

## PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a preprint version which may differ from the publisher's version.

For additional information about this publication click this link.

<http://hdl.handle.net/2066/156368>

Please be advised that this information was generated on 2019-02-15 and may be subject to change.

Running head: THE EFFECTS OF LOCATION-BASED ADVERTISING

Investigating the effects of location-based advertising in the supermarket: Does goal congruence trump location congruence?

Jonathan van 't Riet<sup>a</sup>

Arief Hühn<sup>b</sup>

Paul Ketelaar<sup>a</sup>

Vassilis-Javed Khan<sup>c</sup>

Ruben König<sup>a</sup>

Esther Rozendaal<sup>a</sup>

Panos Markopoulos<sup>c</sup>

<sup>a</sup> Behavioural Science Institute, Radboud University

<sup>b</sup> NHTV University of Applied Sciences of Breda

<sup>c</sup> Department of Industrial Design, Eindhoven University of Technology

Corresponding author: Jonathan van 't Riet. Behavioural Science Institute, Radboud University,

PO Box 9104, 6500 HE Nijmegen, The Netherlands. Email: [j.vantriet@maw.ru.nl](mailto:j.vantriet@maw.ru.nl); Tel: +(31)

(0)24 361 2342; Fax: +(31) (0)24 361 2372.

Abstract

Advertising professionals have great expectations of Location-Based Advertising (LBA). The present study therefore set out to investigate whether ads that are tailored to consumers' location are indeed more effective than ads that are not. In addition it was investigated whether LBA is particularly likely to be effective when the ad is not only location-congruent, but also relevant to consumers' goals. Therefore, a 2 (location congruence) X 2 (goal relevance) experimental design was employed. These expectations were borne out: the location-congruent ad resulted in more purchases than the location-incongruent ad, but only when the ad was high in goal relevance. These results suggest that it is only profitable for advertisers to send 'local' messages when these messages are relevant.

## Introduction

For a number of years, advertisers have been able to tailor online ads to consumers' location, most commonly using IP addresses or WiFi location. Recently, however, the increasing availability of location tracking technologies, such as GPS-enabled mobile phones, has enabled companies to shift from 'standard geo-targeting', most commonly utilized in desktop or traditional marketing, to 'geo-precise targeting', used in mobile marketing (xAD 2012, April 1). These efforts use more specific longitude and latitude data to tailor messages to the consumer's exact location (Banerjee and Dholakia 2012). Such 'Location-Based Advertising' (LBA) has been conceptualized as marketer-controlled information customized to the exact location where users access advertising media (Bruner and Kumar 2007; Unni and Harmon 2007). Recently, a number of professional publications have argued that LBA is one of the big promises of mobile advertising. It has been reported that LBA can increase click-through rates of mobile advertising by a factor of 2.5 (1.0% versus 0.4%) (Tode 2013, Feb 6). Moreover, a report by *Verve Mobile* (2014) stated that recipients of LBA were 2.7 times more likely to visit the advertised store than people who did not receive LBA. An article in *Mobile Marketer* (Tode 2013, Feb 1) quotes Howie Schwartz, CEO of *Human Demand*, as saying "[LBA] is something that desktops can't do – it can't do location at that level". And "[It] is probably the biggest thing that is going to push mobile advertising this year". No wonder, then, that companies offering LBA-related products and services have seen big rises in advertisers' demand (Tode 2013, Feb 1; xAD 2012, April 1). A next possible step is a shift to hyper-local 'indoor' LBA, which can target consumers inside malls or even on specific spots inside stores, using Bluetooth-based applications like Apple's iBeacon (Tode 2013, Nov 20).

In spite of the general enthusiasm among advertising and marketing professionals, only a few scientific studies have investigated whether LBA can be an effective tool to influence consumers' attitudes and behaviors (Banerjee and Dholakia 2012). Given this paucity of data on LBA's effectiveness, the present study sets out to investigate whether ads that are tailored to consumers' location are indeed more effective than ads that are not.

Besides from learning how effective LBA is, it is pivotal to know under which circumstances LBA is effective. One professional publication has suggested that advertisers need to get both context and relevance right in order for mobile advertising to work (Johnson 2013, Feb 22). That is, it is not enough to send consumers messages about products that are available nearby; rather, it is imperative that these products are relevant to consumers at the same time. Although this seems very plausible, there is no scientific research to support this claim. In the present study, we therefore set out to investigate the effects of LBA under conditions of high and low relevance. Our study is the first study to investigate the combined influence of location-based messages and relevance. It employed a virtual reality setting to create a simulation of a real-life shopping experience. This allowed us to achieve relatively high ecological validity and also gave us the opportunity to assess purchase behavior. Our study thus constitutes a considerable step forward in the field of LBA research, where most studies rely on scenario-study methodology (e.g., Banerjee and Dholakia 2012; Unni and Harmon 2007; Xu Oh and Teo 2009).

#### *Location-Congruent Advertising and Goal relevance*

It has been proposed that the impact of traditional advertising is declining because consumers navigate their media-environment more actively than in the past. Rather than passive

recipients of, for instance, television content, consumers use media to fulfil their goals (LaRose Mastro and Eastin 2001). These can consist of being entertained or searching for specific information, among other things (Cho and Cheon 2012). The important thing here, however, is that advertising often impedes the fulfilment of these goals, for instance when consumers are distracted from their entertainment or when pop-up advertising impedes on consumers' search for information. In some cases, consumers may adjust their goals to include advertising. In most cases, however, the result will be advertising avoidance (Cho and Cheon 2004; Kim and Sundar 2010; Li, Edwards and Lee 2002). A solution for this is to deliver advertising content that is highly relevant to consumers' goals. When advertisers succeed in doing so, ads are more likely to be noticed, appreciated and have a greater chance of being effective (Edwards Li and Lee 2002; Van Doorn and Hoekstra 2013; Wehmeyer 2007; D. J. J. Xu 2006).

The relevance of the advertised product in the eyes of the consumer has been an important issue in the advertising literature for a long time. In the Elaboration Likelihood Model (ELM; Cacioppo and Petty 1984), for instance, it is acknowledged that different kinds of appeals can be effective for different audiences. For example, an early study by Petty and Cacioppo (1983) showed that consumers exposed to an ad paid more attention to the ad when it concerned a product that was available in their neighbourhood (high relevance) than when it concerned a product that was not (low relevance).

To increase perceived relevance, Cho and Cheon (2012) have suggested that advertisers deliver 'highly targeted, customized, and context-congruent advertising messages' (p.94), as this increases the likelihood that ads actually help consumers to fulfil their goal, rather than stand in the way. Such targeted messages can be created through consumer profiling, systematic behavioral tracking or other types of 'e-customization' (Ansari and Mela 2003).

