The Effectiveness of Branded Mobile Phone Apps

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Abstract

Mobile phone applications ("apps") have generated substantial interest among marketers, primarily because of their high level of user engagement and the positive impact this presumably has on a user’s attitude toward the sponsoring brand. This study utilized a pre-test/post-test experimental design to determine whether using popular mobile phone apps affects brand attitude and brand purchase intention. The results show that using these apps has a positive persuasive impact, increasing interest in the brand and also the brand’s product category. The relevance of the product category makes no difference, but apps with an informational/user-centered style were more effective at shifting purchase intention, most likely because this style focuses attention on the user, and therefore encourages making personal connections with the brand. Experiential gamelike apps were less successful, because they focus attention on the phone. These results suggest that understanding how to maximize the impact of mobile phone apps will be a key topic for future research.

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Keywords: Mobile marketing; Apps; Advertising; Experiment; Attentional focus; Creative style; Informational; Experiential

Introduction

The Apple iPhone has been described as a turning point, the first true handheld computer (Wortham, 2009). The launch of the iPhone 4 was “the most successful product launch in Apple’s history,” according to Apple CEO Steve Jobs (Apple, 2010). The iPhone also revolutionized the mobile phone industry, changing it from a competition between devices to one between platforms. The driving force behind the Apple iPhone platform is the Apple App Store, where iPhone owners can choose from over 100,000 interactive applications ("apps"). These apps range from tools for e-mailing and text messaging, to maps and direction finders, through to books, games, and online shopping programs. Rival smartphone platforms, such as Google Android-powered phones, have rushed to provide apps for their users, although none offers as many (Wortham, 2009).

Marketers have developed increased interest in creating branded apps, conceptually defined as software downloadable to a mobile device which prominently displays a brand identity, often via the name of the app and the appearance of a brand logo or icon, throughout the user experience (e.g., Table 2). One reason for the popularity of branded apps as a marketing device is their high level of user engagement and the positive impact this presumably has on attitudes toward the sponsoring brand (Hutton and Rodnick, 2009). And, in contrast to other forms of advertising, branded apps are welcomed as “useful,” which suggests that they may be one of the most powerful forms of advertising yet developed.

To date, however, no research has tested the actual impact of branded apps on consumers. Previous research on the effectiveness of mobile phone advertising has largely concentrated on the effects of text messages. Barwise and Strong (2002) report an impressive field test of the potential of customized text messages to mobile phones. However, the very personal nature of mobile phones, including the new smartphones, which are practically
extensions of their owners, means that advertisers need to adopt new rules of conversation when communicating with mobile phone users. For example, repeated messages, which on TV have positive “build up” effects (Campbell and Keller, 2003), seem as odd as a person repeating themselves when talking face-to-face. Most important, because of the personal nature of mobile phones, advertisers need opt-in permission to advertise on them (Tsang, Ho, and Liang, 2004). Smartphone apps overcome both of these difficulties. First, they are “pull” rather than “push” advertising. The consumer talks to the brand, not the other way round. Second, consumers are exposed only to the apps they opt into by downloading, and they control how much information they reveal when customizing the app.

Nevertheless, systematic research is required to determine how to optimize the promising marketing potential of apps. This study builds upon previous papers on mobile phone marketing strategy by testing the effects of branded apps for the first time in an experimental setting. For example, Shankar et al. (2010) discuss the potential of smartphone apps, in particular product-comparison apps, to increase price competition, customer loyalty, or both. They distinguish between consumer activities such as creating a shopping list, comparing product reviews, and redeeming coupons, and marketer practices such as advertising, messaging, servicing. However, many apps— including several we tested in this study—combine all these customer activities and marketer practices into one piece of software and therefore may provide a more synergistic experience. We tested eight apps from major brands and found that using branded apps does have a persuasive effect. The implication is that smartphone application development could be a better use of funds currently deployed on mobile-ready Web sites and other forms of advertising and promotion.

Literature Review

In this section, we review the literature relevant to the potential effectiveness of mobile phone apps as persuasive advertising. This review suggested five hypotheses, which were tested in this experimental study.

Effects of Interacting with Branded Mobile Phone Apps

The most important research question to explore, from the perspective of advertisers, is whether branded apps are effective forms of advertising. In this study, we define advertising effectiveness in terms of persuasion, that is, whether the advertising can positively change brand attitude, and if possible, whether it can change intention to purchase the brand. Attitudes tend to be easier to change than intentions, and for that reason, attitude change can be a signal of a short-lived effect, or an early indicator of later behavioral change (Morris et al., 2002; Petty and Cacioppo, 1986). The impact of using apps on other measures of advertising effectiveness, such as awareness (recognition and recall), seems less relevant as users would be unlikely to download apps for unfamiliar brands.

