



Full length article

Does location congruence matter? A field study on the effects of location-based advertising on perceived ad intrusiveness, relevance & value



Arief Ernst Hühn ^{a,*}, Vassilis-Javed Khan ^a, Paul Ketelaar ^b, Jonathan van 't Riet ^b,
Ruben Konig ^b, Esther Rozendaal ^b, Nikolaos Batalas ^a, Panos Markopoulos ^a

^a Department of Industrial Design, Eindhoven University of Technology, PO Box 513, Den Dolech 2, 5600 Eindhoven, The Netherlands

^b Communication Science, Behavioural Science Institute, Radboud University, PO Box 9104, 6500 HE Nijmegen, The Netherlands

ARTICLE INFO

Article history:

Received 19 January 2016

Received in revised form

1 March 2017

Accepted 1 March 2017

Available online 14 March 2017

Keywords:

Location based advertising

Location-congruency

Intrusiveness

Relevance

Value

Field experiment

ABSTRACT

We investigate the effect of location-congruent mobile messages on perceived intrusiveness, value, and relevance through a field experiment using the Experience Sampling Method (ESM). We developed a mobile application for undergraduate students, featuring campus news and information concerning class schedules. This application also included daily ads for the University restaurant, which were either location-(semi)congruent or location-incongruent. Immediately after viewing the ads the app presented a short questionnaire to the participants for a period of four weeks, thereby measuring their perceived intrusiveness, relevance and value of these ads. During these four weeks daily ads were sent to 40 students, resulting in 107 responses from 23 participants. The results show that our participants perceived location-(semi)congruent ads as significantly more valuable and relevant, whereas no significant results were found for perceived intrusiveness. By investigating LBA in a field-study based on ESM utilizing participants' own smartphone devices this study corroborates the presumed effects of location-(semi)congruency on marketing relevant ad perceptions.

© 2017 Published by Elsevier Ltd.

1. Introduction

The wide-spread adoption of mobile devices with continuous, real-time location tracking technology has opened up the possibility for marketers to serve online ads that are tailored to the consumers' location, a technique also known as Location Based Advertising (LBA). While traditional advertising runs the risk of not sufficiently taking into account the goals and context of the user, usually leading to irritation and ad avoidance (Li, Edwards, & Lee, 2002; Cho & Cheon, 2004), LBA offers the opportunity to tailor ads more specifically to the consumers' situation by taking into account the consumers' physical location. Although the development of LBA still finds itself in an early stage, technology- and businesswise (Dhar & Varshney, 2011), professional publications

already report that LBA increases click-through rates (Tode, 2013, Feb 6) and generate traffic (Verve Mobile, 2014). The expectation that current outdoor location tracking technologies such as GPS and GSM Cell-ID will be complemented with methods that improve accuracy and enable indoors location-tracking (e.g. Bluetooth, RFID, WiMax and sensor technology) could make LBA even more attractive for marketers (Dhar & Varshney, 2011).

Even though LBA has received both professional and academic interest, research on the effectiveness of LBA is still in its infancy. As Hühn, Khan, Lucero, and Ketelaar (2012) and Van 't Riet et al. (2016) have shown, the majority of the LBA related studies are concerned with the technical realization. From the studies that look into consumer reactions, most deal with the general willingness of consumers to receive location-based ads. It is only in the last few years that researchers have increasingly looked into the effects of LBA by means of an experimental setup (e.g. Banerjee & Roy Dholakia, 2012; Hühn et al., 2012; Unni & Harmon, 2007; Xu, Oh & Teo, 2009; Lee, Kim, & Sundar, 2015; Čaić, Mahr, Aguirre, de Ruyter & Wetzels, 2015; Ketelaar et al., 2015; Van 't Riet et al., 2016).

These impact studies have investigated different aspects of LBA such as location type, situational context, gender (Banerjee & Roy

* Corresponding author.

E-mail addresses: a.huhn@tue.nl (A.E. Hühn), v.j.khan@tue.nl (V.-J. Khan), p.ketelaar@ru.nl (P. Ketelaar), j.vanriet@ru.nl (J. van 't Riet), r.konig@ru.nl (R. Konig), e.rozendaal@ru.nl (E. Rozendaal), n.batalas@tue.nl (N. Batalas), p.markopoulos@tue.nl (P. Markopoulos).

Dholakia, 2012), multimedia vs. text-based ads (Xu et al., 2009) and push vs. pull (Unni & Harmon, 2007). But when it comes to the effectiveness of LBA itself, it is location-congruency defined as the extent to which messages (e.g. ads, notifications etc.) are tailored to the consumer's location, which deserves attention. It is only recently that location-congruency has been included in impact studies. Hühn et al. (2012) and Lee et al. (2015) investigated whether tailoring ads to the consumer's location has a positive influence on beliefs, attitude and behavior. In both instances location-congruency was found to have a positive impact, which seem to suggest that LBA is effective as an advertising technique.

Conclusions from these past impact studies remain tentative due to the questionable ecological validity of their experimental setups. Most LBA studies to date have either used verbal scenarios to convey the situation in question (e.g. Unni & Harmon, 2007; Xu et al., 2009; Banerjee & Roy Dholakia, 2012; Cai et al., 2015), or recreated scenarios in the lab within virtual environments (Hühn et al., 2012; Lee et al., 2015; Ketelaar et al., 2015; Van 't Riet et al., 2016). In these approaches the question remains to what extent these findings extend to real life situations since the absence of an actual experience in context, in a scenario-based study, might possibly lead to participants to evaluate situations differently than in an actual response in-the-field (Wehmeyer, 2007).

The dearth of field studies regarding location-based ads could partly be attributed to the technical challenges of data collection which is time-consuming and costly (Kjeldskov and Stage, 2004). Furthermore, field studies are also afflicted by methodological challenges. Given the dynamic and unstable nature of real world situations, field studies usually lack experimental control resulting in studies cluttered with extraneous variables (Kjeldskov and Stage, 2004; Kjeldskov & Skov, 2014; Hühn et al., 2012). Nonetheless, field studies are important as explained by Sun and May (2013), "not only to study LBA in a real shopping context, but also to test the overall acceptability of the designed mobile service" (Sun & May, 2013).

To our knowledge, there have been a few LBA field studies that specifically investigate location. For example the study from Aalto, Göthlin, Korhonen, and Ojala (2004) who conducted a field trial to evaluate their prototype location-based advertising system. However, their research was largely qualitative in nature and did not investigate the effects of location-congruency on ad effectiveness since no comparison was made between location-congruent and location-incongruent conditions. Moreover, the participants answered the questionnaires ex situ, long after they have been exposed, thereby increasing the likelihood of memory bias. Another example is the study of Molitor, Reichhart, Spann, and Ghose (2015). In this instance the researchers conducted an experiment on a fully operational LBA platform which was already used by real consumers. Interestingly, they found a continuous negative influence of geographical distance on ad response rates (measured through click-through rates). In addition, they also found that ranking ad lists based on distance (random vs. distance-based ranking) and displaying distance information (display distance info vs. no distance info) have a positive influence on response rates. However, since only behavioral outcomes (click-through rates) were measured, as with many of the other LBA field studies (Varnali, Yilmaz, & Toker, 2012; Spiekermann, Rothensee, & Klafft, 2011; Ghose et al., 2012; Luo et al., 2013), it remains unclear how geographical distance influenced the perception of the ad, thereby leaving open the question of what is the psychological mechanism behind LBA effectiveness.

