

AN ICON THAT EVERYONE WANTS TO CLICK ON  
– AN EMPIRICAL STUDY ON THE RELATIONSHIP  
BETWEEN CONSUMER PERCEPTIONS AND  
MOBILE GAME ICON SUCCESSFULNESS

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Mobile games market has been touted as the fastest growing gaming sector in the world. Every day thousands of new mobile games are published to join millions of others on app stores. The competition for top grossing mobile games is fierce, and the way a game is represented greatly contributes to its commercial success. When browsing for mobile games, consumers search for an icon they want to click on. However, most mobile games fail to engage consumers who browse past hundreds of icons on app stores daily. This leads us to the following questions: how do consumers perceive mobile game icons and what are the aesthetic qualities that make an icon successful in the sense that it incites consumers to click?

This thesis investigates the relationship between consumer perceptions of mobile game icons and icon successfulness (i.e. consumer overall evaluation of the icon and their willingness to click the icon as well as download and purchase the mobile game).

An online survey was constructed for respondents (respondent  $n = 569$ ) to evaluate 4 randomized icons each from a total set of 68 mobile game icons with a classification of four dominant icon attributes: abstract, concrete, character and text. The evaluation was done by using semantic differential scales of 22 adjective pairs leading into a total of 2276 icon evaluations that form the data of the study (icon evaluation  $n = 2276$ ).

The results indicate that consumers are more likely to give a higher grade to icons and click them as well as download and purchase the mobile game that the icon belongs to, when the icons are perceived *beautiful, good, unique, professional, expensive, soft, exciting, strong, relaxed, realistic* and *quiet*. Additionally, adjectives *masculine, young, active, colorful, three-dimensional, happy* and *simple* predict a higher grade; adjectives *active, two-dimensional, colorless, masculine, happy* and *young* predict clicking; adjectives *active, happy, simple* and *young* predict downloading and; adjectives *sad, colorless* and *fast* predict purchasing. Furthermore, the study investigated the factorial structure of perceptions towards icons, or in other words, which adjectives are likely to occur together in user evaluation for any given icon. The results show that the following factors can be identified: value, potency, activity, integrity and complexity.

This study was one of the first attempts to understand consumer perceptions of mobile game icon successfulness. The results may be helpful for future research as well as to game companies when designing mobile game icons for app stores.

**Keywords:** mobile game, icon design, app store, consumer perception, semantic differential

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# 1 INTRODUCTION

App stores house a massive number of mobile applications, also known as *apps*. According to Chu (2011), a total of 10 billion apps were downloaded from Google Play in December 2011, out of which the majority (25.6%) were mobile games.<sup>1</sup> To this date, the total number of downloads from Google Play is over 65 billion.<sup>2</sup> Furthermore, mobile gaming penetration in the US has been predicted to rise to 63.7% in 2020.<sup>3</sup>

All apps, including mobile games, are listed on app stores as icons – a graphic that “provides a quick, intuitive representation of an action, a status or an app”.<sup>4</sup> Icons essentially act as a first-pass filter for a saturated app store in that an icon is in many cases the first thing a consumer will see when browsing for mobile games on an app store (Woolridge and Schneider 2011, 61). Thus, mobile game companies need to make a strong first impression to prompt the consumer to choose their game instead of the many others.

This observation leads us to the following key research questions: *How does consumer perception of an icon affect icon successfulness*, namely, what are the aesthetic qualities that are likely to incite consumers to click on an icon as well as download and purchase the game that the icon belongs to?

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<sup>1</sup> Eric Chu, “A closer look at 10 billion downloads,” Android Developers Blog, December 8, 2011, <http://android-developers.blogspot.tw/2011/12/closer-look-at-10-billion-downloads.html> (accessed April 11, 2016).

<sup>2</sup> AppBrain, “Google Play stats, apps by downloads,” <http://www.appbrain.com/stats/android-app-downloads> (accessed November 4, 2016).

<sup>3</sup> Statista, “Mobile phone gaming penetration in the United States from 2011 to 2020,” <http://www.statista.com/statistics/234649/percentage-of-us-population-that-play-mobile-games/> (accessed November 4, 2016).

<sup>4</sup> Android Developers, “Iconography,” <http://developer.android.com/design/style/iconography.html> (accessed May 5, 2017).

This study investigates the relationship between consumer perceptions of mobile game icons and icon successfulness. The thesis is divided into five chapters. The following chapter 2 presents the body of literature on mobile games and app stores, icons in human-computer interaction and the features of effective icon design as well as consumer choice related to Google Play and design. Chapter 3 describes the methods used in the experiment. Chapter 4 presents the results of the research. Chapter 5 discusses the meanings and outcomes of the results and concludes the thesis.

## **2 MOBILE GAMES, ICON DESIGN AND CONSUMER CHOICE**

This chapter introduces prior research relevant to the study. First, it describes mobile game success and app stores. Second, it discusses effective icon design. Last, it introduces literature on consumer choice related to design.

### **2.1 Rise of the mobile game era**

The following sub-section 2.1.1 discusses mobile game industry, while sub-section 2.1.2 introduces the leading app stores. Detailed statistic for mobile game success is widely available. However, literature on the reasons for mobile game success is scarce, as it is still a relatively new subject for research.

#### **2.1.1 Success of mobile games**

Mobile games market has been stated as the fastest growing gaming sector in the world (Klopfer 2008, viii). In 2019, global game industry revenue is predicted to reach 118 billion dollars with mobile games driving a significant part of the industry growth: a total of 52 billion dollars.<sup>5</sup> Moreover, game revenues for Apple iOS and Android top both Nintendo and Sony's handheld gaming systems combined (Baran 2014, 222). According to Mobile behavior report, 57% of the respondents play mobile games at least once a day.<sup>6</sup>

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<sup>5</sup> Newzoo, "The global games market reaches \$99.6 billion in 2016, mobile generating 37%," <https://newzoo.com/insights/articles/global-games-market-reaches-99-6-billion-2016-mobile-generating-37/> (accessed November 4, 2016).

<sup>6</sup> Mobile behavior report, "Combining mobile device tracking and consumer survey data to build a powerful mobile strategy," <http://www.exacttarget.com/sites/exacttarget/files/deliverables/etmc-2014mobilebehaviorreport.pdf> (accessed November 3, 2016).

Currently, there are more than 2.2 million apps in Google Play Store and 2 million apps in Apple App Store, which are the two biggest platforms actively competing to dominate the markets.<sup>7</sup> Figure 1 shows the statistics for the leading app stores as of June 2016. The significance of Google Play and Apple App Store is evident.

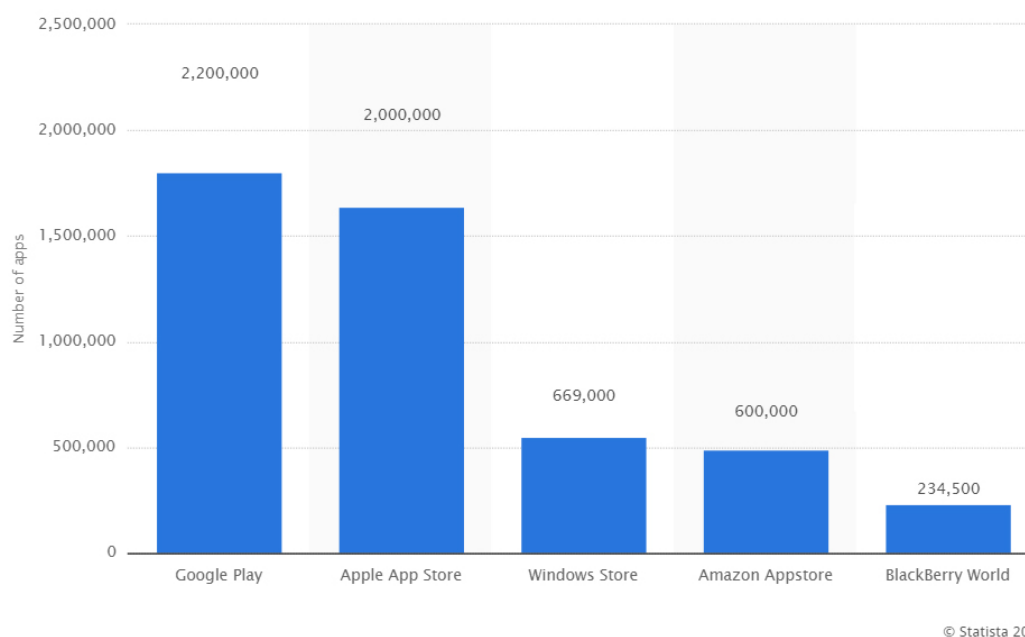


Figure 1. Number of apps available in leading app stores as of June 2016 (ibid.).

One reason for the popularity of mobile platforms is the relative ease of content distribution. It is relatively fast, secure and inexpensive. For example, publishing to Google Play requires only a 25-dollar registration fee.<sup>8</sup> As the cost for publishing is low, game developers are better able to get their product to the markets and achieve wide recognition.

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<sup>7</sup> Statista, “Number of apps available in leading app stores as of June 2016,” <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/> (accessed December 8, 2016).

<sup>8</sup> Android Developers, “Get started with publishing,” <http://developer.android.com/distribute/google-play/start.html> (accessed April 22, 2016).