It is often assumed that LBA increases perceived relevance by enabling advertisers to advertise for products that are physically nearby, thus creating the chance to use the information in the ad immediately. For instance, one professional publication (Tode, 2013, Feb 6) states that adding location information in mobile advertising “brings real value to users by helping them find products and services where and when they want them”. Scientific publications likewise assume that LBA can be effective due to the possibility to ‘offer the most customer-focused local advertising’ to consumers (Lee 2010, page 709; see also Kuo et al., 2009). The assumption seems to be that location congruence automatically triggers perceptions of relevance. However, there is no empirical research on this. This is problematic because, as Gidofalvi et al. (2008) have pointed out, location congruence and relevance are distinct constructs. After all, it is unlikely that knowing where a consumer is will always be sufficient to know what the consumer is up to. In the present paper, we therefore make a distinction between location congruence and relevance. According to Gidofalvi et al. (2008), LBA should not only be tailored to consumers’ location, but also to their interests, in order to create involving advertising content (Li et al. 2002). Adopting this reasoning, we expected that goal relevance is not the inevitable result of location congruence but rather an important additional predictor of advertising effectiveness. More specifically, we expected that goal relevance and location congruence interact to produce effects on advertising effectiveness, as content needs to be both goal-relevant and location-congruent to be most effective. The present study is the first study to investigate this.

### *Previous Research on LBA*

As mentioned above, there is very little scientific evidence for the effectiveness of LBA. As of July 8 2014, a search on Web of Science using the search string ((location-based OR

“location based”) AND (advertising OR marketing OR promotion)) yielded 127 results. A similar search using the search string (“geo-targeting” OR “geo targeting”) found no results. The majority of the 127 results dealt with programming or engineering issues and only a limited number dealt with consumer reactions to LBA. As can be seen in Table 1, which shows 19 studies that investigated consumer reactions towards LBA, most studies have focused on consumer acceptance of the technology, usually operationalized as a general willingness to receive location-based messages. Among other things, these studies have shown that credibility, entertainment, interactivity (Lin Huang Chang and Jheng 2013), perceived relevance (H. H. Lee and Hill 2013) and opportunities for social interaction (Roback and Wakefield 2013) have a positive effect on consumers’ acceptance of LBA. Also, consumer acceptance has been found to be influenced by age, education level (Chong 2013) and personality traits (Junglas Johnson and Spitzmuller 2008). There is a dearth of research, however, on consumer impact.

Two studies aimed to gauge the effectiveness of LBA using qualitative methods (Lee Yeung and Yu 2012; Tussyadiah 2012). Tussyadiah (2012), for instance, had consumers discuss their possible reactions to LBA in focus group interviews. Her conclusions were that the effects of LBA are dependent on relevance and connectivity. While such an approach is certainly worthwhile and allows for a broad exploration of consumer experience, one can argue that it does not provide a sufficiently ecologically valid research context to derive accurate predictions of consumers’ reactions to LBA. Talking about hypothetical location-congruent messages, after all, is vastly different from receiving LBA in real life (Hühn et al. 2012).

Xu and colleagues (2009) employed an experimental design to investigate the relative effectiveness of text versus multimedia messages in LBA. They hypothesized that multimedia messages would be perceived as more engaging and informative than text messages as they can



provide more vivid information about the product. At the same time, Xu et al. note that multimedia messages impose a higher cognitive load on recipients and may therefore lead to more irritation. The results of their study yielded support for both hypotheses. Banerjee and Dholakia (2012) investigated the effects of location-congruent ads for men versus women, in private versus public places, and in work versus leisure contexts. Unni and Harmon (2007) investigated the effects of pull versus push messages and of message content (brand advertising versus promotional). None of these studies, however, employed a no-LBA control group and could therefore make a reliable prediction as to the effect of location-congruent versus location-incongruent advertising. Moreover, all three studies used a verbal scenario procedure, asking consumers to imagine receiving a location-congruent ad. As with the qualitative studies mentioned above, one can wonder whether such a procedure results in a reliable prediction of what consumers would do if they actually received a location-congruent ad in real life.

It has been noted that advertising researchers have struggled with the evaluation of interactive and context-sensitive applications like LBA because of their lack of means to create an ecologically valid research setting (Hühn et al. 2012). In the field of human-computer interaction (HCI), however, this has been a familiar challenge for some time, giving rise to a new line of research where lab studies have been extended with virtual environments (Hühn et al. 2012). This offers participants a dynamic and interactive context during their experience while researchers retain a controllable and malleable experimental setting (Leichtenstern André and Rehm 2010).

In an attempt to investigate the effects of LBA, Hühn and colleagues (2012) employed research tools derived from the field of HCI. They conducted an experiment in a lab setting, using a simulated shopping location created by means of virtual reality. This virtual environment

created the interactivity that is necessary for a relatively ecologically valid consumer experience. Participants entered a 'virtual supermarket' with the task to select five product of their own choice. They were provided with a smartphone with a preinstalled shopping application which enabled them to receive either location-congruent or location-incongruent ads. Their results suggest that location-congruent ads are perceived as less intrusive than location-incongruent ads, and that this lower perceived intrusiveness leads to more positive attitudes towards the ad. However, although the location-congruent ads were more relevant to participants in terms of proximity to the advertised product, it is unclear how relevant the product was to participants' goals and interests in this study. In addition, as intention to purchase the product and actual buying behavior were not assessed, it is hard to say if LBA will indeed lead to increased sales on the basis of this study.

Quite a different approach was used by Fang and colleagues (2013), who provided a quantitative estimate of LBA's effectiveness using company archival data. This study used data on daily movie ticket sales via mobile phone applications and found that consumers' chances of ordering tickets spiked significantly after receiving location-congruent messages, both immediately and cumulatively over the next 9 days. However, the role of goal relevance remained underexplored in this study. The data showed an effect on the purchase behavior of subscribers to the mobile movie-ticket service and it can be assumed that the offer was relevant to all or most of them. The study therefore does not provide us with an estimate of the effects of LBA under conditions of low relevance, nor does it quantify the effect of relevance on the effectiveness of LBA. More generally, while Fang and colleagues' study is the first one to investigate actual buying behavior as a result of LBA, studies of company archival data cannot

be expected to offer the experimental control necessary to investigate moderators of LBA impact.

In all, we can conclude that only two previous studies investigated the effects of LBA in an ecologically valid context. One study used virtual reality to simulate a real-life shopping experience (Hühn et al. 2012), while the other one investigated real-life purchase decisions which were gleaned from company archival data (Fang et al. 2013). No study investigated the combination of location congruence and relevance. The present study aimed to fill this gap in the literature.

As in Hühn et al.'s (2012) study, we used a virtual simulation of a real-world shopping experience. In this virtual research environment, we manipulated both location congruence and goal relevance and assessed effects on persuasion. We assessed purchase behavior, perceived ad intrusiveness, and ad attitude as our outcome measures. As noted above, purchase behavior is rarely assessed in LBA studies, even though it is often regarded as the ultimate criterion of advertising's effectiveness (Schultz et al. 1993). However, in the present study, the simulation of a real-life shopping experience that we employed allowed us to observe participants' product choice and thus use purchase behavior as a persuasive outcome measure. Advertising intrusiveness, as Vespe (1997) has already noted, is a common complaint of consumers when advertising practices interrupt the fulfillment of their goals. Intrusiveness can be seen as a perception that occurs when consumers' cognitive processes are interrupted (Li et al., 2002). Intrusiveness can have negative consequences such as irritation and ad avoidance (Cho and Cheon, 2004) and is therefore a relevant outcome measure. Finally, attitude towards the ad was assessed as this variable is usually seen as an important outcome of advertising practices (MacKenzie et al. 1986).

