



# “The app market has been candy crushed”: Observed and rationalized processes for selecting smartphone games<sup>☆</sup>



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## ABSTRACT

Industry estimates suggests that smartphone gaming – playing video games on smartphone device, accessed via the device's app market – accounts for a growing segment of the entire video game play market. Yet, very little is known about the processes by which smartphone users search for and download these gaming apps. Exploratory data combining behavioral observation with post-behavior talk aloud sessions found that users tended to (1) evaluate only one game, (2) spend little time evaluating that game before downloading it, and (3) based this decision on familiarity or price considerations (with both implicitly based on rating). Privacy concerns were rarely mentioned, and classic motivations for video gameplay (such as challenge, competition, and socialization) were not represented. These data suggest that smartphone gaming might be a qualitatively different experience in terms of its uses and effects than other forms of gaming and mobile entertainment.

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## 1. Introduction

Research has predicted the success of mobile phone-based gaming as early as the mid-2000s [12,18] but it was until the global diffusion of 3G mobile technology that the mobile phone developed into a serious gaming platform [14]. Since then, mobile gaming on smartphones (mobile phones with the processing power necessary to receive data and render on-screen images and graphics) – or smartphone gaming – has developed into a major market. In the US alone, as much as 40 percent of all game content sales from 2012 – or \$5.92 billion – has been attributed to smartphone gaming [8]. According to analyst *Think Gaming* [26], the title *Candy Crush Saga*, the top-grossing mobile game title in 2013 (*Candy Crush*) generates average of over \$1 million in daily revenues for publisher King, with an active user base of around 8 million gamers for the Apple iOS in the US alone [7,26]. Such figures are comparable to blockbuster games in the console sector such as *Halo 2* or *Wii Party*, each selling around 8 million copies according to sales analyst *VGChartz.com*.

The smartphone gaming market – defined here as the available offer of video games played on smartphones – is an attractive one

for gamers and developers alike, as both groups tend to favor simpler games that are not resource-heavy (both in terms of time and energy to play as well as economic resources, such as purchasing computing equipment; cf. MacInnes et al. [16]). For gamers, smartphone gaming serves as a readily-accessible form of entertainment though a device already well-integrated into their (increasingly mediated) lifestyles (cf. Wei [28]). This becomes crucial as a prime motivation for gaming in general (and possibly for mobile gaming, in particular) is for escape and distraction [22,30].

As smartphone gaming continues to grow, there is little empirical research examining how smartphone users engage the growing market in order to search for and eventually download these programs. To this end, the following paper uses a mixed-methodological approach to explore smartphone users' observed choices to download smartphone gaming, as well as the reasons given for those observed choices. As an exploratory study, the goal of the current paper is to highlight areas for further examination into the smartphone gaming app market.

## 2. Smartphone games as a unique market

Smartphone games are somewhat unique from other smartphone applications, or “apps”, in that they do not have a discrete function for smartphone users – that is, they tend to be more entertainment-focused than task-focused apps (Authors, in press).

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Data from Liu and Li [15] support this, suggesting that while perceived usefulness is a dominant predictor of the adoption of task-specific apps, the context of one's mobile phone usage (such as using a phone to pass time) was the best predictor of smartphone gaming adoption. Put another way, gaming apps are rarely the primary reason for an individual's smartphone adoption, yet as the quality of broadband connectivity as well as mobile device itself (display, interface and processing capabilities; cf. Browne and Anaud [3]), smartphone gaming appears to be a natural by-product of mobile technology – just as the computer game was a natural by-product of the advances in computer processing of the 1950s and early 1960s (cf. Bowman et al. [2]).

Perhaps one of the first truly mobile games (pre-smartphone) was the monochromatic Snake – a simple puzzle game in which players navigated a digital “snake” (a line of gray-shaded one-by-one phone pixels) around a series of on-screen obstacles, such as walls and boxes. Taneli Armanto, the game's developer, had a simple vision to “create a great game for a mobile phone” (as cited by Ozler [19]). The game, which was pre-installed with many Nokia-branded cell phones of the time, is estimated to have been installed to more than 350 million mobile phones, making it one of the most-played video games (regardless of genre or platform) of all-time.

From the humble Snake pre-installed games, smartphone games have since developed into a substantial new gaming market that is at once similar to but divergent from the previously-established video game markets [13,16]. Critical differences include: (a) the smartphone gaming market is largely a “casual” game market, it is (b) dominated by a “freemium” revenue model, and (c) it exclusively relies on a digital download distribution model. Each of these is discussed in detail below.

### 2.1. Mobile gaming as casual

The majority of smartphone games fit the category of the casual game – games meant to be played in short bursts, lacking finality and that encourage replay “ad nauseam” (Portnow, as cited by Sliwinski [24]), or games meant to be easy to learn (not requiring heavy time and skill investments on behalf of the player), but difficult to master (presenting an increasingly-difficult challenge to the player; Juul [11]). A recent report by industry magazine Gamasutra [17] reported the top 10 most downloaded and most revenue-generating mobile games of 2013 were all casual games (cf. Kim [14]). While the list represents a great diversity in the type of games played – from the color-matching *Candy Crush* (No. 1, King) to the fast-paced *Fruit Ninja* (No. 5, Halfbrick) to the brain teasers *Angry Birds* (No. 6, Rovio) and *4 Pics, 1 Word* (No. 9, Lotum) – in many ways, the diversity of this list represents a diversity in the casual game “genre” itself: games of various play-styles but with a common focus on short-term gameplay and constant user-system feedback (cf. Chiapello [5] and Kim [14]). This is not to say that all smartphone games are casual – exceptions such as the roleplaying title *The Bard's Tale* (a port of the 2005 PlayStation version of the same game; inXile, 2011) or the space opera *Galaxy on Fire 2* (ported from PC; Deep Silver, 2013) represent mobile games more aligned with the story-driven full-size games expected of consoles. However, such games tend to be the exception rather than the rule of the lion's share of the current mobile gaming market.