Hence, our objective for this study is to determine in situ if location-congruent mobile ads have a positive effect on the user perception of mobile ads. To meet this demand for in situ real world data we conducted a within-subjects field quasi-experiment using the Experience Sampling Method (ESM), a quasi-naturalistic

method that involves signalling questions at informants repeatedly throughout the sampling period (Hektner, Schmidt, & Csikszentmihalyi, 2007). In our particular case we made use of context-triggered sampling which enabled us to trigger an ESM questionnaire based on location and ad exposure. Consequently we were able to retrieve ad evaluations that are based on immediate experience rather than reconstructions from memory as is the case with prior studies that relied on ex situ post-questionnaires (Consolvo et al., 2007). To our knowledge this is the first study that implemented context-aware sampling ESM in an existing LBA application for the purpose of the evaluation of ad perception. With this paper we hope to contribute to the understanding of LBA effectiveness while at the same time providing methodological and practical insights regarding the execution of ESM assisted mobile advertising research in the field.

2. Background

2.1. Mobile marketing & Location Based Advertising

With 2.5 billion smartphone users worldwide (EMarketer, 2014) and the growing readiness amongst consumers to engage with mobile marketing (Persaud & Azhar, 2012) the smartphone has quickly become an interesting advertising vehicle for advertisers. In addition, the level of sophistication with which mobile users can be approached has also improved. Thanks to the continuing advances in sensor technologies (accelerometers, gyroscopes, etc.) and localization technologies (e.g. GPS [Global Positioning System], WPS [Wifi-based Positioning System] and cellular positioning) mobile phones have become increasingly context-aware (Dhar & Varshney, 2011).

The presence of context-aware features enables the possibility for marketer-controlled information customized to recipients' geographic positions (Bruner II & Kumar, 2007), a form of advertising that we refer to as Location Based Advertising (LBA). However, as with every medium, certain conditions should be met before engaging with consumers through the mobile channel.

Foremost, LBA should be permission-based at all times; Barwise and Strong (2002) show that unpermitted mobile ads can lead to irritation, avoidance and negative brand perceptions. In addition, Unni and Harmon (2007) find that there is a relatively greater willingness to accept permitted mobile advertising amongst younger consumers than amongst older age groups. Furthermore, LBA may trigger consumer concerns about privacy and assurance of users' privacy and security is therefore of great importance (Cheung, 2014; Unni & Harmon, 2007).

In terms of the LBA message characteristics previous research shows that multimedia messages as opposed to text messages lead to more favorable attitudes and behavioral intentions, albeit with an increased risk of irritation, (Xu et al., 2009). In addition, Unni and Harmon (2007) show that push messages are perceived as less preferable than pull. This means that users prefer to receive ads on explicit request instead of receiving them on the advertiser's initiative.

Several studies have pointed out that situational aspects are an important influence on how mobile ads are perceived. For instance, Banerjee and Roy Dholakia (2012) show that people within public settings and while doing leisure-related activities find advertising more useful than in private settings and during work-related activities. More specifically, Hühn et al. (2012) and Lee et al. (2015) have shown that location-congruent ads are perceived as less intrusive. These findings seem especially interesting since location-congruency is inherent to LBA. However, there has been relatively little in situ experimental research on the topic.

2.2. Consumer responsiveness – A theoretical framework

With the work on consumer responsiveness [Heinonen and Strandvik \(2003\)](#) provide a theoretical framework in which location-congruency can be related to marketing relevant ad evaluations. Borrowing from service quality models the authors theorize that consumer responsiveness towards mobile ads is primarily based on a function of relevance, acceptance/disturbance and overall value, which in turn are influenced by respectively content and contextual factors. Below we will focus on these individual dependent factors to see how they relate to location-congruency. Based on these insights we will formulate hypotheses. The outcome should provide answers to which perceptions can be influenced by location-congruency.

2.2.1. Perceived ad intrusiveness & location-congruency

In [Heinonen & Strandvik's framework \(2003\)](#) 'disturbance' is operationalized through the theory of perceived ad intrusiveness by [Li et al. \(2002\)](#) where it is defined as the 'psychological reaction to ads that interfere with a consumer's ongoing cognitive processes' ([Li et al., 2002](#), p. 39). Intrusiveness has been associated with irritation and ad avoidance in traditional media ([Ha, 1996](#); [van Doorn & Hoekstra, 2013](#)) and on the web ([Li et al., 2002](#); [McCoy, Everard, Polak, & Galletta, 2008](#)) and mobile ([Lee et al., 2015](#); [Wehmeyer, 2007](#)).

[Heinonen and Strandvik \(2003\)](#) mainly associate contextual characteristics of the ad (when, where and how) with the elicitation of disturbance. More specifically, [Ha \(1996\)](#) defines intrusiveness as the measure in which ads disrupt the context of the medium and its media message. This definition was extended with context being not only the medium through which the ad was communicated, but also as every possible environment where an ad could be ([Li et al., 2002](#)). Implicitly, it builds on the notion that context (media context and/or physical context) plays an important role in our ongoing cognitive processes; hence stimuli (e.g. ads) that do not take into account the situation of the receiver run the risk of being perceived as a disturbing force.

The rationale with LBA with regards to perceived ad intrusiveness could be that the use of location-congruency could lower the interference with the cognitive processes by taking into account the context in which these processes take place. Similarly, we expect that locations that the user will visit in the short term will also be part of the ongoing cognitive processes due to planning and anticipation; thereby ads that are related to these locations, which we will name location-(semi)congruent ads, will cause less interference.

[Hühn et al. \(2012\)](#) and [Lee et al. \(2015\)](#) provide some empirical support for this line of reasoning since they found a negative effect of location-congruency on perceived ad intrusiveness. However, the results were collected through the use of virtual environments, which is still an interruption of a mediated context (perceived ad intrusiveness in the traditional definition of [Ha, 1996](#)) instead of the physical context. Hence, our study tests a similar relationship but in a real world setting with the following hypothesis:

Hypothesis 1. *Location-(semi)congruent advertising is perceived as less intrusive than location-incongruent advertising.*

2.2.2. Perceived relevance & location-congruency

The relevance of the ad is strongly related to ad involvement and is based on inherent needs, values, and interests ([Zaichkowsky, 1994](#)). Based on [Heinonen and Strandvik's responsiveness framework \(2003\)](#) it is assumed that the relevance of an ad is mainly affected by the ad content. However based on Construal Level Theory (CLT) there are also reasons to believe that context can have

an influence on involvement and relevance. Construal Level Theory explains that we tend to think about objects more concretely (low construal level) when they are psychologically close, whereas objects that are psychologically far away are represented more abstractly (high construal level; [Trope & Liberman, 2010](#)). Generally, psychological distance can be affected through social, temporal, spatial and/or hypothetical (the extent to which an object is definite and real) distance.