### *Hypotheses*

We expected ads that were high in goal relevance to be more persuasive than ads that were low in goal relevance (Edwards Li and Lee 2002; Van Doorn and Hoekstra 2013; Wehmeyer 2007; D. J. J. Xu 2006), hence resulting in increased purchase behavior. As the alignment of messages with consumer goal pursuit is the most important predictor of (low) perceived intrusiveness and an important predictor of ad attitude (Li et al. 2002), we also expected that highly goal relevant messages would result in decreased perceptions of intrusiveness and more positive ad attitudes as compared to messages low in goal relevance. Our first set of hypotheses therefore was:

*Hypothesis 1a:* Ads high in goal relevance will result in more purchase behavior than ads low in goal relevance.

*Hypothesis 1b:* Ads high in goal relevance will result in decreased perceptions of intrusiveness as compared with ads low in goal relevance.

*Hypothesis 1c:* Ads high in goal relevance will result in more positive ad attitudes as compared with ads low in goal relevance.

Our second set of hypotheses concerned the interaction between goal relevance and location congruence. As we have discussed above, location congruent messages will be more likely to be perceived as relevant for consumers than location incongruent messages, but only if consumers have an actual interest in the advertised product. In line with previous theorizing (Gidofalvi et al., 2008), we therefore expected that location-congruent advertising would be

especially likely to be in line with consumers' goals, and hence more likely to result in increased purchase behavior, decreased perceptions of intrusiveness and more positive ad attitudes, under conditions of high goal relevance. Therefore, our second set of hypotheses was:

*Hypothesis 2a:* Location congruence will lead to higher levels of purchase behaviour, but only under conditions of high goal relevance.

*Hypothesis 2b:* Location congruence will lead to lower levels of intrusiveness, but only under conditions of high goal relevance.

*Hypothesis 2c:* Location congruence will lead to higher levels of ad attitude, but only under conditions of high goal relevance.

## Method

### *Design and Manipulations*

In order to investigate the influence of both location congruence and goal relevance we employed a 2 (location congruent vs. location incongruent) x 2 (high goal relevance vs. low goal relevance) between-subjects design. All participants received a short grocery list with the instruction to purchase the listed products in a Virtual Supermarket (VSM). They were told to do their groceries in the VSM with the use of a mobile shopping app that was preinstalled on a HTC Legend smartphone. By taking a photograph of a product with the smartphone, participants could add the product to a virtual shopping basket in the mobile app. Participants were told that they should proceed to the check-out after having placed all products in the grocery list in their virtual shopping basket. During this virtual shopping experience, participants received one ad on their mobile device, which was used to create our experimental manipulations. In fact, the ad

contained the same offer for all participants, i.e., a discount offer for a specific brand of tomato soup. The virtual space contained a 'trigger area' in the form of a circle (not visible to participants) with a radius of 0.5 meter. Entering this trigger area immediately triggered the ad. Importantly, the ad was triggered on the same (virtual) location in the VSM for all participants. However, the VSM itself was manipulated such that for half of the participants, the shelf that was closest to the ad's trigger area contained the tomato soup in question, making the ad location-congruent. For the other half of the participants, the shelf contained instant meal mixes, and the packed tomato soup could only be purchased on another location, making the ad location-incongruent. To make sure that participants would relate the mobile ad to their immediate shopping environment, a banner was placed over the shelf which also contained a promotional offer for the shelved product. That is, the banner stated an offer for the packed tomato soup on the shelves in the location-congruent condition, but contained an offer for the shelved meal mixes in the location-incongruent condition (see Figure 1). One could argue that this introduces a confound to the design, as the conditions now differed in 1) the products that were shelved close to the ad's trigger area, and 2) the promotional banner that was placed over the shelves. However, the placement of the banner was deemed necessary because trial runs indicated that some participants, especially elderly participants, did not relate the mobile ad to their immediate surroundings. The banner thus functioned to increase awareness of the products shelved next to the trigger area.

We chose to manipulate the location of the advertised product rather than the location of the trigger area. The reason for this was the fact that varying the location of the trigger area would mean that participants would receive the ads in different locations, introducing the possibility that their reactions to the ad may be influenced by the myriad of factors that differ

between the different locations (e.g., distance into the supermarket, progress with the shopping list, shelved products in the vicinity of the trigger area, etc.).

Goal relevance was manipulated by changing the products on the grocery list. In the high-relevance condition, the shopping list included soup, making the ad highly relevant, whereas in the low-relevance condition, the shopping list included soft drinks instead of soup, making the ad not relevant. As participants were asked to imagine that they were on a 'budget' of €10 to purchase these articles, they would have been likely to be motivated to consider price and therefore interested to receive ads for price-promotions. Participants were randomly assigned to the four resulting conditions using a computerized random number generator. Table 2 provides a schematic overview of the operationalizations. Another way to manipulate goal relevance is to offer participants different ads in the different conditions. Thus, participants could have received only one shopping list (e.g., all lists containing soup), but the product that was advertised in the ad could have been manipulated (e.g., soup ads in the high-relevance condition and soft drinks in the low-relevance condition). A downside of this, however, would be that the content of the ad (soup versus soft drinks) would differ systematically between the conditions. Thus, possible differences between the high- and low-relevance conditions may be ascribed to participants reacting differently to soup versus soft drinks due to personal preferences. For this reason, we chose to keep the ad constant and manipulate the VSM and the shopping list as manipulations of location and goal relevance.

### *Participants*

The study included a total of 139 participants, who were recruited through a market-research company. Of all participants, 65 (46.8%) were women, 60 participants (43.2%) had

finished tertiary education, and the mean age was  $M(SD) = 38.9(15.0)$ . The results of a  $\chi^2$  analysis showed that the four conditions did not differ significantly in terms of gender,  $\chi^2(3) = 1.94, p = .59$ , or education,  $\chi^2(3) = 6.40, p = .09$ . The results of a one-way ANOVA showed that the four conditions did not differ significantly in age,  $F(3, 135) = 0.63, p = .60$ .

### *Procedure*

Upon arrival in the laboratory, participants were seated and given an explanation of the research procedure. Participants were explained how they could navigate the VSM by moving forward, backward and sideways (see below). They were warned of potential dizziness/nausea and were told that they should interrupt/stop the experiment at any time if they wished.

Participants were given an HTC Legend smartphone and were instructed to keep this phone in their hands during the entire experiment. They were told that they could operate the phone with their fingers, using the touch sensitive screen. Participants were notified that the log files of the virtual supermarket and the phone would be saved as part of the data collection, so that their route through the virtual supermarket would be recorded, as well as the offers that they received and the products that they bought. In addition, they were told that a questionnaire would be administered after their experience in the virtual supermarket. All participants agreed with this and signed informed consent forms.