Mobile gaming has lately changed the game industry business models. While most games were published as *premium* a decade ago, now *freemium* has taken over (see Alha et al. 2016; Hamari et al. 2017; Hamari, Hanner and Koivisto 2017; Hamari and Keronen 2017). Premium refers to a game that is paid wholly before use, whereas freemium refers to a game which can be played free of charge, but money is charged for special features, functionalities and content (Moreira, Filho and Ramalho 2014). The freemium model is pervasive, as 98% of Google Play's revenue came from freemium apps in 2014, out of which 90% were from games.<sup>9</sup> Alha et al. (2014) state that the freemium model has multiplied the developer revenue. This explains why developers prefer the freemium model, as the revenue possibilities are much greater than in premium games.

Moreira et al. (2014) have studied the features that make a mobile game reach the top grossing status, i.e. which features make the game successful among consumers. They found that achievements, networking and in-app-purchases result in most downloads (Moreira et al. 2014, 12). This shows that the freemium model has more or less been accepted by not only developers but consumers alike.

### **2.1.2 The leading app stores**

App stores are online marketplaces that offer digital distribution worldwide. The stores allow users to browse and download content, such as mobile games and software, shared by various developers. Different smartphone operating systems use their corresponding stores. Google Play and Apple App Store are the two dominating app stores in the mobile markets.<sup>10</sup> Windows Store and Amazon Appstore have not been able to overtake the leading positions even though they have established their place on the charts. The

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<sup>9</sup> App Annie, "The state of play: A look at the growth of Google Play," <http://www.nationalappsbd.com/wp-content/uploads/2014/11/App+Annie+Special+Report+Google+Play+2014.pdf> (accessed April 22, 2016).

<sup>10</sup> Statista, "Number of apps available in leading app stores as of June 2016," <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/> (accessed December 8, 2016).



breakthrough of app stores was brought by the rise of smartphones and as such, they have enabled mobile gaming to grow explosively.

Google Play, originally referred to as the Android Market, is the official platform for distributing digital applications developed for the Android operating system. Google Play was launched and merged with the Android Market on March 6, 2012.<sup>11</sup> Since then, Google Play has grown to be the leading mobile application store. Apple's online marketplace, the App Store for iOS was launched in 2008, and within 5 years the number of apps passed the 1 million milestone. Currently, however, Apple App Store has fewer apps than Google Play.

Google Play is a world-wide platform, with United States being the country with the most downloads in 2014, while Japan dominated the revenue statistics. Other rapidly emerging markets include Brazil and Turkey. The revenue of Google Play more than doubled in 2014.<sup>12</sup> As games dominate both Google Play and Apple App Store, this growth presents an expanding opportunity for mobile game developers.

Google Play has officially passed the competing app store host Apple in the number of apps and downloads. Butler (2011, 5) argues that the key reason for this is the feature of Google Play being open, while Apple App Store is gated. This means that developers can self-publish to Google Play, whereas Apple decides what is published. For developers, Google's egalitarian model is an advantage as more applications reach the consumers (ibid.). The downside is that more low-quality apps appear in Google Play, which may account for the reason that Apple App Store is in lead of revenue despite Google Play having the most downloads and apps<sup>13</sup>.

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<sup>11</sup> Google, "Introducing Google Play," <http://googleblog.blogspot.fi/2012/03/introducing-google-play-all-your.html> (accessed April 25, 2016).

<sup>12</sup> App Annie, "The state of play: A look at the growth of Google Play," <http://www.national-appsbd.com/wp-content/uploads/2014/11/App+Annie+Special+Report+Google+Play+2014.pdf> (accessed April 22, 2016).

<sup>13</sup> App Annie "App Annie Index Market Q1 2016," <https://www.appannie.com/insights/market-data/app-annie-index-market-q1-2016/> (accessed December 8, 2016).

Google has successfully democratized app and game developer environments. The open developer platform enables anyone to distribute content, which enriches developer and consumer cultures. It remains to be seen how Google will control the openness to quality of apps and to ensure a positive user experience. If Google succeeds, it may well top its competitors in all sectors in the future.

## **2.2 Diversity of icon design**

This section explores icon design based on previous literature. The following sub-section 2.2.1 defines the term “icon” which is used to describe the object of study in this thesis. Sub-section 2.2.2 discusses other relevant study on effective icon design.

### **2.2.1 Defining icon in human-computer interaction**

Icons are widely used in human-computer interaction (García et al. 1994, 191). Similar to mobile platforms, iconic interfaces have made their way into our everyday life. Advances in technology result in additional features and further, additional icons. Concerning smartphone icons in particular, Android Developers’ guide defines an icon as “a graphic that takes up a small portion of screen real estate and provides a quick, intuitive representation of an action, a status, or an app”.<sup>14</sup> This is also the definition that is used in this thesis.

Goonetilleke et al. (2001, 2) trace the evolution of icons back to signs. Signs are elements that “stand to someone for something in some respect or capacity” (Peirce 1932, 135). This can be interpreted in the sense that signs as well as icons have a symbolic meaning or connotation behind them. Wiedenbeck (1999, 68) supports this by noting that icons are interface objects that represent a larger system in a simplified, pictorial manner. Horton

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<sup>14</sup> Android Developers, “Iconography,” <http://developer.android.com/design/style/iconography.html> (accessed May 5, 2017).

(1996, 371) emphasizes that as we communicate through symbols, these symbols must also be embedded in icons to evoke the desired connotation in the viewer.

Horton (1994, 2) differentiates the terms icon and symbol in that icons have a physical connection to a target or function, whereas symbols have an arbitrary, indirect relationship to that which they refer. However, the use of the term “icon” to describe symbols has become dominant especially in the interactive field (*ibid.*). Thus, the everyday usage of “icon” is any graphic on an interactive button. These icons can represent system objects such as files or folders, or actions such as messaging or calling. (Wiedenbeck 1999, 68). Furthermore, leisurely icons, such as game and movie icons, depict characters and other relevant features to the title.

The reason why icons are extensively used is due to many factors. It is reported that icons facilitate human-computer interaction because they are swiftly recognized and memorized (Horton 1994, 1996; McDougall et al. 1999; Wiedenbeck 1999). Icons have also been proven to be more convenient for universal communication than text, since language interpretation is not an obstacle (Horton 1994, 1996; Lodding 1983; McDougall et al. 1999). Despite the positive results of icon usage, there have been relatively few studies of the use of icons in mobile environments related to mobile games in particular, justifying further investigation.

### **2.2.2 Factors for effective icon design**

This chapter explores icon design on a general level to acquire a broader perspective on the topic. The reviewed literature focuses on the main ongoing debates concerning icon effectiveness.

A wide debate regarding icon design is whether concrete or abstract icons are more effective from user perspective (see Blankenberger and Hahn 1991; Dewar 1999; Isherwood et al. 2007; McDougall et al. 1999). Icon concreteness is the extent to which it depicts real objects (Isherwood 2007, 466), whereas icon abstractness tends to have less obvious connections with real objects (McDougall et al. 1999, 488).

Hou and Ho (2013) have investigated the concrete-abstract relationship in icon aesthetics for mobile applications related to consumer reactions. Results show that most respondents prefer concrete, rich icon designs to abstract, simplified icons. According to the study, it seems that the participants relate to physical traits in icon design, such as a miniaturized camera. However, if the physical artefact depicted in the design is unfamiliar to the respondents, such as a compact audio cassette, abstract style is preferred. (Hou and Ho 2013, 10).

The research of Isherwood, McDougall and Curry (2007) contrasts Hou and Ho's (2013). Isherwood et al. (ibid.) have investigated the importance of icon characteristics and the relation to speed and accuracy of icon identification in regular use. The study reveals that concreteness may not be of primary importance after all, rather semantic distance and familiarity may be more important (Isherwood et al. 2007, 474–475). The statement of familiarity being crucial to effective icon design is accompanied by Arab, Malik and Bessam (2013) as well as Forsythe (2008), who have acknowledged that icon familiarity can help reduce the amount of information to communicate a message and thus, makes an icon easier to understand.

The juxtaposition of concrete and abstract icons is referred to as the *guessability gulf* by Moyes and Jordan (1993). This is because concrete icons are easier to guess at first sight than abstract icons. In spite of the debate between concreteness and abstractness of icons, it is noteworthy that icon preference is affected by many factors. As icons are no longer used only for depicting information but are also a part of consumer culture, different personalities may prefer different designs (Huang, Shieh and Chi 2002). Additionally, different types of icons are suitable for different purposes. McDougall, Curry and De Bruijin (1998, 289) state for example that concrete icons can be useful in public information systems or warnings.

Another extensive discussion on effective icon design is the speed and ease with which icons can be understood (see Blankenberger and Hahn 1991; Lodding 1983; Isherwood et al. 2007, McDougall et al. 2008; Wiedenbeck 1999). McDougall et al. (2013) have found that in interface icon design, processing fluency affects icon appeal. Factors that

influence icon processing are e.g. icon familiarity and complexity (McDougall et al. 2013, 577). The study shows that the easier the icon is to process due to simple design and earlier experience with similar icons, the more appealing it is (McDougall et al. 2013, 582). Choi and Lee (2012) agree that simple icon design leads to user satisfaction.

Further concerning icon design and the features that make an icon effective, Goonetilleke et al. (2001) hypothesize that the most important features of an icon are dominance, uniqueness and ambiguity. Likewise, Dewar's study (1999, 299) shows that discriminability is of importance to effective icon design. However, in contrast to Goonetilleke et al. (2001) and Dewar's (1999) statements, Batu, Kim and Cheng (2010, 1) view that ambiguity of mobile phone icons in particular presents various interaction problems to users. To prevent user confusion, Batu et al. (2010) propose participatory icon design as a solution, which resulted in better understanding of icons in the experiment.

