

Ad Intrusiveness of Location-Based Advertising – A Virtual Reconstruction

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1 Introduction

An important problem for advertisers is the general tendency to avoid advertising (Li et al., 2002; McCoy et al., 2008; Zanot, 1984). Ads typically get the 'blame' that they do not meet the goals and desires of consumers, thus the commercial message is perceived as disturbing and therefore avoided (Li et al., 2002, McCoy et al., 2008; Speck and Elliott, 1997). In order to reduce interference and ad avoidance, advertisers must use forms of marketing which reflect the situation of the consumer (Cho and Cheon, 2004).

A possible solution could be the use of personalized and context-congruent ads based on 'behavioral tracking' (Cho and Cheon, 2004; Leppäniemi and Karjaluoto, 2005). A relatively young marketing method based on this principle is Location Based Advertising (LBA). We define LBA as a form of mobile advertising, where advertisers use location-tracking technology (e.g., GPS) to send context-congruent ads to the mobile communication device of the consumer. Stores could use LBA for example to advertise to only those who are approaching the window of the shop. LBA relies on the expectation that an ad that adapts to the context of the user is considered as more relevant and less intrusive (Banerjee and Dholakia, 2008; Xu, 2006/2007).

Recent developments in communication technology have increased the possibilities considerably to make LBA an everyday practice (Dhar and Varshney, 2011). Within a short timeframe we have experienced a transition from simple mobile devices, suitable for telephony and SMS, to so-called smartphones equipped with powerful processors, a rich software platform, intuitive and multi-modal user interface, advanced sensors, high-speed internet

and GPS. The user base of this new generation of phones is rapidly growing: in 2011 there are approximately 449 million smartphone users worldwide (RBC Capital Market Report, 2008). These developments increase the potential for mobile advertising significantly. Where advertisers until recently focused on the use of SMS (Short Message Service) and MMS (Multimedia Messaging Service) (Unni and Harmon, 2007), they can now use mobile applications with a high degree of interactivity, multimedia, connectivity and context-sensitivity. Furthermore, progress is also expected in the field of positioning techniques. In contrast with GPS, new techniques based on WLAN, WiMax, Bluetooth, RFID and NFC give advertisers the possibility to track consumers with high precision in in-door situations (Dhar and Varshney, 2011; Liu et al., 2007). With these developments personalized advertising can be deployed within commercially attractive areas such as department stores and supermarkets. Usability research of Hosbond and Skov (2007) shows that a location-based application in the context of a supermarket is already feasible.

However, despite the growing potential there are still some barriers with regard to the widespread deployment of LBA. Dhar and Varshney (2011) show in their description of the status quo, that the end-devices, infrastructure, logistics, application development, cost, privacy and search for the right business models still deal with difficulties. In addition consumers still perceive mobile applications as 'nice to have' instead of 'must have' (Dhar and Varshney, 2011). Furthermore, advertisers continue to be cautious and sceptical regarding the use of LBA, because little is known about the effectiveness of these mobile context-congruent advertisements (Xu et al., 2009). This knowledge gap leaves room for further investigation.

Scientific studies about 'mobile advertising' and LBA in particular are still in their infancy (Bruner and Kumar, 2007; Unni and Harmon, 2007). Not only advertisers, but also researchers are caught by surprise by the high speed of technological developments. Despite the advanced features that "mobile advertising" offers nowadays, the bulk of mobile research still deals with SMS and MMS-based advertising forms (e.g., Barwise and Strong, 2002; Bauer et al., 2005; Drossos et al., 2007; Soroa-Koury and Yang, 2010; Unni & Harmon, 2007; Varnali and Toker, 2010; Wehmeyer, 2007; Xu, 2006/2007; Xu et al., 2009; Zhang & Mao, 2008).

Another shortcoming of mobile advertising research is the limited data based on user experience. This is partly caused by the novelty of location-based ads (Bruner and Kumar, 2007; Unni and Harmon, 2007; Wehmeyer, 2007). On the other hand most researchers disregard methods that study the user experience of mobile advertising in situ, partly because of the practical and methodological

complications caused by the mobile nature of the medium (Kjeldskov, 2004; see paragraph 'a comparison of methods').

