

MOBILE MEDIA TECHNOLOGY AND POPULAR MOBILE GAMES IN CONTEMPORARY SOCIETY

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Abstract:

With the advent of smartphones, the global mobile applications market has increased exponentially. In particular, mobile games have become extremely popular. As such, this study explores which mobile technologies have been used in mobile games, and their relation to contemporary mobile gamers' download choices. Apple's App Store chart and Google Play chart were utilized to analyze the common technological and gaming design features of the contemporary mobile games that are most popular with the gamers, and also to examine similarities and differences between the most popular smartphone and tablet computer games. The results show that popular mobile games maximize players' touch-based enjoyment (i.e., swiping, sliding or drawing). In addition, the popular mobile games have at least two of the following features: simple rules, social interactions, and the removal of enemies and missions that do not require defeating an enemy to complete. Mobile games that require careful controls, such as tilting the screen or fast and unpredictable movements, tended to be more downloaded on the iPad than on the iPhone. In terms of ranking fluctuations, the paid iOS game charts were statistically more stable than the free iOS game charts.

Keywords: mobile game, mobile technology, popular mobile game, smartphone

INTRODUCTION

In contemporary society, mobile phones have become much more than simple mechanisms by which to make calls. From a functional aspect, they resemble "the Swiss Army knife of the digital era"; not only can phones be used to text others, they can also be used to take pictures, play music and hold your credit card information as a digital wallet (Choe, 2009). From the moment that we wake up until we fall asleep at night, our mobile phones are never far from our sides.

There were 6.8 billion global mobile phone subscriptions in 2013, according to the International Telecommunication Union (2013). No other technology has achieved as rapid an adoption rate as the mobile phone (Katz, 2007). Even older generations have adapted more to mobile phones than the Internet (Plaza, Martín, Martín, & Medrano, 2011).

In particular, smartphones have become one of the must-have items in this media convergence era. According to Nielsen (2013), 62% of all mobile phone

subscribers in the United States used a smartphone in 2013, an increase of 40% from 2011 ("Study: smartphone," 2011). As the smartphone market grows, so has the mobile applications market. It is estimated that the global mobile applications market will be worth \$20.4 billion by the end of 2013 (Portio Research, 2013). Most of all, however, mobile games have become the most often downloaded of all mobile applications (Emerson, 2011). eMarketer (2010) estimated the mobile game market by 2014 will be worth \$1.5 billion and 94.9 million people will play mobile phone games at least monthly; the number excludes on-deck gamers (i.e., those who just play pre-installed games) and has increased from 64 million in 2010. Thus, network operators and the game industry are focusing an increasing amount of attention in this arena (Chehimi, Coulton, & Edwards, 2008).

When it comes to social perspective, mobile games are more involved in a person's daily life than in the past. Accordingly, scholars also have begun to take an interest in smartphone-centric applications,

particularly mobile games. As this field of study is still young, more research is necessary to fully understand the market and its impact on society. Therefore, the purpose of this study is to explore which mobile technologies have been used in mobile games and their relationship to contemporary mobile gamer's download choices. The sample for this study focused on Apple's and Google's popular mobile games, which were taken from the two marketplaces' charts of popular game applications. The research analyzed the common features found in each of these games. The results should help enhance future game applications by allowing developers to tailor their games to users more successfully.

LITERATURE REVIEW

Mobile games first appeared in society when second generation (2G) mobile phones were introduced. However, the number and quality of the games drastically increased with the advent and introduction of third generation (3G) mobile phones. Therefore, in order to fully understand where smartphones and their technology and games are today, one must understand their past.

A Brief History of Mobile Phones

The first generation (1G) mobile phone was launched in the early 1980s and was used solely for making phone calls. Moreover, it was heavy and big, a so called "brick" phone.