Moreover, regarding particularly mobile game icon design, Shu and Lin (2014) have researched mobile game icon appeal by quantitative methods. Shu and Lin's (ibid.) study explores which icon attributes are most appealing in Google Play's three top grossing game genres: arcade, brain (i.e. puzzle) and casual games. The results show that for arcade game icons, there should be an active element in the design. For brain games, there should be organic elements in the design. For casual games, there should be depth in addition to organic elements in the design. Shu and Lin's (ibid.) results imply that consumers download mobile games based on icons. However, the paper does not focus on consumer perceptions of mobile game icons or the willingness to click as well as download and purchase the imagined mobile game that the icon belongs to. I intend to fill this gap by studying the matter from a consumer-centered perspective.

The majority of studies seem to indicate that icons are easier and faster to understand when they are of simple and familiar design. It is noteworthy that icons are seen more appealing when they are easy to process. Furthermore, uniqueness is stressed in effective icon design. This is important when considering mobile game icons, which usually appear in app stores among a number of others.

## **2.3 Consumer choice and how it is related to design**

The following sub-sections discuss app stores and consumer choice. Sub-section 2.3.1 describes product availability and preference. Sub-section 2.3.2 applies product design research on mobile game icon design.

### **2.3.1 Facilitating consumer choice on app stores**

Public data on any app store's marketing strategy is scarce. Yet it is evident that the largest app stores manage to engage a mass of consumers in browsing, downloading and purchasing products. How are app stores constructed to lead consumer choice among the large number of available products?

A common economic theory suggests that large assortments are beneficial to consumers, as a wide product selection offers a better possibility to match consumer preferences. Nevertheless, app stores' default start screen hardly shows many products at once. On the contrary, the consumer is prompted to scroll or tap a button to browse for more products. Iyengar and Lepper (2000) have contrasted the theory of large assortments by showing that large volumes of product selection may actually hinder the probability of purchase due to consumer confusion and delay in decision.

Consumers often have a preference of their ideal product which they are likely to choose without evaluating other options, if the preferred product is available (Chernev 2003, 171). However, on many occasions consumers do not have a preference or the preferred product is not available. In these circumstances, it has been noted that product assortment size related to *ideal point availability* can simplify choice. Ideal point for a consumer means the awareness of attributes and attribute values of their ideal product. (Ibid.). Chernev (2003, 173) confirms that both smaller and larger product assortment sizes should be available for consumers. A smaller selection results in that consumers with an ideal point do not have to browse through a massive selection, while the availability of a larger selection offers more choices for those who are without an available ideal point preference. This facilitates decision process and enforces possibility of purchase. (Ibid.).

It can be speculated that app stores use the ideal point strategy to enhance consumer preference and purchase. Consumers are offered both limited and non-limited view of the available products, while an additional search feature is provided for ideal point product preferences.

### **2.3.2 Product design and consumer choice**

Design is acknowledged as a factor for advantage in economic competition (Creusen and Schoormans 2005, 64). In other words, effective design is what invites consumers. Orth and Malkewitz (2009) note that consumers often form their initial opinions on brands based on package design. Furthermore, design affects brand selection (ibid.). From this perspective, it can be argued that game branding elements such as game icons affect consumer choice. Mobile game icons on app stores may be deemed as part of the brand and product design, since icons are elements presented to the consumer before downloading the content which in this case is the product.

According to Creusen and Schoormans (2005), aesthetic and symbolic roles of design have the most value to consumers. Crossley (2003, 35) adds that there is a growing need to become more sensitive to emotions in design. Cho and Lee (2005) have suggested that if a positive emotion is established between consumer and product by design, it will bring extra value to the product and also increase the possibility of purchase. Hence, designers aim to create an emotional impact on their products, services and brands (Crossley 2003). Impression and related emotions are key factors in product design, as positive impression plays an important role in consumer perception of product quality (Yun et al. 2003). These are worthy notions considering mobile game branding and consumer choice where design plays a central role.

This concludes the review on previous literature. The goal here has been to provide a basis to this study. As mobile game icon design and consumer choice is a rather new area of research, multidisciplinary sources are mandatory in order to get a better understanding of the field of study. Next, the methods used in the experiment are introduced.

### 3 METHODS AND DATA

This chapter explains the research methods used in the study. The basis of this chapter is an online survey designed for the experiment. The following section 3.1 describes the participants. Section 3.2 introduces the materials of the experiment, the mobile game icons. Section 3.3 explains the measurements used in this study. Section 3.4 guides through the data collection procedure. Finally, section 3.5 illustrates the limitations of this thesis.

#### 3.1 Participants

The sample is composed of 569 participants who filled in the online survey. The sample is a nonprobability convenience sample. Sampling was carried out through advertisements on Facebook groups and Finnish student organizations' mailing lists. The participants were predominantly resided in Finland (92,8%). Other countries clearly represented in the data were the United States (2,1%) and United Kingdom (2,1%). Table 1 presents demographic information in detail

Table 1. Demographic information

		n	%			n	%
Age (SD = 7.24) (Mean = 26.90) (Median = 25.00)	-20	60	10.54	Gender	Male	297	52.2
	21-25	249	43.76		Female	257	45.2
	26-30	145	25.48		Other	15	2.6
	31-35	45	7.91				
	36-40	37	6.50	Education	Less than high school	5	.9
	41-45	16	2.81		High school	135	23.7
	46-50	7	1.23		College	95	16.7



	51-55	5	0.88		Bachelor's degree	227	39.9
	56-60	3	0.53		Master's degree	98	17.2
	61-	2	0.35		Higher than master's degree	9	1.6
Employment	Working full-time	133	23.4	Yearly income	Less than \$19,999	330	58.0
	Working part-time	62	10.9		\$20,000 to \$39,999	105	18.5
	Student	351	61.7		\$40,000 to \$59,999	57	10.0
	Unemployed	11	1.9		\$60,000 to \$79,999	25	4.4
	Retired	1	.2		\$80,000 to \$99,999	13	2.3
					\$100,000 to \$119,999	14	2.5
					\$120,000 to \$139,999	10	1.8
					\$140,000 or more	15	2.6


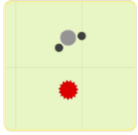














Table 1 shows that the participants were divided quite evenly by gender, as only slightly more than half were male (52.2%). The mean age was 26.90 years (SD = 7.24 years; 16–62 years). Most participants were university students (61.7%) and had a university-level education (39.9%).

Two participants were randomly chosen and awarded a prize (Polar Loop 2 Activity Tracker). No other participation fees were paid. Participants were informed the purpose of the study and assured anonymity (see appendix).




### 3.2 Materials

Existing mobile game icons were used in this study. The icons were published for their corresponding mobile games on Google Play. It is necessary to have a sufficient amount of variation, hence, a total of 68 mobile game icons were chosen. The icons are shown in table 2.

Table 2. Mobile game icons in the study according to their category

Category	Concrete	Abstract	Character	Text
Action				
Adventure				
Arcade				
Board				

Card				
Casino				
Casual				
Education al				
Music				
Puzzle				
Racing				

Role Playing				
Simulation				
Sports				
Strategy				
Trivia				
Word				

Source: Google Play, "Games," <https://play.google.com/store/apps/category/GAME?hl=en> (accessed February 9, 2017).

Google Play has 17 categories for mobile games: action, adventure, arcade, board, card, casino, casual, educational, music, puzzle, racing, role playing, simulation, sports, strategy, trivia and word. Because mobile game icon design is category-dependent (Shu

and Lin 2014), it was important to include icons from all categories. Due to the large amount of mobile game icons on Google Play, a set of criteria was developed to gather a sample sufficient for the scope of this thesis. Previously in chapter 2, effective icon design was discussed with the conclusion that the icon attributes to be studied in the experiment should include icon concreteness and abstractness. Icon concreteness was defined as “the extent to which it depicts real objects” (Isherwood 2007, 466), whereas icon abstractness was defined to have less obvious connections with real objects (McDougall et al. 1999, 488). Other dominant elements seen universally on mobile game icons are characters or faces and text or letters. This resulted in choosing four mobile game icons from each of the 17 categories, depicting distinctly either concreteness, abstractness, characters or text elements. As the categories overlap to some degree, the distinction here was primarily made to acquire a diverse sample of mobile game icons and to avoid systematic bias in icon design in study material.

Additional criteria were the publishing date of the mobile games and the number of installs and reviews they had received at the time of selection. Since the icons in the experiment were chosen during December 2016, the acceptable publishing date for the mobile games was determined to range from December 3rd to 17th 2016. No more than 500 installs and 30 reviews was permitted. The aim of this was to choose new mobile game icons to eliminate the chance of mobile game and icon familiarity. Moreover, the goal was to have as visually rich sample of icons as possible, meaning that several different computer graphic techniques were included, such as 2D and 3D images.

### **3.3 Measurements**

A combination of semantic differential scale and likert scale was utilized in this study. The overall objective was to identify the relationship between consumer perceptions of mobile game icons and the willingness to click an icon as well as download and purchase the imagined mobile game that the icon belongs to. The stages of application for semantic differential are presented in table 3.