When it comes to spatial distance and persuasion [Fujita, Eyal, Chaiken, Trope, and Liberman \(2008\)](#) and [Kim, Rao, and Lee \(2009\)](#) found that messages that were associated with a nearby source were more persuasive. Similarly, [Luo et al. \(2013\)](#) in search of an explanation for the results of their field study also found with their survey a negative relation between psychological spatial distance and ad involvement. [Luo et al. \(2013\)](#) speculate that lower level construals tend to generate more involvement which in turn leads to higher relevance. [Katz and Byrne \(2013\)](#) propose a slightly different take by hypothesizing that concrete ads (e.g. price information) with relatively small spatial distance are more easily processed which consequently increases the effectiveness of the ad ([Kim et al., 2009](#)).

Lastly, based on CLT we could also reason that ads that associate themselves with locations that are going to be visited by the receiver in the near future will be less distant hypothetically, spatially and temporally than ads that are related to locations that are not going to be visited in the near term. The resulting decrease in psychological distance should then also lead to an increase in perceived relevance. Based on these arguments we would like to propose the following hypothesis:

Hypothesis 2. *Location-(semi)congruent advertising is perceived as more relevant than location-incongruent advertising.*

2.2.3. Perceived value & location-congruency

Perceived value is usually defined as "the customer's overall assessment of the utility of a product based on perceptions of what is received and what is given" ([Zeithaml, Berry, & Parasuraman, 1996](#)). Thereby the concepts represent a tradeoff between benefits and costs. However, there are perceived value models that specify which dimensions are involved in this tradeoff. [Pihlström \(2008\)](#) proposes six dimensions, namely *conditional, epistemic, emotional, social, convenience and monetary value*, to fully acknowledge the factors that determine the perception of a service within the new electronic service environments that have been created by mobile technology. Of particular interest is the conditional approach to perceived value which was firstly introduced by [Sheth et al. \(1991\)](#) but which has been adapted to the mobile field by [Pihlström \(2008\)](#) resulting in the following definition: "Value existing in a specific context derived from circumstances that characterize a situation related to the interaction between humans, mobile content, the self-service interface and the surrounding environment". Moreover, conditional value is a function of temporal and spatial factors ([Pihlström, 2008](#)). This definition makes the concept particularly suited for LBA research.

Based on these definitions we could argue that both location-congruent and location-semi-congruent ads positively influence the cost-benefit tradeoff by creating the circumstances (conditional value) under which the expected costs (monetary value) and effort (convenience value) to obtain the advertised product/service are less than with location-incongruent ads. Hence the following hypothesis:

Hypothesis 3. *Location-(semi)congruent advertising is perceived as more valuable than location-incongruent advertising.*

3. Method

To survey participant experiences, we made use of the Experience Sampling Method (ESM) (also called Ecological Momentary Assessment, EMA) which allows participants to evaluate their experiences as they take place (Larson & Csikszentmihalyi, 1983; Dimotakis, Ilies, & Judge, 2013; Hektner et al., 2007). Thereby, ESM helps mitigate memory biases that manifest in self-reports as they become distanced from the events in question (Gorin & Stone, 2001; Keyson, 2010). This enables us to directly retrieve in situ consumer attitudes towards mobile ads within contexts that are either congruent or incongruent with the ad content.

Moreover, early implementations of the method required users to carry with them a diary to fill in paper questionnaires. Sampling designs would vary between letting participants complete self-reports at predetermined moments (interval-contingent sampling), in response to events of interest (event-contingent sampling) or at random intervals triggered by an electronic device like a beeper (signal-contingent sampling). However, gradually ESM has moved on to becoming computerized, making use of devices such as Personal Digital Assistants (Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) and more recently the now ubiquitous smartphones (Khan, Markopoulos, Eggen, Ijsselstein, & De Ruyter, 2008). Consequently, the combination of ubicomp sensing technologies, ESM, and mobile device platforms creates the opportunity to trigger questionnaires based on contextual aspects (e.g. location, movement, user input) also known as context-triggered sampling (Consolvo et al., 2007; Intille, Rondoni, Kukla, Ancona, & Bao, 2003). We conducted a within-subjects field-experiment in a period of four weeks. Thereby each participant received both location-congruent and incongruent ads.

3.1. Material

3.1.1. Application

As a carrier for our study, we developed an Android app targeted at students. The app –in beta version at the time of our study– provides students with personal scheduling information as well as university-related news, but also with national and international news. The mobile ads are listed in the menu of the app, between the other application items. As soon as a news item or an ad is available (relevant to the time and place of the user) the app sends a notification in the conventional way for Android apps. The navigation bar at the bottom of the app gives the possibility to filter and only view the ads or a combination of the ads and other elements of the application (Fig. 1). Location-congruent and incongruent ads were presented within the app.

3.1.2. Ads

The ads are digital discount coupons that participants could redeem during the study period at the university's restaurant. The restaurant has a coffee bar and a main restaurant area that are about 30 m apart in the ground floor of the university's main building. Participants would initially view the product at offer. Then they would be asked to fill out a questionnaire consisting of four questions and only after submitting it they would receive the actual coupon code (Fig. 1). They could then show the coupon code to the employee at the restaurant to redeem the offer. The employee would then check the validity of the code through another app we developed that linked to a simple coupon-tracking system. In that way, we could also track participants' buying behavior. Obviously, participants were free to not redeem coupons.

GPS sensor data were used to detect the actual location. Since GPS data were salient to the study, participants would receive a notification in case their GPS sensor was turned off. The ads were to

be congruent or incongruent based on the phone's location, creating the two conditions. In the first condition, the location-incongruent (LI) condition, participants received the ad wherever they were located at that time –nevertheless, outside of the university's premises. In the LI condition, ads were sent when participants were not expected to be at the premises of the university, based on their class schedule. In the second condition, the location-congruent (LC) condition, ads were sent to students who entered a trigger area surrounding the university restaurant. The trigger area was set at three coordinates: (1) Lat: 51° 35' 25.119" Long: 4° 47' 43.8576"; (2) Lat: 51° 35' 26.0088" Long: 4° 47' 47.1006"; (3) Lat: 51° 35' 24.0858 Long: 4° 47' 43.818". These coordinates are located within the university's main building in which the restaurant is located. The ad was received when the participant was located within the red circles (Fig. 2). The restaurant's exact location is in the building of the top left circle in Fig. 2. The surface of the trigger area is roughly one hundred square meters.

For the ads, we selected a range of products that we expected would be widely liked. Product categories that were used included: fresh juices, sandwiches, soups and hot beverages with discounts varying between the 20% and 40% (see Fig. 3). The products were evenly distributed amongst the conditions to prevent participants' bias towards specific products. There was one coupon sent each weekday (Monday to Friday) to all participants for a period of four weeks. We decided that one coupon per weekday was the maximum frequency since over-exposure to mobile ads could lead to ceiling effects due to irritation (Haghirian, Madlberger, & Tanuskova, 2005).