When the 2G mobile phone was introduced in the 1990s, it utilized a much more advanced data transmission system that converted the analog 1G signal to a digital 2G signal, which dramatically improved the voice quality while decreasing the amount of data needed for the process. In addition, for the first time, the 2G mobile phone allowed for the use of text messaging. After the 2G mobile was introduced, the global mobile phone market was shared by two types of communications technologies:

global systems for mobile communications (GSM) and code division multiple access (CDMA).

After the 3G mobile was introduced, more than 70% of the countries in the world began using the wideband code division multiple access (WCDMA), which originated with the GSM standard (ITU, 2011a). 3G allowed for a high-speed data service at a reduced cost (ITU, 2013). The new technology was quickly given the motto "mobile with Internet" (Hjorth, 2011; ITU, 2011b). The tremendous data transmission speed and wireless Internet access available with this development allowed mobile phone subscribers to watch video clips.

Following the success of 3G mobiles, the industry released the 4G mobile, which had a higher wireless data transmission speed. According to the International Telecommunication Union (ITU) (2010), 4G mobiles have, at the high end, a recommendation of approximately 100 mbit/s and, at the low end, 1 gbit/s. As these speeds are only recommendations, long term evolution (LTE) and worldwide interoperability for microwave access (WiMAX) are currently labeled as being 4G in the mobile market (ITU, 2010; Wisely, 2007). According to Teleco (2013), there are 64.8 million 4G mobile accesses in the United States and Canada; 126.1 million mobile accesses in the world. Today, 4G mobile phones can be used for just about anything related to media and technology.

Mobile Games in the Media Convergence Era

When mobile phone games first appeared on the 2G system they mainly consisted of on-deck, casual, flash-based games, such as Tetris (Hjorth, 2011). As the data transmission speeds of mobile phones improved in the 3G era, mobile service providers opened their paid-application markets. However, at the beginning, the application markets consisted of a few simple categories such as games, news and photography services.

The advent of the smartphone was a milestone in the mobile phone games industry and the entire

application market. Smartphones, which enabled the use of wireless Internet and high-resolution touch screens, enticed the creation of countless applications from a number of application developers (Wilson, Chesher, Hjorth, & Richardson, 2011).

With the development of advanced mobile technologies, mobile games were also upgraded in terms of entertaining gamers. In fact, the mobile game industry has tried to promote a sense of presence for successful users' enjoyment as with other entertainment media (Hartmann, Klimmt, & Vorderer, 2009). This sense of presence has become embodied in smartphones with the use of several developed technologies, such as high-speed wireless data transmission, high-resolution cameras and screens, global positioning systems (GPS) and touch panels. In the 2G era, a sense of presence in mobile games was restricted due to the technical limitations of the phones. Then, the media convergence in the 3G era enabled gamers to feel a sense of presence with mobile games, such as those based on hybrid reality and location-awareness (Hjorth, 2011; Wilson et al., 2011).

3D Technology and Mobile Games

According to Chehimi et al. (2006), 3D computer graphics have not only attracted more gamers than games containing solely 2D content since they were first introduced in the early 1980s, but they have also become an important part of maximizing the gamers' playing experience. However, due to resource constraints, such as "small screen sizes, limited processing power, small memory footprints, and critical power consumption (Chehimi et al., 2006, p. 20)," mobile game developers have been faced with difficulties when designing 3D mobile games. Although mobile game play has improved with smart Web-capable touchscreen phones, such as the Apple iPhone, Samsung Galaxy and HTC Diamond (Richardson, 2011), mobile 3D technology is still not competitive in the mobile game market. Thus, mobile games have begun

focusing more on utilizing smartphone-centric features, such as wireless internet, touch screens and location-awareness functions, in order to maximize gamers' enjoyment with feeling a presence, specifically, a "Telepresence."

According to the International Society for Presence Research (ISPR), telepresence is a user's experiences of "being there" in a virtual environment and temporarily overlooking or misconstruing their mediating experience (ISPR, 2012; Hartmann, et al., 2009). Hybrid and augmented reality games are good examples of mobile telepresence. Moreover, their characteristics such as spatiality, sociability and mobility (de Souza e Silva, 2009) are also reflected in contemporary mobile games.

