweighs that of banner animation. Confirmatory research is needed in this area, integrating insights from the field of cognitive psychology focusing on executive functioning processes when task switching.

To conclude, a three-way ANOVA on advertising irritation confirmed that there is a significant three-way interaction of banner congruity, task relevance, and banner animation on banner irritation. Taking a closer look at the three-way interaction, we can derive several interesting findings. Namely, an incongruent banner in a high task-relevant context evokes significantly more irritation when it is animated. Conversely, a congruent banner in a high task-relevant context evokes more irritation when it is static. We can thus infer that the least amount of irritation occurs in a context in which media tasks are related and ads are congruent and animated. To conclude, we can fully accept hypothesis H4, as there was no significant interaction on perceived irritation under conditions of low task relevance. Strikingly, as hypothesized, all analyses of this study unanimously revealed that no significant direct or interaction effects of task relevance, banner congruity, or animation were found under conditions of low task relevance. We believe that this is the case because people have insufficient resources at hand to process these manipulations when multitasking with unrelated media tasks (e.g., Jeong and Hwang 2016; Segijn, Voorveld, and Smit 2017).

Theoretical Contributions

The combination of diverse theoretical perspectives has created new insights that may have strategic value for both practitioners and academics interested in the effectiveness of banner advertisements within a media multitasking context. In recent years, an increasing body of research has investigated advertising effectiveness during media multitasking (Beuckels, Cauberghe, and Hudders 2017; Jeong and Hwang 2016; Smit et al. 2017). However, there was no clear academic evidence on how to successfully embed advertising banners in a media multitasking context. The present study fills this gap in the literature by empirically revealing that banner congruity, task relevance, and advertising animation interact with each other in explaining visual attention and perceived banner irritation. While banner blindness was already a great concern among advertisers and academics, previous studies predominantly investigated banner effectiveness by directing full attention toward the medium in which banners are embedded (Lee and Ahn 2012; Yoo, Kim, and Stout 2004). However, today’s reality is that the majority of media users divide their attention between different media types that they consume simultaneously (Deloitte 2016), which represents a great challenge for banner advertisements. Our study contributes to the current knowledge about banner advertising by exposing how banners attract attention and are perceived within a media multitasking context. Even though the concept of relatedness has gained popularity in media multitasking research (Garaus, Wagner, and Bäck 2017; Jeong and Hwang 2016; Segijn, Voorveld, and Smit 2017; Smit et al. 2017), the majority of these studies only investigated task relevance and overlooked the concept of advertising congruity during media multitasking. Moreover, previous studies investigating advertising congruity in a single tasking context showed mixed results, both in favor of congruity (e.g., Martín-Luengo, Luna, and Migueles 2015) and incongruity (e.g., Fleck, Korchia, and Le Roy 2012). To the best of our knowledge, the current study is the first to investigate how advertising incongruity works in a media multitasking context and to suggest that its impact on both visual attention and irritation depends on the relatedness of the media tasks with which one is multitasking. Therefore, the current study represents an important addition to the existing knowledge about advertising and, more specifically, banner congruity and task relevance in a media multitasking context.

Further, our research contributes to the current knowledge about banner animation, which had solely focused previously on single-medium tasking contexts (e.g., Kuisma et al. 2010; de Sa, Navalpakkam, and Churchill 2013). Our findings suggest that, depending on the level of banner congruity and task relevance, animation can affect people’s attitudinal reactions toward online banners. However, the results of the three-way interaction on visual attention suggest that animation did not additionally affect the interaction of task relevance and banner congruity when media multitasking. This may imply that banner incongruity under conditions of high task relevance is more determinative in affecting visual attention, as banner animation did not supersede the direction of the two-way interaction.

Practical Guidelines

As discussed above, the results from all analyses suggest that the impact of banner (in)congruity and animation is most significant under conditions of high task relevance. The first part of the study revealed that the highest level of visual attention toward the banner was obtained when it was incongruent and placed in a high task relevant media multitasking context. This finding aligns with the cognitive interference theory arguing that incongruent banners draw more attention because of their surprising placement and people’s need to resolve incongruity. However, advertisers should consider that these results are only shown to be important when both media tasks are related. Combined with previous research arguing that visual attention leads to better *cognitive advertising outcomes* such as brand memory when media multitasking (Segijn, Voorveld, Vandeberg, and Smit 2017; Guitart, Hervet, and Hildebrand 2019), it might thus be best to place an incongruent banner in a high task relevant context for practitioners pursuing cognitive advertising outcomes.