3.1.3. Participant recruitment

We recruited students of NHTV Breda University of Applied Sciences (from now on referred to as "university") –between 18 to 21 years old– through email and personal contact, forming a convenience sample. To participate in the study, they had to own an Android smartphone and agree to install our app. The app was presented to them as a beta-testing version of a student app that would be launched in the near future. All its features were equally highlighted along with the restaurant's discount coupons. No special mention was made on the location-based character of the coupons. After installing the app, participants were asked to respond to every notification as soon as they noticed it and fill out a questionnaire consisting of four items.

Although we initially recruited 40 students, as was our aim, at the end of our data collection period, only 23 responded to the ESM questionnaires. We did not coerce participants to respond in order to maintain a naturalistic setting. Furthermore, our planning did not allow for the recruitment of extra participants. Hence, the results we report in this study are based on these 23 participants. On top of the discount coupons that they received on their phone those 23 participants were also rewarded at the end of the study with a €25 gift voucher.

3.2. Measurement instruments

3.2.1. Coupon tracking system

The coupon tracking system collected information on whether the coupon was received, was read, or not read, or whether it was deleted. With the use of GPS coordinates it tracked where the participant first received and noticed the ad.

3.2.2. Mobile questionnaire

The questionnaire was presented on the participants' phone immediately after the ad using Tempest, a tool for in situ data collection (Batalas & Markopoulos, 2012). Tempest allows researchers to compose data collection instruments, such as

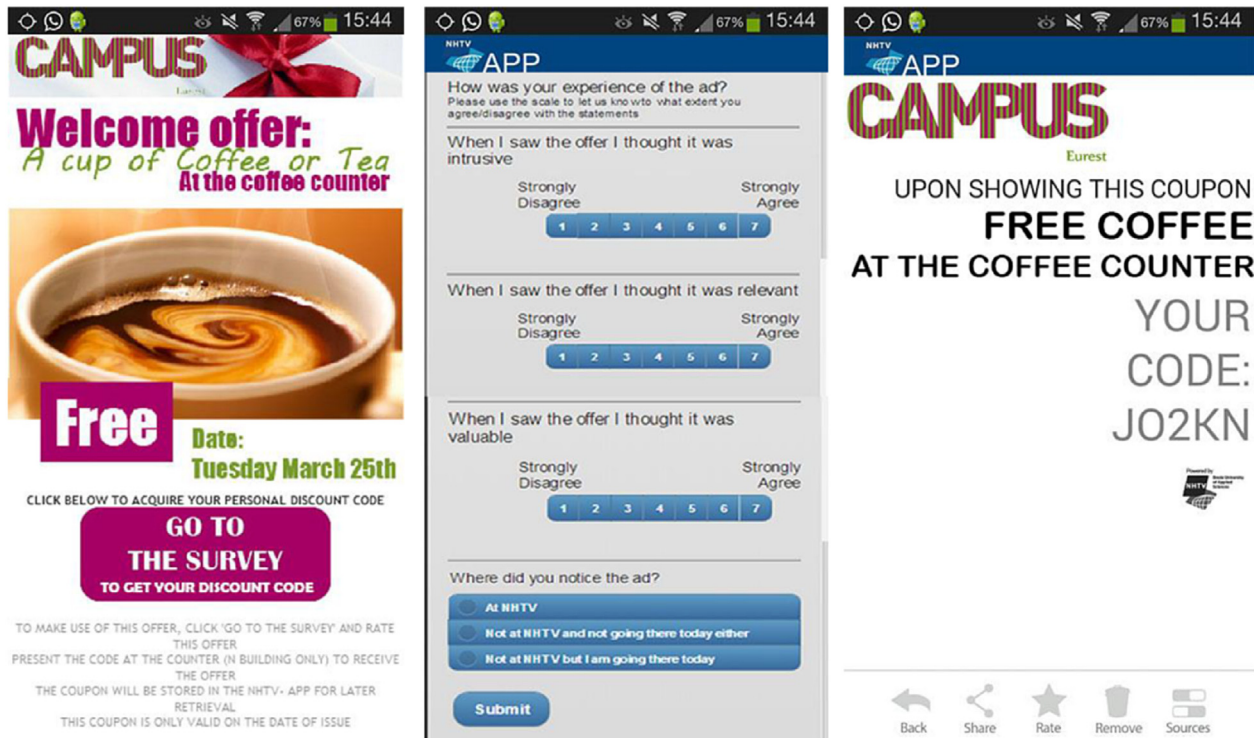


Fig. 1. Sequence of screens participants viewed. From left to right: the first screen advertised the product, the screen in the middle requests participants to fill out the questionnaire and the last screen presents (after the questionnaire has been filled out) the actual coupon code that can be redeemed in the university restaurant. Only the very first coupon offers a free coffee to participants.



Fig. 2. Screenshot from Google Maps of the coverage of the ad triggering areas.

questionnaires. For our purposes we used the web-based client that Tempest provides, embedded in our ad-serving app. The questionnaire we composed on a separate authoring interface, and would be made available to each installed instance of the application upon request. It consisted of four questions. Since the questions were presented on a small screen they were designed to be

short and quick to fill out. Bergqvist and Rossiter (2007) demonstrated that single item attitude towards-the-ad measures are equally predictive as multiple-item measures. Therefore, one item was used to measure the participants' perceived ad intrusiveness, ad relevance and ad value. The items for ad intrusiveness and ad value were adapted from prior scales developed for similar studies



Fig. 3. An impression of the ads/offers participants viewed.

Table 1

List of constructs on mobile questionnaire: ad intrusiveness, ad relevance and ad value (all items were 7-point Likert-scale, 1 = strongly disagree, 7 = strongly agree).

Construct	Origin	Items
Perceived ad intrusiveness	Li et al., 2002; one item selected for the mobile application purpose	When I saw the ad I thought the ad was intrusive
Perceived ad value	Xu et al., 2009; one item selected for the mobile application purpose	When I saw the ad I thought the ad was valuable
Perceived ad relevance	Self-developed	When I saw the ad I thought the ad was relevant

(Table 1) and chosen based on factor loads in these studies.

Lastly, even though we had the ability to trigger the ad based on preset parameters, it did not ensure that the participant would also see the ad at the desired moment. Hence, whether an ad in the end was assigned to the congruent or incongruent depended on where the participant noticed the ad for the first time. Therefore, we asked participants to report where they noticed the ad. In case they noticed the ad outside of the university building we then were also interested in their intention of going to school or not. Participants could then choose between the following options:

- At university campus (congruent condition)
- Not at university campus and not going there today either (incongruent condition)
- Not at university campus but I am going there today (semi-congruent condition)

3.2.3. Feedback system

Next to the questionnaire, participants had the option to send feedback to the app developers at their own convenience through a 'feedback feature' in the application. In case they experienced any issues with the app they were able to send short texts to share their opinion.