Hybrid Reality Games

Hybrid reality games are archetypal mobile-centric games based on location-awareness and internet connection technology. For example, *Can You See Me Now?*, the pioneer of current hybrid reality games published by Blast Theory in 2001, was played by off-line and on-line players. The main goal for the off-line players was to catch the on-line players' graphical avatars as they moved around a specific part of the city. Both sets of players were able to discover their opponents' location on a digital map via an internet networking connection. With wireless internet and location awareness technology, mobile games have been trying to actualize hybrid reality games on smartphones.

Spatiality. All traditional games, such as video, board and physical games, have a primary play space. Salen and Zimmerman (2003) applied Dutch historian Johan Huizinga's concept of the "magic circle" to digital games. This magic circle encompasses a video game's screen, a board game's board and a physical game's arena. Hybrid reality games, however, do not have a particular playing space as they play simultaneously in physical and digital space, or physical and represented spaces (de Souza e Silva,

2009). Therefore, according to Wirth, Hartmann, Boecking, Vorderer, Klimmt, Schramm, & Wirth (2007), spatial presence is “a binary experience, during which perceived self-location and, in most cases, perceived action possibilities are connected to a mediated spatial environment, and mental capacities are bound by the mediated environment instead of reality” (p. 497). In this respect, users may feel a spatial presence in this hybrid space created by using internet connected mobile media (de Souza e Silva, 2006). In the case of mobile games, wireless internet and location-based games are considered as hybrid reality mobile games.

The first location-based mobile game, *Tron LiveCycle*, was released in late 2010; it was not popular with gamers. Strong virtual reality technology could better stimulate spatial presence, but the technology is still not perfect. The level of spatial presence can vary depending on the users’ interests, attention, arousal level and cognitive-spatial abilities (Wirth et al, 2007; Hartmann et al., 2009).

Sociability. Due to their sociability, hybrid reality games are frequently compared to several types of multi-user games, including multi-user dungeon (MUD), role-playing games (RPGs) and massively multiplayer online role-playing games (MMORPGs). Indeed, collaboration and interaction among gamers are necessary in order to play hybrid reality games during which gamers are connected via technology in the same way as in multiuser games (de Souza e Silva, 2009). On the other hand, hybrid reality games are not confined to a digital space because they occur in both the cyber and real world simultaneously as mobile media expands the gamers’ action “[from] specific private place[s] to public urban spaces” (de Souza e Silva, 2006, p. 270). Gamers not only communicate via texts or phone calls with other gamers, but also interact with strangers not playing the game. For example, an off-line player may ask for directions or clues from strangers on the street.

Some mobile games also have sociability, though most of them do not require the gamers to engage in face-to-face interaction. For example, *Draw Something* needs another gamer to play. In this game, player A explains one word among three random words by drawing that word. Player B is to guess what the word is based on the drawing. The process of drawing and choosing the letters for answering are recorded and displayed to both players, which induces a presence for the players. *QuizUp*, *Scramble With Friends*, and *Words With Friends* are also similar type mobile games.

Mobility. During the game, hybrid reality gamers hold mobile devices equipped with location-awareness, which encourages the players’ mobility in urban spaces instead of using an immovable computer screen, which limits their play space. Along the same line, contemporary mobile games have no restriction when it comes to mobility.

As mobile phones are almost always with their users, the borders between games and life are increasingly becoming blurred (de Souza e Silva, 2006; 2009). In contemporary society, gamers more frequently alternate between game play and real-life duties (de Souza e Silva, 2009). As such, they can and often do play mobile games in normal daily spaces, such as on the street while out walking, on public transportation or in bed (Sheller & Urry, 2006). Thus, the mobility causes the gamers to experience telepresence.

