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Enhancing the influence of pop-up advertisements on advertising effects from the perspective of personalization and placement

Completed Research Paper

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Abstract

This study examined the influence of personalized pop-up advertising and ad placement on ad effects. Moreover, the moderator of product involvement on the influence of personalized pop-up ads was investigated. A 2 (ad type: personalized pop-up vs. non-personalized pop-up ad) × 2 (ad placement: initial webpage vs. middle webpage) experiment was conducted to examine how personalized pop-up advertising impacts ad attitude and recall, and how it interacts with different degrees of product involvement. Total valid experimental data derived from 296 participants showed that (1) Personalized pop-up ads were better than non-personalized pop-up ads in terms of ad attitude and ad recall; (2) There was no significant difference in ad attitude and ad recall of the personalized and non-personalized pop-up ads on the initial or the middle webpage. However, the influence of personalized pop-up ads on ad attitude but not on ad recall was significant for different types of webpage involvement; (3) Contrary to the hypothesis, the personalized ad had a significant effect on ad attitude when individuals had high rather than low product involvement. However, there was no significant difference in ad recall in either the low or high product involvement conditions.

Keywords: pop-up ad, personalization, ad effects, ad placement, product involvement

1. Introduction

Internet advertising had increased 7% to U.S.584.14 billion by the end of 2017 and has been forecast to approach \$757.44 billion in 2021 (eMarketer 2017), presenting a large growth in the advertising industry. Six types of advertisements have been applied on the Internet, namely banners, pop-ups, floating ads, skyscrapers, large rectangles, and interstitials (Burns & Lutz, 2006). Early research on banner ads found them to be effective in terms of creating brand awareness and positive attitudes (Briggs et al. 1997). However, studies in recent years have shown that banner avoidance, called *banner blindness*, occurs frequently, resulting in the ad messages not being paid attention to and not remaining in the consumer's memory (Lee et al. 2012). Banner blindness results from habituation to the banner in a specific area on a webpage, and thus conditions viewers to ignore those habitual areas (Cunningham et al. 2016).

It is widely believed that human attention is limited and allocated selectively to the stimulus based on the salience of the object (Hsieh et al. 2011). Faced with an abundance of advertising messages, internet users allocate only minimal cognitive resources to advertising compared with the main webpage content. In order to grab consumers' attention, more novelty and creative ad content and format, such as pop-up windows, personalization, and animation are being applied to attract more visual attention to the target ads (Diao et al. 2004; Malheiros et al. 2012; Sundar et al. 2010).

A pop-up ad is a forced exposure for internet users. It interrupts the viewer's current browsing task by opening a new window with ad messages in the foreground of the webpage. A pop up ad emphasizes the presented information by increasing its visual presence (Bétrancourt et al. 1998), in turn increasing the click-through rate and purchase intention (Diao et al. 2004). Even though the ad effects are promoted by pop-up ads, their format has been viewed as intrusive (Freier 2017), and they tend to be dismissed both visually and cognitively (Bahr et al. 2011). Besides the pop-up format, personalized ads are commonly applied as an effective strategy to increase ad effects. Recent research shows that personalized ads tailored with relevant individual information drive the highest click-through rate of 0.43 percent, and attract viewers' attention (Bragge et al. 2013; Malheiros et al. 2012), with the longest average dwell time of 21 seconds (Statista 2018). What determines or controls consumers' visual processing of information in the competitive media environment is an important issue for advertisers. Pop-up windows have the potential to be an effective communication tool in online advertising, if their design avoids irritation in users (Edwards et al. 2002). The pop-up ad has the advantage of forced exposure (i.e., push power), while the personalized ad has the advantage of a tailored message (i.e., pull power). A personalized ad with a self-relevant message may be attractive for reducing the irritation of pop-up windows. Whether the ad effects are enhanced if the advantages of pop-up ads and personalization are combined in internet advertising is the main issue of this study.

The placement of an advertisement also has a significant effect on ad exposure among a cluster of information. Since the crucial role of ad placement in ad effectiveness on a single page (i.e., left, right, top, bottom) has been proven (Agarwal et al. 2011; Lin et al. 2009), it is striking that research on the influence of ad placement concerning web structure (i.e., initial web page, middle page) on the ad effects is still limited. In a recent study, Hsieh, Chen, and Ma (2012), found that an ad situated on the initial webpage got more attention than that on the middle webpage. The same result was demonstrated in a study by (Wang et al. 2007), in which viewers had increasingly less banner attention as the meaning path of the webpages became deeper. This phenomenon resulted from individuals' attention inertia. As more webpages are read, viewers are more involved in them, and the peripheral advertising is less able to compete with the main web context. According to the result of previous studies, it is believed that the personalized pop-up ad has different ad effects when it is situated on the initial webpage or on the middle web page.