Branded mobile phone apps are another form of interactive advertising, similar to Web sites and rich-media banner advertising, but potentially even more engaging. The high level of engagement associated with users’ experiences interacting with mobile phone apps is likely to make the advertising messages conveyed by those apps highly persuasive (Calder, Malthouse, and Schaedel, 2009; Wang, 2006). More generally, the presence of interactivity in advertising typically has positive effects, although we still have little understanding of precisely how interactivity “works” (Sundar, Qian and Saraswatii, 2010). Interactors tend to process an ad more deeply (Liu and Shrum, 2002; Sundar and Kim, 2005), and for a longer time (Caubergh and De Pelsmacker, 2010), and therefore generate more thoughts about the ad (Celsi and Olson, 1988; Sicilia, Ruiz, and Munuera, 2005). If most of these thoughts are positive (Cacioppo and Petty, 1979; Sicilia et al., 2005), interaction with branded mobile phone apps should have a positive effect on attitude toward the brand (Caubergh and De Pelsmacker, 2010), and brand purchase intention (Bellman, Schweda, and Varan, 2009; Sundar and Kim, 2005). Our first hypothesis tests, therefore, whether interacting with branded mobile phone apps can result in a positive shift in our two measures of persuasion, attitude toward the brand and purchase intention:

III. Using a branded mobile phone application improves attitude toward the brand and increases purchase intention.

Moderating Effect of Relevance

Our second hypothesis proposes that the main effect of using apps on attitudes is likely to be moderated by the relevance of the product category to the user. First of all, users are unlikely to download apps for products they view as not relevant to them personally. More importantly, though, according to the Elaboration-likelihood model (the ELM; Petty, Cacioppo and Schumann, 1983), consumers are unlikely to process an app for a low-relevance product in great depth, and therefore their attitudes will be influenced more by peripheral visual aspects of the app. The mere presence of interactivity can also be a peripheral cue, when it is noted but not used (Liu and Shrum, 2009). In contrast, when a product is highly relevant, consumers should want to process an app for that product in depth, and their attitudes would then be swayed only if the app contains attributes beneficial to central processing such as strong verbal arguments (Petry et al., 1983). Moreover, because the content of a relevant-product application should be processed in more depth, following the ELM’s central route to persuasion, a user is more likely to have elaborated on the meaning and utility of the app’s content, and formed a closer personal connection with the brand. This should mean that pre-post shifts in attitude after using apps for highly relevant products are more resistant to change, and more predictive of future behavior (Petry and Cacioppo, 1986; Petry et al., 1983). However, research using the ELM has found that immediate post-test effects can be identical for central-route and peripheral-route processing (Petry and Cacioppo, 1986). Nevertheless, our second hypothesis tests whether apps for high-relevance products are associated with larger shifts in both of our measures of persuasion: brand attitude
and brand purchase intention, compared to low-relevance products:

**H2.** Branded mobile phone apps that are highly relevant to the user will have a larger persuasive impact on shifts in attitude and intention from pre-test to post-test.

*Creative Execution Style*

Our next two hypotheses explore whether the creative execution style used for a branded app makes any difference to its effectiveness. As we discussed above, overall perceptions of engagement with an interactive app are a function of the number and intensity of the experiences a user can have with that application. Although consumers may experience more than eight different kinds of interactive experiences (Calder, Malthouse, and Schaefel (2009)), we concentrated on just two of these: utilitarian/information-gathering (*informational*) experiences and intrinsic enjoyment/entertainment (*experiential*) experiences, as they are clearly facilitated by two very different types of interactive content. Hoffman and Novak (1996, 2009) directly relate informational (utilitarian/goal-directed) and experiential modes of interaction to different types of Web site content. Informational content such as on-line shopping or banking facilities supports a utilitarian/goal-directed desired outcome, whereas experiential content such as on-line magazines or chat rooms caters to a desired intrinsic-enjoyment outcome. It is also possible to align differences between informational and experiential interactive content with the differences between two creative styles commonly defined in advertising textbooks: functional/informational versus experiential/transformational (e.g., Rossiter and Percy, 1997; Shimp, 2007).

The presence of these two creative styles is typically identified by comparing perceptions (Calder, Malthouse, and Schaefel (2009); Huang, 2003). For example, the Calder, Malthouse, and Schaefel set of experiences measures perceptions of utilitarian experiences by agreement with items such as “this site helps me to make good purchase decisions,” and intrinsic enjoyment experiences with items such as “it’s a treat for me” or “I like to kick back and wind down with it” (Calder, Malthouse, and Schaefel (2009)). In this study, however, instead of relying on participant perceptions we classified our test apps as informational or experiential a priori. Our reasoning was that whether an app is seen as informational or entertaining very likely depends on the relevance of the app, something we manipulated to test H2. If some of our participants did not like a game application, because they didn't see it as relevant, or just didn’t like the game (Wise et al., 2008), and therefore did not endorse the intrinsic enjoyment items from the Calder, Malthouse, and Schaefel experience inventory, we did not see any reason for changing the categorization of that application from experiential to informational. Instead, we used a potentially more useful means of differentiating between creative execution styles, based on using biometric measures to identify the focus of attention rather than evaluations or perceptions of the experience.

Lacey (1967) identified two types of attentional focus: (1) an external focus, in which attention is directed to “sensory intake,” and (2) an internal focus (“environmental rejection”), in which attention is directed inside, for example, to mental processes such as remembering, or performing calculations. Lacey proposed that these differences in attentional focus explained why measures of participants’ heart rates do not always correlate with other measures of general psychological arousal. Lacey hypothesized that a fast heart rate interferes with sensory intake from the outside world, whereas a slow heart rate increases it. When attention is focused externally, heart rate goes down (Hunt and Campbell, 1997; Lang, Potter, and Bolls, 2009; Potter and Bolls, 2011), despite increases in other measures of arousal. It is only when attention is focused internally, on information previously processed and stored in long-term memory, that heart rate increases in line with “distraction” in the environment (Cacioppo et al., 1992).