After these instructions, the participants were asked to complete a three-minute practice run in a nearly empty supermarket, with the aim of mastering navigation and use of the phone. This practice run entailed navigating a short route through the VSM, purchasing one product by making a photo of the product with the phone, and reporting at the (virtual) counter for the check out.



After the practice run, participants were asked whether they had any additional questions or concerns. If this was not the case, participants started their grocery shopping task. They were told to imagine that they were shopping for a friend, who needed ingredients for dinner, but could not do his own groceries because he had to take his brother to the hospital at the last minute. This was done to make sure that personal preferences did not interfere with the manipulation of goal relevance. They were told to imagine that their friend had given them a grocery list, which included fruit, instant meal mix, rice and soup in the high-relevance condition, and fruit, instant meal mix, rice and soft drink in the low-relevance condition. A scan of supermarket prices in the Netherlands' main supermarket chains revealed that these products could be purchased for anywhere between €7 and €10. However, prices were not revealed in the VSM, neither on the shelves nor through the smartphone, and it is reasonable to believe that the €10 budget served as a gentle nudge for participants to be open to price promotions. After their experience in the virtual VSM, participants were taken to another room, where they were seated and could fill in the questionnaire.

### *Virtual Supermarket*

The VSM (modeled and rendered in Unity) was projected onto four rear-projection screens (each 3.6 meters wide and 2.6 meters high). The screens formed a closed space, called the CAVE, with a square floor surface of approximately 13 m<sup>2</sup>, offering participants a 360° view of the environment. Participants were instructed to stand in the exact centre of the floor surface, which was designated by a cross on the floor. Participants could move in the VSM with the help of a head-tracking system based on the Microsoft Kinect. This system determines the participant's head's position in the CAVE, which is then used to control motion in the VSM.

When the participant stands in the centre of the CAVE the virtual camera stands still, but when the participant takes one step forward, the projections on the screens change to give the participant the impression of moving forward. As long as the participant remains standing one step from the centre of the CAVE, he/she will keep 'moving'. The speed with which this happens is dependent on the distance between the participant and the middle of the CAVE: a larger distance (a bigger step forward) results in faster virtual movement. The participant is able to turn and step in every direction relative to the CAVE's centre; he/she can move sideways and backward, and to the left and right, by taking a step to the side and to the back, and turning to face left/right. The simulation did not correct the first person view for the vertical axis, for instance correcting the perspective when participants ducked or jumped, as this was not deemed necessary for the experimental task at hand. In contrast to often-used head-mounted virtual displays, the VSM did not block out the physical world, offering us the opportunity to include physical objects, in particular the mobile smartphone, in the experimental procedure.

For the present study, a supermarket environment was created based on the corporate style and spatial arrangement in the supermarkets of the Netherland's largest supermarket chain (see Figure 1). All shelves were filled with products, although some products were stacked at multiple shelves and the inventory, relative to a real-world supermarket, was not complete. As in most Dutch supermarkets, participants first encountered the fruit and vegetable section. The trigger area of the mobile ad was placed at the end of this section. Right behind the trigger area, a shelf facing the entrance of the supermarket was used to display the advertised product in the location-congruent condition and the non-advertized instant meal mixes in the location-incongruent condition.

An Android application was developed, which connected the phone with the CAVE through Wifi. The moment that the participants entered the trigger area of the virtual supermarket, this application would play a notification sound, vibrate and present the ad to participants. The application could also be used to purchase products (see above). Participants were instructed to access this list and delete photographs if they had made a mistake or if they had changed their mind about purchasing a product. By deleting the photograph, the product was removed from the virtual shopping basket.

### *Questionnaire*

*Manipulation checks.* We used two self-constructed instruments to assess perceived goal relevance and perceived location congruence as manipulation checks. Three items assessed goal relevance by asking participants to indicate their agreement with the statements ‘The mobile ad fitted my goals well’, ‘The mobile ad was not relevant to my task’ and ‘The mobile ad fitted what I was doing’ each on a 7-point scale (1 = *strongly disagree*; 7 = *strongly agree*). We reversed the second item to create an average goal relevance scale ( $\alpha = .89$ ;  $M = 4.31$ ;  $SD = 1.96$ ). One item assessed perceived location congruence by asking participants to indicate their agreement with the statement ‘The mobile ad was suitable to my specific location’ ( $M = 4.50$ ;  $SD = 1.69$ ).

*Perceived ad intrusiveness* was measured using 7 items from previous research by Li et al. (2002). For instance, one item asked participants to indicate the extent to which they found the mobile ad distracting (1 = *strongly disagree*; 7 = *strongly agree*;  $\alpha = .87$ ;  $M = 3.07$ ;  $SD = 1.18$ ).

*Ad attitude* was assessed with a self-constructed scale of 12 items using a 7-point scale. These items asked participants to indicate the extent to which they found the ad important, meaningful, useful, valuable, believable, negative, fun, bad, no fun, unbelievable, good and positive (1 = *strongly disagree*; 7 = *strongly agree*). A factor analysis revealed the existence of two factors, with all factors loading on the first factor, which accounted for 36.2% of variance, except for the items negative, bad, no fun and unbelievable, which loaded on the second factor, accounting for 33.5% of variance. Based on these results, we dropped these four items from the scale. The resulting scale had a high internal consistency ( $\alpha = .91$ ;  $M = 4.31$ ;  $SD = 1.19$ ).

#### *Purchase behavior*

As detailed above, participants could add products to their virtual shopping basket by making a photo of the desired products with the phone. After adding all desired products to the shopping basket, participants could report at the (virtual) counter for the check out. Participants were instructed to access the shopping basket and delete photographs if they had made a mistake or if they had changed their mind about purchasing a product. By deleting the photograph, the product was removed from the shopping basket. After participants completed the questionnaire, the virtual shopping basket was inspected by the experimenters to record whether the advertised product was purchased or not.

#### *Analyses*

We investigated the effects of location congruence (LC), goal relevance (GR), and the interaction between LC and GR on our manipulation checks perceived location congruence and perceived goal relevance with ANOVAs. As purchase behavior constituted a dichotomous

variable, and ANOVAs require dependent variables on an interval or ratio scale, we used  $\chi^2$  analyses to investigate the effects of LC and GR on purchase behavior. Effects on intrusiveness and ad attitude were investigated in a series of ANOVAs.