The purpose of this study was to identify ways to improve the effects of pop-up ads from the content and placement of the ad. The attractiveness of ad content is strengthened by personalization. The research explores the influence of personalized pop-up ads on ad effect, comparing the difference of ad effects including attitude and ad recall of personalized and non-personalized pop-up ads. The placement of personalized pop-up ads is discussed. Two ad placements were implemented in the experimental design: the ad shown on the initial webpage and the ad shown on the middle webpage. Moreover, we look at how these effects interacted with the degree of product involvement. This study makes a contribution to the design of pop-up ads in order to reduce their irritation and increase viewers' attention. That is to say, the results provide an understanding of how personalized pop-up ads impact ad effects and the influence of placement on ad effects, and we highlight the implications for advertisers seeking to increase the effectiveness of pop-up ads.

2. Literature and Hypothesis

2.1 Ad avoidance

Ad avoidance, as defined by Speck and Elliott (1997), refers to "all actions by media users that differentially reduce their exposure to ad content." Ad avoidance could be demonstrated in three

manners: 1) cognitive avoidance: by ignoring the ad, 2) physical avoidance: by not looking at the ad, and 3) mechanical avoidance: by using mechanical aids to not see the ad.

The phenomenon of ad avoidance has been revealed in numerous studies (Drèze et al. 2003; Hervet et al. 2011). The purpose of internet users surfing the Internet is to check webpage content, and thus peripheral advertising is seen as useless information (Benway 1998; Chatterjee 2008). In many related studies, researchers considered the subjects' memory and self-evaluation to measure their ad avoidance. For example, Chatterjee (2008) analyzed the subjects' memory points and found that only 26% of advertising was recalled; most of the banners were neglected. Razzouk and Seitz 's (2002) research also found that only 8% of people could recognize the existence of advertising, among which 50% could not recognize the advertised products. Moreover, 62% of people said that they did not see the banner at all. Nielsen (2007) used eye tracking to observe how internet users read internet advertising. They discovered that most users did not pay attention to the advertising; instead, they were eager to engage in their work, so they neglected peripheral advertising no matter whether it was presented as pictures or text. This ad avoidance could be explained by the concept of habituation (Hsieh et al. 2011), which means that an individual experiences an unconscious attention shift caused by familiar and insignificant stimuli after going through progressive information processing (Cacioppo et al. 2007). Thus, the more familiar with online advertising displayed on webpages the viewers are, the less attention they will pay to it.

2.2 Pop-up ads

Despite online advertising being a promising tool, ads on websites have been perceived as intrusions that disturb users' online activities (Diao et al. 2004). The evidence of a few studies has shown that pop-up windows can be effective for online activities (Bétrancourt et al. 1998; Constantin 2007). A pop-up is a graphical user interface display, usually a small window provided with the help of JavaScript or Adobe Flash. Pop-ups direct the viewers' attention toward a specific location on the screen, and thus enhance their attention as a spotlight for information processing (Constantin 2007). The time participants take to first glance at pop-ups is relatively stable, at an average of 1.3–1.5 s (Bahr et al. 2011). Although pop-ups have been commonly used as an advertising technique, they are not popular with web surfers. Forcing viewing of pop-up ads on the Internet leads to ad intrusiveness and avoidance (Bahr et al. 2011). Intrusiveness is thought to be a psychological consequence that occurs when a person's cognitive processes are interrupted (Edwards et al. 2002). Users quickly dismiss pop-ups both visually and cognitively (Bahr et al. 2011) after forced exposure. One survey found that 81% of mobile users dislike app pop-up advertising (Freier 2017), and advertisement-blocking software such as Pop-up Stopper, Pop-up Killer, and Pop-up Annihilator was invented in response to the widespread use of pop-up ads (WhatIs.com 2005). Recently, Google also released a new version of Chrome that blocks the most annoying types of pop-up ads on websites (Bonelli 2017).

Despite industry reports that pop-up ads provide a poor user experience, when they are implemented appropriately, they can actually be extremely effective (Durante 2016). Pop-up windows have the potential to be an effective communication tool in online advertising, if their design can avoid irritating users (Edwards, Li, & Lee, 2002). For example, one study revealed that implementing a pop-up strategy immediately boosted email list opt-ins (Hayden 2013). Another study similarly showed that pop-ups helped Entrepreneur.com increase its subscriptions by 86% and its sales by 162% (Durante 2016). The forced exposure driven by the pop-up format increased the possibility of the ads being noticed by viewers.