### 2.2. Mobile games as “freemiums”

The success of many mobile games has been attributed to a business model that well-established within video games: the “freemium” model [13]. In this model, companies usually release a basic version of a game that is free to play, encouraging players

to either pay for in-game objects (such as better equipment, short-cuts or other performance enhancers) or to purchase game versions that adds further functions to the games (such as eliminating in-game advertising). Such a model is parallel to the shareware model of the 1990s, wherein developers such as id software (of *Wolfenstein 3D* and *Doom* fame) would encourage players to download and share early (re: shorter) versions of the game for free, but needed to purchase software keys in order to unlock the full game's levels and other objects. The aforementioned *Candy Crush* is an example of such a monetization strategy, with a daily generation of nearly \$1 million in revenue vastly eclipsing even the most successful (in terms of revenue) paid mobile game title of 2013, *Minecraft Pocket Edition* (around \$50K per day, according to industry news site Think Gaming). This is astonishing as nearly two-thirds of casual games – “freemium” or otherwise – are never played again after initial download, and nearly 98% of casual gamers never invest money in their games [4].

### 2.3. Digital delivery platform

Notably, one reason this “freemium” monetization strategy is employed – beyond the economic benefit – is due to the general functionality of the smartphone device itself. As a constantly-connected device whose main data reception point is via wireless signals, rather than the insertion of physical media, the primary method of delivering any software such as video games is via a wireless digital delivery platform. As most smartphones already have such a delivery platform pre-programmed into their operating systems (namely Google Android's Play Store and the Apple App Store), the development of mobile games has largely modeled the larger app market.

## 3. Playing smartphone games

This new technological environment generates some new challenges for researchers, investigating the process of choosing gaming content to fulfill any type of entertaining function. Whereas console and PC games are often purchased through traditional retail channels (such as packaged media sales) and online portals (such as Amazon.com or game-specific portals, such as Sony PlayStation Store), smartphone games are purchased in the same app markets as all other smartphone apps. Users to download, install and play a mobile game have to search and sought among a dizzying array of other mobile phone app offerings. On the one hand, their ready-accessibility (as mobile apps) might be understood in terms of a more intrinsic selective exposure approach [31] by which gamers simply “dial up a distraction” when needed, as suggested by Liu and Li [15]. On the other hand, users might take a more elaborated approach to game purchases, considering both the size of the mobile gaming market in tandem with any number of quality dimensions before investing their time into a gaming experience (cf. Wolling [29]). At the same time, the “freemium” price model might make mobile games more attractive to users, giving them a low-investment opportunity (in terms of time and money) to try out a variety of different games before investing money into games they actually want to play.

While research on broad motivations for playing video games is rather extensive, comparison work looking at smartphone gaming is rather sparse. Wei [28] reported a general trend that younger mobile users were more likely to play games on their smartphone than older users, with a marginally significant association between smartphone gaming and passing time motivations. Such a finding is consistent with the general focus of smartphone gaming as a market for quick engagement – indeed, gamers self-report wanting smartphone games that allow them to quickly engage and

disengage the content, especially in the face of other communication interruptions native to the smartphone's primary use (such as incoming calls, e-mails and text messages; Soomro et al. [25]).

Another reason for playing smartphone games identified in the aforementioned Wei [28] study was evidence of the so-called activation effect [20]. Activation effects occur when media users begin to involve themselves more intensely with a medium after being exposed to it through novel means, such as evidence suggesting owners of VCRs to engage in more live/broadcast television viewing after purchasing their VCR (the idea being that use of the VCR to record live television also encouraged users to use more live television). Applied to mobile gaming, Wei [28] found significant correlations between the amount of time one spent talking on and messaging with their smartphone and the amount of time they spend using the smartphone for both informational (such as reading the news) and entertainment purposes (such as surfing the Web and playing games).

In explaining the evolution of the smartphone gaming market, Feijoo et al. [10] highlight a marked gap between gamers' intentions to use mobile devices for gaming compared to their actual mobile gaming engagement – citing data from Verkasalo [27] showing that while 22 percent of mobile phone owners discussed intending to game on the devices, less than 13 percent actually played. Of the reasons given included no perceived intrinsic value of gaming on the phone, as well as a steady existence of other suitable alternatives – simply put, those wishing to play video games found other devices such as consoles, tablets and personal computers better-suited for the task. At the same time, these studies were done in 2008, when leading smartphones lacked many of the technological features such as high-resolution displays, broadband wireless capability, high-performance processors, and enhanced battery life found on newer-generation smartphones – for example, the fourth-generation Samsung Galaxy S4 had two gigabytes of on-board ready-access memory, which is comparable to the processing power of a Sony PlayStation (in fact, emulation programs such as PXS4Droid and PS2EMU allow gamers to use their smartphones to play original PlayStation One titles). Browne and Anaod [3] demonstrated that designing smartphone games to specifically take advantage of the unique interfaces of a smartphone, such as motion-sensor controls (via many phone's on-board accelerometers) and touch-screen interfaces, resulted in games that were both easier to play and more enjoyable as a result.