Augmented Reality Games. In recent years, augmented reality has become a popular concept in the mobile phone applications industry, especially for mobile games (Gu & Duh, 2011). Augmented reality games are referred to as “reality-based [games], which enfold the player into a temporary and incomplete simulation of real-world physics” (Richardson, 2011, p. 424). The first augmented reality game, *AR Soccer*, was released in 2004. This game was designed so that the gamers could “kick a virtual ball with [the gamer’s] real foot into the virtual goalpost” by tracking the

gamer's movement with an integrated camera (Gu & Duh, 2011, p. 103). In accordance with Merleau-Ponty's (1964) argument, actuality is "our corporeal or body schema...it allows us to incorporate technologies and equipment into our perceptual and corporeal organization" (Richardson, 2011, p. 422).

Shark Fingers! is a good example of an augmented reality mobile game. In this game, the gamer's pre-pictured photo or live camera is used for an underwater background. In the game, sharks bite a gamer's finger, and a player can tilt the smartphone, which is a gamer's shark tank. Developed mobile technologies, such as multi-touch interfaces, accelerometers, high-resolution cameras, and GPS are not only actualized augmented reality through mobile game, but also enable gamers to experience telepresence while playing the game (Richardson, 2011).

RESEARCH QUESTIONS

In 1989, Nintendo released the hand-held game console Game Boy and its addictive puzzle game *Tetris* (Anderson, 2012). Compared to today's mobile games, *Tetris'* graphics were extremely simple and its motion monotonous; however, it sold more than 70 million copies (Anderson, 2012). It can be assumed that *Tetris'* gaming feature was corresponding to the hand-held game console's technological feature. Along the same line, the most popular mobile games tend to stay consistent, while a number of new mobile games are released every day across several worldwide application platforms. For example, the most often downloaded game of 2011, *Angry Birds* (Emerson, 2011), was at the top of the Apple's App Store charts as of April 2012. Therefore, it can be assumed that mobile gamers prefer a certain technological feature or gaming design feature when looking for new mobile games to download. This information leads to the first research question.

RQ1: What are the common technological and gaming design features in the most downloaded mobile games? And what are the popular mobile games' genres?

One area that seems to impact the number of downloads for a game is the device on which it can be played (i.e., the top game for a smartphone is different than the top game for a tablet computer). This information leads to the second research question.

RQ2: What are the common technological and gaming design features of popular mobile games for smartphones and tablet computers?

Another aspect that influences the popularity of a game is its cost (i.e., the popularity of the top free game is not the same as the top paid game). This influence remains true regardless of the device on which the game is played. This information leads to the third research question.

RQ3: What are the key differences between popular free and paid games?

METHOD

According to Nielsen (2013), 52% of smartphone subscribers in the United States used Google's Android operating system (Android OS) in 2013, while 40% used Apple's iPhone/iPad operating system (iOS). Several mobile device manufacturers use Android OS, whereas iOS can only be used on Apple devices, such as the iPhone and iPad. In accordance with their operating systems, Google's Play Store is exclusively available for Android OS gamers and Apple's App Store is exclusively available for iOS gamers. For the validity of the research, this study utilized the data gleaned from Google's Play Store and Apple's App Store. This data was utilized in order to discover the common technological and gaming design features of the mobile games that are the most popular with gamers and also to examine the similarities and differences

between the most popular smartphone and tablet computer games.

No separate data charts exist for mobile phone and tablet computer games in terms of the Play Store, while the App Store provides separate data for the iPhone and iPad. The secondary data for this study was collected from appannie.com, which releases a daily top 500 mobile games application chart based on the App Store and Play Store charts. In order to make the data pool manageable, only data from the top 10 mobile games were collected. The research data were collected only from U.S. users for data consistency. Since the mobile games application market is fast-changing, the investigation period was limited to 30 days between November 1 and November 30, 2013. Based on the daily chart, the most downloaded game received 10 points and the least downloaded game

received one point. This method was applied to all of the research data as it allowed the researchers to discover the most popular games and their genre during the investigation period.