2.3 Personalized ads

Due to the advancements in tracking and database technology, advertising has been tailored and served to users depending on consumers' interests and needs (Bragge et al. 2013); this is called personalized advertising. Personalized advertising is advertising incorporating information about the person, such as individual demographics (e.g., age, gender), preferences (e.g., preferred products, services), and geographic information (Lee et al. 2015). Personalization emphasizes system-initiated tailoring, whereby the system automatically tracks personal information and delivers ad content that matches consumer interest (Sundar et al. 2010). Commercial e-mail, telemarketing, and text

messaging can all be considered as forms of personalized advertising (Bragge et al. 2013). Personalized ads provide the right content in the right format to the right person at the right time, resulting in mixed ad effects. It not only drives consumers to pay attention to or engage with messages, but also promotes their purchase behavior. Some studies have found that personalized advertising attracts users' attention (Bragge et al. 2013; Malheiros et al. 2012), and in turn increases the click-through rate (Bragge et al. 2013), enhances consumers' attitudes toward the ads (Li 2016), and drives purchase intention (Li 2016; Yu et al. 2009).

Ad personalization may play an important role in attracting consumers' attention to ads that they might otherwise overlook. Bragge et al. (2013) found that personalization of banners not only encourages consumers to pay attention to or engage with ad content, but also increases sales. They found that personalized information increases attention and the elaboration levels of the given content. Malheiros et al. (2012) similarly presented that people pay more attention to an ad with a high degree of personalization, such as consumers' own photographs, even though people may feel uncomfortable with the ad itself. This increased attention caused by personalization may translate into behavior. A recent study found that personalized ads are clicked much more often than generic ads (Bragge et al. 2013).

In addition to visual attention being increased by personalization, attitude and behavior are also changed after attention is gained. Recent research has also shown that a consumer's level of personalization of a message can be a far better predictor of positive attitude effects (Li 2016). Lee et al. (Lee et al. 2015) found that the level of customization of advertising led to more positive user attitudes toward local-based advertising and its service quality. Similar effects have been found for personalization in advertising. Specifically, Howard and Kerin (Howard et al. 2004) discovered that consumers' ad responsiveness could be enhanced by personalization. The viewer was likely to have higher purchase intention for the product recommended in the ad when it contained the viewer's first name. In addition, Bragge et al. (2013) found that these effects can go beyond intention to behavioral responses, with personalized ads yielding a higher click-through rate and sales, even though consumers have concerns about their privacy.

In line with the previous studies concerning pop-up and personalized ads, the following hypotheses are proposed. The pop-up ad format has push power to force ad exposure and the content of personalization has pull power to attract viewers' attention to the ads. Therefore, combining the advantages of pop-ups and personalization, a personalized pop-up ad will have more ad effects than a non-personalized pop-up ad.

H1. A personalized pop-up ad has better ad effects than a non-personalized pop-up ad.

H1a. A personalized pop-up ad elicits better ad attitude than a non-personalized pop-up ad.

H1b. A personalized pop-up ad leads to better ad recall than a non-personalized pop-up ad.

2.4 Ad placement

Ad placement on websites has been proven to be an indicator of users' response to ads in terms of ad processing, attention, attitudes, clicks, and nuisance (Agarwal et al. 2011; Lin et al. 2009). The traditional print advertisements on the right side of newspaper articles have attracted more attention and are better recognized than those on the left (Simola et al. 2013). In addition, ads with animation in the middle position of the web page have the highest estimated click-through rate (Lin et al. 2009). This effect extends to social media, where ad placement has been shown to have an impact on the effects of Facebook ads (Broeck et al. 2017). Studies have shown that the Facebook advertising on the sidebar gets less ad avoidance than that on the message stream (Broeck et al. 2018).

In addition to the ad placement on the webpage directing ad attention, the web structure also impacts the attention grabbing of the embedded ads. Previous studies have shown that user attention to peripheral ads drops sharply when serious webpages are being read (Hsieh et al. 2012; Wang et al. 2007). Specifically, advertising is automatically judged as a *distractor* that repeatedly appears on every page; moreover, as time goes by, viewers gradually focus their attention on the main content, and are less likely to be interrupted by advertising. This phenomenon could be explained by the theory

of attention inertia which states that when individuals focus attention on an object, the amount of attention paid to the object will change over time (Anderson, Choi, & Lorch, 1987; Burns & Anderson, 1993). Based on TV viewing and toy-playing studies, Anderson theorized that, at the beginning of a mental process, an individual's inertia engagement is not as strong as it would be later. So, in the beginning, one would be more likely to be attracted by a distractor, but when one's mental process has operated for a long period of time, it becomes more actively engaged and would be less susceptible to interruptions by the distractor (Burns & Anderson, 1993; Choi & Anderson, 1991).