## Results

### *Manipulation Checks*

We first investigated whether Location Congruence (LC), Goal Relevance (GR) and the interaction between LC and GR had significant effects on our manipulation checks: perceived location congruence and perceived goal relevance. In the ANOVA, GR had a significant effect on perceived goal relevance,  $F(1, 128) = 178.91, p < .000, \eta_p^2 = .58$ , while LC did not,  $F(1, 128) = 0.93, p = .34, \eta_p^2 = .01$ . An investigation of the means revealed that participants in the high-relevance condition perceived the ad as more relevant ( $M = 5.82$ ) than participants in the low-relevance condition ( $M = 2.85$ ). The interaction between LC and GR did not have a significant effect on perceived goal relevance,  $F(1, 128) = 3.07, p = .08, \eta_p^2 = .02$ . With regards to perceived location congruence, the results of the ANOVA showed that LC had a significant effect on perceived location congruence,  $F(1, 125) = 5.50, p = .02, \eta_p^2 = .04$ , with participants in the location-congruent condition perceiving the ad as more location-congruent ( $M = 4.85$ ) than participants in the location-incongruent condition ( $M = 4.16$ ). There was no significant effect of GR,  $F(1, 125) = 0.75, p = .39, \eta_p^2 = .01$ . The interaction between LC and GR did not have a significant effect on perceived location congruence,  $F(1, 125) = 0.69, p = .41, \eta_p^2 = .01$ .

### *Persuasive Outcome Measures*

With regards to purchase behavior, Table 3 shows that only one participant in the low-relevance condition bought the advertized product. There was no significant main effect of LC,  $\chi^2(1) = 1.56, p = .21$ . There was an effect of GR, however, as the majority of participants (79.7%) in the high-relevance condition bought the advertized product, and only a very small minority in the low-relevance condition (1.4%),  $\chi^2(1) = 88.52, p < .001$ . This supports Hypothesis 1a. In addition, within the high-relevance condition, the likelihood of purchasing the product was greater for the location-congruent participants (90.9%) than for the location-incongruent participants (69.4%),  $\chi^2(1) = 4.91, p = .03$ . There was no significant effect of LC in the low-relevance condition,  $\chi^2(1) = 1.01, p = .31$ . Hypothesis 2a was thus supported.

With regards to intrusiveness, our results revealed that there was no main effect of LC,  $F(1, 124) = 0.93, p = .34, \eta_p^2 = .01$ . However, participants in the high-relevance condition perceived the ad as less intrusive than participants in the low-relevance condition ( $M_{\text{High-relevance}} = 2.76; M_{\text{Low-relevance}} = 3.38; F(1, 124) = 9.29, p < .01, \eta_p^2 = .07$ , supporting Hypothesis 1b. There was no significant interaction between LC and I,  $F(1, 124) = 0.52, p = .47, \eta_p^2 = .004$ , leading us to reject Hypothesis 2b.

For ad attitude, significant main effects of both LC,  $F(1, 126) = 4.44, p = .04, \eta_p^2 = .03$ , and GR,  $F(1, 126) = 36.46, p < .001, \eta_p^2 = .22$ , were found. However, inspection of the means revealed that the significant effect of LC was in the opposite direction from what could have been expected: attitudes towards the ad were more negative in the location-congruent condition ( $M = 4.12$ ) than in the location-incongruent condition ( $M = 4.51$ ). For GR, inspection of the means showed more positive attitudes in the high-relevance ( $M = 4.86$ ) than in the low-relevance condition ( $M = 3.79$ ), supporting Hypothesis 1c. These main effects were qualified by a significant interaction between LC and I,  $F(1, 126) = 10.44, p < .01, \eta_p^2 = .08$ . Further

inspection of this interaction effect revealed that, contrary to our expectations, there was no effect of LC in the high-relevance condition ( $M_{\text{Location-congruent}} = 4.96$ ;  $M_{\text{Location-incongruent}} = 4.76$ ;  $p = .46$ ). Instead, in the low-relevance condition, participants had more negative attitudes towards the ad when it had been location-congruent than when it had been location-incongruent ( $M_{\text{Location-congruent}} = 3.32$ ;  $M_{\text{Location-incongruent}} = 4.27$ ;  $p < .001$ ) (see Table 4). Thus, although the interaction was significant, the simple effects showed a different pattern than was expected. Hypothesis 2c was rejected.

### Discussion

The present study investigated the combined influence of goal relevance and location congruence on purchase behavior, perceived intrusiveness and ad attitude. We hypothesized that goal relevance would predict purchase behavior, ad intrusiveness, and ad attitude (Hypotheses 1a, 1b, and 1c). These expectations were borne out, as purchase behavior was higher, ad intrusiveness was lower, and ad attitude was more positive in the high-relevance condition as compared to the low-relevance condition. In addition, we expected that location congruence would result in increased purchase behavior, lower levels of ad intrusiveness, and more positive ad attitudes, but only for consumers for whom the ad was highly goal relevant. This expectation was borne out for purchase behavior, supporting Hypothesis 2a: the location-congruent ad resulted in more purchases than the location-incongruent ad, but only when the advertised product was highly relevant for participants because they had the goal to purchase it. For ad intrusiveness and ad attitude, this effect was not found, however. In fact, the results for ad attitude revealed quite a different pattern. Contrary to Hypothesis 2c, location congruence resulted in more negative ad attitudes when the advertised product was of low relevance to participants. Perhaps the

explanation for this result lies in the disruption to consumers' activities that results from the message. The combination of an irrelevant mobile message and a shelf filled with the undesired advertised product may be more disruptive to consumers' activities than the mobile message alone. That is, a mobile message alone may be easier to discard or ignore than a message that is combined with information in the real world. If that is the case, location congruence could be a double-edged sword and advertisers should consider the advertised products' relevance very carefully before employing LBA. However, we did not find evidence that location-congruent messages were particularly likely to result in perceived intrusiveness under conditions of low relevance, something that we would expect if the disruption hypothesis were true. More research is needed to investigate whether location-congruent messages can backfire when the advertising content is perceived as irrelevant.

Another explanation of the unexpected interaction between goal relevance and location congruence arises from our use of a banner to direct participants' attention to the advertised product in the location-congruent condition. The combination of a banner and a mobile ad, while perhaps not especially noteworthy in the high-relevance condition, may have been perceived as useless in the low-relevance condition, resulting in more negative attitudes. Or the mobile ad may have been considered to add little information to the banner. If that is the case, advertisers should perhaps not be too afraid that location-congruent messages backfire, although they should still take care not to overexpose consumers with irrelevant information.

Besides from the negative effect of location congruence on ad attitude in the low-relevance condition, it is also noteworthy that location congruence did not result in more positive ad attitudes for participants in the high-relevance condition. This is in contrast with a previous study that found location-congruent advertising to result in more positive consumer reactions



(Hühn et al. 2012). However, a crucial difference between the present study and that previous study is the fact that in the previous study, participants were not given a shopping list, and had no opportunity to make (virtual) purchases. Instead, participants roamed their virtual shopping environment freely, during which they received a mobile ad, after which attitudes towards the ad and mobile application were assessed. Thus, participants may not have been likely to evaluate the ad on the dimension of goal relevance, as both ads did not have direct bearing on their activities. Instead, they may have solely evaluated the ad and application based on location congruence. In the present study, however, the ad may have been predominantly judged on goal relevance rather than location congruence. In other words, with the shopping list on their minds, participants may have used goal relevance as the main consideration to determine the value of the ad in both the location-congruent and –incongruent conditions. Consistent with this, goal relevance was found to significantly affect purchase behavior and ad attitude, but there were no main effects of location congruence. To investigate the role of consumer goals further, future studies could randomize participants over three conditions: high-relevance, low-relevance and free shopping. This could also have the practical benefit of determining whether different LBA messages are needed for shopping-list shopping versus leisurely browsing.