Table 3. Stages of application for semantic differential

Nr. crt.	Stages
1.	Selecting the concepts
2.	Choosing pairs of opposed adjectives
3.	Construction of a scale with 7 (Osgood) or 9 (Heise) steps
4.	Writing the questions
5.	Application of the instrument
6.	Statistical analysis of data
7.	Identifying factor patterns
8.	Analysis of statistical results
9.	Interpretation of results
10.	Formulating the conclusions

Source: Strungă, Alexandru-Constantin. "Osgood's semantic differential: a review of the Romanian social sciences literature." *Social Sciences and Education Research Review* 2 (2014): 22-28.

Semantic differential scale was developed by psychologist Charles Osgood and his co-authors (1957) as a tool used for measuring opinions and values. It is a seven-point bipolar rating scale that uses opposing adjective pairs from which respondents select a point corresponding to their judgement about the concept in question. In accordance with Osgood, "The semantic differential is a combination of association and scaling procedures designed to give an objective measure of the connotative meaning of concepts" (Osgood and Luria 1954, 579).

A total of 22 adjective pairs was formulated and assigned to each icon. The polarity of the adjective pairs was reversed so that perceivably positive and negative adjectives did not align on the same side of the scale. In other words, the order and direction of the scales were rotated to prevent systematic response bias. Moreover, the means and standards deviation of the adjective pairs were calculated. Table 4 lists the adjective pairs used in the study and presents an overview of the means and standard deviations.

Table 4. Adjective pairs, means and standard deviations

<b>Adjective pairs according to Shaikh (2009)</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Adjective pairs related to icons</b>	<b>Mean</b>	<b>Std. Deviation</b>
Beautiful–Ugly	4.57	1.618	Concrete–Abstract	4.03	1.998
Expensive–Cheap	4.83	1.563	Professional–Unprofessional	4.22	1.736
Good–Bad	4.34	1.641	Unique–Ordinary	4.60	1.651
Happy–Sad	3.80	1.507	Colorful–Colorless	3.77	1.810
Hard–Soft	3.81	1.545	Realistic–Unrealistic	4.22	1.592
Strong–Weak	3.93	1.464	Two-dimensional–Three-dimensional	3.33	1.863
Feminine–Masculine	4.34	1.388	Complex–Simple	4.69	1.669
Delicate–Rugged	4.42	1.368			
Relaxed–Stiff	4.47	1.560			
Old–Young	3.98	1.611			
Passive–Active	3.97	1.708			
Slow–Fast	3.87	1.576			
Calm–Exciting	3.96	1.452			
Cool–Warm	3.97	1.436			
Quiet–Loud	4.12	1.601			

Table 4 shows that there are no outstanding values and the range between the lowest and highest scores cluster closely to the average despite the fact that the 68 icons were quite different from each other. All the mean scores are between 3.5 and 4.5 for each evaluation. This indicates little skewness in the data.

All of the adjective pairs were chosen according to Shaikh's (2009) study on onscreen typeface design and usage. Additionally, adjectives related to icons were added as suggested per previous literature on effective icon design (see Blankenberger and Hahn 1991; Dewar 1999; Hou and Ho 2013; Isherwood et al. 2007; McDougall et al. 1999; McDougall et al. 2013). These adjectives include concrete and abstract, simple and complex as well as unique and ordinary. Furthermore, adjective pairs that were added to specifically measure the aesthetics of the icons include professional and unprofessional, colorful and colorless, realistic and unrealistic as well as two-dimensional and three-dimensional. The online Oxford English Dictionary thesaurus<sup>15</sup> was used to select the most accurate adjectives and their referents.

According to Wirtz and Lee (2003, 345), the semantic differential scale is best applicable when measuring qualities of an object or a concept. This would indicate that semantic differential is a reliable method of measurement for this study, taken into account that the intention is to measure consumer perceptions of mobile game icon qualities.

Likert scale was used to measure the willingness to click a mobile game icon as well as download and purchase the imagined mobile game that the icon belongs to. Likert scale, which was developed by Rensis Likert (1932), uses standardized responses to specify levels of agreement or disagreement on a concept or object. In this study, a seven-point likert scale was constructed with the format shown in table 5.

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<sup>15</sup> Oxford English Dictionary, "Thesaurus," <https://en.oxforddictionaries.com/> (accessed February 19, 2017).



Table 5. Likert scale in the study

<b>Overall evaluation (judging by the icon alone)</b>						
Compared to the mobile game icons I usually click, I would click this icon.						
Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Compared to the icons of mobile games I usually download, I would click this icon.						
Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Compared to the icons of mobile games I usually purchase, I would click this icon.						
Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

The likert scale allows degrees of opinions to a statement. As seen in table 5, the scale provides extremes as well as a neutral central point. The benefit of this is that the respondent is not forced to express an opinion. As the goal was to measure agreement or disagreement to the statements shown in table 5, likert scale was best applicable to the study. Moreover, participants were asked to grade the mobile game icons on a scale of 4 to 10 with the instructions “Now think about the overall icon design. All in all, how would you rate this icon on a scale of 4 to 10?” to further assess consumer perceptions of mobile game icon successfulness.

### 3.4 Procedure

The data was collected through an online survey. This instrument was chosen for the experiment because it has several advantages compared to other methods, such as efficiency and cost (see Evans and Mathur 2005; Shaughnessy et al. 2011). There is a number of online survey tools and software available, which massively reduces time and labour when creating the survey. These tools enable required completion of answers, question diversity and controlled sampling among other beneficial features (Evans and Mathur 2005, 199–200).

As online surveys are self-administered, the risk for respondent frustration is high. In case of a problem the respondent might exit the survey without completing it. This was tackled by giving clear answering instructions, pre-testing the survey with different testers and devices before publishing and visibly stating that individual respondents cannot be identified in the results.

Initially, participants were provided the purpose of the study after which they were guided to fill out the survey. The survey consisted of three or four parts depending on the participant's responses. The first part mapped out the participant's mobile game and smartphone usage. The second part included more specific questions about the aforementioned as well as mobile game icon importance. If the participant answered that they do not use a smartphone in the first part, they were assigned directly to the third part. In the third part, the participant was asked to evaluate mobile game icons using semantic differential scale rating. Prior to this, instructions were given on how to evaluate the icons. The respondent was shown one icon at a time and was then asked to rate the adjective pairs under the image with an initial "In my opinion, this icon is...". Each participant was randomly assigned to a corresponding set of four icons by a script ( $n = 2276$ ). With four dominant icon attributes (abstract, concrete character and text) and 17 mobile game categories, a total of 68 sets were created. After the semantic scales, the participant rated their willingness to click a mobile game icon as well as download and purchase the imagined mobile game that the icon belongs to using likert scale questions. Additionally, the following instructions were provided to the participant: "Clicking means tapping when using a touchscreen device. If you have never clicked, downloaded or purchased mobile games, please answer based on your expectations of mobile game icons you might click or tap." Moreover, the participant was asked to evaluate the quality of the imagined mobile game based on the icon using a seven-point likert scale as well as to grade the mobile game icon on a scale of 4 to 10. Last, demographic information (age, gender, etc.) was asked. The survey took about 10 minutes to complete.

The survey was implemented via Surveygizmo, a service that provides survey solutions for individuals and organizations. Radio buttons and dropdown menus were provided as

means for entering responses. All content was in English. The quantitative data was analyzed with IBM SPSS Statistics version 24 and Microsoft Office Excel 2016.

### **3.5 Limitations**

Mobile game prices were not included in this study, because it focuses on mobile game icons and their aesthetic qualities. Whether a consumer's willingness to click icons as well as download or purchase a mobile game based on the mobile game icon changes due to a certain price, free-to-play or a completely free game model is an interesting option for future research. Furthermore, the study did not include other possible factors aside from aesthetic qualities that contribute to a consumer's willingness to click, download or purchase. This is because only the aspects of mobile game successfulness that depend on an icon's aesthetic qualities were explored.

Regarding the measurement, the semantic differential has many advantages including its relative ease of construct, use and administration as well as reliability of the quantitative data it provides (Heise 1970, 235). However, subsidiary problems may arise concerning the extent to which errors of measurement are minimized. For instance, as the semantic differential scale cannot include a large number of adjectives to prevent response fatigue, a sample must be constructed. This may create a risk of distortion if the chosen adjectives are ambiguous or unfamiliar to the respondent. Valli (2015) points out another issue with the semantic differential, namely that the respondent is forced to express an opinion about something they perhaps are not concerned with. This was countered with the neutral space of the semantic differential scale which allows the respondent to stay indifferent (*ibid.*).

Concerning external validity, as the sample is a nonprobability convenience sample it is difficult to estimate the representativeness of the population. Additionally, sampling bias is probable with this sampling method.

This concludes the method chapter. The purpose here was to give an overview of how the experiment was carried out. Next, the results of the analysis are reviewed in detail.

## 4 RESULTS

This chapter reports the results of the data analysis. The following section 4.1 describes the main analyses on consumer perceptions of mobile game icon successfulness. Section 4.2 introduces the results of a factor analysis that was performed to explore which adjectives load on the same factor based on consumer perceptions.

### 4.1 Analysis of the relationship between consumer perceptions and mobile game icon successfulness

Multiple linear regression analysis was performed with the 22 adjective pairs to investigate the relationship between consumer perceptions of mobile game icons and how high they were graded on a scale of 4 to 10. Moreover, the same analysis was used to predict a consumer's willingness to click an icon as well as download and purchase the imagined mobile game that the icon belongs to. Table 6 presents the results of the analysis.