Based on these previous studies, when internet users are first surfing the initial webpage, they are easily disrupted by peripheral advertising because they do not have intensive attention on the web content. However, after they have become deeply involved in the web content for a period of time, the influence of peripheral advertising would be reduced. The significant evidence provided in the study by Hsieh and Chen (2011) revealed that the lines of attention intensity of the peripheral advertising appear elevated during the first few pages in which there is less involvement. Therefore, we further considered the possible interaction of ad placement on the personalized pop-up ad. Specifically, we hypothesized that the personalized pop-up ad would have a more salient effect than the non-personalized pop-up ad when the viewer has low involvement in the initial webpage. As a series of webpages is gone through, however, the pop-up ad will be easily ignored as a distractor as the user becomes more involved in the main webpage content. Thus, the attention of the personalized pop-up ad or the non-personalized pop-up ad will be ignored, and in turn less ad attitude and recall will be generated. The personalized and non-personalized pop-up ads situated on the middle pages would produce the same ad effect. This is hypothesized as follows:

H2: A personalized pop-up ad placed on the initial webpage has better ad effect than a non-personalized pop-up ad on the initial webpage. However, the ad effects are the same when personalized and non-personalized pop-up ads are placed on the middle page.

H2a: A personalized pop-up ad placed on the initial webpage generates better ad attitude than a non-personalized pop-up ad on the initial webpage. However, the ad effects are the same when the personalized and non-personalized pop-up ads are placed on the middle page.

H2b: A personalized pop-up ad placed on the initial webpage generates better ad recall than a non-personalized pop-up ad on the initial webpage. However, the ad effects are the same when the personalized and non-personalized pop-up ads are placed on the middle page.

2.5 Product involvement

The Elaboration Likelihood Model (ELM) proposed by Petty and Cacioppo (1986) indicated that there are two routes of approach for information processing. First, central route processing is the term used when an individual is motivated and able to elaborate on message arguments. Second, the peripheral route argues that individuals evaluate the product based on superficial but salient cues in the information, regardless of such cues being meaningfully related to the product.

Involvement level could have a significant impact on consumers' responses to taking the central or peripheral route for advertising stimuli (Behe et al. 2015; Eskola 2016). The involvement refers to a person's perceived relevance of the object based on inherent interest, value, or needs (Zaichkowsky 1986). Involvement would influence the amount of mental and physical efforts an individual puts into the information process. The concept of involvement is used to study stimulus objects such as products, advertisements, and purchase situations (Zaichkowsky 1986). Previous studies related to the design of online shops showed that consumers with high product involvement paid more attention to product detail information as a central rather than a peripheral cue (Behe et al. 2015). In addition, researchers consistently found that product involvement leads to higher degrees of advertising effectiveness and lower ad avoidance on multiple occasions and in different settings (Jung 2017; Rejón-Guardia et al. 2014). The high degree of fit between product and audience can generate more additional and positive cognitive elaboration of the ads (Becker-Olsen et al. 2003).

An interaction effect of product involvement and peripheral cues was found in the previous studies. Petty et al. (1983) demonstrated that under low levels of involvement, a celebrity source served as a

peripheral cue and led to more favorable attitudes toward a razor than did a non-celebrity source, because the celebrity endorser was more liked. The peripheral cues as ad size were found to have a significant impact on the effectiveness of the ad in terms of click intention in the low product involvement condition (Cho 1999). Moreover, a study by Van den Broeck et al. (2017) showed that the influence of ad placement was highly dependent on the degree of involvement the user showed with the advertised product. High product involvement was related to higher acceptance of ads in a more prominent position. However, ads were better accepted when shown in the sidebar under low product involvement.

According to the previous arguments, product involvement is a predictor for motives of ad attention and interacts with the relationship between the personalized pop-up ad and the ad effects. Specifically, a personalized pop-up ad is seen as a peripheral cue to affect viewers' motivation of information processing in the low degree of product involvement. Those with high product involvement are more motivated to process the product information, and the personalized pop-up ads have no significant influence on the ad effects. This is hypothesized as follows.

H3: Product involvement interacts with the relationship between a personalized pop-up ad and ad effects.

H3a: A personalized pop-up ad generates positive ad attitude when viewers have low product involvement. However, a personalized pop-up ad generates no better ad attitude when viewers have high product involvement.

H3b: A personalized pop-up ad generates positive ad recall when viewers have low product involvement. However, a personalized pop-up ad has no better ad recall when viewers have high product involvement.