Casual gamers usually find their games through social recommendations (Facebook and Twitter messages) and other forms of electronic word-of-mouth. To this, Campbell [4] notes that for engaged smartphone gamers (primarily, those who spend money on smartphone games), a primary reason given is the passive social interactions these games create for users: Games such as *Candy Crush* allow players to share their high scores within existing social networks, which tends to foster communal competition within the same networks, all increasing the number of users downloading and playing a given smartphone game (Palm, as cited by Campbell [4]). As best summed up by Campbell, "[smartphone gamers] are looking for a diversion, a bit of fun, preferably involving their friends" (para. 26).

#### 4. Research questions

The state of empirical work examining discrete reasons for smartphone gaming is sparse. The majority of studies focus on broader market trends, usually informed by industry analysts or game designers looking to better understand smartphone games from an investment or device-centric perspective (cf. Kim [14]). Extant work from the academy tends to favor console and PC games rather than mobile games, and those few studies on

smartphone games tend to be confounded with theoretical discussions about the nature of casual games (cf. Juul [11]) that while useful from an academic standpoint, do not inform us as to the manner in which smartphone users are engaging their devices for gaming. For the current study, we are interested in the in situ criteria mentioned by smartphone users as to why they prefer to use a specific mobile game, in a given situation – after having participated in a lab study. We do so by following a two-stage model for app selection (cf. Authors, in press) that considers (a) the app search process (by which the mobile phone users navigates the expansive app market to find a potential app) and (b) the app selection, or download, process (by which the user decides to download and/or purchase the app, or start a new app search process). In this framework, we ask: What are the common (RQ1a) search rules and (RQ1b) download rules given by user searching for smartphone games?

#### 5. Method

##### 5.1. Participants

Participants from two areas ( $n = 25$  from the US,  $n = 16$  from Germany) were invited to test out a (at the time) new smartphone device by meeting with research team in a secure interview environment on two college campuses. Participants in the German sample ( $M = 23.69$ ,  $SD = 3.30$ ) were slightly older than US participants ( $M = 20.83$ ,  $SD = 2.04$ ),  $t(38) = 3.39$ ,  $p < .002$ , with slightly more females in the US (64%) than German (44%) sample. US ( $M = 5.44$  years,  $SD = 1.78$ ) respondents had more experience with smartphones in general (Germans,  $M = 3.44$  years,  $SD = 1.31$ ),  $t(39) = 3.87$ ,  $p \sim .000$ , but neither sample differed in terms of experience with their current smartphone (Germans,  $M = 2.44$ ,  $SD = 1.03$ ; US,  $M = 2.40$ ,  $SD = 1.12$ ),  $t(39) = .108$ ,  $p = .915$ . All study respondents had at least some college education, with eight college graduates in the German sample and five graduates in the US sample.

##### 5.2. Procedures

For the current study, participants were recruited as active users of the Google Android Play Store. They took part in another study on app selection, where users had to download and install a broad range of discrete-functions apps on an Android lab-phone [details blinded for publication] (Authors, 2014). After completing the initial study – varying between seven and 10 min in length – participants were asked to download a mobile game of their choosing from the app store that they would like to play after the initial study had been completed. Participants were given the expectation that they would play the games, but gameplay was not included in the study protocol in order to control for the impact of direct play experiences on the selection recall process (for this study, we were interested in the extent to which participants evaluated the information provided in the app market). Participants were told that they would have to pay for any gaming apps that they downloaded with their own funds.

Activity on the smartphone (including what visual information as displayed on-screen, which portion of the screen users touched or interfaced with, and how long participants spend on each screen) was recorded via a laptop computer that was connected to the phone. Once they had installed a game, they were invited to watch the discreetly captured recordings of their on-screen phone interactions along with the researcher as part of a think-aloud study (cf. Ericsson and Simon [9]). During this co-viewing, the researcher interviewed the participants, and asked him/her to explain the various mobile game searches and

download behaviors observed in the videos. After the think-aloud session, participants completed a very brief survey.

### 5.3. Measures

#### 5.3.1. Demographics

Participants completed a short questionnaire that asked them to report their gender, age and experience using smartphones (all reported above).

#### 5.3.2. Reasons for searching and installing mobile games

Participants' mobile game search and download behaviors were discussed with the researcher, while both participant and researcher viewed discreetly recorded footage of the participants' on-screen interactions with the mobile phone. Participants were asked to talk through the reasons for searching for and eventually downloading mobile games, and these discussions were recording using a multi-directional microphone on the smartphone itself.

These discussions were transcribed by a separate team of undergraduate research assistants using computer-assisted transcription techniques (i.e., software that adjust the pace, pitch, tone and volume of digital audio files), and they were explicitly instructed to transcribe all language, including utterances (such as laughter, sighs or other audio cues). These transcriptions were then coded by two research assistants involved with earlier stages of the project (one involved in the talk-aloud sessions, one involved in the transcription process) and analyzed for emergent themes associated with (a) the initial app search process and (b) the final app download decision. Coders were instructed to assign as few terms as possible to each coding stage, and a third coder (the first author of the current study) resolved any coder disagreements. Coders agreed on 25 of 26 US participants, and given this high level of agreement, only one of these coders (a bilingual coder, English and German) was used to thematically code the German-language transcripts.

#### 5.3.3. Video coding

The total elapsed time of each mobile game search was recorded, including the amount of time they spent reading about the focal app (the mobile game they eventually downloaded), by the same software used to screen-capture the participants' usage of the phone. Researchers also recorded the total number of mobile games viewed by each participant in the study.