In all, the present study provides insights into the effects of location-congruent advertising for high- and low-relevance consumers. Below, we will expand on the theoretical and managerial implications of our results.

### *Theoretical implications*

On a theoretical level our results draw attention to the distinction between location congruence and relevance. It is sometimes suggested that location-congruence will be highly

relevant to consumers, because the advertized product is available nearby (Kuo et al. 2009; Lee 2010). Our results cast doubt on that, as there were no positive effects of LBA in the low-relevance condition. In addition, location congruence did not result in increased levels of perceived relevance as assessed for our goal-relevance manipulation check. It seems the LBA literature would benefit from a more fine-grained model of relevance in advertising. One model that could be used to formulate hypotheses about LBA-related processes is the Relevance-Accessibility Model (RAM; Baker and Lutz 2000). The RAM predicts that an advertizing message is most likely to influence purchase behavior when it is both relevant and accessible at a time when purchase is possible. This reasoning suggests that the LBA literature could benefit from focusing on accessibility rather than on relevance as the major advantage of LBA: by conveying messages at a location where the consumer might buy the product, rather than at a location where there is no opportunity to buy the product, LBA can dramatically increase the accessibility of the message in consumers' minds at the time of the purchase. It is unclear, however, whether LBA can increase relevance, as this is predominantly dependent on consumers' interests and goals. Perhaps the RAM, or other theoretical models on the relevance of advertising, can be used to disentangle the roles of relevance and accessibility in LBA, as well as guide future research into the factors that make an advertising message effective.

### *Managerial implications*

The positive effect of LBA on purchase behavior in the high-relevance condition is in line with previous research reporting significant effects for LBA (Fang et al. 2013; Hühn et al. 2012). It suggests that, under the right circumstances, LBA 'brings real value to users by helping them find products and services where and when they want them' (Tode 2013, Feb 6). But in

addition to studies reporting a positive general effect of LBA, the present results suggest that it is only profitable for advertisers to send 'local' messages when they can personalize these messages to increase relevance. In advertising practice, this could be done by using data on demographics or purchase history to tailor product offers to consumers' needs (Johnson 2013, Feb 22; Tode 2013, Feb 6). Alternatively, companies could give consumers the opportunity to customize their own product (Miceli Raimondo and Farace 2013) or to coproduce some aspect of the communication process (Bacile Ye and Swilley 2014). A report from *Mobile Marketer* stated that 24% of location-based campaigns already used a combination of 'third party data' and 'place-based targeting' (Tode 2013, Feb 6). Perhaps this practice explains the large effects sometimes claimed in professional publications with regards to the effectiveness of LBA (Tode 2013, Feb 6). At any rate, the present results support the notion that LBA needs to be combined with highly relevant advertising content (Johnson 2013, Feb 22).

This conclusion is underlined by findings from another recent study, which showed that highly involved consumers reported more positive attitudes towards LBA than low-involvement consumers (Lee, Kim, and Sundar, 2015). As the present study, that study also showed involvement (i.e., goal relevance) to be the strongest predictor of ad attitudes, far stronger than location congruence. As such, it seems that personal relevance trumps goal congruence. Thus, a second recommendation for advertisers is that, given the choice between tailoring to consumers' goals and tailoring to consumers' location, advertisers should surely focus on consumers' goals first.

This may also be true for other forms of LBA. There are gradations within geo-targeting, with the fairly common LBA based on cell tower or WiFi-location on one end of the extreme, and the fine-grained use of consumers' exact location, for instance with the help of Bluetooth, on

the other end. The location-congruent messages that we used in the present study are most similar to the latter, fine-grained, type of LBA. LBA based on cell tower or WiFi location is more common, however, partially because its broader scope offers the opportunity to reach more consumers (Tode 2013, Feb 1). Future studies should investigate the role of relevance and location congruence for less precise types of LBA. For now, the results of the present study suggest that location-based messages need to be highly relevant for consumers in order to be effective.

### *Strengths and limitations*

A number of strengths and limitations of the present study should be noted. A notable strength is our use of the virtual supermarket. The virtual supermarket provided participants with a realistic shopping experience, while providing us with the experimental control to manipulate the location of the products.

One notable limitation is the use of participants' shopping list as a manipulation of goal relevance. This manipulation was part of a scenario in which participants were asked to do groceries for a friend, which may have limited participants' involvement in the procedure. Asking participants to use the virtual supermarket to do their own groceries, for instance by using their virtual purchases as actual orders in an online delivery service, could be the next step in creating an even more realistic shopping experience. Ultimately, however, field experiments are necessary, not only to study LBA in a real shopping context, but also to test the overall acceptability of the designed mobile service (Sun and May 2013). Another limitation of the shopping list procedure may have been that it was 'too effective' as a manipulation of goal relevance, in the sense that it left participants at the two extremes of the goal relevance

continuum. That is, whereas in real life products can be slightly less or slightly more desirable than other products because of factors like brand, packaging, perceived quality, etcetera, the advertised products in our experiment were not desirable at all (because they weren't on respondents' shopping list), or highly desirable (because they were). Thus, one could argue that our experiment does not reveal the effects of goal relevance at moderate levels of goal relevance. Future studies could employ more subtle manipulations of goal relevance, or could try to measure goal relevance on a scale that allows for more subtle differences. As the first study to investigate the combination of goal relevance and location congruence, however, the present results are nevertheless informative.

### *Conclusions*

The results of the present study draw attention to the distinction between location congruence and personal relevance. Whereas it is sometimes suggested that location-congruence will always increase relevance, our results suggest that these two concepts have distinct effects. Future research should attempt to disentangle the effects of location congruence and personal relevance further. As for recommendations for practice, the present results suggest that LBA can be of great value to advertisers, provided they succeed in creating content that is relevant to consumers. If there is a choice between creating personally relevant ads on the one hand or employing location-based ads, advertisers should surely focus on personal relevance, as it seems to have a stronger effect on relevant outcome measures than location congruence. In addition, location congruence may result in negative perceptions when the advertising content is irrelevant, although this latter effect should be investigated further in future research. The results underline the pivotal role of goal relevance, as this factor not only moderated the effect of

location congruence on behavior, but also had strong main effects on behavior and perceptions of the ad.