Instead of an experiential approach past studies are largely based on general expectations measured through surveys (Bauer et al., 2005; Bruner and Kumar, 2007; Okazaki, 2004; Tsang et al., 2004; Xu, 2006/2007) or on mental representations of hypothetical use cases triggered by story-based scenarios (Banerjee and Dholakia, 2008; Drossos et al., 2007; Unni and Harmon, 2007; Wehmeyer, 2007; Xu et al. 2009). While some of these studies have yielded interesting results with respect to recipient and message-related conditions for the acceptance of LBA, there are significant limitations associated with these results. Because respondents cannot base their evaluation of LBA on prior experience, the results provide limited insight into cognitive processes that occur during the use of LBA and the contextual factors that may affect these processes. In addition, the results may not be indicative of the practice, as a direct experience is qualitatively different from a mental image or expectation. Schwarz states (2007: 640) that human evaluation is context-sensitive, because it is grounded in the physical contextual experience. Consequently, assessments based on a contextual experience of mobile advertising are preferable. In line with this recommendation Xu (2006/2007) states with regard to their own survey research that consumers cannot imagine what personalized ads mean to them because they did not have a real life experience with this form of advertising. Also Wehmeyer (2007) takes into account the possibility that the results from their scenario study differ from how users react when they actually receive a mobile advertisement in real life.

This limited access to the user experience within mobile advertising research keeps researchers from getting a conclusive answer regarding the question if mobile context-congruent ads have a positive effect on consumers. Until now we only have data in terms of the general expectations of consumers towards LBA. The scenario study of Banerjee and Dholakia (2008) for example found that consumers do not expect LBA to be more useful than non-location based ads. The study of Drossos et al. (2007) found similar results based on scenarios as well: context-congruent ads do not lead to significantly more positive attitudes towards the ad and the brand.

Based on these results, we could conclude that LBA has no added value, but according to the aforementioned reservations towards scenario studies we can be doubtful regarding this conclusion. First, there is the possibility that the lack of contextual experience in these studies cause the results to differ from the real world. Second, the results did not capture the possible psychological reactions after receiving a context-congruent ad. It is possible that context-congruency does not affect the overall evaluation (attitude) and behavioural intentions directly, but instead influences the preceding cognitive processes that occur during

a real interaction with LBA. Perceived ad intrusiveness, or 'the psychological reaction to ads that interfere with the consumer's ongoing cognitive processes' (Li et al., 2002: 39) focuses specifically on the formation of perception. It shows how the advertisement is related to the cognitive state of the user and the context in which it appears (Li et al., 2002; Morimoto and Chang, 2006). Thereby the concept offers a suitable approach for determining the efficacy of LBA, since this form of advertising is also characterized by the close interaction between the message, the recipient and its context. Yet there is no research on the effect of context-congruent mobile ads on perceived ad intrusiveness.

Thus we find two important research objectives in determining the effectiveness of context-congruent mobile ads: the effectiveness of LBA should be examined with regard to cognitive processes and should be based on an actual contextual experience of using a LBA application. The first goal is pursued by studying the perceived intrusiveness of context-congruent ads. Additionally this study examines the impact of perceived ad intrusiveness on attitude and behavioural intentions. For the second objective we introduce a virtual reality environment where the user experience is being reconstructed. With this method we are able to carry out an experiment without the complications mentioned above.

2 Theory

2.1 *Perceived ad intrusiveness & LBA*

Intrusiveness has proven to be a relevant indicator for feelings of ad irritation and ad avoidance in traditional media (Ha, 1996) and on the web (Edwards et al., 2002; Li et al., 2002; McCoy et al., 2008). With regard to the mobile platform intrusiveness has already been investigated by Wehmeyer (2007) and Unni and Harmon (2007). However, when it comes to LBA, perceived ad intrusiveness is an under-explored phenomenon, even though the concept is theoretically appropriate for the investigation of context-congruent ads. Instead most studies have concentrated on the concept of irritation and its effects on attitude and behavioural intentions (Tsang et al., 2004; Xu et al., 2009) but at the same time provide little understanding of how these feelings of irritation arise. Li et al. (2002) emphasize that intrusiveness differs conceptually from irritation. Irritation finds itself in the domain of affective evaluation of attitude, whereas intrusiveness occurs at a precursory stage, as a result of the discrepancy between the ad and the cognitive processes of the consumer.