## 6. Results

Adopting the mobile app decision-making framework from Authors (in press), our central research question asked about the (RQ1a) search and (RQ1b) download decisions used by smartphone users when seeking out mobile games. Although our study was not per se concerned with intercultural difference between US and German smartphone users, data below is presented separately for each group, with a third section that compares and contrasts emergent themes from both groups.

### 6.1. Search and download rule descriptions

Sample-wide, our  $N = 41$  participants spend an average of  $M = 59.45$  s ( $SD = 36.65$ ) searching for a mobile game to download, looking at just over one game on average ( $M = 1.26$ ,  $SD = .69$ ). After participants settled on a target game (i.e., stopped searching for other games), they spent  $M = 16.11$  s ( $SD = 13.32$ ) to finalize their download decision. Only  $n = 6$  participants chose to investigate more than one game before downloading, and only two of these

participants chose to look at more than two games (see [Appendix A](#)).

#### 6.1.1. Search rules

When asked to explain the decision to stop their initial search for a mobile game – that is, to select a game for more information – nearly 42 percent of respondents ( $n = 17$ ) chose only to investigate games that they had either previously owned ( $n = 11$ ) or had some specific familiarity with ( $n = 6$ ). The next-most-prevalent category was cost, with  $n = 12$  gamers specifically mentioning cost as a factor in halting their mobile game search – of these,  $n = 11$  sought out free game: one German male explained that while he had no issue paying per se (“for a great game, I would absolutely pay money”) but explained that “those apps that we previously had to buy, now there are equivalent apps for free”. On the contrary, one German male specifically avoided games that were free, viewing free games as inherently inferior to paid games: “I’ve only looked at the paid apps, because let’s be honest, the free version is ultimately the stripped down version.” In all, direct ownership or game-specific familiarity and game cost accounted for nearly 70 percent of all search stop rules. Another five participants referenced a preference for the specific game topic or genre, with other categories being rather evenly distributed among the remaining mobile game searches (see [Table 1](#)).

#### 6.1.2. Download rules

When asked to walk the researcher through the eventual decision to download a selected mobile game, the most prominent download decision rational given ( $n = 10$ , 34.5 percent) was that the game seemed specifically familiar to them. In other words, they did not immediately recognize the game (or report recognition as a salient cue) when first selecting it for further review, but immediately recognized it after opening the game information screen. One US male participant remarked after opening an app (*Candy Crush*) that “I’m always getting invited [to the game] on Facebook like every three seconds, so that’s why I downloaded it.” Aesthetics,

**Table 1**  
Prevalence of mobile game search stop rules, by frequency.

Search rule	Freq.	~ %	Sample statement (utterances corrected)
Previously Owned	11	26	“I chose Candy Crush because I am addicted to Candy Crush. I play it all the time on my phone and my tablet”
Familiarity	6	14	“Tetris is like an old game. I haven’t played that in a long time. I know its fun.”
Cost	12	29	“[For] those apps that we previously had to buy, now there are equivalent things for free.”
Topic/Genre	5	12	“I’m going to do a game I might as well do something that I’m learning new words and stuff.”
Aesthetics	2	4	“I looked at the pictures and realized [that] it looked like a fun game to play.”
Low Commitment	2	4	“I don’t have the patience to . . . learn all of the buttons and every little trick to all those other games. Word games are more simple.”
Top-Ranked	2	4	“I chose it cause it was in [the] top finds . . . the apps to watch”
Brand	1	2	“I chose Deal or no Deal because it’s my favorite show on GSN: Game Show Network.”
Novelty	1	2	“I can honestly say I have no experience with arcade and action games on mobile phones. I’ve only ever seen people who have played [this game] and it looked pretty good.”



**Table 2**  
Prevalence of mobile game download rules, by frequency.

Search rule	Freq.	~ %	Sample statement (utterances corrected)
Familiarity	10	34	"I'm always getting invited on Facebook like every three seconds to get it, so that's why I downloaded it."
Aesthetics	5	17	"I downloaded the Hobbit because it looked pretty good [and] well-illustrated. It's a bit more upscale quality."
Top-Ranked	3	10	"I usually just go to the top three [games] every time."
User Reviews	2	7	"I went down to the reviews and looked at it, but even if there's a couple bad reviews usually they update [the game] every so often."
Playability	2	7	"I'll download a game and delete it like two days later, cause I'll be like "wow, I'm really over this." So, I didn't see anything that was really super interesting, except Tetris."
Low Commitment	7	23	"I chose Tetris because it's a classic and simple game."
Novelty	2	7	"I chose it because it's a new game on there...it's new to me and I've played Candy Crush and all those others. I've reached my limit on those."
Topic/Genre	2	7	"I like zombie games."
Educational	1	3	"Yeah, it's entertaining, challenging, and brain stimulating."

such as considerations for an app's general appearance (including pictures) were noted by another five players, with comment such as one German male suggesting that their download decision was made easy "because [the game] looked pretty good [and] well-illustrated ... a bit more upscale quality." User reviews and rankings each made up another 16 percent collectively ( $n = 2$  for each), see Table 2. Notably, the  $n = 11$  participants who engaged a "previously owned" rule for their mobile game search did not give another rule for eventually downloading the game – and these individuals (with exception to one outlier who investigated more than one game) spend less than six seconds advancing through from the search stop to downloading a mobile game. For example, one German female noted that "I had some experiences playing video game and yes [when searching] I pushed on the icon for *Temple Run*, a game that I'd played before in my spare time."