Table 6. Consumer perceptions of mobile game icons and the willingness to click, download and purchase

	<b>Beta</b>	<b>p</b>	<b>Beta</b>	<b>p</b>	<b>Beta</b>	<b>p</b>	<b>Beta</b>	<b>p</b>	<b>VIF</b>
	Grade (R <sup>2</sup> = .658)		Click (R <sup>2</sup> = .550)		Download (R <sup>2</sup> = .530)		Purchase (R <sup>2</sup> = .425)		
Concrete–Abstract	.024	.118	.015	.413	.031	.103	.039	.057	1.503
Professional– Unprofessional	<b>-.126**</b>	<b>.000</b>	-.029	.219	-.048	.051	-.048	.069	2.549
Beautiful–Ugly	<b>-.246**</b>	<b>.000</b>	<b>-.256**</b>	<b>.000</b>	<b>-.222**</b>	<b>.000</b>	<b>-.201**</b>	<b>.000</b>	3.206
Expensive–Cheap	-.032	.120	-.005	.829	-.033	.188	-.025	.354	2.725
Good–Bad	<b>-.332**</b>	<b>.000</b>	<b>-.357**</b>	<b>.000</b>	<b>-.351**</b>	<b>.000</b>	<b>-.303**</b>	<b>.000</b>	3.494
Happy–Sad	.002	.907	.023	.275	.042	.053	<b>.059*</b>	<b>.012</b>	1.963
Unique–Ordinary	<b>-.071**</b>	<b>.000</b>	<b>-.112**</b>	<b>.000</b>	<b>-.098**</b>	<b>.000</b>	<b>-.113**</b>	<b>.000</b>	1.326

Hard–Soft	<b>.049**</b>	<b>.004</b>	<b>.055**</b>	<b>.008</b>	<b>.056**</b>	<b>.009</b>	<b>.054*</b>	<b>.020</b>	1.924
Strong–Weak	<b>-.060**</b>	<b>.000</b>	-.027	.194	-.012	.564	-.020	.396	1.922
Feminine–Masculine	<b>.081**</b>	<b>.000</b>	<b>.044*</b>	<b>.027</b>	.037	.068	.021	.328	1.730
Delicate–Rugged	-.003	.832	.008	.672	.011	.595	-.001	.980	1.760
Relaxed–Stiff	<b>-.055**</b>	<b>.002</b>	-.013	.554	-.033	.137	-.035	.148	2.065
Colorful–Colorless	<b>-.036*</b>	<b>.032</b>	<b>.051*</b>	<b>.014</b>	.030	.156	<b>.053*</b>	<b>.021</b>	1.899
Old–Young	<b>.043**</b>	<b>.004</b>	.020	.256	.027	.147	.014	.485	1.420
Realistic–Unrealistic	-.002	.888	<b>-.048**</b>	<b>.007</b>	<b>-.052**</b>	<b>.004</b>	<b>-.060**</b>	<b>.002</b>	1.368
Two-dimensional–Three-dimensional	<b>.031*</b>	<b>.036</b>	<b>-.050**</b>	<b>.006</b>	-.029	.113	-.007	.719	1.443
Passive–Active	<b>.057**</b>	<b>.004</b>	<b>.084**</b>	<b>.000</b>	<b>.049*</b>	<b>.048</b>	.029	.276	2.570
Slow–Fast	-.018	.354	.015	.547	.015	.547	.043	.110	2.579
Complex–Simple	.004	.800	-.007	.688	.008	.664	.001	.954	1.338
Calm–Exciting	<b>.072**</b>	<b>.000</b>	<b>.069**</b>	<b>.002</b>	<b>.086**</b>	<b>.000</b>	<b>.049*</b>	<b>.043</b>	2.085
Cool–Warm	.000	.985	.010	.569	-.002	.911	.013	.489	1.350
Quiet–Loud	-.013	.462	<b>-.057**</b>	<b>.007</b>	<b>-.053*</b>	<b>.016</b>	<b>-.051*</b>	<b>.033</b>	2.033

\* =  $p < 0.05$ , \*\* =  $p < 0.01$

Table 6 indicates that in the relationship between consumer perceptions of mobile game icons and how high they were graded, the following adjectives most statistically significantly predicted their grade: professional, beautiful, good, unique, strong, masculine and exciting. The second most statistically significant adjectives included relaxed, soft, young and active. The third most statistically significant adjectives included colorful and three-dimensional.

Concerning a consumer's willingness to click an icon, table 6 shows that fewer adjectives were statistically significant. Furthermore, differences in significance can be identified.

Here, the following adjectives most statistically significantly predicted the willingness to click: beautiful, good, unique and active. The second most statistically significant adjectives included exciting, two-dimensional, realistic, quiet and soft. The third most statistically significant adjectives included colorless and masculine.

Regarding the willingness to download the imagined mobile game that the icon belongs to, again, the number of statistically significant adjectives decreased. Concerning downloading, the following adjectives were the most statistically significant: beautiful, good, unique and exciting. The second most statistically significant adjectives included realistic and soft. The third most statistically significant adjectives included quiet and active.

Regarding the willingness to purchase the imagined mobile game that the icon belongs to, the number of statistically significant adjectives increased slightly. Furthermore, differences in significance can be identified. Concerning purchasing, the following adjectives were the most statistically significant: beautiful, good and unique. The second most statistically significant adjectives included realistic and sad. The third most statistically significant adjectives included soft, colorless, quiet and exciting.

In table 6, the VIF values of adjective pairs beautiful–ugly and good–bad are higher than the values of other adjective pairs ( $VIF > 3$ ). According to Montgomery et al. (2001) a VIF value that exceeds 5 or 10 implies multicollinearity. In this light, the values in table 6 are acceptable. Nevertheless, compared to the other values, the higher VIF values suggest some multicollinearity. This is probably caused by the general nature of the adjective pairs that may cause some of the relevant effects to remain undetected when they are kept in the model. Thus, it was justified to perform an additional multiple linear regression analysis excluding adjective pairs beautiful–ugly and good–bad. The analysis revealed differences in significance which are presented in table 7.

Table 7. Consumer perceptions of mobile game icons and the willingness to click, download and purchase (excl. beautiful–ugly and good–bad)

	<b>Beta</b>	<b>p</b>	<b>Beta</b>	<b>p</b>	<b>Beta</b>	<b>p</b>	<b>Beta</b>	<b>p</b>	<b>VIF</b>
	Grade (R <sup>2</sup> = .567)		Click (R <sup>2</sup> = .521)		Download (R <sup>2</sup> = .506)		Purchase (R <sup>2</sup> = .408)		
Concrete–Abstract	.029	.084	.021	.293	.036	.073	.044	.042	1.503
Professional–Unprofessional	<b>-.290**</b>	<b>.000</b>	<b>-.204**</b>	<b>.000</b>	<b>-.212**</b>	<b>.000</b>	<b>-.192**</b>	<b>.000</b>	2.247
Expensive–Cheap	<b>-.182**</b>	<b>.000</b>	<b>-.165**</b>	<b>.000</b>	<b>-.182**</b>	<b>.000</b>	<b>-.157**</b>	<b>.000</b>	2.474
Happy–Sad	<b>-.101**</b>	<b>.000</b>	<b>-.086**</b>	<b>.000</b>	<b>-.062**</b>	<b>.006</b>	-.032	.185	1.839
Unique–Ordinary	<b>-.101**</b>	<b>.000</b>	<b>-.143**</b>	<b>.000</b>	<b>-.128**</b>	<b>.000</b>	<b>-.139**</b>	<b>.000</b>	1.314
Hard–Soft	<b>.065**</b>	<b>.001</b>	<b>.071**</b>	<b>.002</b>	<b>.071**</b>	<b>.002</b>	<b>.067**</b>	<b>.006</b>	1.921
Strong–Weak	<b>-.148**</b>	<b>.000</b>	<b>-.120**</b>	<b>.000</b>	<b>-.100**</b>	<b>.000</b>	<b>-.097**</b>	<b>.000</b>	1.836
Feminine–Masculine	<b>.065**</b>	<b>.000</b>	.027	.214	.023	.295	.008	.715	1.703
Delicate–Rugged	-.016	.384	-.005	.831	-.001	.969	-.011	.635	1.755
Relaxed–Stiff	<b>-.111**</b>	<b>.000</b>	<b>-.072**</b>	<b>.002</b>	<b>-.088**</b>	<b>.000</b>	<b>-.083**</b>	<b>.001</b>	2.030
Colorful–Colorless	<b>-.042*</b>	<b>.027</b>	<b>.045*</b>	<b>.047</b>	.025	.281	<b>.048*</b>	<b>.046</b>	1.898
Old–Young	<b>.060**</b>	<b>.000</b>	<b>.039*</b>	<b>.048</b>	<b>.043*</b>	<b>.028</b>	.029	.167	1.416
Realistic–Unrealistic	<b>-.050**</b>	<b>.002</b>	<b>-.099**</b>	<b>.000</b>	<b>-.100**</b>	<b>.000</b>	<b>-.102**</b>	<b>.000</b>	1.342
Two-dimensional–Three-dimensional	<b>.038*</b>	<b>.022</b>	<b>-.042*</b>	<b>.032</b>	-.023	.255	-.001	.951	1.442
Passive–Active	<b>.078**</b>	<b>.000</b>	<b>.106**</b>	<b>.000</b>	<b>.070**</b>	<b>.009</b>	.048	.090	2.563
Slow–Fast	.000	.982	.034	.192	.033	.212	<b>.059*</b>	<b>.036</b>	2.574
Complex–Simple	<b>.039*</b>	<b>.014</b>	.031	.106	<b>.043*</b>	<b>.025</b>	.032	.113	1.324
Calm–Exciting	<b>.100**</b>	<b>.000</b>	<b>.099**</b>	<b>.000</b>	<b>.114**</b>	<b>.000</b>	<b>.073**</b>	<b>.004</b>	2.076
Cool–Warm	.006	.721	.016	.395	.004	.847	.018	.364	1.349