RESULTS

Candy Crush Saga was the most downloaded free game on the Google Play Store chart (10.0 average points) (Table 1). During the investigation period, it was always on the top of the chart. *Pet Rescue Saga* was the second most popular free game for the Android OS (8.33 points). *Subway Surfers* (6.93 points) and *Deer Hunter 2014* (6.57 points) followed that as the most downloaded free Play Store game. Four Arcade & Action games and four Casual games were on the top 10 chart. The other two games were in the Sports and Brain & Puzzle genre.

Table 1: Top 10 free Google Play Store games

	Title	Genre	Ave. Score
1	Candy Crush Saga	Casual	10.00
2	Pet Rescue Saga	Casual	8.33
3	Subway Surfers	Arcade & Action	6.93
4	Deer Hunter 2014	Arcade & Action	6.57
5	Fanatical Football	Sports games	3.90
6	Despicable Me	Casual	3.30
7	My Talking Tom	Casual	2.83
8	Temple Run 2	Arcade & Action	2.57
9	Plants vs. Zombies 2	Arcade & Action	2.40
10	Find Objects	Brain & Puzzle	1.43

Note 1. Standard deviation = 2.91 / Variance = 8.47 / Median = 3.60

As displayed in Table 2, *Minecraft* was consistently the top paid game downloaded for the Android OS (10 points). *Plants vs. Zombies* were ranked ninth (2.40 points) on the free Play Store chart, while it ranked second (8.80 points) in the paid Play

Store chart. The other nine games in the paid Play Store chart did not coincide with the free chart. Eight out of the 10 games on the chart were in the Arcade & Action genre.

Table 2: Top 10 paid Google Play Store games

	Title	Genre	Ave. Score
1	Minecraft - Pocket Edition	Arcade & Action	10.00
2	Plants vs. Zombies	Arcade & Action	8.80
3	Need for Speed Most Wanted	Racing	7.10
4	Bloons TD 5	Arcade & Action	6.60
5	Osmos HD	Arcade & Action	4.77
6	Where's My Water?	Brain & Puzzle	4.43
7	Fruit Ninja	Arcade & Action	4.07
8	SuperGNES (SNES Emulator)	Arcade & Action	1.97
9	The Walking Dead: Assault	Arcade & Action	1.93
10	Grand Theft Auto III	Arcade & Action	1.77

Note 1. Standard deviation = 2.92 / Variance = 8.50 / Median = 4.60

During the investigation period, *Deer Hunter 2014* earned .14 points more than the second ranked game's average in the Top Free iPhone Games (Table 3). The third (*Candy Crush Saga*) and fourth (*Clumsy Ninja*) ranked games were 2.17 and 4.20 average points less than the most downloaded game. *QuizUp*,

Clumsy Ninja, *Call of Duty* and *NinJump Rooftops* have not been released for the Android OS. The majority of the iOS games were categorized into more than one genre. On the free iPhone chart, three games were regarded as being in the Action and Simulation genre.

Table 3: Top 10 free iPhone games

	Title	Genre	Ave. Score
1	Deer Hunter 2014	Action, Simulation	7.37
2	QuizUp: The Biggest Trivia Game In The World!	Educational, Trivia	7.23
3	Candy Crush Saga	Puzzle	5.20
4	Clumsy Ninja	Family, Adventure	3.17
5	Call of Duty	Action	3.07
6	NinJump Rooftops	Action	3.00
7	My Talking Tom	Family, Simulation	2.90
8	Skee Ball Arcade	Arcade, Family	2.83
9	Star Wars: Tiny Death Star	Adventure, Simulation	1.97
10	GT Racing 2: The Real Car Experience	Racing, Sports	1.67

Note. Standard deviation = 2.05 / Variance = 4.19 / Median = 3.03

There was a .07 average point difference between the most downloaded game (*Minecraft*: 8.10 points) and the second most downloaded game (*Duck Dynasty*: 8.03 points) on the paid iPhone chart (Table 4). All of the top 10 paid iPhone games have also been

released as free versions. While *Angry Birds Star Wars II* is an expanded version of *Angry Birds Free*, they are virtually identical games. The most popular genre on the paid iPhone chart was Action and Simulation; this genre contained four games that landed on the chart.