### 6.2. US sample

Of the 25 valid cases from the US, over one-half ( $n = 14$ ) were chosen due to prior ownership of the game ( $n = 9$ ) or as a result of having some familiarity with the specific game title ( $n = 5$ ) – games such as *Candy Crush* (chosen seven times, the most in our study), *Fruit Ninja* and the classic *Tetris* (both chosen three times) made up the majority of this category. Searching for games of a preferred topic or genre (such as word search games) made up another  $n = 5$  searches. One conclusion possibly drawn from this data is that nearly two-thirds ( $n = 18$ , or 72 percent) of the apps selected (and eventually installed) in our study were chosen because of the participant's acute preference for a specific game title, either through direct experience or through indirect brand or genre preference. With the exception of one participant who considered a mobile game for longer than 60 s, the average time for participants browsing game-specific information was  $M = 12.63$  s ( $SD = 8.57$ ) with only two participants taking longer than 12 s to make a download decision choosing to read user reviews first (and both naming user reviews as key to their eventual download decision). A full list of all search and download rules espoused by US participants in available in Appendix A.

### 6.3. Germany sample

Of the German sample, nearly three-fourths ( $n = 11$ , or 69 percent) mentioned price considerations as their primary reason for stopping on a particular mobile game, with 10 of these users citing free apps as being most desirable – a comment typifying this reaction was "I was actually really careful about what I looked at, and I only looked to see if it was a free game.". Only one participant (noted earlier) specifically avoided free games, seeing them as inferior to pay games (he eventually downloaded the game *Wo ist mein Wasser [Where is my Water?]* at a cost of .79 euro). These price considerations dominated search stop rules, with  $n = 4$  or the remaining five all citing some sort of proximal or distal familiarity with the games eventually downloaded, such as "[Although I] searched for multiple apps, [I] decided on sticking with what was familiar.": previous ownership ( $n = 2$ , "I installed that game because I myself have it on my phone. I have tried other games, but none have thrilled me."), game familiarity ( $n = 1$ ) and topic/genre familiarity ( $n = 1$ ).

Regarding the final decision to download a mobile game, just over 80 percent of the German sample chose to download the first game they saw, often citing familiarity with the game ( $n = 8$ , or 50 percent) as their eventual rationale for downloading it, such as one participant who said that "[I] saw Tetris as I scrolled, and I looked further down, but I thought that Tetris is so well-known" and "This Bubble [game] – I think it used to be on the PC, or at least I knew it earlier". German participants spend an average  $M = 16.8$  s ( $SD = 12.73$ ) on their decision to download the mobile game. A full list of all search and download rules espoused by German participants in available in Appendix A.

### 6.4. Comparing findings

While our two samples differed little in terms of their broad mobile game downloads – both samples spend little time in the app market, selecting from very few games viewed exercising little discretion given the enormity of the game-specific app offerings – one of the main differences between the samples was the dominant cue used: US respondents tended to rely on prior ownership or game-specific familiarity cues, while German respondents tended to speak to price as a salient cue for stopping their mobile game app search. Notably, even if participants from both populations espoused different search and download rules, we cannot overlook one striking similarity between them: most sampled from the top-listed free apps available in the Google Play Store – giving different reasons for downloading different games, but all sampling from essential the same small and finite set of high-rated and free-to-download mobile games.

Finally, for both the overall search duration and the specific game download duration, German participants spend more time reading on-screen information than US participants, see Table 3.

**Table 3**

Total duration of mobile game search and specific game download time, comparing German and US respondents.

	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
<i>Total search time</i>						
US	53.48	34.64	.850	28.3	.204	.320
German	63.82	39.93				
<i>Download time</i>						
US*	12.63	8.57	1.15	23.5	.130	.474
German	16.82	12.73				

Note: For download time, one US participant with a total duration of 68 s (see Appendix A) was removed from analysis, as his score was considered an outlier; inclusion of this score resulted in a standard deviation equal to the mean of all US respondents on this category.

Notably, given the small sample sizes associated with both tests, Cohen's  $d$  effect size measures were used to guide interpretations. For total search time, results suggested a small effect (Cohen [6]), with Cohen's  $d = .320$  (equivalent of effect size  $r = .158$ ) representing a 58.95 percent probability of superiority (a German picked at random would be ~59 percent more likely to take longer searching for mobile games in the app market). For specific game download considerations, results suggested a small-to-moderate effect, with Cohen's  $d = .474$  (equivalent of effect size  $r = .231$ ) representing a 63.02 percent probability of superiority.

Given that participants from both populations searched through roughly the same number of games ( $n = 22$  of 26 US participants, or 85%, searched only one game, compared to  $n = 13$  of 16 German respondents, or 82%), it is not the case that either population showed a proclivity to consider a greater variety of gaming options.

## 7. Discussion

Given the enormity of the smartphone mobile games market, often set up in a "freemium" economic model that encourages users sampling various low-investment products before purchasing, perhaps the most striking finding from this exploratory study is that smartphone gamers spend very little time and energy searching through the market. Indeed, even though the two populations gave different rationales for their downloads (prior ownership and familiarity being the most dominant cues for US users, pricing a salient cue for German users), both groups seemed to sample from the same rather short list of top-rated free-to-play games: those games available on quick browse through the Google Play Store (apps that, by function of the Store, are the top-rated free apps currently on offer). In fact, one German female participant, unsolicited, expressed a good deal of frustration with the mobile game app market:

"There is simply an incredibly large amount of apps to choose from, it's overwhelming. It would be nice if you could even narrow it down a bit more, [for example] according to some other criteria."