3.2.4. Method of data analysis

To test our hypotheses, we used a fixed effects model with a set of weighted effects coded dummies that identify individual subjects on the first level and not on a second level (Cohen, Cohen, West, & Aiken, 2003; Kenny, Bolger & Kashy, 2002; Snijders & Bosker, 2012).¹ Through this approach we have been able to account for the within-subject variation while at the same time respecting the unbalanced nature of our data and the limited observations per level. Furthermore, to detect whether the two conditions differed significantly from each other, we conducted two linear regression analyses with each a different dummy reference variable for location-congruency (incongruent and semi-congruent).

¹ To check our weighted effect coded dummies we conducted analysis twice with a different reference dummy variable. Both analyses provided identical parameters.

The analysis of within-subjects data is usually approached with multilevel analysis or repeated measures anova (Field, Miles, & Field, 2012; Kenny et al., 2002). However, Maas and Hox (2005) conclude that a low number of subjects may result in inaccurate standard errors on the subject level of multilevel analysis, and Larson and Csikszentmihalyi (1983) argue that data from ESM research are unbalanced by their very nature, which makes such data incompatible with repeated measures analysis (Field et al., 2012).

4. Results

4.1. Sample description

The 23 participants who finally participated filled in 107 experience sampling questionnaires. 43% of those were congruent (46 answers "At university campus" to the question where they were when noticing the ad), 57% incongruent (42 answers "Not at university campus and not going there today either") and 19 answers were semi-congruent ("Not at university campus but I am going there today").

4.2. Hypotheses testing

Firstly, Table 2 shows us the mean scores for each condition per dependent variable on the aggregated level. As we can see on face value is that ads received in congruent and semi-congruent situations score fairly high in relevance and value. However, to test our hypotheses properly, we used a fixed effects model with weighted effects coded dummies to account for intra-individual variations. Table 3 presents the results of the ANOVA analysis. With regards to our first hypothesis results show that there was no significant difference between the three conditions regarding perceived intrusiveness. In contrast, the intra-individual variations prove to be a significant factor with a considerable effect size. Based on these results we reject our first hypothesis.

With regards to our second hypothesis results show that location-congruency has a significant effect on perceived relevance. In addition, we see that personal differences also have a significant impact on the level of perceived relevance with a considerable larger effect size. When looking at the coefficients in Table 4 we can see that both the location-congruent and (to a lesser degree,

Table 2
Mean scores Intrusiveness, Relevance and Value per Location Congruency condition.

Location Congruency		Intrusiveness	Relevance	Value
Location Congruent	Mean	3.46	5.22	5.41
	N	46	46	46
	Std. Deviation	1.669	1.209	1.185
Location Semi-congruent	Mean	2.95	4.68	4.95
	N	19	19	19
	Std. Deviation	1.508	1.336	1.353
Location Incongruent	Mean	3.14	4.36	4.74
	N	42	42	42
	Std. Deviation	1.617	1.479	1.415
Total	Mean	3.24	4.79	5.07
	N	107	107	107
	Std. Deviation	1.619	1.387	1.334

though not significantly) semi-congruent condition are perceived as significantly more relevant than the location incongruent condition. Taken together, these results suggest that a location-congruent and semi-congruent ad are considered as more relevant than a location incongruent ad. Hence, we can accept *hypothesis 2*.

Lastly, in relation to our third hypothesis results in *Table 3* show a significant positive effect of location-congruency on perceived value. Again, the intra-individual variations have a significant impact on the level of perceived value with a comparatively higher effect size than location-congruency. Results in *Table 4* show that once again the location-congruent condition and to a lesser degree the semi-congruent condition lead to a significantly higher perceived value than the incongruent condition. This suggests that the ad is perceived as more valuable when the ad is noticed in a location-congruent context compared to a location-incongruent context. As with our previous hypothesis the semi-congruent condition once again lies between the congruent and incongruent conditions, however in both instances the difference between congruent and semi-congruent was not significant. Therefore, we can also accept our third hypothesis.

5. Discussion & conclusion

5.1. Discussion

The aim of this study was to investigate the effect of location congruence on perceived ad intrusiveness, value, and relevance in the field in which the actual context is addressed. To that end, we hypothesized that ads that are congruent to the location of the user, are perceived as less intrusive, more valuable and more relevant.

Our findings did not show any differences regarding perceived intrusiveness between ads that are congruent and ads that are incongruent with the location of the user. The result seems to be in conflict with earlier findings from *Hühn et al. (2012)*, *Lee et al. (2015)* and *Edwards, Li, and Lee (2002)* who have shown that tailoring messages to the context in which it is received reduces perceived ad intrusiveness.

An explanation for this difference could come from the way intrusiveness has been measured. First of all, we did not have as much control over the situation in which intrusiveness was measured which could have increased the risk of extraneous variables. For example, it could have very well been possible that at university students were more occupied with high cognitive load activities (chatting with other students, learning etc.) than at home, which could render an ad as even more intrusive (*Rau, Liao, & Chen, 2013*) even though it would be location-congruent.

On the one hand, this underlines the advantages of lab approaches in terms of control. It enables the researcher to expose

participants to the stimulus and subsequently measure their reaction in a more isolated and stable setting, keeping extraneous variables in check. On the other hand, the field study ensures higher ecological validity, thereby respecting the fragmented nature of mobile interaction and the high cognitive load that accompanies it (*Oulasvirta, Tamminen, Roto, & Kuorelahti, 2005*).

Further, our findings show that location-congruent ads are perceived as more relevant than incongruent ads, thereby accepting H2. This is in line with CLT (*Liberman, Trope, & Wakslak, 2007*) and previous research by *Luo et al., 2013* and *Pelsmacker et al. (2002)*, which show that location-congruent ads result in higher ad involvement and in turn increase perceived relevance. However, our finding stands in contrast with a newly published study from *Van 't Riet et al. (2016)* which has not been able to find a correlation between location-congruency and relevance. According to that study the relation between relevance and context-congruency is still rather diffuse and needs additional research (p.11). It turns out that there are still a few theories that apparently hypothesize different relations between location-congruency and relevance. As stated earlier *Heinonen and Strandvik (2003)* theorize that it is mainly the involvement with the message content that determines the relevance of the ad, whereas ad placement, which includes location-congruency, is more related to disturbance (perceived ad intrusiveness)/acceptance of the ad. Similarly, based on the Relevance-Accessibility Model, *Van 't Riet et al. (2016)* speculate that location-congruency is mainly responsible for increasing the accessibility of the advertised product, whereas the relevance of the ad could be associated more with the content. Construal Level Theory on the other hand allows for a direct effect of location-congruency on relevance: *Luo et al. (2013)* reason that objects that are psychologically close by generate more involvement which in turn increases the perceived relevance of the ad (*Luo et al., 2013*). Our results seem to corroborate this idea.