It is informative to apply the dichotomy of internal and external attentional focus to the distinctions between the two creative strategies we tested: informational and experiential. Whether or not an experiential app such as a game is liked, these types of apps should be associated with an external focus of attention. This is because game apps like the ones we tested require users to observe and manipulate cues on the mobile phone screen, rather than in the user’s mind. In contrast, the alternative informational creative strategy attempts to show how the brand can solve particular problems a user may have. Doing so requires an internal focus of attention, as users search their memories and make decisions and plans in relation to the brand. It is very likely, therefore, that we will be able to differentiate between experiential and informational apps by measuring heart rate as an indication of cognitive focus during usage. Relatively slower heart rates indicate an external focus of attention whereas comparatively higher heart rates occur when attention is internally focused (Bolls, 2002; Lang, 1994). Because an external focus of attention is expected during experiential apps, an internal focus of attention is more likely to be associated with informational apps. For these reasons, we proposed our third hypothesis:

**H3.** Experiential apps are associated with an external focus of attention, indicated by comparatively slower heart rates, whereas informational apps are associated with an internal focus of attention, indicated by comparatively faster heart rates.

*Potential Moderating Effect of Creative Execution Style*

If experiential apps are characterized by an external focus of attention, and informational apps are characterized by an internal focus of attention, then experiential apps may be less persuasive than informational apps. The reason for this is that an internal focus of attention resembles the deeper processing referred to earlier as the central route to persuasion (Petty and Cacioppo, 1986). By customizing the tools of the application, users elaborate extensively on what its content means to them, and make personal connections with the advertised brand. A personal connection with the brand, if it is positive, increases the chances that this positive attitude toward the brand will result in favorable behavior toward the brand (Petty and Cacioppo,
1986): that is, an internal focus on the brand increases the likelihood that it will be purchased.

In contrast, the external-focus strategy of a game-like application is more likely to persuade via the shallow-processing peripheral route. Not much information is conveyed, counterarguments are unlikely to be thought of, let alone challenged, and little personal elaboration on the relevance of the brand is encouraged. Instead, the hope is that the positive affect associated with the game experience transfers to brand evaluation (Wise et al., 2008). While the peripheral strategy can generate attitude changes equivalent in size to the central strategy, its effects on behavior can be weaker (Petty, Cacioppo, and Schumann (1983)), or take a long time to accumulate (Heath, 2009). For these reasons, we predicted a significant difference in the persuasive impact of the two levels of the style factor:

**H4.** Informational apps will have a greater persuasive impact on attitude toward the brand and purchase intention than experiential apps.

*Interaction Effects of Combinations of Relevance and Execution Style
*

Our fifth hypothesis tests what happens when different styles of execution are combined with different levels of product relevance. According to the ELM, consumers peripherally process information about low-relevance products and centrally process information about high-relevance products (Petty, Cacioppo, and Schumann (1983); Petty and Cacioppo, 1986). It is unlikely that the presentation format of the information will alter the perceived relevance of the product. Therefore, it is not expected that consumers will centrally process information about a low-relevance product even when this type of processing is seemingly encouraged by an informational-style app. Similarly, consumers wanting to centrally process information about a high-relevance product may be disappointed by the lack of information provided by an experiential app, and these negative emotions could reduce the favorability of brand attitude and brand purchase intention (Sohn, Ci, and Lee, 2007). Our final hypothesis, therefore, predicts a crossover interaction between relevance and execution style that affects both attitude and behavioral intention:

**H5.** Experiential apps are more persuasive for low- rather than high-relevance products. Informational apps are more persuasive for high- rather than low-relevance products.

*Method*

*Sample and Design*

Two hundred and twenty eight (228) members of the general public participated in a one-and-a-half hour study conducted in the Southwestern United States (n=159) or Western Australia (n=69). Participants in both locations were recruited from pre-existing audience panels created to provide survey respondents and experimental subjects for ongoing media research studies. Both self-report and psychophysiological data (heart rate and skin conductance) were collected from the Australian participants. The U.S. participants each received a $20 (USD) Visa gift card in exchange for their time and travel. The Australian participants were each given a slightly more valuable $30 (AUD) department store gift voucher, to compensate them for the additional time and burden of the psychophysiological measures. Neither sample was significantly different from its respective population in age or gender. Ages ranged from 18 to 74 years (M=40.90; SD=13.92). Half of the final sample (N=219, data were lost from 4% of the sample due to technical malfunctions) were women (n=105 [48%]), which allowed us to test whether the gender-relevance of an application had an influence on its impact. There were no differences in mobile phone ownership between the two samples. Nearly three in ten (28%) of the sample owned an iPhone or an iPod touch; the rest owned either a different kind of mobile phone (68%), or no mobile phone at all (4%). All participants received extensive training in the use of branded apps before exposure to the test apps.

*Design*

The basic design of this study was a pre-test post-test experiment. The pre-test measures were collected using an online survey, between one and two weeks (M=9.5 days) prior to the experimental session. Questions were asked about the eight brands used in the experiment, as well as about eight competitor brands (one per product category) in order to avoid highlighting the test brands.

To eliminate the self-selection effects that occur when interaction is optional, each participant was asked to interact with all eight test apps during the experiment. Although interaction was required, however, the amount of time spent with each application was up to the participant. Order of presentation was randomized so that each participant used the eight apps in a uniquely different random order (none of the 40,320 possible permutations appeared twice in our data). The eight apps varied according to a 2 (Gender Target: Female-Targeted vs. Male-Targeted)×2 (creative execution style: informational vs. experiential)×2 (App: Brand 1 vs. Brand 2) within-subjects design (Table 1). The overall experiment was therefore a 2×2×2×2 design, with one between-subjects factor, Gender, and four within-subjects factors: Time, Gender Target, Style, and Application, all with two levels.