Such quotes are evidence of what Schwartz [21] refers to as a paralysis of choice – a paradoxical situation by which consumers in free market express frustration and dissatisfaction with an increasing number of products on offer. Put another way, the introduction of more alternatives can complicate rather than facilitate consumer satisfaction, as it reminds the consumer of the potential alternatives not selected, rather than the benefits of the eventual alternative decided upon. Given the rather low-investment nature of smartphone gaming, it is possible that the introduction of so many different game choices might lead many users to altogether avoid rather than engage alternative choices, instead encouraging reliance on salient heuristics such as familiarity and price (and possibly, top-rated heuristics, although not explicitly), in order to reduce cognitive effort.

Another intriguing finding is the relative lack of representation of search or download decisions normally associated to play video games, such as seeking out challenge or competition or socialization with other gamers [22,30]. In the interviews, only one participant even tangentially mentioned the notion of challenge (in reference to installing a word puzzle game for "brain-stimulating" educational purposes), and none of them mentioned socialization as a salient download decision. On the one hand, these data could be indicative of the casual nature of smartphone games: as low-involvement (and low-investment) games, we might not expect them to be engaged in the same way as more traditional console and PC games. Ausick [1] reports that while US (52 min) and German (47 min) smartphone gamers do play more than most

other populations, these numbers pale in comparison to the 3.14 average daily hours spend gaming by most core (platform and PC) gamers (NPD Group, as cited by Siegal [23]). Moreover, given that games such as *Candy Crush* actively encourage players to share and compare (and conquer) each other's scores via social media, the lack of socialization as a salient cue is somehow surprising. However, the discordance of our findings with established motivations for traditional video gaming should be taken with a grain of salt for two methodological reasons. First, most research on video game motivations is rooted in a uses and gratifications model of media consumption wherein study participants (usually in response to closed-ended survey items) are specifically asked to either generate, rank or select from a list of discrete motivations. Second, we should consider this data in reflection of Liu and Li's [15] findings that the context of smartphone usage plays an important role for mobile gaming adoption. For our study, the context of downloading mobile games to a laboratory-owned smartphone as part of a larger study on mobile app adoption might have represented a simple desire to have a quick distraction to the mundane procedures of the study itself of the experiment itself. On the one hand, such a mundane process might not differ much from the sort of leisure and distraction contexts found by Liu and Li that were most predictive of smartphone users' mobile gaming in the first place. From this perspective, the context – albeit unintended – as created through our study design (playing a game after participating in a longer study on mobile app usage) may have encouraged participants just choose rather simple games for basic amusement or to pass the time quickly. On the other hand, these findings hint at the potential for different usage contexts to perhaps encourage a wider variety of motivations and preference for mobile games – a necessary focus for replication and extension of this work.

Beyond the limitations mentioned above, the small sampling frame in the current study should also be addressed in future work – incorporating a larger and more representative sample of both smartphone users broadly as well as smartphone gamers specifically. As well, the mechanics behind the apparent cultural differences in the current study should be more robustly examined, to consider more nuanced differences such as users' opinions on gaming, leisure and privacy as well as other factors known to be influential on both smartphone usage and gaming at large. Unfortunately, the small sample size here and the interview and behavioral focus of the current study do not allow for more elaborate statistical analyses, such as regression models of demographic and psychographic variables that might explain variance in espoused or observed gaming preferences.

While the results of the current study provide an empirical baseline for which to understand the heuristics that might explain mobile gaming selection, we can see two natural extensions of this work integral to providing a more comprehensive understanding of mobile games. First, we suggest research that considers the role of trialability in the selection of mobile games, perhaps by allowing participants to sample their app downloads and play them as part of the selection process before deciding to retain the app or not. Note that the Google Play Store allows for a two hour trial window where users can choose to delete an app (receiving a full refund in the case of paid apps) if they are not satisfied with it. While none of the participants in our current study requested an opportunity to "try before buying" (or at least, downloading), such a behavior might be more likely to occur in a more natural setting, such as when using one's own personal phone without being supervised. Second (and related to the latter point of the previous sentence), we would suggest future work to investigate our findings in a more natural setting, such as retrieving data from participants' own smartphones and combining this data with an experience sampling method to combine self-reported contextual factors (i.e., emotions, moods, or gratifications sought) with observed (via recording)

search and download data (Authors, 2105). Given that our study claims that the observed heuristics were the result of smartphone users making ecologically rational decisions, it stands to reason that shifting the ecology of the smartphone use (such as moving from a laboratory to a “real world” setting) might impact the heuristics used. While our initial effort was an attempt to observe heuristics in a controlled setting, future work should integrate a variety of settings in order to broaden the scope of how we understand mobile game apps to be selected and used.