## References

- Agarwal, R. and Prasad, J. (1998), "A conceptual and operational definition of personal innovativeness in the domain of information technology," *Information Systems Research*, 9(2), 204-215. doi: 10.1287/isre.9.2.204
- Ansari, A. and Mela, C. F. (2003), "E-Customization," *Journal of Marketing Research*, 40(2), 131-145. doi: 10.1509/jmkr.40.2.131.19224
- Bacile, T. J., Ye, C. and Swilley, E. (2014), "From Firm-Controlled to Consumer-Contributed: Consumer Co-Production of Personal Media Marketing Communication," *Journal of Interactive Marketing*, 28(2), 117-133. doi: 10.1016/j.intmar.2013.12.001
- Baker, W. E. and Lutz, R. J. (2000), "An Empirical Test of an Updated Relevance-Accessibility Model of Advertising Effectiveness," *Journal of Advertising*, 29(1), 1-14.
- Banerjee, S. and Dholakia, R. R. (2012), "Location-Based Mobile Advertisements and Gender Targeting," *Journal of Research in Interactive Marketing*, 6(3), 198-214.
- Brunner, G. C. and Kumar, A. (2007), "Attitude toward location-based advertising," *Journal of Interactive Advertising*, 7(2), 3-15.
- Cacioppo, J. T. and Petty, R. E. (1984), "The elaboration likelihood model of persuasion," *Advances in Consumer Research*, 11, 673-675.
- Chen, K. Y. and Chang, M. L. (2013), "User acceptance of 'near field communication' mobile phone service: an investigation based on the 'unified theory of acceptance and use of technology' model," *Service Industries Journal*, 33(6), 609-623. doi: 10.1080/02642069.2011.622369
- Cho, C. H. and Cheon, H. J. (2004), "Why do people avoid advertising on the Internet?" *Journal of Advertising*, 33(4), 89-97.

- Chong, A. Y. L. (2013), "Mobile commerce usage activities: The roles of demographic and motivation variables," *Technological Forecasting and Social Change*, 80(7), 1350-1359. doi: 10.1016/j.techfore.2012.12.011
- Dhar, S. and Varshney, U. (2011), "Challenges and Business Models for Mobile Location-based Services and Advertising," *Communications of the Acm*, 54(5), 121-129. doi: 10.1145/1941487.1941515
- Edwards, S. M., Li, H. R. and Lee, J. H. (2002), "Forced exposure and psychological reactance: Antecedents and consequences of the perceived intrusiveness of pop-up ads," *Journal of Advertising*, 31(3), 83-95.
- Fang, Z., Yang, Y., Li, W. and Deng, F. M. (2013), "Quantify sales impact of Location-Based Advertising," *International Journal of Mobile Communications*, 11(5), 513-529. doi: 10.1504/ijmc.2013.056958
- Gallego, D., Woerndl, W. and Huecas, G. (2013), "Evaluating the impact of proactivity in the user experience of a context-aware restaurant recommender for Android smartphones," *Journal of Systems Architecture*, 59(9), 748-758. doi: 10.1016/j.sysarc.2013.02.004
- Gidofalvi, G., Larsen, H. R. and Pedersen, T. B. (2008), "Estimating the capacity of the Location-Based Advertising channel," *International Journal of Mobile Communications*, 6(3), 357-375. doi: 10.1504/ijmc.2008.017516
- Hühn, A. E., Khan, V.-J., Lucero, A. and Ketelaar, P. (2012), "On the Use of Virtual Environments for the Evaluation of Location-Based Applications," Paper presented at the CHI 2012, Austin, Texas, USA.
- Johnson, L. (2013, Feb 22), "Does context always trump content in mobile?" *Mobile Marketer*. Retrieved from <http://www.mobilemarketer.com/cms/news/strategy/14828.html>



- Junglas, I. A., Johnson, N. A. and Spitzmuller, C. (2008), "Personality traits and concern for privacy: an empirical study in the context of location-based services," *European Journal of Information Systems*, 17(4), 387-402. doi: 10.1057/ejis.2008.29
- Kim, N. Y. and Sundar, S. S. (2010), "Relevance to the rescue: Can "smart ads" reduce negative response to online ad clutter?" *Journalism and Mass Communication Quarterly*, 87(2), 346-362.
- Kuo, M. H., Chen, L. C. and Liang, C. W. (2009), "Building and evaluating a location-based service recommendation system with a preference adjustment mechanism," *Expert Systems with Applications*, 36(2), 3543-3554. doi:10.1016/j.eswa.2008.02.014
- LaRose, R., Mastro, D. and Eastin, M. S. (2001), "Understanding internet usage - A social-cognitive approach to uses and gratifications," *Social Science Computer Review*, 19(4), 395-413.
- Lee, E.-S. A., Yeung, F. K.-W. and Yu, T.-Z. (2012), "Variable Categorization and Modelling: A Novel Adversarial Approach to Mobile Location-Based Advertising," AAI Technical Report WS-12-09 Intelligent Techniques for Web Personalization and Recommender Systems.
- Lee, H. H. and Hill, J. T. (2013), "Moderating effect of Privacy Self-Efficacy on Location-Based Mobile Marketing," *International Journal of Mobile Communications*, 11(4), 330-350. doi: 10.1504/ijmc.2013.055747
- Lee, S., Kim, K.J. and Sundar, S. S. (2015), "Customization in location-based advertising: Effects of tailoring source, locational congruity, and product involvement on ad attitudes," *Computers in Human Behavior*, 51, 336-343, doi: 10.1016/j.chb.2015.04.049

- Lee, Y.-C. (2010), "Factors Influencing Attitudes towards Mobile Location-based Advertising,"  
In: Wenzheng, L (Ed.), Proceedings of the 2010 IEEE International Conference on  
Software Engineering and Service Sciences, 709-712.
- Leichtenstern, K., André, E. and Rehm, M. (2010), "Using the Hybrid Simulation for Early User  
Evaluations of Pervasive Interactions," Paper presented at the NordiCHI 2010.
- Li, H. R., Edwards, S. M. and Lee, J. H. (2002), "Measuring the intrusiveness of advertisements:  
Scale development and validation," *Journal of Advertising*, 31(2), 37-47.
- Lin, K. H., Huang, K. F., Chang, Y. Y. and Jheng, C. H. (2013), "Potential consumers' intentions  
to use LBS in Taiwan," *International Journal of Mobile Communications*, 11(6), 636-  
655. doi: 10.1504/ijmc.2013.057819
- MacKenzie, S. B., Lutz, R. J. and Belch, G. E. (1986), "The Role of Attitude toward the Ad as a  
Mediator of Advertising Effectiveness: A Test of Competing Explanations," *Journal of  
Marketing Research*, 23(2), 130-143. doi: 10.2307/3151660
- Miceli, G., Raimondo, M. A. and Farace, S. (2013), "Customer Attitude and Dispositions  
Towards Customized Products: The Interaction Between Customization Model and  
Brand," *Journal of Interactive Marketing*, 27(3), 209-225. doi:  
10.1016/j.intmar.2013.03.001
- Okazaki, S. and Barwise, P. (2011), "Has the Time Finally Come for the Medium of the Future?  
Research on Mobile Advertising," *Journal of Advertising Research*, 51(1), 59-71. doi:  
10.2501/jar-51-1-059-071
- Petty, R. E. and Cacioppo, J. T. (1983), "Central and peripheral routes to advertising  
effectiveness: The moderating role of involvement," *Journal of Consumer Research*,  
10(2), 135-146. doi: 10.1086/208954