*Table 1 Study design.*

<table>
<thead>
<tr>
<th>Gender Target</th>
<th>Female-Targeted</th>
<th>Male-Targeted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution style</td>
<td>Informational</td>
<td>Experiential</td>
</tr>
<tr>
<td>First app</td>
<td>Target</td>
<td>Gap</td>
</tr>
<tr>
<td>Second app</td>
<td>Kraft</td>
<td>Lancôme</td>
</tr>
<tr>
<td>Total N=219. Each participant used all eight apps, in a different random order.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1 Power analysis using the G*Power 3 program (Faul et al., 2007) shows expected power to be >.95 for all tested main effects and interactions given an expected medium-sized effect, even in the smaller heart-rate sub-sample.
Stimuli

The eight test stimuli were all real apps downloaded from the iTunes Store. The process of choosing the apps began with the decision to contrast the experiential and informational creative execution styles. Within each style, four example apps were selected, two targeted toward women and two targeted toward men. The final eight apps were deliberately selected “typical” apps, that is, average in terms of their online ratings on the Apple iTunes App Store and number of raters (an indicator of popularity). The eight apps selected are described briefly in Table 2. All these apps were generally unfamiliar to our participants. Only five of the eight apps had been used by any of our participants before the experiment (Target, Gillette, Gap, Weber, Best Buy), and at most 5% of participants had used a single app (Best Buy). All the apps were loaded onto an Apple iPod touch, which has the same touch screen as an iPhone. None of the apps was updated over the course of the experiment, so that each participant experienced the same version of each application (personal customizations were deleted between participants).

Before seeing any of the test apps, participants completed a short training app. This app gave participants three practice trials at performing four tasks required to interact with the eight test apps: (1) tapping a white spot, (2) dragging a spot with a finger, (3) resizing (pinching and stretching) a square with the finger and thumb, and (4) tilting the iPod touch to control a rolling ball. Measures of arousal (skin conductance) taken from the psychophysiological-measures subst-sample during this training phase indicate that three practice repetitions were enough to acclimatize (habituate) our participants to the novelty of these tasks, with the exception of the tilt task, which was still evolving a significant increase in arousal during the third repetition (Arousal [change from one second prior to the task]=-.15 microSiemens, one-sample t(51)=4.23 [vs. 0], p<.001). This task, however, was required for only one of the eight apps.

Measures

Participants were measured at two separate times for this experiment, (1) in a pre-test survey before the lab session, and (2) in a post-test survey after using all eight test apps. Both surveys were completed online, using a computer.

Pre-Test Survey

Randomly-selected sub-sets of the two audience panels received email invitations to participate in an online survey about media technology and consumer brands in exchange for a movie pass for one adult. In line with the survey’s cover story, it began with questions about ownership and usage of various media devices, including smartphones. The survey then measured pre-test product category involvement for the eight test brands, using five 7-point items (α=.98), adapted from Mittal (1995). The pre-test survey ended by measuring purchase intention and attitude toward the brand for two brands from each of the eight product categories: a test brand and a competitor brand. Purchase intention (PI) was measured using a single-item, Juster’s (1966) 11-point scale (0%=”no chance or almost no chance [0% chance]” to 99%=”certain or practically certain [99% chance]”), with a conditional framing (e.g., “if you were going to buy a car, what is the probability that you would buy a BMW [assuming that brand was available?”). Attitude toward the brand (A) was measured by the mean of five 7-point semantic-differential items, anchored by “bad/good,” “unfavorable/favorable,” “unappealing/appealing,” “displeasing/unpleasant,” and “pleasant/unpleasant” (the last two were reverse coded; α=.94). Both online surveys randomized the order in which the categories and brands were presented, and also the order of the items in the multiple-item scales.

Psychophysiological Measures

During the lab session, we successfully collected skin conductance and heart rate from the majority of the psychophysiological sub-sample (n=54 [78% of 69]). These measures are recognized as an index of arousal and attention respectively.