In addition to the cognitive dimension intrusiveness also consists of a contextual dimension (Morimoto and Chang, 2006), which makes it an attractive concept for studying the efficacy of context-congruent advertising forms such as

LBA. Ha (1996: 77) emphasizes the importance of context by defining intrusiveness 'as the degree to which advertisements in a media vehicle interfere with the editorial unit'. In this case editorial unit refers to the media content where the ad appears in. Subsequently, Li et al. (2002: 39) expand the definition by replacing 'editorial unit' with "every possible environment in which ads might appear." Moreover, they claim that as communication technology progresses, ads increasingly appear at unexpected moments and in non-traditional contexts. As a consequence of this new medium neutral definition, intrusiveness is well suited for the investigation of mobile advertising and LBA in particular. Where the old definition mainly applied to forms of advertising in television, radio, newspaper and web, which interrupted the media content, the new definition encompasses the transcendent nature of mobile ads. Mobile devices, because of their ubiquitous quality, can also potentially disturb the consumer at times when he or she pays attention to the physical environment rather than the medium itself (Bauer et al., 2005; Wehmeyer, 2007). However, following the assumptions of Edwards et al. (2002), this disturbance, i.e. perceived intrusiveness can be decreased by relating the content of the ad to the context which it is intruding. Context-incongruent ads activate divergent knowledge structures and create added processing demands, whereas context congruent ads are seen as positive social influences and thus not be considered threats to the consumer's freedom (Edwards et al., 2002: 86). This assumed relation between context-congruency and intrusiveness has already been confirmed by Edwards et al. (2002) with respect to banners on websites. Since LBA offers context-congruent ads we would expect that people perceive LBA as less intrusive than their context-independent counterpart. In line with this expectation we propose the following hypothesis:

H1: Location-based ads will be perceived as less intrusive compared to location-independent ads

2.2 Intrusiveness, attitude and behavioural intentions

Smartphone owners are in the first place technology users but secondly also a potential target group for ads (Xu et al., 2009). To create a conceptual model in which both aspects are represented, we relied on the Theory of Reasoned Action (TRA) of Fishbein and Ajzen (1975), Theory of Planned Behavior (TPB) of Ajzen (1991) and Technology Acceptance Model (TAM) of Davis (1989). The theories of Fishbein and Ajzen suggest that perceptions/beliefs lead to a global (affective) evaluation, or attitude (Liska, 1984). We therefore assume that the negative perception of "perceived ad intrusiveness" affects the overall evaluation of the LBA application negatively. The relationship between intrusiveness and the affective evaluation (attitude) has been confirmed in the case of mail advertising (Morimoto and Chang, 2006) and web ads (McCoy, 2008). This study tries

to find a similar relationship in the case of LBA. Thus we propose the following hypotheses:

H2: Lower level of perceived ad intrusiveness results in a more favourable attitude toward the mobile advertising application.

Subsequently, according to the TRA/TPB theoretical framework the attitude in turn can influence the behavioural intention, which in turn is a predictor for actual behaviour. In the case of advertising, the influence of the affective evaluation of ads on the intention to buy the advertised product has been studied thoroughly. With regard to LBA this specific relation has already been confirmed by the study of Xu (2009). However, this result was found with surveys using scenarios. It is therefore interesting to see if we can find a similar relationship when having an actual LBA experience. We therefore propose the following hypothesis:

H3: The attitude towards the mobile advertising application is positively related to the intention to buy the advertised product.