Table 4: Top 10 paid iPhone games

	Title	Genre	Ave. Score
1	Minecraft – Pocket Edition	Adventure	8.10
2	Duck Dynasty: Battle of the Beards HD	Action, Family	8.03
3	Heads Up!	Word	7.30
4	Backflip Madness	Sports	6.80
5	Angry Birds Star Wars II	Action, Arcade	6.13
6	Plague Inc.	Simulation, Strategy	4.80
7	Pixel Gun 3D - Block World Pocket Survival Shooter ...	Action, Simulation	3.07
8	Cops N Robbers (Jail Break) - Mine Mini Game	Adventure, Simulation	2.67
9	Rayman Fiesta Run	Action, Arcade	1.53
10	Hatch	Simulation	1.07

Note. Standard deviation = 2.69 / Variance = 7.26 / Median = 5.47

As can be seen from Tables 3 and 5, *Deer Hunter 2014* was the most downloaded free game for both the iPhone (7.37 points) and iPad (5.17 points). *Kids Face Paint*, *Baby Pet Vet Doctor* and *Cops N Robbers (FPS)* were only released for the iPad. Except for those

three games, all of the other games were included on both the top 10 free iPhone and iPad game charts. Four games were categorized in the Simulation and Family genres. Those two genres were the most downloaded genres on the free iPad chart.

Table 5: Top 10 free iPad games

	Title	Genre	Ave. Score
1	Deer Hunter 2014	Action, Simulation	5.17
2	My Talking Tom	Family, Simulation	4.93
3	Candy Crush Saga	Puzzle	4.07
4	Clumsy Ninja	Family, Adventure	3.13
5	Star Wars: Tiny Death Star	Adventure, Simulation	2.40
6	Kids Face Paint	Educational, Family	2.33
7	GT Racing 2: The Real Car Experience	Racing, Sports	2.20
8	NinJump Rooftops	Action	2.17
9	Baby Pet Vet Doctor - Kids Games	Educational, Family	1.80
10	Cops N Robbers (FPS) - Mine Mini Game	Adventure, Simulation	1.73

Note. Standard deviation = 1.28 / Variance = 1.64 / Median = 2.37

As displayed in Tables 4 and 6, *Minecraft* was the most popular paid game for the iPhone (8.10 points) and iPad (9.50 points). *Angry Birds Star Wars II* was the second most downloaded paid iPad game (7.93 points), while it ranked 5th on the paid iPhone chart (6.13 points). *Heads Up!* was ranked lower on the paid

iPad chart than on the paid iPhone chart during the data collection period.

Oceanhorn, *LEGO The Lord of the Rings*, and *Castle of Illusion Starring Mickey Mouse* were not released for the iPhone. In addition, *Blocky Roads* was not ranked on the top 10 paid iPhone chart.

Table 6: Top 10 paid iPad games

	Title	Genre	Ave. Score
1	Minecraft – Pocket Edition	Adventure	9.50
2	Angry Birds Star Wars II	Action, Arcade	7.93
3	Duck Dynasty: Battle of the Beards HD	Action, Family	6.97
4	Pixel Gun 3D - Block World Pocket Survival Shooter ...	Action, Simulation	4.77
5	Cops N Robbers (Jail Break) - Mine Mini Game	Adventure, Simulation	3.93
6	Oceanhorn	Adventure	2.70
7	LEGO The Lord of the Rings	Action, Adventure	2.53
8	Heads Up!	Word	1.77
9	Blocky Roads	Racing	1.73
10	Castle of Illusion Starring Mickey Mouse	Action, Adventure	1.47
Note. Standard deviation = 2.88 / Variance = 8.27 / Median = 3.32			

Top Free Games

Candy Crush Saga, *Deer Hunter 2014* and *My Talking Tom* were on all of the top 10 free game charts, even though their rankings varied depending on the chart (see Tables 1, 3 and 5). On the Play Store chart, *Candy Crush Saga* was the most downloaded game. However, *Deer Hunter 2014* was downloaded the most on the iOS chart. *My Talking Tom* was more popular on the iPad chart than on the iPhone or Play Store charts.

