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Tracking users' visual attention and responses to personalized advertising based on task cognitive demand

Hyejin Bang [a, *], Bartosz W. Wojdynski [b]

[a] Department of Advertising and Public Relations, Grady College of Journalism and Mass Communication, The University of Georgia, GA, 30602, USA
[b] Grady College of Journalism and Mass Communication, The University of Georgia Athens, GA, 30602, USA

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ABSTRACT

This study examined the effects of personalization in banner advertising on visual attention to the advertisement. A 2 (ad type: personalized vs. non-personalized) × 2 (task cognitive demand: high vs. low) eye-tracking experiment ($N = 93$) was conducted to examine how personally salient information attracts consumers' attention, and how it interacts with different levels of cognitive load for given tasks. Consistent with previous literature, participants paid relatively longer and more attention to the personalized compared to non-personalized advertisements. However, task cognitive demand was shown to moderate the effects of personalization on attention, such that the personalized advertisement was much more effective in attracting consumers' attention than the non-personalized advertisement when people were engaged in a highly cognitively demanding task. No significant interactions between personalization and cognitive demand of task were found on perceived goal impediment and attitude toward the advertisement. Implications and suggestions for future research are provided.

1. Introduction

Consider the following scenario: 29-year-old Sara is due to give birth in 3 months, so she and her husband have started to shop online for baby paraphernalia. In the past week, they've visited e-retailers like Amazon.com or Babies “R” Us to look for car seats, strollers, and other baby gear. While browsing the Web, Sara noticed that ads for baby gear started following her across unrelated sites. Ads appear alongside her daily news articles, ads with her friends' names appear in her Facebook news feed, and she even receives email and text messages with promotional coupons. Although she'll usually at least glance at most of the ads to see if they're promoting a must-get product for her baby, she's starting to think that it's a bit creepy that all of the sites somehow seem to know she's pregnant.

Experiences like Sara's are rapidly becoming the norm for a large majority of Web users. The development of Web-based behavior-tracking and database technology enables marketers to tailor advertising based on consumers' interest, preference and needs (Pavlou & Stewart, 2000). Software now keeps track of a variety of users' browsing behavior, such as their past product selection, favorite celebrity, address, phone number, name, zip code and etc. This data is gathered either covertly (e.g., storing digital “cookies” on users' devices) or overtly (asking or requiring users to submit information), but in both cases the data collected can be incorporated into strategies by marketers or advertisers (Sundar & Marathe, 2010). Therefore, from the marketers' perspective, personalized advertising increases brands' ability to provide more accurate targeting, and from the consumers' perspective, it also increases message relevance or involvement to consumers (Tucker, 2011).

Recent industry research (e.g., Internet Retailer, 2013) shows that the prevalence of personalized advertising continues to grow. According to the research, more than half of e-retailers provide product recommendations or web page personalization using digital “cookies” (Internet Retailer, 2013). According to the U.S. Federal Trade Commission (FTC), more than 90% of online websites store users' personal information to use it for marketing purposes (US FTC, 2000).

In spite of the prevalence of personalized advertising, our theoretical understanding of the impact of personalization on

* Corresponding author.
E-mail addresses: adhjbang@uga.edu (H. Bang), bartw@uga.edu (B.W. Wojdynski).

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consumer decision-making is still in its nascent stages. This may be due in part to the difficulty of tailoring advertising based on participant's personal information in experiment setting. Most research on personalized advertising has relied on survey data (e.g., Baek & Morimoto, 2012; Nyheim, Xu, Zhang, & Mattila, 2015; Xu, 2006; Yu & Cude, 2009), not experimental analysis. As a result, some of the controversy over how personalization may affect users responses to ads continues (Pavlou & Stewart, 2000; Phelps, D'Souza, & Nowak, 2001). Therefore, to answer the need for more empirical research regarding the situational impact of personalized advertising on consumers behavior and perceptions, this study investigated how personalized advertising alongside news article may work to attract readers' attention, and whether the effects of personalization on attention, recall and attitudes may vary based on the cognitive effort required by the task the user is trying to accomplish on the site. To more accurately gauge how personalized advertising affects consumers' attention on a page, participants' visual attention to on-screen stimuli was measured using eye-tracking equipment.