The 'Technology Acceptance Model' takes the aforementioned sequence of effects as a theoretical basis to investigate the acceptance and use of technology. The model assumes that a positive evaluation of the technology leads to the intention to use the technology in the future (Davis, 1989). TAM is used extensively within advertising research (e.g., Bauer et al., 2005; McCoy et al., 2008; Morimoto and Chang, 2006; Tsang, Ho and Liang, 2004; Xu, 2006/2007; Xu et al., 2009) because of the possibility to study precursors of acceptance and the focus on novel technology. Therefore LBA research (e.g., Banerjee and Dholakia, 2008; Drossos et al., 2007; Unni and Harmon, 2007; Xu et al., 2009) is largely based on the framework of Fishbein & Ajzen and Davis.

Hence with the use of TAM we can assume that a positive attitude towards LBA will increase the intentions to use it. As was the case with our former hypothesis, this causal relationship has been confirmed by the scenario-based study by Xu et al. (2009). This study wants to confirm this relationship in the case of an actual LBA experience, hence our following hypothesis:

H4: The attitude towards the mobile advertising application is positively related to the intention to use the mobile advertising application.

3 Method

3.1 *A comparison of methods*

Field experiments are praised for respecting the use-context. Particularly in the case of LBA an in situ approach seems appropriate, given the prominent role that context plays in the communication process. Yet this type of research is scarce when it comes to the investigation of mobile applications (Kjeldskov and Graham, 2003) because of the considerable investment in time, resources (Kjeldskov, 2004) and the dependence on third parties such as network providers, mobile marketing agencies and other facilitative parties (Wehmeyer 2007). In addition, there are currently relatively few initiatives that can serve as a vehicle for field research.

Apart from the practical issues there are also methodological complications, causing field studies to be not necessarily preferable. Kjeldskov and Stage (2004) report difficulties in regard to measurement, control and manipulability as a consequence of the unstable research setting due to the mobile nature of the medium. In addition, Wehmeyer (2007) states that controllability of mobile advertising research is compromised because crucial aspects such as time and place must be included in the study design.

Previous studies regarding the evaluation of mobile applications have avoided these organizational and methodological obstacles associated with field studies by conducting scenario-based surveys. However these approaches obviously lack a practical user experience with a LBA application. Although some lab studies hand their participants a mobile phone (e.g., Duh et al., 2006; Tang et al., 2009; Xu et al., 2009), they still lack the interaction with an immersive context (Kjeldskov and Stage, 2004;). Especially in LBA research, the environment is an important aspect since it is actively involved in the communication process (Kjeldskov and Stage, 2004). The contextual experience is also a determining factor in shaping perceptions and evaluations (MacInnis and Jaworski, 1989; Schwarz, 2007; Wright, 1973). With the absence of this experience it is possible that respondents may respond differently in practice (Wehmeyer, 2007). This shows the need for a design that merges the benefits of field studies, such as context, realism and physical experience, with the manipulability, measurability and control of lab experiments while keeping costs in check.

These requirements are met to a certain extent when extending lab studies with virtual environments. The unique combination of a malleable and a dynamic virtual context with a stable research environment, gives the researcher the opportunity to offer the participant an interactive and photo-realistic context, without sacrificing control and measurement capabilities. Moreover, because of

the plasticity of virtual reality scenarios and stimuli are relatively easy to operationalize, and the influence of confounding factors can be excluded. This makes it easy to carry out research under similar thereby securing reproducibility. Finally we also report practical benefits in terms of organizational effort, cost and time.

