Mobile Advertising: An Empirical Study of Temporal and Spatial Differences in Search Behavior and Advertising Response ☆

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Abstract

Using clickstream panel data from an automobile ad campaign conducted on a mobile platform, we investigate the relevance of mobile advertising, the interrelationships between ad content, information search behavior, and advertising response. Temporally, we compare mobile users' search behavior and advertising response before and during a focal campaign event of an automobile show. Spatially, we examine their search behavior and advertising response in relation to their proximity to the show's location. Estimation results from individual-user random effects binary Logit and Poisson count models show that users' responses to mobile advertising are related to the depth and breadth of search and the ad content. While informative and persuasive ad content exhibits differential non-linear effects on the depth and breadth of search, they have similar effects on advertising response. Interestingly, spatial and temporal proximity of mobile ad campaigns may not lead to increased relevance of mobile campaigns; it depends on the type of ad content and the type of measure used to assess relevance.
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Keywords: Mobile advertising; Location awareness; Information search; Advertising response; Clickstream data

Introduction

Mobile devices and mobile media technologies are playing an increasingly important role in the everyday lives of millions of people worldwide. In 2013, 96% of the world's population or 6.8 billion people subscribed to mobile services. Seventy three percent of Internet users in 2013 accessed the Web from a mobile device, and the usage is expected to reach 90.1% in 2017 as mobile devices overtake PCs as the most popular way to get onto the Web. As adoptions of mobile devices further take off, global expenditures on mobile advertising are estimated to increase to $24.6 billion by 2016 (Mobithinking.com 2014).

The mobile communications platform, as an advertising medium, provides distinct advantages over the Internet medium in terms of targeted marketing. First, mobile technologies can track users' geographical locations precisely. Automakers, insurance companies and shopping malls are experimenting with new ways to use this kind of location data, such as for geo-targeting of advertisements and price promotions (Valentino-Devries and Angwin 2011). Second, mobile phones are portable, accompanying their owners and following their movements. Thus, mobile advertising is likely to be the most timely and relevant. If marketers use mobile service operators' profile of their customers cleverly enough, they can tailor their advertisements to match each subscriber's habits (Economist 2007). Consequently, many practitioners and researchers opine that the mobile medium can render advertisements more proximal to the consumer both

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geographically and temporally, thus increasing the relevance of such advertising, and making them more effective.

In this paper, we aim to evaluate whether the mobile medium can make advertisements more relevant, and also provide new insights on mobile users' information search and advertising response behaviors on the mobile platform. More specifically, we ask: (1) How does ad content influence consumers' information search and advertising response on a mobile platform? (2) What is the relationship between consumer information search behavior and mobile advertising response? (3) Does spatial and temporal proximity of advertisements increase the relevance of a mobile location-aware ad campaign?

We study the relevance of mobile advertising in terms of information search and advertising response. We investigate temporal and spatial differences in consumers' information search and advertising response behaviors, and the interrelationships between *ad content*, *information search* and *advertising response* on the mobile media. Temporally, we compare information search and advertising response behaviors before and during a focal campaign event of an industry-level automobile show. Spatially, we examine how their search behavior and advertising response differ according to their proximity to the event's location. Using a novel proprietary dataset of an automobile ad campaign conducted on the mobile medium in a large Asian country, we estimate panel-level models of information search and advertising response.

This study is fundamentally unique from other prior studies in the following aspects. We focus on the mobile medium and move beyond prior studies that examine information search and advertising response behaviors limited only to the Internet media (Agarwal, Hosanagar, and Smith 2011; Brynjolfsson and Smith 2000; Dreze and Hussherr 2003; Goldfarb and Tucker 2011; Hollis 2005; Lewis and Reiley 2011; Manchanda et al. 2006; Yang and Ghose 2010). Research efforts on mobile advertising have primarily relied on experimental and survey data, with a focus on measuring consumer attitude toward mobile ads and the moderating factors (Drossos, Giaglis, and Vlachos 2009; Oh and Xu 2003; Okazaki, Li, and Hirose 2009; Tsang, Ho, and Liang 2004). We instead use detailed individual-user panel level click-stream data from a real mobile ad campaign to evaluate our research questions. Two prior studies are most related to our work. First, Ghose and Han (2011) analyze the inter-dependence between mobile users' content generation and usage behaviors in a mobile Internet setting. However, their work is not based on an advertising context and lacks information on the specific nature of the content consumed by mobile users (which we have in contrast). Second, Banerjee and Dholakia (2008) study the effectiveness of mobile location-based advertising, but use a lab experimentation method that captures only perceptual and attitudinal responses. Thus, this research is a novel effort to examine mobile ad content specifics, users' information search behavior and advertising response in a location-aware setting that uses individual-level panel clickstream data.

Our major research findings are as follows: (1) Mobile ad content of informative and persuasive nature exhibits differential non-linear effects on the depth and breadth of information search. Both types of ad content however have a similar U-shaped influence on mobile advertising response. (2) Increased depth and breadth of information search are associated with higher propensities to respond to mobile ads. (3) Spatial and temporal proximity of conducting mobile ad campaigns does not always make them more relevant. It depends on the type of ad content and the type of measure used to assess relevance (i.e., depth/breadth of search, or advertising response).

This study contributes to the advertising literature in three important ways. First, we clarify the relationship between consumer information search and advertising response behavior on the increasingly important yet under-studied mobile media. Second, we document the relationships between mobile ad content, information search and advertising response behaviors. Third, we examine how consumers' search behavior and advertising response sensitivities vary by temporal proximity to a focal marketing event and across various geographic regions in an integrated marketing communications campaign context.

Conceptual Foundations and Research Hypotheses

Fig. 1 presents the research model for this study. Based on our literature review and the information available in our data set, we propose to have mobile ad content (Mandel and Johnson 2002; Sismeiro and Bucklin 2004) as our main group of independent constructs. Dependent constructs used to assess the relevance of mobile ad campaigns include depth and breadth of information search and advertising response. Control variables include page attributes (Bucklin and Sismeiro 2003; Sismeiro and Bucklin 2004), session characteristics (Bucklin and Sismeiro 2003; Moe and Fader 2004a,b; Sismeiro and Bucklin 2004), phone attributes and province location. We summarize the relationships between various constructs in the research model depicted in Fig. 1.

Two strands of literature are relevant to our research. One is research on consumer's information search behavior and the other is research on consumer's advertising response in terms of purchase intention. Although most of the literature pertains to the Internet platform, it provides us with an important theoretical background to explain user behavior toward information transmitted via a mobile network and interactive interface.
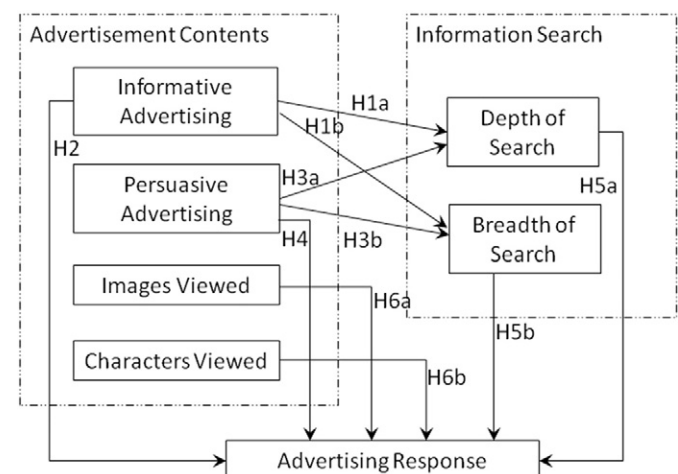

Fig. 1. Research framework.