| Target | Female-Targeted/informational. The Target app allowed users to see this week's deals at Target, clearance items, and also to get product details, reviews, and add products to registries and lists by scanning barcodes. [http://j.mp/MnO5Ta] |
| Kraft | Female-Targeted/informational. The iFood assistant, described as the “most appetizing app on the planet,” delivered simple, delicious food ideas, anytime and anywhere, with how-to videos, smart 1-2-3 recipes, and a built-in shopping list. [http://j.mp/hbFEl] |
| Gap | Female-Targeted/experiential. The Gap StyleMixer application allowed users to try out different combinations of Gap casual clothing. [http://j.mp/npYsb] |
| Lanscôme | Female-Targeted/experiential. The Lanscôme cosmetics application allowed users to see the latest looks from Lanscôme, or create their own look and send it to friends. [No longer available] |
| Best Buy | Male-Targeted/informational. Allowed users to browse and buy all the categories of consumer electronics stocked by Best Buy, anywhere and anytime. They could also see customer reviews, find local store hours and locations, and get weekly deals sent to the user’s phone. [http://j.mp/10eXrK] |
| Weber | Male-Targeted/informational. Weber’s On the Grill™ application showcased 250 classic Weber recipes plus 40 recipes for rubs, marinades, and sauces. It could create a grocery list to take to the store, and also featured a timer, so cooks would know exactly when to take their food off the grill. [http://j.mp/4z9M2J] |
| BMW | Male-Targeted/experiential. The “BMW Z4—An Expression of Joy” application was a game, which allowed users to configure a detailed 3D model of the BMW Z4 roadster, take a virtual test drive, and create their own personal painting with the vehicle’s tires, in the style of the TV commercial featuring a stunt driver following the direction of an artist Robin Rhodes. The car was steered by tilting the phone, and excitement was added by the sound of the engine. [http://j.mp/DFXrD] |
| Gillette | Male-Targeted/experiential. The “iArt” application allowed users to experiment with facial hairstyles, by uploading a picture, choosing a facial hair length, texture, and color, and then shaving it by finger. For this experiment, participants were given a choice of two already-loaded pictures to use. [http://j.mp/6NwD] |
(Potter and Bolls, 2011). Data were acquired via a BioPac MP150 with appropriate amplifiers (GSR100 C; PPG100C) using AcqKnowledge software (AcqKnowledge version 3.9). These data were stored on a personal computer for later off-line analysis. Skin conductance (SC) was measured using SC-specific disposable electrodes placed on the medial phalanges of the first and second fingers of the non-dominant hand. Average skin conductance level (SCL) during usage of an app was measured in microSiemens (µS). We also calculated a change in SCL (ΔSC in µS) from one second prior to app usage to control for relaxation over the experimental session. Prior to quantification, the SC waveform was filtered to remove high frequency artifacts caused by movement of the electrode leads. Heart rate (HR) was measured as millisecond intervals between heart beats using a pulse oxymeter. Two photoplethysmographs were attached to each subject: one at the lobule of the ear and one at the distal phalanx of the ring finger of the non-dominant hand. The signal with the fewest movement artifacts was determined on a per-subject basis and, after removing the artifacts, used in calculating average HR during app usage, in beats per minute (bpm). Again, we calculated change in HR (ΔHR, in bpm) from one second prior to usage, to control for relaxation over the session.

Post-Test Survey

After interacting with the last app in their assigned sequence, participants went to a different room in the building to complete the post-test survey. This survey began with the same technology usage questions that appeared at the beginning of the pre-test survey. The survey then collected post-test measures of product category involvement, PI, and Aπ, for the eight test brands and their categories, using the same measures as the pre-test. The post-test survey concludes by measuring brand familiarity (Machleit, Allen, and Madden, 1993) for the eight test brands, using the mean of three 7-point items (α = .94). Demographics, such as gender, age, education level, occupation and income, were already known for members of both audience panels. Table 3 lists the means, standard deviations, and correlations between the measures used in this experiment.

### Results

#### Manipulation Checks

We checked our manipulation of relevance using the full ANOVA model used for the main analysis (i.e., Time × Gender × Gender Target × Style of Attention × Application; see Table 4). To manipulate relevance, half of our test apps were selected as targeted toward women and the other half targeted toward men, and women and men were equally represented in our sample. This meant that for each participant, half of the apps

<table>
<thead>
<tr>
<th>Effect</th>
<th>Attitude toward the brand (1 to 7)</th>
<th>Purchase intention (0 to 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (pre vs. post)</td>
<td>.15***</td>
<td>.02†</td>
</tr>
<tr>
<td>Gender (female vs. male)</td>
<td>.04**</td>
<td>.001</td>
</tr>
<tr>
<td>Gender Target (Female-Targeted vs. Male-Targeted)</td>
<td>.09***</td>
<td>.004</td>
</tr>
<tr>
<td>Creative execution style (informational vs. experiential)</td>
<td>.12***</td>
<td>.58***</td>
</tr>
<tr>
<td>Application (example brand: 1 vs. 2)</td>
<td>.04**</td>
<td>.01</td>
</tr>
<tr>
<td>Gender Target × style</td>
<td>.48***</td>
<td>.50***</td>
</tr>
<tr>
<td>Gender Target × application</td>
<td>.03*</td>
<td>.38***</td>
</tr>
<tr>
<td>Style × application</td>
<td>.01</td>
<td>.24***</td>
</tr>
<tr>
<td>Gender Target × style × application</td>
<td>.02</td>
<td>.34***</td>
</tr>
<tr>
<td>Gender Target × Gender Target</td>
<td>.17***</td>
<td>.28***</td>
</tr>
<tr>
<td>Gender Target × style</td>
<td>.03**</td>
<td>.01</td>
</tr>
<tr>
<td>Gender application</td>
<td>.005</td>
<td>.01</td>
</tr>
<tr>
<td>Gender × Gender Target × style</td>
<td>.03**</td>
<td>.06***</td>
</tr>
<tr>
<td>Gender × Gender Target × application</td>
<td>.01</td>
<td>.07***</td>
</tr>
<tr>
<td>Gender × style × application</td>
<td>.01</td>
<td>.02*</td>
</tr>
<tr>
<td>Gender × Gender</td>
<td>.48***</td>
<td>.05**</td>
</tr>
</tbody>
</table>

Target × style × application | .001 | <.001 |
| Time × gender | .003 | .01 |
| Time × Gender Target | .003 | .06*** |
| Time × style | .002 | <.001 |
| Time × Gender Target × style | .03* | .14*** |
| Time × Gender Target × application | .002 | .001 |
| Time × style × application | .002 | .002 |
| Time × Gender | .001 | .001 |
| Target × style × application | .004 | .002 |
| Time × gender × Gender Target | .003 | .002 |
| Time × gender × style | .003 | .001 |
| Time × gender × application | <.001 | .001 |
| Time × gender × Gender Target × style | .01 | <.001 |
| Target × application | .01 | .003 |
| Time × gender × style × application | <.001 | .005 |
| Error degrees of freedom | 206 | 217 |

Effect sizes (partial eta squared): small = .01, medium = .06, large = .14. All effects have hypothesis degrees of freedom = 1. Error degrees of freedom differ because of missing data.