3. Method

3.1 Participants

A total of 322 undergraduate and graduate students participated in this study, for which they gained a credit. Among them, 26 were excluded from the analysis due to their incomplete answers. Therefore, a total of 296 valid responses were analyzed. Respondents were between 20 and 29 years of age; 63% were female and 37% were male.

3.2 Stimulus

For the experiment, fictitious webpages on a mobile device were designed to meet the needs of the experiment. The layout of the webpage content followed the style commonly appearing on most internet content providers. Figure 1 shows the layout of a typical experimental webpage containing news article. The news articles were selected from the real news website named "et today news". In order to present the news to the participants in an easily accessible way, there were six articles, of about 500 words each. To engage participants in the article, topics relevant to daily life and food were selected. Each article was presented on a single page.

The pop-up ad designs were based on real internet pop-up ads and contained the product photo, brand name, and slogan. The product involvement measure was not manipulated in the study. Thus, the ad product was chosen based on not being of extremely high or low interest to the students. A coffee machine was selected as the target advertised product, and the brand of the coffee machine was fictitious in order to eliminate any confounding effect from participants' previous experience or exposure to the brand. The picture and message of the coffee machine were chosen and revised from real coffee machines advertised on the Internet.

Previous studies have shown that the sound or sight of one's own name can attract one's attention, even when the name is embedded in sets of other information (Bang et al. 2016). This is because a person's own name is always meaningful to him or her and becomes emotionally salient (Harris et al. 2004). The level of personalization was manipulated by the presence or absence of the participant's name in the advertisement. Specifically, in the personalized advertising condition, each participant's

name was included in the advertising message, such as “Hello Stanley, this advertisement is selected for you.” The format of the personalized ad is shown in Figure 2. In the non-personalized ad condition, viewers received the same ad message without their name. The ad placement was manipulated on the initial webpage and on the middle webpage. That is, the personalized pop-up ad was presented on the front of the first webpage for one experimental group and on the fourth webpage for the other experimental group.



Figure 1. Webpage in mobile device Figure 2. Personalized pop-up ad

3.3 Procedure

The study utilized a 2 (ad type: personalized pop-up ad vs. non-personalized pop-up ad) × 2 (ad placement: initial web page vs. middle page) factorial between-subject experiment to test the hypotheses. The experiment was conducted using a fictitious webpage displayed on mobile devices via the Internet. At the beginning of the experiment, each participant was provided with a hyperlink to the webpage, and was randomly assigned to one of the four experimental groups. On the first page, the participants were informed of the experimental process. Next, the participants were asked to fill in their name in one text area on the next page for manipulation of the personalization. The experimental webpages were then presented. A total of six webpages were presented sequentially, and each page required at least 30 seconds of reading. The pop-up ad was shown on one of the webpages (Figure 3). The participants read through the six articles and saw the pop-up ad at their own speed. After viewing the articles, the participants completed a digital questionnaire about their ad attitude, ad recall, product involvement, and personal demographics.



Figure 3 Pop-up ad displayed over the webpage.

3.4 Measurement

Advertising attitude and recall were measured as independent variables in the study. A total of five ad attitude items with a 5-point Likert scale were adopted and modified from the study by (MacKenzie et al. 1986). An example item is: "I think the advertising is easy to understand. Advertising recall was measured by unaided recall, which refers to the measurement used by Hsieh and Chen (Hsieh et al. 2011). Recall measurement includes product brand, name, and slogan. After the participants finished browsing all of the webpages, they were asked to provide the brand, name, and slogan of the product just shown on the previous screen. Participants who answered correctly scored one point, otherwise they scored zero. Thus, the maximum recall score was 3. Product involvement was discussed as a moderator in the study. Referring to the study by Zaichkowsky (1985), product involvement was measured by five items using a 5-point Likert scale. An example item is: "The coffee machine is important to me."

4. Results

4.1. Testing hypothesis 1

Independent *t* tests were applied to test H1. Results from the *t* tests revealed that the personalized pop-up ad had better ad effects than the non-personalized pop-up ad. Specifically, the personalized pop-up ad generated better ad attitude than the non-personalized pop-up ad ($M=3.12$ vs. 2.61 , $t=5.164$, $p<.05$). Further, the ad recall of the personalized pop-up ad was better than that of the non-personalized pop-up ad ($M=1.45$ vs. 0.96 , $t=3.50$, $p<.05$). H1a and H1b were therefore supported.