3.2 *Setup*

The experiments took place within a virtual supermarket simulated by a CAVE (see Khan, Nuijten and Deslé, 2011). A supermarket seemed to be the most suitable setting since mobile ads are more effective if they are aimed at low-priced and frequently bought products (Barwise and Strong, 2002). The VE (modelled in Maya and rendered in OGRE) is projected onto four rear-projection screens (each 3.6 meters wide by 2.6 meters high). The screens form a closed space, thereby offering the participant a 360° view of the environment. Participants can move in the virtual setting with the help of a head-tracking system based on four Wii-mote IR cameras. In contrast with head-mounted displays, the CAVE does not block out the physical world, which offers the opportunity to use physical objects and the representation of the participant's own physical body. In this particular case, it gave us the possibility to use an actual smartphone, with which participants were able to receive location-based ads. The tracking device (Figure 1, right) determines the participant's head position in the physical room, which is then used to control motion in the virtual supermarket. In essence, the participant acts as a "human joystick": when the participant stands in the centre of the CAVE the virtual camera stands still, whereas when the participant takes one step in a certain direction, the virtual camera moves accordingly, thus giving the illusion of movement within the virtual space. The participant is able to turn and step in every direction relative to the CAVE's centre. The simulation is also sensitive to the magnitude of the participant's distance from the centre of the physical room. This distance, determines the speed with which a participant walks within the environment. The simulation also corrects the first person view for the vertical axis. Thus, in the case in which one, for example, jumped or ducked the simulation corrected the perspective according to the vertical position of the participant's head. When it comes to shopping within the supermarket our simulation does not yet support interaction with virtual products. To simulate the act of selecting a product, participants were asked to make a grabbing gesture, without actually attempting to interact with the virtual product (Figure 1, left). When the participant made this grabbing gesture, they received auditory feedback.



Figure 1: CAVE setup. Left: Overview right: Participant with phone 'grabs' product

We created a simple user interface for the application using the supermarket's corporate style. Furthermore, participants had to start the application themselves in contrast to the pilot where the application was already started and was running in the background. In this way we wanted to convey the idea to the participant that this is an opt-in service within the environment of an application instead of a simple push message.



Figure 2: The soup ad (left) the participants received when they reached the trigger location. Subsequently, participants could pull more information about the offer by using 'yes' and 'no' buttons (middle, right).

3.3 Experimental design

For this study we used a between-subjects design to test our hypotheses. Participants were randomly assigned to two conditions: 1) Location-congruent: the mobile ad with product x was presented when the user entered location A where product x, product group X and product group Y were available, 2) Location-incongruent: the mobile ad with product x was presented when the user entered location A where only product group Y was available. We kept location constant

and manipulated the products on the shelf to keep as many circumstantial factors constant as possible. Location A could be found approximately in the centre of the supermarket and covered the space with a radius of 0.5 meter from the manipulated shelf. For product x, a well-known Dutch soup product was used. Accordingly, the ad showed an offer with this specific soup product (Figure 3). Further, product group X consisted of soups and product group Y consisted of meal mixes.

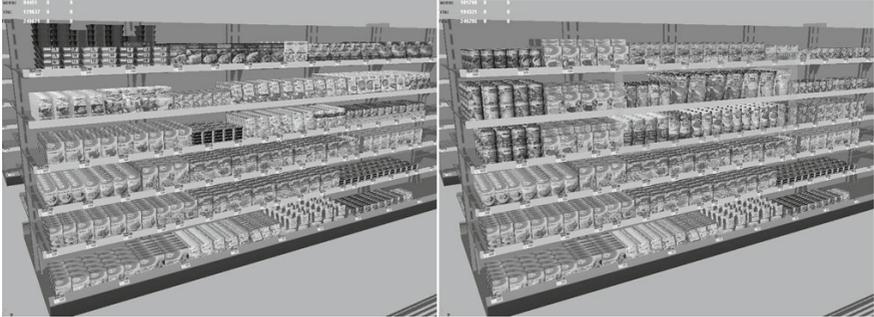


Figure 3: Left: incongruent shelf; right: Congruent shelf with advertised product

3.4 Participants

We recruited 70 participants through a marketing research company. From the 70 participants 15 participants received the ad outside the perimeter as a consequence of an unstable Bluetooth connection and 2 participants did not notice the ad. The remaining 53 participants (31 male, 22 female; age range 17-64 years, $M=28.57$ years, $SD=11.60$) consisted of 26 who witnessed the location-incongruent setup (15 males and 11 females; $M=28.96$ years, $SD=14.22$) and 27 who witnessed the location-congruent (16 male and 11 female; $M=28.19$ years, $SD=11.22$). Moreover, they all owned a mobile phone and were familiar with smartphones equipped with a touch screen interface. For their effort participants received a five euro coupon.