* * * p <.001.
* * p <.01.
* p <.05.
† p <.06.

Table 3

Means, standard deviations, and correlations between measures collapsed across brand.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Familiarity of brand (1 to 7)</td>
<td>5.07</td>
<td>.88</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
</tr>
<tr>
<td>2. Product category involvement (pre) (1 to 7)</td>
<td>3.82</td>
<td>1.03</td>
<td>.24</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
</tr>
<tr>
<td>3. Product category involvement (post) (1 to 7)</td>
<td>4.21</td>
<td>.96</td>
<td>.30</td>
<td>.67</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
</tr>
<tr>
<td>4. Attitude toward the brand (pre) (1 to 7)</td>
<td>5.22</td>
<td>.78</td>
<td>.26</td>
<td>.38</td>
<td>.40</td>
<td>-.</td>
<td>-.</td>
<td>-.</td>
</tr>
<tr>
<td>5. Attitude toward the brand (post) (1 to 7)</td>
<td>5.48</td>
<td>.75</td>
<td>.34</td>
<td>.29</td>
<td>.44</td>
<td>.71</td>
<td>-.</td>
<td>-.</td>
</tr>
<tr>
<td>6. Purchase intention (pre) (0 to 100%)</td>
<td>46.73</td>
<td>18.65</td>
<td>.35</td>
<td>.51</td>
<td>.36</td>
<td>.54</td>
<td>.34</td>
<td>-.</td>
</tr>
<tr>
<td>7. Purchase intention (post) (0 to 100%)</td>
<td>48.60</td>
<td>18.32</td>
<td>.31*</td>
<td>.38</td>
<td>.41</td>
<td>.44</td>
<td>.47</td>
<td>.71</td>
</tr>
</tbody>
</table>

M = mean, SD = Standard deviation. Pearson's correlations. N=219 except familiarity, involvement (pre), recognition, attitude toward the brand (post), N=212; involvement (pre), attitude toward the brand (pre), N=214; and attitude toward the application, N=194. All correlations are significant at p <.001 except * p <.01.
would be highly relevant (Gender matched Gender Target) and the other half would be less relevant. A significant effect of relevance was therefore indicated by the significant and large effect of the two-way interaction between Gender and Gender Target on product category involvement ($F(1, 206) = 379.90, p < .001, \eta^2_p = .65$). Women rated the four categories targeted toward women as significantly higher in relevance (product category involvement) compared to the four Male-Targeted categories ($M_{\text{high}}$Female-Targeted$ = 4.66$ vs. $M_{\text{low}}$Male-Targeted$ = 3.50, \eta(104) = -12.68, p < .001$). The opposite was true for men ($M_{\text{high}}$Male-Targeted$ = 4.51$ vs. $M_{\text{low}}$Female-Targeted$ = 3.38, \eta(112) = -14.50, p < .001$). Also, usage-time data, which we have from the psychophysiological-measures sub-sample only as a by-product of biometric measurement, shows that each gender spent significantly more time in the apps that were more relevant to them (i.e., women spent longer with Female-Targeted apps $M_{\text{Female-Targeted}} = 260$ s vs. $M_{\text{Male-Targeted}} = 220$ s) while men spent longer with Male-Targeted apps $M_{\text{Female-Targeted}} = 213$ s vs. $M_{\text{Male-Targeted}} = 236$ s). Gender $\times$ Gender Target interaction, $F(1, 48) = 10.79, p < .05, \eta^2_p = .18$. This manipulation-check procedure also revealed that using a branded app can produce an un-hypothesized large and significant positive shift in product category involvement, across categories, no matter what their prior level of relevance ($M_{\text{before}} = 3.84$ vs. $M_{\text{after}} = 4.22, F(1, 206) = 44.46, p < .001, \eta^2_p = .18$).

In the results below, we report only on those effects that are directly related to our hypothesis tests (Table 5). Details of other results are available on request from the authors.

**Hypothesis 1**

Our first hypothesis predicted that using branded apps has a persuasive impact on attitude toward the brand and purchase intention. This hypothesis was supported, for both $A_b$ ($M_{\text{pre}} = 5.25$ vs. $M_{\text{post}} = 5.49, p < .001$; see Table 4) and $PI$ ($M_{\text{pre}} = 46.75\%$ vs. $M_{\text{post}} = 48.63\%, p = .052$). This effect is unlikely due to device novelty, as our participants exhibited psychophysiological habituation to the response tasks required by the test apps, after three practice trials. It cannot be explained by brand novelty either. Brand familiarity had only small, non-significant correlations with changes in $A_b$ and $PI$ ($\Delta A_b, r = .09; \Delta PI, r = -.11$; also $\Delta$involvement, $r = .04, p > .10$). Prior usage of the apps did not correlate with persuasion shift either (all $r < .09$ [absolute value], $p > .290$). Furthermore, there were no significant differences in persuasion shift between iPhone owners, iPod touch owners, owners of other mobile phones, or those with no mobile phone at all (all $F < 1$).