4.2 Testing hypothesis 2

H2 predicted that the ad effects of personalized pop-up ads would interact with the ad placement. Two-way ANOVA was applied to test H2. The results showed that there was no significant interaction effect of personalized pop-up ad and placement on ad attitude ($F(1,292) = 0.241$ $p=0.624$) or on ad recall ($F(1,292) = 0.088$ $p=0.767$). The personalized pop-up ad generated better ad attitude than the non-personalized pop-up ad no matter whether it was situated on the initial webpage ($M_{\text{personalized ad}} = 3.049$ vs. $M_{\text{non-personalized ad}} = 2.585$, $F(1,146) = 10.409$ $p<.05$) or on the middle webpage ($M_{\text{personalized ad}} = 3.197$ vs. $M_{\text{non-personalized ad}} = 2.635$, $F(1,146) = 16.008$ $p<.05$). In addition, the personalized pop-up ad generated better ad recall than the non-personalized pop-up ad no matter whether it was situated on the initial webpage ($M_{\text{personalized ad}} = 1.439$ vs.

Mnon-personalized ad = 0.985, $F(1,146) = 3.862$ $p < .05$) or on the middle webpage (Mpersonalized ad = 1.468 vs. Mnon-personalized ad = 0.928, $F(1,146) = 9.235$ $p < .05$). H2a and H2b were therefore not supported.

This phenomenon may be explained by the fact that the participants did not become gradually more involved in the webpage as they read more pages because one article was presented as a single page, and not across multiple pages. In order to further explore the influence of the webpage content, the influence of webpage involvement was then analyzed.

The involvement with websites has been categorized into cognitive and affective components (Jiang et al. 2010). Cognitive involvement is associated with *rational thinking* and is induced by utilitarian or cognitive motives (Park et al. 1986). Thus, in this study, the users' involvement with the webpage containing the pop-up ad was measured by the comprehension of the content. A comprehension quiz about the webpages' content was provided for the participants after they had read all of the webpages. The webpage content involvement was high when the participants answered the questions about the article more correctly. Similarly, two-way ANOVA was applied to test the interaction effect of the webpage involvement. The results showed that there was a significant interactions effect of personalized pop-up ad and web involvement on ad attitude ($F(1,292) = 21.776$, $p < .05$). Further analysis showed that when people had low involvement in the webpage, they were likely to have stronger ad attitude about the personalized pop-up ad (Mpersonalized ad = 3.44) compared to the non-personalized pop-up ad (Mnon-personalized ad = 2.49) ($F(1,152) = 40.792$, $p < .01$). However, when they were highly engaged in the webpage, there was no significant difference between the personalized pop-up ad and non-personalized pop-up ad regarding ad attitude (Mpersonalized ad = 2.80 vs. Mnon-personalized ad = 2.75, $F(1,140) = 0.164$ $p = 0.686$).

Contrary to ad attitude, there was no significant interactions effect of the personalized pop-up ad and web involvement on ad recall ($F(1,292) = 0.428$, $p = 0.514$). The influence of the personalized pop-up ad on ad recall was significant no matter whether the participants had high involvement in the webpage (Mpersonalized ad = 1.075 vs. Mnon-personalized ad = 0.452, $F(1,140) = 9.097$ $p < .05$) or low involvement (Mpersonalized ad = 1.827 vs. Mnon-personalized ad = 1.384, $F(1,152) = 5.894$ $p < .05$).

4.3. Testing hypothesis 3

To test H3, the experimental data were analyzed using two-way ANOVAs. The participants were divided into high and low product involvement according to the mean score. A score higher than 13 was categorized as high product involvement, and 13 and below was categorized as low product involvement. The result of the two-way ANOVAs found a significant interactions effect between personalized pop-up ad and product involvement on ad attitude ($F(1,292) = 5.817$, $p < .05$). To determine the nature of the significant interaction effects, further contrasts were conducted on ad attitude and ad recall for different product involvement. The results indicated that when participants had high product involvement, they were likely to have stronger ad attitude toward the personalized pop-up ad ($M = 3.426$) compared to the non-personalized pop-up ad ($M = 2.699$) ($F(1,155) = 30.132$, $p < .01$). However, when they had a low degree of product involvement, there was no significant difference between the personalized and non-personalized pop-up ad regarding ad attitude (Mpersonalized ad = 2.773 vs. Mnon-personalized ad = 2.513, $F(1,137) = 3.432$ $p = 0.66$). The personalized pop-up ad generated better ad attitude than the non-personalized pop-up ad under high product involvement rather than low involvement. Although there was a significant effect derived from the data, it was opposite to H3a. Therefore, H3a was rejected.

There was no significant interactions effect of the personalized pop-up ad and product involvement on ad recall ($F = 0.221$, $p = 0.693$). The participants showed significantly different ad recall of the personalized pop-up ad compared to that of the non-personalized pop-up ad for both high product involvement (Mpersonalized ad = 1.558 vs. Mnon-personalized ad = 1.127, $F(1,155) = 5.265$, $p < .05$), and low product involvement (Mpersonalized ad = 1.333 vs. Mnon-personalized ad = 0.766 $F(1,137) = 6.457$ $P < .05$). They had better ad recall for the personalized pop-up ad than for the non-

personalized pop-up ad no matter whether they had high or low product involvement. H3b was therefore rejected.