3.5 Tasks

Participants were given two tasks during the briefing: first, they freely navigated in the supermarket for a few minutes to get familiar with the controls and the interaction. Second, they had to pick five different food products and then had to go to the counter. The central location of our trigger area, the task of shopping five products and the limited product set of the virtual supermarket ensured that both groups visited the trigger area. In this way we did not have any specific

instructions for participants to visit the manipulated shelf, thereby keeping our research goal concealed.

3.6 Measurement

After the virtual shopping experience, a questionnaire assessed the perceived intrusiveness (C's $\alpha=.841$), based on the scale of Li et al. (2001), attitude toward the mobile application (single item) based on a scale of Bergkvist and Rossiter (2007) and measured their intention to use the application (C's $\alpha=.921$) based on a scale of Kowatsch and Maas (2010). As was the case with our pilot study we also took into account relevant control variables: product involvement (C's $\alpha=.842$) (Verbeke and Vackier, 2004), the attitude towards advertising in general (C's $\alpha=.841$) (Muehling et al., 1990) and personal innovativeness (C's $\alpha=.845$) (Agarwal and Prasad, 1997).

4 Results

The variable *intrusiveness* shows a statistically significant higher value with the incongruent-group ($M=3.15$, $SD=0.90$) than with the congruent-group ($M=2.45$, $SD=1.07$); ($t(51, N=53)=-2.546$, $p<.05$), thereby pointing in the direction expected by H1. The ANCOVA (see Table 1) confirms the significant effect of the congruent/incongruent condition when controlled for *product involvement* and *attitude toward advertising in general*. It also shows that the congruent/incongruent condition has the greatest effect ($\eta^2=0,094$). H1 is thereby supported by the data. Furthermore, we tested the remaining hypotheses by conducting a regression analysis. We once again took the congruent/incongruent condition (incongruent=0, congruent=1) into account and found a significant effect in the expected direction ($\beta=-0.286$, $p<.05$). The congruent/incongruent condition explains together with the control variables 23.2% of the variance of *intrusiveness*. *Intrusiveness* in turn has a significant effect on the *attitude toward the app* ($\beta=-0.173$, $p<.05$) and is responsible for 14.1% of the variance, thereby supporting H2. *Attitude toward the app* has a positive influence on 'intention to use the application' ($\beta=0.393$, $p<.001$) when controlled for *innovativeness* (H3 supported). Together they explain 48.1% of the variance of *intention to use the application*.

Table 1: ANCOVA for 'intrusiveness'

<i>Variable</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>partial η^2</i>
Product involvement	1	1.621	1.826	.036
Attitude ad in general	1	4.369	4.921	.091*
Context congruency	1	4.514	5.085	.094*
Error	49	.888		
Total	53			
Corrected Total	52			

Note: * $p < 0,05$

5 Conclusion and discussion

With this study we studied the influence of context (in)congruent ads on perceived ad intrusiveness. Further, we examined whether the degree of "intrusiveness" has a negative impact on the attitude in regard to the application and how these attitudes in turn affect behavioural intentions.

Following the results we find that LBA has a significant influence on the degree in which the consumer considers mobile ads to be "intrusive". It turns out that mobile ads that focus on the context of the user are experienced as less intrusive than context-incongruent ads (H1 confirmed). The significant relationship between context-(in)congruency and intrusiveness even holds up when we take into account people's attitude towards advertising in general and their product involvement. Against our expectations we did not find a relationship between someone's product involvement and intrusiveness.

Further results show that people who have experienced a lower intrusiveness, developed a more positive attitude towards the mobile application (H2 confirmed). This attitude in turn determines the intention to use the application. It was found that as people develop a more positive attitude towards the application, they were more likely to use it in the future (H3 confirmed). Besides the effect on the intention to use the application we also saw a positive impact of the attitude towards the application on the intention to buy the product. People who developed a positive attitude about the application, were as a result inclined to purchase the advertised product (H4 confirmed).