Quiet–Loud	<b>-.084**</b>	<b>.000</b>	<b>-.133**</b>	<b>.000</b>	<b>-.123**</b>	<b>.000</b>	<b>-.112**</b>	<b>.000</b>	1.974
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\* =  $p < 0.05$ , \*\* =  $p < 0.01$

Table 7 indicates that when the adjective pairs beautiful–ugly and good–bad are excluded from the analysis, the number of statistically significant adjectives increased. Concerning the relationship between consumer perceptions of mobile game icons and how high they were graded, the following adjectives most statistically significantly predicted their grade: professional, expensive, happy, unique, strong, masculine, relaxed, young, active, exciting and quiet. The second most statistically significant adjectives included soft and realistic. The third most statistically significant adjectives included simple, three-dimensional and colorful.

Similar to the prior analysis, fewer adjectives were statistically significant regarding a consumer’s willingness to click an icon. Additionally, differences in significance can be identified. Concerning clicking, the following adjectives were the most statistically significant: professional, expensive, happy, unique, strong, realistic, active, exciting and quiet. The second most statistically significant adjectives included soft and relaxed. The third most statistically significant adjectives included two-dimensional, colorless and young.

The same pattern repeats, as again fewer adjectives were statistically significant regarding the willingness to download the imagined mobile game that the icon belongs to. Concerning downloading, the following adjectives were the most statistically significant: professional, expensive, unique, strong, relaxed, realistic, exciting and quiet. The second most statistically significant adjectives included soft, happy and active. The third most statistically significant adjectives included simple and young.

Contrary to the prior analysis, regarding the willingness to purchase the imagined mobile game that the icon belongs to, the number of statistically significant adjectives decreased. Similarly, differences in significance can be identified. Concerning purchasing, the following adjectives were the most statistically significant: professional, expensive, unique, strong, realistic and quiet. The second most statistically significant adjectives



included relaxed, exciting and soft. The third most statistically significant adjectives included fast and colorless.

## 4.2 Factor division

Factor analysis was used to test loadings of the 22 adjective pairs used in the experiment. As the adjective pairs were not divided into factors prior to the experiment, this analysis was an exploratory factor analysis (EFA) to find out the underlying structure and relationships of the variables. The analysis indicates variables that load on the same factor based on consumer evaluations. In other words, it demonstrates consumer perceptions of icon attributes that are likely to occur together. The factors were rotated with varimax rotation. Table 8 shows the results of the analysis.

Table 8. Factor analysis

	<b>Value</b> (Variance extracted % = 17.353)	<b>Potency</b> (Variance extracted % = 16.434)	<b>Activity</b> (Variance extracted % = 15.720)	<b>Integrity</b> (Variance extracted % = 7.828)	<b>Complexity</b> (Variance extracted % = 6.163)
Good–Bad	<b>.838</b>	.243	-.151	.124	-.021
Professional– Unprofessional	<b>.835</b>	.052	-.039	.045	.055
Beautiful–Ugly	<b>.809</b>	.328	-.074	.079	.021
Expensive–Cheap	<b>.806</b>	.067	-.121	.036	.240
Strong–Weak	<b>.664</b>	-.348	-.269	.051	.047
Hard–Soft	.150	<b>-.793</b>	-.040	-.026	.005
Relaxed–Stiff	.203	<b>.777</b>	-.027	.046	.000
Feminine– Masculine	.008	<b>.713</b>	.192	-.098	.189
Delicate–Rugged	.310	<b>.652</b>	.130	-.072	.116
Happy–Sad	.296	<b>.618</b>	-.332	.135	-.099

Colorful–Colorless	.128	<b>.568</b>	-.460	.079	.164
Cool–Warm	.075	<b>-.480</b>	.368	-.103	.068
Slow–Fast	-.191	.025	<b>.811</b>	-.064	-.056
Quiet–Loud	.096	.110	<b>.805</b>	-.027	-.065
Calm–Exciting	-.141	.013	<b>.792</b>	-.006	-.106
Passive–Active	-.214	-.138	<b>.767</b>	-.107	-.158
Old–Young	-.232	-.384	<b>.419</b>	.171	-.096
Concrete–Abstract	.000	.061	-.179	<b>.810</b>	.066
Realistic– Unrealistic	.242	-.019	.087	<b>.738</b>	.034
Unique–Ordinary	.393	.134	-.031	<b>-.413</b>	.379
Complex–Simple	.101	.053	-.212	.024	<b>.834</b>
Two-dimensional– Three-dimensional	-.125	-.127	.213	-.474	<b>-.552</b>

Table 8 exposes five distinguishable factor loadings. The factors were renamed to correspond the adjective pairs in each factor. Adjective pairs good–bad, professional–unprofessional, beautiful–ugly, expensive–cheap and strong–weak loaded on the value factor. Adjective pairs hard–soft, relaxed–stiff, feminine–masculine, delicate–rugged, happy–sad, colorful–colorless and cool–warm loaded on the potency factor. Adjective pairs slow–fast, quiet–loud, calm–exciting, passive–active and old–young loaded on the activity factor. Adjective pairs concrete–abstract, realistic–unrealistic, unique–ordinary loaded on the integrity factor. Finally, adjective pairs complex–simple and two-dimensional–three-dimensional loaded on the complexity factor.

This concludes the results chapter. In the next chapter, key findings will be summarized and discussed. Furthermore, avenues for future research are suggested.

## 5 DISCUSSION

After the launching of app stores, the number of mobile games has been constantly growing at a fast pace. As was previously discussed in sub-section 2.1.1, the games category far outpaces other categories on app stores. Furthermore, mobile games accounted for half of the entire global digital games market in 2016.<sup>16</sup> Changes in the games market and consumer mindsets poise new possibilities and challenges in the world-wide competition of commercial success, which motivates the need for research on mobile game icons on app stores.

This study investigated the relationship between consumer perceptions of mobile game icons and their successfulness using semantic differential scales of 22 adjective pairs. The goal was to discover aesthetic qualities that are likely to predict consumer behavior related to clicking, downloading and purchasing mobile games.

The ratings in the analysis that investigated the relationship between consumer perceptions of mobile game icons and icon successfulness including all of the 22 adjective pairs (see table 6) displayed a clear pattern in that the likelihood to a higher grade as well as clicking, downloading and purchasing can be predicted by the following adjectives: *beautiful*, *good*, *unique*, *soft* and *exciting*. Naturally, the polar opposite of these adjectives (see table 4) on the semantic scale has an equal negative effect on the aspects of icon successfulness.

The appearance of the adjectives “beautiful” and “good” was an expected find. The experience of beauty and goodness is subjective and as such, the adjectives are of general nature and may therefore reflect more of a general estimate of aesthetic quality of an icon.

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<sup>16</sup> SuperData & Unity, “Can’t stop, won’t stop: 2016 mobile and vr games year in review,” <https://www.superdataresearch.com/unity-and-superdata-launch-major-mobile-games-and-vr-report/> (accessed May 18, 2017).

Whereas, for example, adjective pairs such as colorful–colorless, realistic–unrealistic and two-dimensional–three-dimensional are perhaps more specific aesthetic qualities and thus express more variation in the ratings seen on table 6. This finding contrasts Shaikh’s (2009) study on onscreen typeface design and usage that was used as a source for the majority of the semantic differentials. Shaikh’s (ibid.) experiment indicated that some typefaces for online content, such as Display, should not convey beauty as it is not consistent with the meaning of the text. The results of the present study suggest that beauty is in all cases an important factor for mobile game icon successfulness regardless of the context.

As described in sub-section 2.2.2, icon uniqueness is stressed as an important factor for effective design (see Goonetilleke et al. 2001; Dewar 1999). This is supported by the findings as the adjective “unique” occurs in each case of the aforementioned analysis (see table 6). Accordingly, from consumer perspective, a unique icon design is likely to be more successful than an ordinary icon design. This is probably due to the fact that there are millions of apps and mobile games available for consumers on app stores (see figure 1) and millions of icons to choose from. Hence, an icon must be distinguishable to stand out from the masses.

Previous literature in sub-section 2.3.2 suggested that a positive emotion between consumer and product established by design will bring extra value to a product (Cho and Lee 2005). Furthermore, positive impression was stated as an important part of consumer perception (Yun et al. 2003). The occurrence of the adjectives “soft” and “exciting” emphasize this observation as they are emotionally engaging qualities that can be perceived positive. Considering that icon design is a core part of mobile game branding and presentation, an emotional connection with the consumers by design is likely to enhance icon successfulness.

From the perspective of previous literature on effective icon design (see sub-section 2.2.2), the statistical insignificance of the adjective pairs concrete–abstract and complex–simple was unexpected. Previous literature has debated that the concrete–abstract (see Blankenberger and Hahn 1991; Dewar 1999; Isherwood et al. 2007; McDougall et al.