Lastly, we have seen that ads that are location-congruent are perceived as more valuable than incongruent ads. This suggests that location-congruency has a positive influence on perceived value, thereby accepting H3. Even though this study as a first empirical attempt shows that there is a direct relation between location-congruency and perceived value in the context of LBA, it is in line with circumstantial evidence from the literature. In *Heinonen's (2006)* conceptual framework for temporal and spatial e-service value, perceived value is partly dependent on spatial aspects such as location. Similarly *Pura and Gummerus (2007)* draw a difference between epistemic and conditional value, connecting the concept of value respectively to psychological and environmental factors such as location.

In addition to our main findings we found that individual differences had a significant influence on all of our dependent variables. Moreover, when comparing effect sizes it turned out that intra-individual variations explained more of the variance than location-congruency. Past studies have shown that mobile ad effectiveness can partly be affected by individual characteristics including but not limited to general attitude towards advertising (*Wehmeyer, 2007*), social norms (*Soroa-Koury & Yang, 2010*), personal innovativeness (*Xu et al., 2009*).

5.1.1. Managerial & researcher implications

Overall this research shows that the use of LBA can add value and relevance to mobile advertising. Thereby advertisers should feel encouraged in their endeavor to tailor advertising to the context of the individual user. Although prior studies have shown that location-congruent ads positively influence the perceptions regarding the mobile ad through lab studies, this study has found preliminary evidence that this effect also takes place in the real world. Ecological validity is especially valuable to practitioners, as it

Table 3
Multivariate ANOVA results for location-congruency and individual variation on dependent measures.

Model			Sum of Squares	df	Mean Square	F	Sig.	R Square Change
Intrusive	Subset Tests	Location congruence	1.089	2	0.545	0.606	0.548	0.004
		Individual variation	199.812	22	9.082	10.106	0.000	0.720
	Regression	203.991	24	8.500	9.458	0.000		
	Residual	73.692	82	0.899				
	Total	277.682	106					
Value	Subset Tests	Location congruence	20.900	2	10.450	8.540	0.000	0.111
		Individual variation	77.877	22	3.540	2.893	0.000	0.413
	Regression	88.200	24	3.675	3.003	0.000		
	Residual	100.342	82	1.224				
	Total	188.542	106					
Relevance	Subset Tests	Location congruence	24.560	2	12.280	8.557	0.000	0.120
		Individual variation	69.893	22	3.177	2.214	0.005	0.343
	Regression	86.375	24	3.599	2.508	0.001		
	Residual	117.681	82	1.435				
	Total	204.056	106					

Table 4
Coefficients for location-congruency hypothesis testing.

Model			Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Intrusiveness	Semi-congruent (reference variable)	(Constant)	3.080	0.242		12.742	0.000
		Congruent	0.109	0.310	0.033	0.351	0.727
		Incongruent	0.295	0.288	0.089	1.023	0.309
	Incongruent (reference variable)	(Constant)	3.376	0.163		20.671	0.000
		Congruent	-0.186	0.252	-0.057	-0.739	0.462
		Semi-congruent	-0.295	0.288	-0.070	-1.023	0.309
Relevance	Semi-congruent (reference variable)	(Constant)	4.840	0.306		15.842	0.000
		Congruent	0.554	0.391	0.199	1.416	0.160
		Incongruent	-0.747	0.364	-0.264	-2.050	0.044
	Incongruent (reference variable)	(Constant)	4.093	0.206		19.833	0.000
		Congruent	1.302	0.319	0.467	4.083	0.000
		Semi-congruent	0.747	0.364	0.207	2.050	0.044
Value	Semi-congruent (reference variable)	(Constant)	5.007	0.282		17.748	0.000
		Congruent	0.651	0.361	0.243	1.801	0.075
		Incongruent	-0.563	0.337	-0.207	-1.674	0.098
	Incongruent (reference variable)	(Constant)	4.443	0.191		23.318	0.000
		Congruent	1.214	0.294	0.453	4.125	0.000
		Semi-congruent	0.563	0.337	0.162	1.674	0.098

Note: Coefficients for participant dummies have been removed from this overview.

takes away the doubts about how lab results translate to the real world.

Furthermore, we also believe that our results with regard to the location semi-congruent condition offer interesting insights to advertisers. As it turned out, user perceptions are not only positively influenced by ads that are congruent with the current location, but also by ads that are congruent with locations the user will visit in the foreseeable future. These insights are meaningful against the backdrop of large-scale user data and predictive analytics which increasingly enable the possibility of anticipating where users will be.

However, triggering an ad based on (semi) context-congruency is in vain when the user does not notice the ad within that particular context. As our research has exemplified, it is quite challenging to control at which moment or in which context an ad is noticed (hence the manipulation check). Nevertheless, one could still make use of haptic or auditory alerts to increase the chances that the ad is noticed. Another option would be to only send messages when the user is actively using their mobile device. Lastly, advertisers could make sure that ad content updates in real-

time based on context to ensure that an ad is always congruent when it is noticed.

A few interesting observations can be made about studying LBA in the field using ESM. As stated earlier, the significant advantage of this approach is that the research took place in a real world setting instead of an artificially recreated one. Moreover, the use of ESM enabled us to retrieve user perceptions and attitudes directly from within the context which is being investigated, instead of asking to reflect back on the situation. In our case, we were also able to use the participant's own phone, instead of a device that is given out by the researchers. Another advantage was that the researcher was able to remotely follow results without interfering in the context of participants, whereas in the lab the context for participants needs to be reconstructed and controlled. On the other hand, the field study required continuous monitoring, whereas the lab study had the comfort of having dedicated timeslots in which the study took place.

Furthermore, based on our analysis we found that intra-individual variations were determinative with regard to our outcome variables. Thereby our study reconfirms that personal

characteristics should be accounted for when conducting these kinds of studies.

5.1.2. Limitations & future studies

One limitation of our study was the relatively small sample size. Having more observations at our disposal would have allowed for more robust analyses. Statistical methods such as multilevel analysis would have enabled us to respect upper-level predictors such as certain characteristics of the individual person, type of ad, time and type of location (Hektner et al., 2007). On the other hand, our study could be exemplary for other ESM studies with regards to which statistical means to use when dealing with sparse and unbalanced data.

In part the low response presumably comes from the use of ESM. ESM relies on the use of self-report, which makes the data collection largely dependent on the willingness of the participant. This may have contributed to self-selection bias and selective non-response (Keyson, 2010). For example, it could have been that the participant was busy at the moment of reception, or had difficulty using the app, thereby not able to send a response. More problematic is the possibility that people who are frustrated by the advertisements are less likely to respond to the ESM as it would structurally deny us the access to negative responses. Alternatively, experimental studies that have researched LBA in a lab setting (e.g. Hühn et al., 2012; Lee et al., 2015) usually relied on more coerced forms of data collection which resulted in a better response rate. However, the use of coercion usually interferes with the naturalistic setting, thereby degrading the ecological validity of these studies. A better strategy for dealing with non-response, is the use of a non-response follow up in which we explicitly ask the participant for their reason for not responding.

To detect a possible self selection/non-response bias as a consequence of a low response rate, future studies conducting similar research could supplement the ESM questionnaires with a mandatory closing interview or survey. Thereby researchers can retrieve the overall perception from all participants which then could function as a reference to which the results from the ESM can be compared.