It must be noted, however, that previous media multitasking research claims that, even though visual attention towards an ad might positively affect cognitive advertising outcomes such as brand memory (e.g. Guitart, Hervet, and Hildebrand 2019), it is not necessarily a desired outcome for advertisers in terms of attitudinal advertising outcomes (e.g., Jeong and Hwang 2016; Segijn and Eisend 2019). More specifically, research on attitudinal outcomes in media multitasking suggests that attention towards an ad during media multitasking could lead to more negative attitudinal outcomes (e.g., Jeong and Hwang 2012). That is because attention towards advertising messages enables people to process its content critically and to produce counterarguments (Jeong and Hwang 2012; Segijn, Voorveld, and Smit 2016). Indeed, the results of the current study shows that the lowest level of irritation were obtained for a congruent banner in a high task-relevant context. Following this reasoning, one could argue that, when a marketer’s aim is to pursue better *attitudinal outcomes*, it would be most beneficial for advertisers to avoid greater attention and critical processing and to place a congruent banner advertisement in a high task relevant media multitasking context. Even if cognitive resources and motivation are unavailable to produce counterarguments to the banner in that context, following the priming theory, the congruent banner might be easier to process and might be perceived as more suitable within the context. This might represent a lower level of intrusion and thus evoke less irritation toward the banner.

The second part of the study additionally suggests that manipulating banner congruity, task relevance, and banner animation could significantly affect perceived irritation toward the ad. More specifically, the results reveal that the lowest levels of irritation are obtained when an animated congruent banner is placed in a high task-relevant context. Here again, when using animation, it is proposed that advertisers should pursue congruent advertisements and high task-relevant contexts in order to boost attitudinal impact.

Until recently, online targeted advertising strategies consisted of the placement of relevant advertisements based on media users’ past online activity (Boerman, Kruikemeier, and Zuiderveen Borgesius 2017). Today’s tremendous popularity of mobile device usage and the accompanying facilitation of data collection and sharing, however, has even made it possible for advertisers to target individuals based on their ongoing live media consumption (Segijn 2019). This mobile data-driven targeting strategy is called “synced advertising,” and it allows advertisers to adjust their content according to the media consumption behavior of their targets at a certain point in time. A survey among over 2,000 participants reported that a huge amount of mobile device owners engage in online activities related to the television content they are simultaneously watching (Smith, 2012). The above-mentioned data collection methods would thus enable advertisers to implement the findings of our study practically. Moreover, modern content providers must increasingly strive to keep up with people’s tendency to consume several types of media at once, and they often use cross-platform strategies to deliver related, congruent content to their audience (Berthold, Schmidt, and Kirchknopf 2010; Fleury et al. 2012). This implies that broadcasters are reaching out to other devices to allow consumers to interact with TV content on several devices at once (Fleury et al. 2012). Academics are even developing methods to detect which TV programs media users are watching in order to target them with additional information through a second screen (Chuang et al. 2013; Seo et al. 2015). Consequently, these so-called “second-screen apps” create increasing task-relevant contexts in which it could be profitable, according to the results of our study, to place animated congruent banners. In addition, media users often watch television on digital devices such as tablets or laptops that make tracking data much more convenient. In summary, the media habits of contemporary consumers offer various opportunities for marketers to implement the outcomes of this study in practice.

Limitations and Further Research

The limitations of the current study suggest some directions for future research. First, the results of the current study revealed that manipulations had no significant impact under conditions of low task relevance. We proposed that the underlying reason for this finding could be the highly interruptive character of this media context and the associated cognitive depletion. However, we did not specifically investigate these driving mechanisms. Therefore, future research could address this shortcoming and implicitly investigate whether the interruptive character or cognitive depletion are the underlying mechanisms of the different effects of banner (in)congruity and animation under conditions of high and low task relevance. Moreover, as media multitasking behavior is highly unconscious, people often misjudge their experiences (Chinchanachokchai, Duff, and Sar 2015). Therefore, we believe it would be informative to measure this load construct in an implicit way (e.g., by the use of an electroencephalogram or Heart Rate Variability), as media users might underestimate the perceived load.

A second limitation of the current study is related to the fact that switching eyesight from one screen to another might have created some unwanted noise for the results. The definition of media multitasking assumes the simultaneous engagement in at least two media activities at once, either on one or multiple devices (e.g., Garaus, Wagner, and Bäck 2017). Therefore, omitting the second media activity (web surfing) would have implied that respondents were single-tasking instead of multitasking. Since the eye-tracking device to capture the respondents’ attention was installed on the laptop, the attention devoted to the TV content was not measured. In addition, due to the constraints of questionnaire length, we did not measure the perceived attention devoted to the TV content. However, based on the successful manipulation check of task relevance, we assume that the respondents watched the TV content, at least to some extent.

In addition to the levels of relatedness taken into account in this study (task relevance and banner congruity), the relatedness between two simultaneously displayed advertisements represents another (and last) level of relatedness during media multitasking (Segijn, Voorveld, and Smit 2017). The ubiquity of advertisements at present and the data-driven approaches that enable marketers to synchronize advertisements (Segijn 2019) makes it fairly plausible that people are often exposed to two advertisements at the same time. A third limitation thus relates to the fact that his level has not been taken into account within this study, which would be an interesting direction for future research.

To conclude, the advertising format within our study was a header banner centered at the top of the web page that disappeared after scrolling down. This has a high naturalistic value, but of course implicates that the duration of exposure was fairly short (cf. Figure 1). Future research should consider the impact of other banner formats, such as pop-up banners or ads that cover the full window, as these are often considered even more intrusive and would possibly be affected by banner congruity to a lesser extent as they cover the website’s content.

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