2. Literature review

2.1. The rise and evolution of personalized advertising

Personalized advertising can be defined as advertising that incorporates information about the individual, such as demographic information, personally identifying information (e.g., name, residence, and job) and shopping-related information (e.g., purchase habit or history and brand preference; Wolin & Korgaonkar, 2005; Yuan & Tsao, 2003; Yu & Cude, 2009). Unsolicited commercial e-mail, postal direct mail, telemarketing, and text messaging can be all considered as forms of personalized advertising (Baek & Morimoto, 2012), although recent interest in the phenomenon has focused primarily on mobile and Web display advertising tailored and served to users based on their identity and behavior (e.g., Aguirre, Mahr, Grewal, de Ruyter, & Wetzels, 2015), a practice also known as online behavioral advertising (Smit, Van Noort, & Voorveld, 2014). Overall, personalization refers to tailoring of message content and delivery based on data collection or covert observation of users, to increase the personal relevance of message. This is often treated a distinct concept from “customization,” which involves users actively selecting or inputting information and receiving tailored content in response, thus enabling users to perform an active role in receiving information (Sundar & Marathe, 2010).

Personalized advertising, once thought of as a promising attention-getting tactic, is no longer a new development. However, the processes by which user information is recorded and used to generate personalized ad content continue to evolve. Due to the advancement of tracking and database technology (e.g., digital cookies), advertisers are now equipped with power to tailor ad messages at individual level depending on consumers' interests and needs (Pavlou & Stewart, 2000), and their capabilities are often bolstered by cross-platform information sharing between various sites and applications (Finley, 2015).

Despite the prevalence of personalized or customized messages (Kalyanaraman & Sundar, 2006; Poon & Jevons, 1997), evidence of the effects of personalization on advertising-related outcomes has been mixed (Yu & Cude, 2009). Some researchers have found that personalized messages (e.g., advertising) attract users' attention (Malheiros, Jennett, Patel, Brostoff, & Sasse, 2012; Tam & Ho, 2005) and increase message receivers' attitude toward the message or even toward the medium (Kreuter & Wray, 2003; Pavlou & Stewart, 2000) because of its perceived relevance to the self (Lang, 2006; Petty, Barden, & Wheeler, 2002). For instance, Kalyanaraman and Sundar (2006) found that the level of customization of Web site content led to more positive user attitudes toward the portal mediated by perceived relevance, novelty and involvement. Recent research has also shown that a consumer's level of *perceived* personalization of a message can be a far better predictor of positive attitude effects than whether the message was actually personalized (Li, 2016). Similar effects have been found for personalization in advertising (Baek & Morimoto, 2012; Howard & Kerin, 2004; Pavlou & Stewart, 2000). Specifically, Howard and Kerin (2004) discovered that consumers' ad responsiveness could be enhanced by personalization; when an ad contained a viewer's first name, the viewer was likely to have higher purchase intention for the product recommended in the ad. Tucker (2014) found that these effects can go beyond intention to behavioral responses, with personalized ads yielding a higher click-through rate if consumers have power to control the privacy setting on the webpage.

While personalized advertising may have broad overall benefits to advertisers, its success with individual consumers may be moderated by other factors, such as the extent to which the mechanism of personalization raises privacy concerns among message recipients (Phelps et al., 2001; Sacirbey, 2000). White, Zahay, Thorbjørnsen and Shavitt (2008) suggested that the level of personalization, the presence of justification for personalization and the perceived utility of the message could all be important factors in determining consumers' reactance to personalization. Several studies empirically proved that consumers generally have a negative perception towards personalized advertising across media types, which may increase as privacy issues are made more salient (Sheehan & Hoy, 1999), or if the personalization is based on behavioral tracking (Turow et al., 2009). Recently, Baek and Morimoto (2012) found that individuals with high enduring levels of privacy concerns are likely to avoid personalized ads, mediated by skepticism toward the personalized advertising. These negative effects might offset the positive effects of personalized ad (Phelps et al., 2001; Sacirbey, 2000; Van Doorn & Hoekstra, 2013).

2.2. Attentional salience of personalized information

In any Web use experience, consumers are bombarded with many simultaneous calls for attention, yet they are limited in their capacity for processing information. Biased competition theory (Desimone & Duncan, 1995), which argues that information in visual fields competes for cognitive processing, is highly relevant to the often-cluttered online media environment, where media context and advertisements compete for consumers' attention. According to industry studies, the amount of attention paid to online advertising is much lower than that to advertising in other media, such as TV, radio and magazine (AdNews, 2013). Therefore, what determines or controls consumers' visual processing of information in the competitive media environment is an important issue for advertisers.

Ad personalization may play a role in attracting consumers' attention to advertisements that they might otherwise miss. According to previous research, it has been found that the sound or sight of a person's own name can attract one's attention, even when the name is embedded in sets of other information (Harris & Pashler, 2004; Mack & Rock, 1998; Moray, 1959; Wolford & Morrison, 1980). Moray (1959) first confirmed the attentional salience of person's own name in an experiment in which participants were asked to shadow information played in their left ear,