**8. Conclusion**

Despite an enormous number of smartphone game offerings, data from this study collaborates with past work on mobile apps (cf. Authors, in press) to suggest that smartphone consumers do not exercise careful considerations when evaluating and eventually downloading games to their mobile devices. The majority of participants in our study evaluated only one gaming app before selecting it, spent very little time evaluating this single app, and evaluated the app based primarily on its familiarity or price (and,

perhaps underlying both espoused heuristics, the fact that it was listed among the top free apps in the market). Privacy concerns were rarely mentioned and, when present, did neither resulted in more elaborate search heuristics nor prevented users from installing the target smartphone game. Moreover, none of the traditional gratifications associated with video game play – such as challenge, competition and social relatedness – played even a trace role in our study. This suggests that smartphone games are viewed differently than console and computer games supporting debates about casual compared to traditional games that seem to typify both media forms. Due to the reliance on cues associated with recognition heuristics and the comparative disinterest shown by smartphone gamers in engaging more elaborate search and download patterns, the Google Play Store smartphone games app market seems to be candy crushed – with a few most familiar (free) games dominating an otherwise vast market.

**Appendix A. List of apps chosen by each study participant, with search and stop roles coded from interview transcripts (split by nationality of respondent)**

Game downloaded	Gender	Total elapsed time (s)	Game info time (s)	Total games viewed	Permissions?	Search rule	Download rule
<i>US Sample (n = 25)</i>							
Candy Crush	M	44	13	1	No	Previously Owned	n/a
Candy Crush	F	18	4	1	No	Previously Owned	n/a
Candy Crush	F	37	11	1	No	Previously Owned	n/a
Candy Crush	F	24	8	1	No	Familiarity	Social Media
Candy Crush	M	39	16	1	No	Familiarity	Top-Ranked
Candy Crush	F	43	10	1	No	Familiarity	Aesthetics
Candy Crush	M	20	8	1	No	Previously Owned	n/a
Tetris	M	66	38	1	No	Top-Ranked	Familiarity
Tetris	F	83	11	1	No	Familiarity	Playability
Fruit Ninja*	F	36	11	1	No	Previously Owned	n/a
Fruit Ninja	M	21	10	1	No	Previously Owned	n/a
Temple Run	F	59	6	1	No	Previously Owned	n/a
Temple Run	F	30	13	1	No	Low Commitment	Familiarity
Word Search Puzzle	F	29	8	1	No	Previously Owned	n/a
Word Search Puzzle	F	105	22	2	No	Non-Gamer	Educational
Angry Birds	M	60	1	1	No	Topic/Genre	Aesthetics
Deal or No Deal	F	21	5	1	No	Familiarity	Novelty
Despicable Me	F	59	7	1	No	Top-Ranked	Free
Middle Manager of Justice	M	39	15	1	No	Aesthetics	Topic/Genre
Osmos	F	152	24	4	No	Aesthetics	Topic/Genre
Plants v. Zombies	M	110	68	2	Yes	Previously Owned	n/a
Solitaire	F	105	7	1	No	Low Commitment	Playability
Word Search – Colorful	F	23	6	1	No	Topic/Genre	Low Commitment
Wordly	F	77	21	1	No	Topic/Genre	User Reviews

(continued on next page)

## Appendix A (continued)

Game downloaded	Gender	Total elapsed time (s)	Game info time (s)	Total games viewed	Permissions?	Search rule	Download rule
Zombie Gunship	M	37	28	1	No	Topic/Genre	User Reviews
Average	64% F	53.48	14.84	1.20			
SD		34.64	13.89	0.64			
<i>German sample (n = 16)</i>							
Tetris	F	46	15	1	No	Free	Low Commitment
Tetris	F	90	21	2	Yes	Free	Familiarity
Tetris	F	48	6	1	No	Free	Familiarity
Tetris	M	32	12	1	No	Free	Familiarity
Tetris	M	130	9	1	No	Novelty	Familiarity
Tetris	F	34	6	1		Previously Owned	n/a
Temple Run	M	37	6	1	No	Free	Familiarity
Bubble	F	31	7	1	No	Free	Familiarity
Angry Birds	M	50	10	1	Yes	Free	Top-Ranked
Classic Words	F	33	3	1	No	Previously Owned	n/a
Despicable Me	M	141	39	4	No	Free	Aesthetics
Jetpack Joyride	M	59	39	1	Yes	Free	Familiarity
Scrabble	F	140	24	2	Yes	Topic/Genre	Familiarity
The Hobbit	M	46	39	1	No	Free	Aesthetics
Where is My Water?*	M	75	24	1	No	Free (Paid)	Novelty
World of Goo*	M	29	9	1	No	Familiarity	Aesthetics
Average	43% F	63.81	16.81	1.31			
SD		39.93	12.73	0.79			
Overall average	56% F	59.45	16.11	1.26			
		36.66	13.32	0.70			

\* Denotes a paid mobile game.