- Richard, J. E. and Meuli, P. G. (2013), "Exploring and modelling digital natives' intention to use permission-based location-aware mobile advertising," *Journal of Marketing Management*, 29(5-6), 698-719.
- Roback, D. and Wakefield, R. L. (2013), "Privacy Risk versus Socialness in the Decision to Use Mobile Location-Based Applications," *Data Base for Advances in Information Systems*, 44(2), 19-38.
- Schultz, D. E., Tannenbaum, S. I. and Lauterborn, R. F. (1993), *Integrated Marketing Communications: Pulling It Together and Making It Work*, Lincolnwood, IL: NTC Business Books.
- Sun, X. and May, A. (2013), "A comparison of field-based and lab-based experiments to evaluate user experience of personalized mobile devices," *Advances in Human-Computer Interaction*, 2013(619767). doi: [org/10.1155/2013/619767](https://doi.org/10.1155/2013/619767)
- Tode, C. (2013, Feb 1), "Dos and don'ts of hyper-local mobile advertising," *Mobile Marketer*. <http://www.mobilemarketer.com/cms/news/advertising/14703.html> (accessed on 12/09/2014)
- Tode, C. (2013, Feb 6), "Location targeting more than doubles performance of mobile ads: report," *Mobile Marketer*. <http://www.mobilemarketer.com/cms/news/research/14731.html> (accessed on 12/09/2014)
- Tode, C. (2013, Nov 20), "Apple poised to surpass Google in indoor location-based services," *Mobile Marketer*. <http://www.mobilemarketer.com/cms/news/software-technology/16647.html> (accessed on 12/09/2014)

- Tussyadiah, I. P. (2012), "A concept of location-based social network marketing," *Journal of Travel and Tourism Marketing*, 29(3), 205-220. doi: 10.1080/10548408.2012.666168
- Unni, R. and Harmon, R. (2007), "Perceived effectiveness of push vs. pull mobile location-based advertising," *Journal of Interactive Advertising*, 7(2), 28-40.
- Van Doorn, J. and Hoekstra, J. C. (2013), "Customization of online advertising: The role of intrusiveness," *Marketing Letters*, 24(4), 339-351. doi: 10.1007/s11002-012-9222-1
- Venkatesh, V. and Davis, F. D. (2000), "A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies," *Management Science*, 46(2), 186-204. doi: 10.1287/mnsc.46.2.186.11926
- Verbeke, W. and Vackier, I. (2004), "Profile and effects of consumer involvement in fresh meat," *Meat Science*, 67(1), 159-168. doi: 10.1016/j.meatsci.2003.09.017
- Verve Mobile (2014), "Location powered mobile advertising report"  
<http://www.vervemobile.com/research/verve-state-of-the-retail-market-location-powered-mobile-advertising-report/> (accessed on 12/09/2014)
- Vespe, F. (1997), "High-Tech Billboards: The Same Old Litter on a Stick," *Journal of Public Policy & Marketing*, 16 (1), 176-179.
- Wehmeyer, K. (2007), "Mobile ad intrusiveness: The effects of message type and situation," Paper presented at the 20th Bled eConference eMergence: Merging and Emerging Technologies, Processes and Institutions.
- xAD. (2012, April 1), "Mobile-local performance stats,"  
<http://www.iab.net/media/file/xAdQ12012Report.pdf> (accessed on 7/01/2014)
- Xu, D. J. J. (2006), "The influence of personalization in affecting consumer attitudes toward mobile advertising in China," *Journal of Computer Information Systems*, 47(2), 9-19.

- Xu, H., Oh, L. B. and Teo, H. H. (2009), "Perceived effectiveness of text vs. multimedia Location-Based Advertising messaging," *International Journal of Mobile Communications*, 7(2), 154-177.
- Yoon, K., Bolls, P. D. and Muehling, D. D. (1999), "The Effect of Involvement, Arousal, and Pace on Claim and Non-claim Components of Attitude toward the Ad," *Media Psychology*, 1(4), 331-352.
- Zhou, T. (2013), "An empirical examination of user adoption of location-based services," *Electronic Commerce Research*, 13(1), 25-39. doi: 10.1007/s10660-013-9106-3.

Figure 1 Screenshots of the VSM.



Figure 1a Location-incongruent shelf with the meal-mix ad



Figure 1b Location-congruent shelf with the soup ad

Table 1 Previous research on consumer reactions to LBA

Source	Focus of the study	Design
Banerjee and Dholakia 2012	Consumer impact	Experimental study
Chen and Chang 2013	Consumer acceptance	Survey
Chong 2013	Consumer acceptance	Survey
Dhar and Varshney 2011	Conceptualization and description of LBA	Literature review
Fang et al. 2013	Consumer impact	Analysis of company archival data
Gallego et al. 2013	Consumer acceptance	Survey
Gidofalvi et al. 2008	Capacity of the LBA channel	Simulation study
Hühn et al. 2012	Consumer impact	Experimental study
Junglas et al. 2008	Consumer acceptance	Survey
Lee and Hill 2013	Consumer acceptance	Survey
Lee et al. 2012	Consumer impact	Interviews with consumers
Lin et al. 2013	Consumer acceptance	Survey
Okazaki 2011	Consumer acceptance	Literature review
Richard and Meuli 2013	Consumer acceptance	Survey
Roback and Wakefield 2013	Consumer acceptance	Survey
Tussyadiah 2012	Consumer impact	Focus group study
Unni and Harmon 2007	Consumer impact	Experimental study
Xu et al. 2009	Consumer impact	Experimental study
Zhou 2013	Consumer acceptance	Survey

Table 2 Schematic overview of operationalizations

	High goal relevance	Low goal relevance
Location congruent	Unox Soup ad in front of soup shelf + shopping list with soup	Unox Soup ad in front of soup shelf + shopping list with soft drinks (instead of soup)
Location incongruent	Unox Soup ad in front of mealmixes shelf + shopping list with unox soup	Unox Soup ad in front of mealmixes shelf + shopping list with soft drinks (instead of soup)



Table 3 Proportions of buyers and non-buyers in the four conditions

	High goal relevance		Low goal relevance	
	Location	Location	Location	Location
	congruent	incongruent	congruent	incongruent
Did buy the advertized product	30	25	1	0
Did not buy the advertized product	3	11	34	35

Table 4 Means, SDs in the four conditions for intrusiveness and ad attitude, and F-values for the differences

	Means and SDs								ANOVA results		
	High goal relevance				Low goal relevance				Main effect LC (Step 1)	Main effect GC (Step 1)	Interaction (Step 2)
	Location congruent		Location incongruent		Location congruent		Location incongruent				
	M	SD	M	SD	M	SD	M	SD			
Intrusiveness	2.79	1.18	2.73	1.05	3.55	1.22	3.21	1.12	0.95	9.33*	0.52
Ad attitude	4.96	1.02	4.76	1.10	3.32	0.79	4.27	1.11	4.54*	34.51*	10.44*

\*  $p < .05$