1999) and complex–simple (McDougall et al. 2013; Choi and Lee 2012) relationship may predict icon successfulness but the results of this experiment contrast this statement. On the other hand, the occurrence of the adjective “realistic” in the results may in some cases be interpreted similarly to “concrete”, as icon concreteness is stated as the extent to which it depicts real objects (Isherwood 2007, 466). This calls for more research particularly on mobile game icons as the reason for this finding may well be caused by the fact that most previous literature investigated other icon genres.

The additional analysis that investigated the relationship between consumer perceptions of mobile game icons and icon successfulness excluding adjective pairs beautiful–ugly and good–bad (see table 7) revealed the same pattern that was found earlier (see table 6): the adjectives *unique*, *soft* and *exciting* appeared here as well. This strengthens the conclusions made on these ratings. Furthermore, the latter analysis exposed additional relevant effects in that the likelihood to a higher grade as well as clicking, downloading and purchasing was predicted by the following adjectives: *professional*, *expensive*, *strong*, *relaxed*, *realistic* and *quiet*.

The main observation of the results is not only the similarities that strengthen the grasp on the concept, but also the differences as well as the frequent occurrence of statistically significant adjectives that may explicate consumer perceptions of mobile game icons on a more detailed level. In spite of the findings in the analysis that omitted adjective pairs beautiful–ugly and good–bad (see table 7), it is important to note that both “beautiful” and “good” are significant in predicting the likelihood to a higher grade as well as the willingness to click icons as well as download and purchase the mobile game that the icon belongs to.

In conclusion, this study suggests several features for eye-catching mobile game icon design. A striking mobile game icon should convey beauty and goodness. The icon should be memorable and unique to make a striking first impression in consumers. The composition should include elements of softness as well as excitement. High quality is valued in that the icon should seem professional and expensive. Moreover, realistic qualities are preferred over non-realistic. According to the factor analysis (see table 8),

consumers are more likely to interact with mobile game icons that are perceived as having value, potency, activity, integrity and complexity. The ultimate purpose of the design should be to create an emotional and functional connection to the consumer.

It is evident that mobile game icon design is a complex matter with a lot of room for investigation. This study was one of the first attempts to understand consumer perceptions of mobile game icon successfulness and has only scratched the surface of this topic. Moreover, this study attempted to rule out non-significant adjectives to aid future research on this topic. Future research could be expanded in several directions. For one, investigating the concrete–abstract and simple–complex relationship regarding specifically mobile game icons would be beneficial as the results did not support former literature to a great extent. Additionally, a comparison between the four main categories (concrete, abstract, character and text) in this study could be performed to find out further consumer preferences. Whether a consumer’s willingness to click icons as well as download or purchase a mobile game based on the mobile game icon changes due to a certain price is an interesting option for future research. Other possible factors aside from aesthetic qualities that contribute to consumer perceptions of mobile game icon successfulness should also be explored, such as the role of mobile game categories. Finally, differences in perceptions between different cultures as well as male and female participants would be an interesting approach as the mobile games market is global.

Art is subjective, which is a probable cause for variations in the results. However, the study shows evidence of consensus. The present findings underline that there is a relationship between consumer perceptions and mobile game icon successfulness. This should be taken into account when designing mobile game icons for app stores.

## REFERENCES

Alha, Kati, Elina Koskinen, Janne Paavilainen, Juho Hamari, and Jani Kinnunen. "Free-to-play games: Professionals' perspectives." Paper presented in the 14th International DiGRA Nordic Conference, Gotland, Sweden, May 29, 2014. Accessed April 22, 2015. [http://www.digra.org/wp-content/uploads/digital-library/nordicdigra2014\\_submission\\_8.pdf](http://www.digra.org/wp-content/uploads/digital-library/nordicdigra2014_submission_8.pdf).

Alha, Kati, Elina Koskinen, Janne Paavilainen, and Juho Hamari. "Critical Acclaim and Commercial Success in Mobile Free-to-Play Games." Paper presented in Proceedings of DiGRA FDG Conference, Dundee, Scotland, August 1–6, 2016. Accessed May 24, 2017. [http://www.digra.org/wp-content/uploads/digital-library/paper\\_210.pdf](http://www.digra.org/wp-content/uploads/digital-library/paper_210.pdf).

Arab, Farah, Yasir Malik, and Abdulrazak Bessam. "Evaluation of PhonAge: An adapted smartphone interface for elderly people." Paper presented at the 14th IFIP TC 13 International Conference, Cape Town, South Africa, September 2–6, 2013. Accessed April 19, 2015. doi: 10.1007/978-3-642-40498-6\_44.

Baran, Stanley J. *Introduction to mass communication: Media literacy and culture*. 8th ed. New York: McGraw-Hill, 2014.

Batu, Salman Y., Young-Hee Kim, and Hong-In Cheng. "Senior-friendly icon design for the mobile phone". Paper presented at the 6th International Conference on Digital Content, Multimedia Technology and its Applications (IDC 2010), Seoul, South Korea, August 16–18, 2010. Accessed April 19, 2015.

Blankenberger, Sven, and Klaus Hahn. "Effects of icon design on human-computer interaction." *International Journal of Man-Machine Studies* 35, no. 3 (1991): 363–377. Accessed April 20, 2015. doi: 10.1016/S0020-7373(05)80133-6.

Butler, Margaret. "Android: Changing the mobile landscape." *Pervasive Computing, IEEE* 10, no. 1 (2011): 4–7. Accessed April 24, 2015. doi: 10.1109/MPRV.2011.1.

Chernev, Alexander. "When more is less and less is more: The role of ideal point availability and assortment in consumer choice." *Journal of Consumer Research* 30, no. 2 (2003): 170–183. Accessed April 28, 2015. doi: 10.1086/376808.

Cho, Hyun-Seung, and Joohyeon Lee. "Development of a macroscopic model on recent fashion trends on the basis of consumer emotion." *International Journal of Consumer Studies* 29, no. 1 (2005): 17–33. Accessed April 29, 2015. doi 10.1111/j.1470-6431.2005.00370.x.

Choi, Junho H., and Hye-Jin Lee. "Facets of simplicity for the smartphone interface: A structural model." *International Journal of Human-Computer Studies* 70, no. 2 (2012): 129–142. Accessed April 20, 2015. doi: 10.1016/j.ijhcs.2011.09.002.

Creusen, Marielle E. H., and Jan P. L. Schoormans. "The different roles of product appearance in consumer choice." *Journal of Product Innovation Management* 22, no. 1 (2005): 63–81. Accessed April 29, 2015. doi: 10.1111/j.0737-6782.2005.00103.x.

Crossley, Lee. "Building emotions in design." *The Design Journal* 6, no. 3 (2003): 35–41. Accessed April 29, 2015. doi: 10.2752/146069203789355264.

Dewar, Robert. "Design and evaluation of public information symbols." In *Visual Information for Everyday Use*, edited by Harms Zwaga J. G., Theo Boersema, and Henriëtte C. M. London: Tylor & Francis, 1999.

Evans, Joel R., and Anil Mathur. "The value of online surveys." *Internet Research* 15, no. 2 (2005): 195–219. Accessed February 27, 2017. doi: 10.1108/10662240510590360.

Forsythe, Alex, Gerry Mulhern, and Martin Sawey. "Confounds in pictorial sets: The role of complexity and familiarity in basic-level picture processing." *Behavior Research Methods* 40, no. 1 (2008): 116–129. Accessed April 20, 2015. doi: 10.3758/BRM.40.1.116.



García, Mariano, Albert N. Badre, and John T. Stasko. "Development and validation of icons varying in their abstractness." *Interacting with Computers* 6, no. 2 (1994): 191–211. Accessed April 19, 2015. doi: 10.1016/0953-5438(94)90024-8.

Goonetilleke, Ravindra S., Heloisa M. Shih, Hung K. On, and Julien Fritsch. "Effects of training and representational characteristics in icon design." *International Journal of Human-Computer Studies* 55, no. 5 (2001): 741–760. Accessed April 5, 2015. doi: 10.1006/ijhc.2001.0501.

Hamari, Juho, Kati Alha, Simo Järvelä, J. Matias Kivikangas, Jonna Koivisto, and Janne Paavilainen. "Why do players buy in-game content? An empirical study on concrete purchase motivations." *Computers in Human Behavior* 68 (2017): 538–546. Accessed May 24, 2017. [http://people.uta.fi/~kljuham/2016-hamari\\_et\\_al-why\\_do\\_players\\_buy\\_in-game\\_content.pdf](http://people.uta.fi/~kljuham/2016-hamari_et_al-why_do_players_buy_in-game_content.pdf).

Hamari, Juho, Nicolai Hanner, and Jonna Koivisto. "Service quality explains why people use freemium services but not if they go premium: An empirical study in free-to-play games." *International Journal of Information Management* 37, no. 1 (2017): 1449–1459. Accessed May 24, 2017. [http://people.uta.fi/~kljuham/2017-hamari\\_et\\_al-service\\_quality\\_expains\\_why\\_people\\_use\\_freemium\\_services\\_but\\_not\\_if\\_they\\_go\\_premium.pdf](http://people.uta.fi/~kljuham/2017-hamari_et_al-service_quality_expains_why_people_use_freemium_services_but_not_if_they_go_premium.pdf).