Preferably, future LBA studies could utilize large-scale LBA platforms, similar to the study by Molitor et al. (2015), thereby solving problems around small sample sizes and ecological validity while at the same time retrieving real time insights on user perceptions. However, in addition to measuring user interactions, ESM questionnaires could be deployed to measure perception and attitude.

Another limitation was the lack of sensitivity with regard to user activities, which may have confounded our results. To address this issue, future studies could include an ESM question which measures to what extent the participant was occupied during the reception of the ad. Once measured the variable could function as a control during the analysis. Inspiration could be drawn from the Locales Framework (Fitzpatrick, Kaplan & Mansfield, 1998) in which places and their resources exist in relationship with the social world and their interactional needs.

5.2. Conclusion

The results of our real world investigation show that location-congruency has a positive effect on the perceived relevance and value of the mobile ad. In contrast, against our expectation, we did not see a significant effect of location-congruency on perceived ad intrusiveness.

Our study contributes in being the first field study investigating the UX of LBA, providing both theoretical and methodological insights. More specifically, the results show us for the first time in the

field that location-congruency increases the user's perceived relevance and value of mobile ads (we elaborate more on this point under comment 6 g), thereby tentatively corroborating prior research on location-congruency. In addition, as opposed to earlier LBA field studies where only user behavior is measured (e.g. Molitor et al., 2015) or in which user perceptions are measured long after the exposure (Aalto et al., 2004) this study utilized ESM to gather experiential data right at the moment of exposure within the context that is being investigated. Consequently, we believe that our results are more ecologically valid and are less subject to memory bias. Practically, the paper provides some guidelines with regard to conducting mobile advertising research using ESM and context-triggered sampling. Lastly, the results from our location semi-congruent condition also show that mobile advertising could also be effective when content is anticipating future locations.

Acknowledgements

We would like to extend our gratitude to our financial sponsors: the Dutch Ministry of Education, Culture and Science (OCW). Moreover, we would like to thank Nienke Kruit, Carlos Santos, Jerry van den Heuvel, Ingrid Martens, NHTV University of Applied Sciences and Eures for their essential contribution to this project.

References

- Aalto, L., Göthlin, N., Korhonen, J., & Ojala, T. (2004, June). Bluetooth and WAP push based location-aware mobile advertising system. In *Proceedings of the 2nd international conference on Mobile systems, applications, and services* (pp. 49–58). ACM.
- Batalas, N., & Markopoulos, P. (2012). Introducing tempest, a modular platform for in situ data collection. In *Proceedings of the 7th nordic Conference on human-computer interaction: Making sense through design (NordCHI '12)* (pp. 781–782). New York, NY, USA: ACM. <http://dx.doi.org/10.1145/2399016.2399144>.
- Banerjee, S., & Roy Dholakia, R. (2012). Location-based mobile advertisements and gender targeting. *Journal of Research in Interactive Marketing*, 6(3), 198–214.
- Bergkvist, L., & Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-item measures of the same constructs. *Journal of marketing research*, 44(2), 175–184.
- Barwise, P., & Strong, C. (2002). Permission-based mobile advertising. *Journal of Interactive Marketing*, 16(1), 14–24.
- Bruner, C. G., II, & Kumar, A. (2007). Attitude toward location-based advertising. *Journal of Interactive Marketing*, 7. Available at: <http://jiad.org/vol7/no2/bruner/>.
- Čaić, M. M., Mahr, D., Aguirre, M. E., de Ruyter, M. K., & Wetzels, M. (2015). "Too Close for Comfort": The Negative Effects of Location-Based Advertising. In *Advances in advertising research* (Vol. V, pp. 103–111). Fachmedien Wiesbaden: Springer.
- Cheung, A. S. (2014). Location privacy: The challenges of mobile service devices. *Computer Law & Security Review*, 30(1), 41–54.
- Cho, C. H., & Cheon, H. J. (2004). Why do people avoid advertising on the internet? *Journal of Advertising*, 33(4), 89–97.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.
- Consolvo, S., Harrison, B., Smith, I., Chen, M. Y., Everitt, K., Froehlich, J., et al. (2007). Conducting in situ evaluations for and with ubiquitous computing technologies. *International Journal of Human-Computer Interaction*, 22(1–2), 103–118.
- De Pelsmacker, P., Geuens, M., & Anckaert, P. (2002). Media context and advertising effectiveness: The role of context appreciation and context/ad similarity. *Journal of Advertising*, 31(2), 49–61.
- Dhar, S., & Varshney, U. (2011). Challenges and business models for mobile location-based services and advertising. *Communications of the ACM*, 54(5), 121–128.
- Dimotakis, N., Ilies, R., & Judge, T. A. (2013). Experience sampling methodology. *Modern research methods for the study of behavior in organizations* (pp. 319–348).
- van Doorn, J., & Hoekstra, J. C. (2013). Customization of online advertising: The role of intrusiveness. *Marketing Letters*, 24(4), 339–351.
- Edwards, S. M., Li, H., & 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.
- Emarketer. (2014). Smartphone users worldwide will total 1.75 billion in 2014. Retrieved from <https://www.emarketer.com/Article/Smartphone-Users-Worldwide-Will-Total-1.75-Billion-2014/1010536>.
- Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. London: Sage.
- Fitzpatrick, G., Kaplan, S., & Mansfield, T. (1998, November). Applying the locales framework to understanding and designing. In *Computer human interaction*