Our findings are in line with theories about "perceived ad intrusiveness" (Ha, 1996; Li et al. 2002). The theory states that ads are to some degree capable of interrupting cognitive processes, depending on how these ads are disturbing the flow of 'editorial content' (Ha, 1996). Due to the interruption of these processes

the consumer perceives the ad as intrusive (Li et al., 2002). Based on the medium neutral definition of intrusiveness from Li et al. (2002) we were able to translate the theory to everyday practice of LBA. Hence, we hypothesized that the editorial content is comparable to the physical environment in which the recipient is located. Both represent an information environment that determines the cognitive processes. Receiving a message interrupts the attention towards this environment. However, by relating to the 'content' the ad with the environment less divergent knowledge structures of the recipient are addressed, than is the case with context-independent ads. This results in less disruption of cognitive processes and subsequently leads to lower intrusiveness levels.

We also find in accordance with previous studies (Unni and Harmon, 2007; Xu, 2009; Zhang and Mao, 2008) a confirmation of the Theory of Reasoned Action, Theory of Planned Behavior and Technology Acceptance Model. The assumed sequence of effects has been proven to be valuable in predicting attitudinal and intentional change. In addition, it appeared that the theoretical framework of Fishbein and Ajzen and Davis was not only in theory compatible with perceived ad intrusiveness, but also in practice.

We consider a few limitations of our study. First, we have some reservations regarding the ecological validity of the research. Although the CAVE gives us the unique opportunity to collect data based on a LBA-user experience and managed to produce consistent data, our experimental design and specific operationalization could have consequences for the generalization of our results. The virtual supermarket, though based on reality, still shows considerable differences with the real world. While the graphic quality of the simulation was high, the image was still distinguishable from the real. The interaction, such as navigation and manipulation of objects, also differed from practice. Furthermore at the level of the supermarket simulation we also observe important differences: for instance, not all the shelves were filled and there were no other people/customers.

In addition, the presence of supporting equipment such as video cameras, projection screens, projectors, computers and head-tracking system could have impaired the level of empathy. However, these restrictions are not necessarily inherent to the concept of a virtual reconstruction of user experience, but are caused by our operationalisations and by the limitations of current technology. Therefore, a validation study in which the results of a cave setting are compared with a real life supermarket is highly recommendable.

Second, we identify limitations concerning the measuring instrument. Although the stability of the CAVE-setting allowed the use of direct measuring instruments, we chose for a post-hoc measurement for practical reasons with the disadvantage that experiences are evaluated retrospectively. A psychological

concept like 'intrusiveness' relates to direct experience and should be measured instantly instead.

This study delivers a few contributions to the expansion of scientific knowledge. While former scenario-based studies (Banerjee and Dholakia, 2008; Drossos et al., 2007) have found no significant effect of context-congruent advertising, this study provides for the first time insight into the disturbing effect that context-(in)congruent mobile ads have on consumers. We also showed that the interference that is experienced as result of the mobile advertising, has a significant influence on the evaluation of the LBA application, and thereby indirectly on the purchase intention and intention to use the LBA application.

In addition, this study contributes to the theoretical concept of intrusiveness. In line with the definition of Ha (1996), intrusiveness has mainly been studied within the context of editorial content. However, the extension of the definition by Edwards et al. (2002) enables researchers to apply intrusiveness to other non-traditional environments. In our study we have demonstrated that this indeed the case by measuring the concept in relation to the content of the spatial (virtual) environment instead of the editorial content. Besides we have also demonstrated that the Theory of Planned Behavior (Ajzen, 1991) and Technology Acceptance Model (Davis, 1989) are compatible with the concept of perceived ad intrusiveness.

Finally, this study makes a first step in developing a new method for the assessment of the effect of mobile advertising applications. Research regarding these applications has a number of practical and methodological complications due to the mobile nature of the medium. With the CAVE set-up however, researchers have the opportunity to explore the mobile medium in a dynamic context, without sacrificing the advantages of laboratory experiments.

The research shows also its relevance beyond the scientific goals we set out. Against the backdrop of the current exponential technological development more and more opportunities arise to adapt the communication process on a mass scale to the individual user (e.g., mobile advertising, narrow casting, personalized advertising). Hence, this raises the question with advertisers and other communicators/communication specialists how these new technologies have to be deployed. This study provides a number of strategic recommendations on how communication can effectively work out using these ubiquitous context-sensitive communication technologies.

6 References

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