5. Discussion

Limited by individuals' cognitive capacity, the main content of webpages and internet advertising have to compete for web surfers' attention (Constantin 2007). Advertisers have tried various strategies to grab viewers' attention, and to enhance the ad effects. Combining the characteristics of pop-up windows and personalization, this study investigated the impacts of personalized pop-up ads on ad attitude and ad recall. H1 was supported. Consistent with the implication of previous literature (Bragge et al. 2013; Li 2016 ; Yu et al. 2009), the experimental results showed that the personalized pop-up ad led to better ad attitude and ad recall than the non-personalized pop-up ad, indicating the strong influence of the push power of the pop-up window and the pull power of personalization on the ad effects. Although the format of such ads, that is the pop-up window, has been seen as being annoying, it will generate more ad effects when it is designed properly. Xu (2006) proposed that the personalization tactic is an effective way to elicit positive attitudes toward mobile advertising by increasing ad utility and relieving ad intrusiveness. The personalization feature of ads could be a strategy to avoid the detrimental effect of irritation caused by pop-up ads. Specifically, the forced exposure derived from the pop-up and the personal information resulting from personalization grab individuals' attention, further increasing the ad effects. Even though the annoying feature of pop-up ads, which forces exposure on the viewers, has been considered to generate negative responses to such ads, the finding of the current research suggests the possibility that the negative effect of the forced exposure to the pop-up ad on ad intrusiveness and irritation could be reduced by the feature of personalization.

Not supporting hypothesis 2, the place where the personalized pop-up ad was situated resulted in equal attention, and in turn shaped the same ad effects. This result implies that the attention inertia of reading serious web content did not interfere with the attention to the personalized pop-up ad in this case. That is, the personalized pop-up ads on the initial and middle pages produced the same ad effects. However, there is an interesting finding for advanced analysis. The webpage involvement interacted with the influence of the personalized pop-up ad on ad attitude, but not on ad recall. Specifically, the participants had more positive ad attitude towards the personalized pop-up ad than the non-personalized pop-up ad when they had low involvement in the webpage. The personalized pop-up ad enhanced the ad recall no matter whether the participants had high or low involvement.

This result implies that personalized pop-up ads do indeed promote ad recall on any webpage, and ad attitude is enhanced by personalized pop-up ads depending on the webpage. As implied in limited capacity theories (Lang 2000), when people are involved in the web content, they have very limited cognitive resources left for the processing of peripheral information such as advertising. Therefore, people paid more attention to the peripheral advertising when they were less involved in the web content, and paid relatively less attention to other information when they were highly involved in the web content. Based on this theory, a number of scholars and practitioners believe that placing ads alongside web content might fail to attract consumers' attention and result in ad avoidance (Resnick et al. 2014). The experimental results of the current study showed that personalization *stole* the cognitive effort paid to the webpage and reduced ad avoidance. No matter whether people are strongly or weakly involved in the webpage content, the personally salient advertising could be a distractor to be noticed by consumers so that the message is recalled easily. However, ad attitude is not easily changed just by personalization. Even though the personalized pop-up ad was noticed regardless of high or low the webpage involvement was, the influence of personalization was interfered with by the webpage involvement. The positive attitude toward the personalized pop-up ad was promoted in the low but not in the high webpage involvement condition. Thus, the attitude is not just changed by being noticed. The factor influencing the ad attitude includes not only the ad characteristics, but also the web context.

The two-way interactions between personalized pop-up ad and product involvement on attitude and recall reinforce the importance of personalization. H3a and H3b were both rejected. Having a similar

result to that of the interaction effect with webpage involvement, product involvement interacts with the relationship between personalized pop-up ad and ad attitude, but not ad recall. Previous studies have demonstrated that high-involving product ads apparently stimulated greater central processing and induced a higher level of motivation to process the ad message, leading to more positive attitudes toward the ads (Celsi & Olson, 1988; Greenwald & Leavitt, 1984). However, the effect of personalization is still salient regardless of high or low product involvement. The influence of personalization on ad recall is greater than the influence of product involvement. The personalized pop-up ad is not a *peripheral cue*, but rather a central message under either the high or low product involvement conditions. Given that personalization is believed to trigger more central processing and greater engagement, the finding that personalization leads to generally better ad recall when exposed to both high- and low-involvement ads suggests potential cognitive processing of ad information and better ad recall. This result once again showed the powerful influence of personalization on ad recall.