## References

- [1] P. Ausick, Gaming Dominates Mobile, Yahoo! Finance, 2014, September 19. <<http://finance.yahoo.com/news/gaming-dominates-mobile-120102385.html>>.
- [2] N.D. Bowman, R. Kowert, C.J. Ferguson, The impact of video game play on human (and orc) creativity, in: G.P. Green, J.C. Kaufman (Eds.), *Video Games and Creativity*, Academic Press, San Diego, CA, 2015.
- [3] K. Browne, C. Anand, An empirical evaluation of user interfaces for a mobile video game, *Entertain. Comput.* 3 (1) (2012) 1–10, <http://dx.doi.org/10.1016/j.entcom.2011.06.001>.
- [4] C. Campbell, Analysis: Mobile Games Explosion Comes at a Price, *Polygon.com*, 2014, May 9. <<http://www.polygon.com/2014/5/9/5692510/mobile-games-market-analysis-candy-crush-clash-of-clans>>.
- [5] L. Chiapello, Formalizing casual games: a study based on game designers' professional knowledge, in: *Proceedings of Digital Games Research Association, DiGRA*, Atlanta, GA, 2013, August.
- [6] J. Cohen, *Statistical power analysis for the behavioral sciences*, Routledge, 1977.
- [7] M.R. Dickey, Insanely Popular Game Candy Crush Saga is Bringing in an Estimated \$633,000 a Day, 2013. <<http://www.businessinsider.com/candy-crush-saga-daily-revenue-2013>>.
- [8] Entertainment Software Association, *The Evolution of Mobile Games*, 2014. <<http://www.theesa.com/games-improving-what-matters/mobile-games.asp>>.
- [9] K.A. Ericsson, H.A. Simon, *Protocol Analysis: Verbal Reports as Data*, Rev. ed., MIT Press, Cambridge, Mass., 1993.
- [10] C. Feijoo, J.-L. Gomez-Barroso, J.-M. Aruado, S. Ramos, Mobile gaming: industry challenges and policy implications, *Telecommun. Policy* 36 (2012) 212–221, <http://dx.doi.org/10.1016/j.telepol.2011.12.004>.
- [11] J. Juul, *A Casual Revolution: Reinventing Video Games and their Players*, MIT Press, Cambridge, MA, 2009.
- [12] J. Hall, Future of games: mobile gaming, in: J. Raessens, J. Goldstein (Eds.), *Handbook of Computer Game Studies*, MIT Press, Cambridge, London, 2005, pp. 47–58.
- [13] A. Kerr, *The Business and Culture of Digital Games. Gamework/Gameplay*, Sage, London, Thousand Oaks, New Delhi, 2006.
- [14] H.-M. Kim, Mobile media technology and popular mobile games in contemporary society, *Mobile Market.* 8 (2) (2013) 42–54.
- [15] Y. Liu, H. Li, Exploring the impact of use context on mobile hedonic services adoption: an empirical study on mobile gaming in China, *Comput. Hum. Behav.* 27 (2) (2011) 890–898, <http://dx.doi.org/10.1016/j.chb.2010.11.014>.
- [16] I. MacInnes, J. Monata, J. Caraballo, D. Sarni, Business models for mobile content: the case of m-games, *Electron. Markets* 12 (4) (2002) 218–227, <http://dx.doi.org/10.1080/101967802762553477>.
- [17] C. Nutt, The Most Successful Mobile Games of 2013, *Gamasutra.com*, 2014, January 30. <[http://www.gamasutra.com/view/news/209611/The\\_most\\_successful\\_mobile\\_games\\_of\\_2013.php](http://www.gamasutra.com/view/news/209611/The_most_successful_mobile_games_of_2013.php)>.
- [18] S. Okazaki, R. Skapa, I. Grande, Global youth and mobile games. *Applying the extended technology acceptance model in the U.S.A., Japan, Spain, and the Czech Republic*, *Adv. Int. Market.* 18 (2007) 253–270.
- [19] L. Ozler, Taneli Armanto: Snake Creator Receives Special Recognition, *Dexigner.com*, 2005, June 16. <<http://www.dexigner.com/news/4785>>.
- [20] K. Rosengren, S. Windahl, *Media Matter: TV Use in Childhood and Adolescence*, Ablex, Norwood, NJ, 1989.
- [21] B. Schwartz, *The Paradox of Choice: Why More is Less*, HarperCollins, New York, NY, 2009.
- [22] J.L. Sherry, K. Lucas, B.S. Greenberg, K. Lachlan, Video game uses and gratifications as predictors of use and game preference, in: P. Vorderer, J. Bryant (Eds.), *Playing Video Games: Motives, Responses, and Consequences*, LEA, Mahwah, NJ, 2006, pp. 213–224.
- [23] J. Siegal, This is How Much Time the Average Gamer Spends Playing Games Every Week, *BGR.com*, 2014, May 14. <<http://bgr.com/2014/05/14/time-spent-playing-video-games/>>.
- [24] A. Sliwinski, What Defines a 'Casual' Game? *Joystiq.com*, 2009, April 29. <<http://www.joystiq.com/2009/04/29/what-defines-a-casual-game/>>.
- [25] S. Soomro, W.F.W. Ahmad, S. Sulaiman, A preliminary study on heuristics for mobile games, in: *Proceedings of the Computer & Information Science 2012 International Conference*, 2012, pp. 1030–1035. <http://dx.doi.org/10.1109/ICCISci.2012.6297177>.
- [26] Think Gaming, *Candy Crush Saga: Public Data*, 2014. <<http://thinkgaming.com/app-sales-data/2/candy-crush-saga/>>.
- [27] H. Verkasalo, From intentions to active usage: a study on mobile services in Finland, in: *Proceedings of the 19th European Regional Conference of the International Telecommunications Society*, Rome, Italy, 2008.



- [28] R. Wei, Motivations for using the mobile phone for mass communication and entertainment, *Telematics Inform.* 25 (1) (2008) 36–46, <http://dx.doi.org/10.1016/j.tele.2006.03.001>.
- [29] J. Wolling, The effect of subjective quality assessments on media selection, in: T. Hartmann (Ed.), *Media Choice. A Theoretical and Empirical Overview*, Routledge Taylor & Francis, New York, 2009, pp. 84–101.
- [30] N. Yee, Motivations for play in online games, *CyberPsychol. Behav.* 9 (6) (2006) 772–775, <http://dx.doi.org/10.1089/cpb.2006.9.772>.
- [31] D. Zillmann, J. Bryant, *Selective Exposure to Communication*, Routledge, New York, NY, 1985.