**Hypothesis 2**

Our second hypothesis proposed that branded apps have a more persuasive impact when the sponsor’s product is highly relevant to the user. This hypothesis was not supported by the data, as the three-way interaction between Time (Pre-test to Post-test) and relevance (Gender $\times$ Gender Target) was not significant, for both $A_b$ and $PI$ (Table 4). One explanation for this result is that the women in our sample had positive $A_b$ toward both high- and low-relevance brands ($M_{\text{high-relevance Female-Targeted}} = 5.52$ vs. $M_{\text{low-relevance Male-Targeted}} = 5.43, \eta(104) = -1.24, p = .22$; *men*: $M_{\text{high-relevance Male-Targeted}} = 5.50$ vs. $M_{\text{low-relevance Female-Targeted}} = 4.95, \eta(112) = -.8.32, p < .001$). Also, previous research using the ELM has shown that low- and high-relevance messages can have equivalent persuasive effects, at least in the short term (Petty and Cacioppo, 1986). Finally, it is likely that the main effect of relevance in real life is to filter attention, but we forced exposure to low-relevance apps in the lab.

**Hypothesis 3**

As predicted by H3, experiential branded apps were associated with a lower average HR, indicating greater intake of external information (Lacey, 1967), compared to average HR for the informational apps ($M_{\text{experiential}} = 71.54$ beats per minute [bpm] vs. $M_{\text{informational}} = 72.55$ bpm, $F(1, 42) = 26.43, p < .001, \eta^2_p = .39$). We note, though, that this difference in attention focus was significant only for males ($\Delta HR: M_{\text{experiential}} = -3.09$ bpm vs. $M_{\text{informational}} = -1.64$ bpm, $\eta(23) = 3.44, p < .05$). For women

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Effect</th>
<th>Attitude toward the brand</th>
<th>Purchase intention</th>
<th>Heart rate</th>
<th>Accepted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1. Using a branded mobile phone application improves attitude toward the brand and increases purchase intention.</td>
<td>Time (pro vs. post)</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>H2. Branded mobile phone apps that are highly relevant to the user will have a larger persuasive impact on shifts in attitude and intention from pre-test to post-test.</td>
<td>Time $\times$ gender $\times$ Gender Target</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H3. Experiential apps are associated with an external focus of attention, indicated by comparatively slower heart rates, whereas informational apps are associated with an internal focus of attention, indicated by comparatively faster heart rates.</td>
<td>Creative style (informational vs. experiential)</td>
<td></td>
<td>✔️</td>
<td>Partially (males only)</td>
<td></td>
</tr>
<tr>
<td>H4. Informational apps will have a greater persuasive impact on attitude toward the brand and purchase intention than experiential apps.</td>
<td>Time $\times$ style</td>
<td></td>
<td>✔️</td>
<td>Partially</td>
<td></td>
</tr>
<tr>
<td>H5. Experiential apps are more persuasive for low-rather than high-relevance products. Informational apps are more persuasive for high-rather than low-relevance products.</td>
<td>Time $\times$ gender $\times$ Gender Target $\times$ style</td>
<td></td>
<td>✔️</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Summary of hypothesis tests.
this difference was not significant ($t(23) = .54, ns$; Gender × Style interaction: $F(1, 38) = 4.60, p < .05, \eta^2_p = .11$).

**Hypothesis 4**

H4 was partially supported by the significant effect on PI of the two-way interaction between Style and Time (Table 4). However, this interaction had no significant effect on $A_h$. Both creative styles generated pre-post shifts in $A_h$ that were equally significant (informational: $M_{pre} = 5.38$ vs. $M_{post} = 5.64$; experiential: $M_{pre} = 5.11$ vs. $M_{post} = 5.33$; $p < .001$ for both). But only informational apps significantly increased PI ($M_{pre} = 5.71\%$ vs. $M_{post} = 60.92\%, p = .001$). Experiential apps had uniformly low PI pre and post ($M_{experiential} = 36.38\%$ vs. $M_{informational} = 59.00\%, p < .001$).

**Hypothesis 5**

H5 was not supported, as the significant two-way interaction between Style and Time on PI (H4) was not further qualified by relevance (Gender × Gender Target). The hypothesized four-way interaction was not significant on either PI or $A_h$ (Table 4). Table 5 summarizes the results of our five hypothesis tests.

**Discussion**

This study confirms that using branded mobile phone apps has a positive persuasive impact, increasing interest in the brand and also the brand’s product category. Branded apps have a large effect on the favorability of brand attitude, but only a small effect on purchase intention. However, both shifts appear to be robust and not influenced by alternative explanations, such as novelty effects from using a touch-screen or mobile phone apps for the first time, or seeing information about unfamiliar brands. The most likely explanation for the effectiveness of branded apps is that they offer a high level of user engagement, based on rich experiences that in this experiment were either informational or experiential (Calder, Malthouse, and Schaad; 2009).