Hamari, Juho, and Lauri Keronen. "Why do people buy virtual goods: A Meta-analysis." *Computers in Human Behavior* 71 (2017): 59–69. Accessed May 24, 2017. [https://www.researchgate.net/publication/312870311\\_Why\\_do\\_people\\_buy\\_virtual\\_goods\\_A\\_meta-analysis](https://www.researchgate.net/publication/312870311_Why_do_people_buy_virtual_goods_A_meta-analysis).

Heise, David R. "The Semantic Differential and Attitude Research." In *Attitude measurement*, edited by Gene F. Summers, 235–253. Chicago: Rand McNally, 1970.

Hou, Kai-Chun, and Chun-Heng Ho. "A preliminary study on aesthetic of apps icon design." Paper presented at the 5th International Congress of International Association of Societies of Design Research (IASDR 2013), Tokyo, Japan, August 26–30, 2013.

Accessed April 18, 2015. <http://www.mendeley.com/research/preliminary-study-aesthetic-apps-icon-design>.

Horton, William. *The icon book: Visual symbols for computing systems and documentation*. New York: John Wiley & Sons, 1994.

Horton, William. "Designing icons and visual symbols." Paper presented at CHI 96 Conference on Human Factors in Computing Systems, Vancouver, Canada, April 13–18, 1996. Accessed April 19, 2015. doi: 10.1145/257089.257378.

Huang, Shih-Miao, Kong-King Shieh, and Chai-Fen Chi. "Factors affecting the design of computer icons." *International Journal of Industrial Ergonomics* 29, no. 4 (2002): 211–218. Accessed May 24, 2017. <http://www.nortonfastback.com/york/docs/design%20of%20computer%20icons.pdf>.

Isherwood, Sarah J., Siné J. P. McDougall, and Martin B. Curry. "Icon identification in context: The changing role of icon characteristics with user experience." *Human factors* 49, no. 3 (2007): 465–476. Accessed April 20, 2015. doi: 10.1518/001872007X200102.

Iyengar, Sheena S., and Mark R. Lepper. "When choice is demotivating: Can one desire too much of a good thing?" *Journal of Personality and Social Psychology* 79, no. 6 (2000): 995–1006. Accessed April 28, 2015. doi: 10.1037/0022-3514.79.6.995.

Klopfer, Eric. *Augmented learning: Research and design of mobile educational games*. Cambridge: MIT Press, 2008.

Likert, Rensis. "A technique for the measurement of attitudes." *Archives of Psychology* 22, no. 140 (1932): 5–55. Accessed May 16, 2017. [http://www.voteview.com/pdf/Likert\\_1932.pdf](http://www.voteview.com/pdf/Likert_1932.pdf).

Lodding, Kenneth N. "Iconic interfacing." *IEEE Computer Graphics and Applications* 3 (1983): 11–20. Accessed April 19, 2015. doi: 10.1109/MCG.1983.262982.

McDougall, Siné J. P., Martin B. Curry, and Oscar De Bruijin. "Understanding what makes icons effective: How subjective ratings can inform design." In *Contemporary Ergonomics*, edited by Margaret Hanson, 285–289. London: Taylor & Francis, 1998.

McDougall, Siné J. P., Martin B. Curry, and Oscar De Bruijin. "Measuring symbol and icon characteristics: Norms for concreteness, complexity, meaningfulness, familiarity, and semantic distance for 239 symbols." *Behavior Research Methods, Instruments, & Computers* 31, no. 3 (1999): 487–519. Accessed April 19, 2015. doi: 10.3758/BF03200730.

McDougall, Siné J. P., and Irene Reppa. "Why do I like it? The relationships between icon characteristics, user performance and aesthetic appeal." Paper presented at Human Factors and Ergonomics Society 52nd Annual Meeting, New York, USA, September 22–26, 2008. Accessed April 20, 2015. doi: 10.1177/154193120805201822.

McDougall, Siné J. P., and Irene Reppa. "Ease of icon processing can predict icon appeal." Paper presented at the 15th International Conference, HCI International, Las Vegas, USA, July 21–26, 2013. Accessed April 20, 2015.

Montgomery, Douglas C., Elizabeth A. Peck, and G. Geoffrey Vining. *Introduction to linear regression analysis*. 3rd ed. New York: John Wiley & Sons, 2001.

Moreira, Àtila V. M., Vicente V. Filho, and Geber L. Ramalho. "Understanding mobile game success: A study of features related to acquisition, retention and monetization." *Journal on Interactive Systems* 5, no. 2 (2014): 2–13. Accessed April 22, 2015. <http://seer.ufrgs.br/index.php/jis/article/view/45696/31858>.

Moyes, Jackie, and Partick W. Jordan. "Icon design and its effect on guessability, learnability, and experienced user performance." Paper presented in HCI 93, People and computers VIII, Loughborough, UK, September 7–10, 1993. Accessed March 20, 2015.

Orth, Ulrich R., and Keven Malkewitz. "Good from far but far from good: The effects of visual fluency on impressions of package design." *Advances in Consumer Research*, 36 (2009): 211–212. Accessed April 29, 2015.

[http://www.researchgate.net/publication/265181854\\_Good\\_from\\_Far\\_but\\_Far\\_from\\_Good\\_The\\_Effects\\_of\\_Visual\\_Fluency\\_on\\_Impressions\\_of\\_Package\\_Design](http://www.researchgate.net/publication/265181854_Good_from_Far_but_Far_from_Good_The_Effects_of_Visual_Fluency_on_Impressions_of_Package_Design).

Osgood, Charles E., and Zella Luria. "A blind analysis of a case of multiple personality." *Journal of Abnormal and Social Psychology* 49 (1954): 579–591. Accessed February 8, 2017.

<http://ion.uwinnipeg.ca/~clark/teach/zzArchives/4630/Week4Readings/multipersabn-49-4p1-579.pdf>.

Osgood, Charles E., George J. Suci, and Percy H. Tannenbaum. *The measurement of meaning*. Urbana: University of Illinois Press, 1957.

Peirce, Charles S. "Volumes I and II: Principles of philosophy and elements of logic." In *Collected papers of Charles Sanders Peirce*, edited by Charles Hartshorne and Paul Weiss. London: Belknap of Harvard University Press, 1931.

Shaikh, A. Dawn. "Know Your Typefaces! Semantic Differential Presentation of 40 Onscreen Typefaces." *Usability News* 11, no. 2 (2009): 23–65. Accessed February 19, 2017. <http://usabilitynews.org/know-your-typefaces-semantic-differential-presentation-of-40-onscreen-typefaces/>.

Shaughnessy, Joel R., Eugene B. Zechmeister, and Jeanne S. Zechmeister. *Research methods in psychology*. 9th ed. New York: McGraw-Hill, 2011.

Shu, Wesley, and Chia-Sheng Lin. "Icon design and game app adoption." Paper presented at the 20th Americas Conference on Information Systems (AMCIS 2014), Association for Information Systems, Savannah, Georgia, August 7–9, 2014. Accessed March 19, 2015. <http://aisel.aisnet.org/amcis2014/MobileComputing/GeneralPresentations>.

Strungă, Alexandru-Constantin. "Osgood's semantic differential: a review of the Romanian social sciences literature." *Social Sciences and Education Research Review* 2 (2014): 22–28. Accessed February 7, 2017. <http://sserr.ro/wp-content/uploads/2014/12/2-22-28.pdf>.

Valli, Raine. “Semanttinen differentiaali.” Chap. 5 in *Johdatus tilastolliseen tutkimukseen*. 2nd ed. Jyväskylä: PS-kustannus, 2015.

Wiedenbeck, Susan. “The use of icons and labels in an end user application program: An empirical study of learning and retention.” *Behaviour & Information Technology* 18, no. 2 (1999): 68–82. Accessed April 19, 2015. doi: 10.1080/014492999119129.

Wirtz, Jochen, and Meng C. Lee. “An examination of the quality and context-specific applicability of commonly used customer satisfaction measures.” *Journal of Service Research* 5, no. 4 (2003): 345–355. Accessed February 21, 2017. doi: 10.1177/1094670503005004006.

Woolridge, Dave, and Michael Schneider. “Your iOS app is your most powerful marketing tool.” In *The business of iPhone and iPad app development*, edited by Dave Woolridge and Michael Schneider, 61–96. Berkeley: Apress, 2011. doi: 10.1007/978-1-4302-3301-5\_4.

Yun, Myung Hwan, Sung H. Han, Sang W. Hong, and Jongseo Kim. “Incorporating user satisfaction into the look-and-feel of mobile phone design.” *Ergonomics* 46, no. 13–14 (2003): 1423–1440. Accessed April 29, 2015. doi: 10.1080/00140130310001610919.

## **APPENDIX: SURVEY INSTRUCTIONS**

Welcome!

This is a survey about the visual appearance of mobile game icons. The survey takes about 15 minutes to complete and all participants may enter into a prize draw after completion. Two randomly selected winners will be awarded a Polar Loop 2 Activity Tracker.

The survey data will be kept anonymous and will only be used for research purposes. Contact information will only be used for distribution of the raffle prizes. The results of this study will be used in my Master's thesis, and may be used in further reports, presentations, or publications. The icons on this survey are copyrighted to their creators.

Any questions or queries can be addressed to: [jylha.a.henrietta@student.uta.fi](mailto:jylha.a.henrietta@student.uta.fi).

Thank you for your patience and for taking the time to fill out this survey!

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