Contrary to our prediction, ad attitude toward the personalized pop-up ad was better than that toward the non-personalized pop-up ad in the high-involvement, rather than the low-involvement condition. The attitude toward the personalized pop-up ad was enhanced when people had high interest in the advertised product. The personalized pop-up ad worked successfully on attitude when people were not interested in the product. Therefore, product involvement is the precondition for attitude change of the personalized pop-up ad. When people have high product involvement, they will have a more favorable attitude.

Differing from the previous studies concerning pop-up ads, this study explored the effect of pop-up ads on ad effects with personalization. The results of this study offer a significant contribution to the design of the pop-up ad on the Internet. In the limited extant literature of pop-up ads, much of the research has been focused on the negative impacts resulting from the pop-up window, such as annoyance and irritation (Bahr et al. 2011; Freier 2017). However, little attention has been paid to the discussion of the effective work of pop-up ads in the field of internet advertising. In this regard, the current study contributes to the understanding of the effective work of pop-up ads from the aspects of ad content and placement, providing more strategies for internet advertising design. Furthermore, as the present work found the moderating effects of product involvement, our findings deepen understanding of how personalized pop-up ads work in different product involvement conditions. Product involvement is investigated as an important factor directing consumers' information processing. Our study offers insights into the effect of personalized pop-up ads incorporating product involvement, and provides more enhanced understanding of the influence of personalized pop-up advertising with different levels of product involvement. Our findings strengthen the assertion that consumers are active in information processing and attitude change under the high product involvement condition, and that personalization enhances ad recall.

6. Implications

The current study also provides practical implications for advertisers. Pop-up ads have been used to force internet users' exposure to them. When considering the design of pop-up ads, an advertising manager must understand how to eliminate their annoyance. If the pop-up ad is designed to cause less irritation, it will capture a viewer's attention while breaking the browsing task, and enhance ad attitude and recall. Therefore, pop-up ads containing personalized messages are an effective way to attract viewers' attention and attitude toward the ad. In addition, the placement of personalized pop-up ads should be considered further by advertisers in order to get more attention. In order to promote ad attitude, the personalized ad should be placed on a low rather than on a high involvement webpage. The personalized pop-up ad did not work when people were highly engaged in the webpage, and was seen as an irritation. However, personalized pop-up ads could be placed anywhere if the purpose of the ad is to enhance ad recall. The product involvement is a precondition for the ad attitude of personalized pop-ups. That is, the influence of personalized pop-up ads on ad attitude only works for high product involvement and not for low product involvement. Similarly, ad recall is enhanced by personalized pop-up ads no matter where the ad is placed. Therefore, the product advertised in the personalized pop-up ad could be chosen based on the viewers' interest.

7. Limitation

As with all empirical investigations, there are several limitations that should be acknowledged. The main limitation concerns the stimulus materials. First, the personalization was manipulated only using the participant's name. However, based on the definition of personalized advertising and research by industry (Lee et al. 2015), users' other relevant information, such as age, gender, preferences, search behavior could have been included in the experiment. Therefore, further studies should explore how advertising that incorporates those data affects consumers' attention and attitude toward the ad. Second, this study employed only one type of product category, a coffee machine, as the target advertising, which may have resulted in confounded findings. Therefore, the generalizability of the findings is limited, and future research is needed to explore whether similar effects can be replicated by extending the categories of products.

The attention inertia did not take effect in this study, resulting in no influence of the ad placement. This insignificant result may have been caused by the fact that the participants did not have high attention inertia due to the limited number of pages of web content. The number of articles could be extended to explore the effect of attention inertia. Moreover, the results of the current study suggest that the attention-grabbing effect of the personalized pop-up ads is likely to differ depending on individuals' webpage involvement. The information type of the webpage (e.g., video) could be varied to further study the effects of types other than text and graphics, and further attention could be paid to the effects of the relationship between the information type of the webpage and personalized pop-up ads. In addition, the congruity between webpage content and ad message was not explored in the study. The match-up between webpage content and ad message could be explored deeply in future studies. This study suffered greatly from financial and time constraints, and the researchers believe that if these challenges are addressed it would result in a more meaningful and superior contribution to the literature of internet advertising.

Finally, attention is a crucial first step in any positive consumer response (Aribarg et al. 2010); however, visual attention was not measured in this study. There is an opportunity for researchers to explore the visual attention of the personalized pop-up ad to deeply understand the previous stage before ad attitude and recall are generated. It is suggested that similar studies to the current one be conducted with eye-tracking devices which can record the duration and first fixation on the personalized pop-up ad. This would generate more detailed results, and allow us to explore in more depth the black box of advertising information processing.

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