We found that the relevance of the product category made no difference to the effectiveness of a branded app. We had predicted that we would see a change in both attitude and intention only when the product had high relevance. We didn’t find this. Instead, pre-post shifts in brand attitude and purchase intention were identical for both high- and low-relevance apps, such as when our women participants interacted with apps targeted toward men. In practice, though, it would be difficult to convince people to download apps for low-relevance products. However, apps seem like an ideal medium for educating people about new categories, or categories they have yet to try, so it would be useful to experiment with ways of encouraging consumers to use apps for this purpose.

Not all branded apps have the same effectiveness, however. We found that the creative execution style used in an app makes a difference to its effectiveness. Apps that used an informational style were more effective at shifting purchase intention, compared to apps that used an experiential style. In male participants we found a difference between these two creative styles in the biometric measure, heart rate, suggestive of the informational style focusing attention internally and thereby encouraging the generation of personal connections with the brand. In contrast, males using the experiential apps had slower heart rates indicating an external focus of attention. Women had the same heart rate for both creative styles. This result may reflect gender differences in engagement with mobile devices in general. However, our data are unable to comment on that possibility which we leave for further investigation. The creative execution style employed by a branded app made no difference to the effects of relevance, mainly because relevance itself made no difference.

**Implications**

Mobile phone apps provide a pull marketing opportunity delivered via a platform that consumers have strong emotional attachments to. Many view their mobile phones as extensions of themselves. This has resulted in a rush into the marketplace by many brands looking to capitalize on the affective and interactive experience that apps provide. However, no research to date has explored the different variables that may impact on how branded apps affect attitudes and behavioral intentions. Being the first such study to do so, our results suggest that branded apps are a highly effective form of advertising, one that can change attitudes and intentions, and even increase interest in a whole product category. Moreover, branded apps offer the unique benefits of mobile marketing communications, following consumers wherever they go, and able to be updated with the latest localized information and deals (Shankar and Balasubramanian, 2009), but in a “pull” format that consumers actually want to see, rather than annoying “push” messages.

However, this study also suggests that the most successful type of app is the one that is the most intensive to produce. Designing an informational app that consumers find useful in their daily lives is a lot more difficult than building an experiential app by creating or adapting an interactive game: it requires developing a whole suite of tools instead of just one. Identifying, programming, and testing these tools requires a large budget of time and money to ensure success.

Another problem for marketers is the success of Apple’s App Store. Getting a new branded app noticed when there are 100,000 others on the shelf probably requires a separate persuasive advertising campaign. Many of the brands we tested appeared to be successful, however, at advertising the availability of their apps on their corporate Web sites.

**Limitations**

Like all lab studies, the findings of this study should be transferred to the real world with caution. The main limitation is the use of forced exposure, which means that our results are more conservative than they might be in the field. Our measures of pre-post shift include data from people who might not have been interested in any of the products advertised by our test apps. This limitation highlights the need to replicate our findings in field trials.
A second limitation is that our sample reflected the general population, and therefore the majority was not composed of current iPhone or iPod touch owners. It is possible that our results reflect novelty effects from using a touch-screen device or a branded app for the first time. We conducted a number of tests, however, to rule out this explanation, but future research should attempt to replicate our findings using a sample of highly experienced app users.

Third, we could only test eight branded apps, and our results may not apply to other branded apps. In particular, we found that the four experiential apps we tested were associated with an external focus of attention, among males, while the four informational apps we tested were associated with an internal focus of attention. But it is easy to imagine examples of game-like apps that would encourage an internal focus (e.g., chess, or Scrabble), and also examples of informational apps that would encourage an external focus (e.g., a long-form, linear video ad). Future research should attempt to replicate our findings using different apps. Other research may find that the key distinction is between an external and an internal focus of attention, rather than an experiential versus an informational creative execution style. Most importantly, thought listing or verbal protocol analyses are needed to confirm our assumption that internal-focus apps are associated with more personal elaboration than external-focus apps.

Fourth, when designing the procedure for this experiment we faced a dilemma common to researchers conducting experimental work in the area of interactive marketing; namely, whether we should control the amount of time we required subjects to interact with the app or allow it to be self-directed. We chose the latter in this experiment for two reasons. First, it seemed to provide a more realistic scenario emulating the user experience when one first downloads an app and begins interacting with it. Second, we assumed that forcing subjects to continue using an app longer than they wanted to introduced unwanted variance into both the self-report and physiological data. However, this is an assumption that could be empirically tested in future research by standardizing interaction time across subjects. We note also that in our study, interaction time was closely related to relevance, which was already included in our design.

Finally, we tested the effects of branded apps as a new form of interactive advertising, rather than a new form of mobile advertising, which has the unique ability to deliver location-specific information and offers in the right place, at the right time (Shankar and Balasubramanian, 2009). It is possible that including precisely localized and timed information makes mobile phone apps even more effective, and may be the key reason why consumers would repeatedly re-open a branded application. Future studies should explore this possibility.

Conclusion

Mobile phone apps have generated substantial interest among marketers. This study confirms that using these apps has a positive persuasive impact, increasing interest in the brand and also the brand’s product category. The relevance of the product category makes no difference, although in practice it would be difficult to convince people to download apps for low-relevance products. We found that the creative execution style used in the app did make a difference, however. Apps with an informational creative style, which focuses attention on the user, and therefore encouraged personal connections with the brand, were more effective at shifting purchase intention. In contrast, experiential, game-like apps were less successful because they focused attention on the phone. This is the first study to explore the impact of mobile phone apps, but its results suggest that understanding how to maximize the impact of mobile phone apps will be a key topic for future research.

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References