- conference, 1998. *Proceedings. 1998 Australasian* (pp. 122–129). IEEE.
- Fujita, K., Eyal, T., Chaiken, S., Trope, Y., & Liberman, N. (2008). Influencing attitudes toward near and distant objects. *Journal of Experimental Social Psychology, 44*(3), 562–572.
- Ghose, A., Goldfarb, A., & Han, S. P. (2012). How is the mobile Internet different? Search costs and local activities. *Information Systems Research, 24*(3), 613–631.
- Gorin, A. A., & Stone, A. A. (2001). Recall biases and cognitive errors in retrospective self-reports: A call for momentary assessments. *Handbook of health psychology, 23*, 405–413.
- Ha, L. (1996). Observations: Advertising clutter in consumer magazines: Dimensions and effects. *Journal of Advertising Research, 36*, 76–84.
- Haghiri, P., Madlberger, M., & Tanuskova, A. (2005, January). Increasing advertising value of mobile marketing—an empirical study of antecedents. In *System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii international conference on* (pp. 32c–32c). IEEE.
- Heinonen, K. (2006). Temporal and spatial e-service value. *International Journal of Service Industry Management, 17*(4), 380–400.
- Heinonen, K., & Strandvik, T. (2003). Consumer responsiveness to mobile marketing. In *Paper presented at stockholm mobility roundtable* (Vol. 22, pp. 23–25).
- Hektner, J. M., Schmidt, J. A., & Csikszentmihalyi, M. (2007). *Experience sampling method: Measuring the quality of everyday life*. Sage.
- Hühn, A. E., Ketelaar, P., Khan, V. J., Lucero, A., van Gisbergen, M., & Bouwknecht, H. (2012). Ad intrusiveness of location-based advertising—a virtual reconstruction. In *Advances in advertising research* (Vol. III, pp. 191–207). Gabler Verlag.
- Hühn, A. E., Khan, V. J., Lucero, A., & Ketelaar, P. (2012, May). On the use of virtual environments for the evaluation of location-based applications. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 2569–2578). ACM.
- Intille, S. S., Rondoni, J., Kukla, C., Ancona, I., & Bao, L. (2003). Context-aware experience sampling tool. In *CHI '03 extended Abstracts on human factors in computing systems* (pp. 972–973).
- Katz, S. J., & Byrne, S. (2013). Construal level theory of mobile persuasion. *Media Psychology, 16*(3), 245–271.
- Kenny, D. A., Bolger, N., & Kashy, D. A. (2002). Traditional methods for estimating multilevel models. *Modeling intraindividual variability with repeated measures data: Methods and applications* (pp. 1–24).
- Ketelaar, P. E., Bernritter, S. F., van't Riet, J., Hühn, A. E., van Woudenberg, T. J., Müller, B. C., et al. (2015). Disentangling location-based advertising: The effects of location congruency and medium type on consumers' ad attention and brand choice. *International Journal of Advertising, 1–12*.
- Khan, V. J., Markopoulos, P., Eggen, B., IJsselstein, W., & de Ruyter, B. (2008). Reconexp: A way to reduce the data loss of the experiencing sampling method. In , Vols. 471–476. *Proceedings. MobileHCI '08* (p. 68). New York, NY: ACM.
- Kim, H., Rao, A. R., & Lee, A. Y. (2009). It's time to vote: The effect of matching message orientation and temporal frame on political persuasion. *Journal of Consumer Research, 35*(6), 877–889.
- Kjeldskov, J., & Skov, M. B. (2014, September). Was it worth the hassle?: ten years of mobile HCI research discussions on lab and field evaluations. In *Proceedings of the 16th international conference on Human-computer interaction with mobile devices & services* (pp. 43–52). ACM.
- Kjeldskov, J., & Stage, J. (2004). New techniques for usability evaluation of mobile systems. *International journal of human-computer studies, 60*(5), 599–620.
- Larson, R., & Csikszentmihalyi, M. (1983). The experience sampling method. *New Directions for Methodology of Social and Behavioral Science, 15*, 41–56.
- Lee, S., Kim, K. J., & Sundar, S. S. (2015). Customization in location-based advertising: Effects of tailoring source, locational congruence, and product involvement on ad attitudes. *Computers in Human Behavior, 51*, 336–343.
- Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal level theory and consumer behavior. *Journal of Consumer Psychology, 17*(2), 113–117.
- Li, H., Edwards, S. M., & Lee, J. (2002). Measuring the intrusiveness of advertisements: Scale development and validation. *Journal of Advertising, 31*, 37–47.
- Luo, X., Andrews, M., Fang, Z., & Phang, C. W. (2013). Mobile targeting. *Management Science, 60*(7), 1738–1756.
- Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology, 1*(3), 86–92.
- McCoy, S., Everard, A., Polak, P., & Galletta, D. F. (2008). An experimental study of Antecedents and consequences of online ad-intrusiveness. *Journal of Human-Computer Interaction, 24*(7), 672–699.
- Mehl, M. R., Pennebaker, J. W., Crow, M. D., Dabbs, J., & Price, J. H. (2001). The electronically activated recorder (EAR): A device for sampling naturalistic daily activities and conversations. *Behavior Research Methods, Instruments, and Computers, 33*, 517–523.
- Molitor, D., Reichhart, P., Spann, M., & Ghose, A. (2015). *Measuring the effectiveness of location-based pull advertising: A randomized field experiment*. Available at: SSRN 2645281.
- Oulasvirta, A., Tamminen, S., Roto, V., & Kuorelahti, J. (2005, April). Interaction in 4-second bursts: The fragmented nature of attentional resources in mobile HCI. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 919–928). ACM.
- Persaud, A., & Azhar, I. (2012). Innovative mobile marketing via smartphones: Are consumers ready? *Marketing Intelligence & Planning, 30*(4), 418–443.
- Pihlström, M. (2008). *Perceived value of mobile service use and its consequences*. Svenska handelshögskolan.
- Pura, M., & Gummerus, J. (2007). Discovering value perceptions of mobile services with critical incident technique (CIT). In *Marketing theory and applications* (p. 35).
- Rau, P. L. P., Liao, Q., & Chen, C. (2013). Factors influencing mobile advertising avoidance. *International Journal of Mobile Communications, 11*(2), 123–139.
- van't Riet, J., Hühn, A., Ketelaar, P., Khan, V. J., König, R., Rozendaal, E., et al. (2016). Investigating the effects of location-based advertising in the supermarket: Does goal congruence trump location congruence? *Journal of Interactive Advertising, 16*(1), 31–43.
- Snijders, T. A. B., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). London: Sage.
- Soroa-Koury, S., & Yang, K. C. (2010). Factors affecting consumers' responses to mobile advertising from a social norm theoretical perspective. *Telematics and Informatics, 27*(1), 103–113.
- Spiekermann, S., Rothensee, M., & Klaff, M. (2011). Street marketing: How proximity and context drive coupon redemption. *Journal of Consumer Marketing, 28*(4), 280–289.
- Sun, X., & May, A. (2013). A comparison of field-based and lab-based experiments to evaluate user experience of personalised mobile devices. *Advances in Human-Computer Interaction, 2013*, 2.
- Tode, C. (2013, Feb 6). *Location targeting more than doubles performance of mobile ads: Report. Mobile Marketer*. Retrieved from <http://www.mobilemarketer.com/cms/news/research/14731.html> (Accessed on 12/09/2014).
- Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*(2), 440–463.
- Unni, R., & Harmon, R. (2007). Perceived effectiveness of push vs. pull mobile location based advertising. *Journal of Interactive advertising, 7*(2), 28–40.
- Varnali, K., Yilmaz, C., & Toker, A. (2012). Predictors of attitudinal and behavioral outcomes in mobile advertising: A field experiment. *Electronic Commerce Research and Applications, 11*(6), 570–581.
- Verve Mobile. (2014). *Location powered mobile advertising report*. Retrieved from <http://www.vervemobile.com/research/verve-state-of-the-retail-market-location-powered-mobile-advertising-report/> (Accessed on 12/09/2014).
- Wehmeyer, K. (2007). Mobile ad intrusiveness—The effects of message type and situation. In *20th bled eConference eMerge: Merging and emerging technologies, processes, and institutions* (pp. 4–6).
- Xu, H., Oh, L. B., & Teo, H. H. (2009). Perceived effectiveness of text vs. multimedia location-based advertising messaging. *International Journal of Mobile Communications, 7*(2), 154–177.
- Zaichkowsky, J. L. (1994). The personal involvement inventory: Reduction, revision, and application to advertising. *Journal of advertising, 23*(4), 59–70.
- Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *the Journal of Marketing, 31*–46.