Top Free Games in the App Store

Including *Candy Crush Saga*, *Deer Hunter 2014* and *My Talking Tom*, seven games were ranked on both the free iPhone and iPad charts (see Tables 3 and 5). Some of the top 10 free Play Store games (i.e., *Pet Rescue Saga*, *Subway Surfers*, *Despicable Me*, *Temple Run 2* and *Plants vs. Zombies 2*) were also released for the iOS platform. However, they were not as popular for iOS users.

Top Paid Games

On all of the platforms, *Minecraft* was the most downloaded paid mobile game (see Tables 2, 4 and 6). *Angry Birds Star Wars II* and *Heads Up!* were also available for the Android OS, but were not downloaded as much as they were for the top 10 paid iOS Store games.

Top Paid Games in the App Store

Minecraft, *Angry Birds Star Wars II*, *Duck Dynasty*, *Heads Up!*, *Pixel Gun 3D* and *Cops N Robbers* were included on both the top 10 paid games for the iPhone and iPad, even though most of their rankings were not same (see Tables 4 and 6).

DISCUSSION

Some genres were not included on the most downloaded game chart. For example, games within the Board, Card, Casino, Dice, Music and Role Playing genres did not appear on the top 10 iOS charts during the investigation period. However, Action, Adventure, Arcade, Family and Simulation were typical genres for iOS mobile games. In terms of the Android games' genres, Live Wallpaper and Widgets were not included on the top downloaded game charts. Arcade & Action and Casual were the most downloaded game genres for the Android OS.

Genre classification is the universal way to categorize a game's characteristic, but a cross-genre hybrid is common in mobile gaming (Deniozou, 2013). The App Store has determined 18 genres for mobile games, while the Play Store has eight genres. Unlike Android OS games, iOS games have overlapping genres. The two stores' classification criteria are also different. It was hard to generalize the popular mobile games' genres, not only because the games were

categorized into more than one genre, but also because even the same games are classified into different categories by platforms. Therefore, popular mobile games' common features were analyzed by their gaming designs, not their genres.

Based on the research results, it can be shown that screen size and price are considerable factors in regard to gamers' motivations to download a game. Mobile gamers often prefer a certain type of game based on whether it is for the smartphone or tablet computer (screen size) and whether it is free or paid (price). To be specific, the popular paid iPhone games (i.e., *Backflip Madness*, *Plague, Inc.* and *Rayman Fiesta Run*) were also released for the iPad, but were only popular for the iPhone. On the other hand, *Oceanhorn* and *Blocky Roads* were downloaded more by iPhone users. Racing and Sports games, such as *GT Racing 2* and *Blocky Roads*, were ranked higher on the top iPad chart than on the iPhone chart. Educational and Family games, such as *Kids Face Paint* and *Baby Pet Vet Doctor*, were also popular, but only for the iPad. Thus, games that require high quality graphics or careful controls, such as tilting the screen or fast and unpredictable movements, tended to be downloaded more for the iPad than the iPhone. This might be because the tablet computer's bigger screen allowed a better enjoyment for playing. Nevertheless, the boundary between phones and tablets has been blurred because brand new mobile devices have been introduced with a variety of screen sizes.

The *Angry Birds* paid version was more popular than the free version. Gamers are generally willing to pay for expanded versions. On the other hand, *Call of Duty*, *Kids Face Paint* and *Baby Pet Vet Doctor* were only popular on the free charts. Gamers might download paid versions after they play and enjoy the free versions.

The ability of the gamers to interact socially through the game also influenced their desire to download the game. For example, *Heads Up!* was

ranked high on both the paid iPhone and iPad charts, while *QuizUp* was ranked on the top 10 free iPhone chart. These games are not games that players can play alone as two players must be linked online or offline to play.

How the game is controlled might also be a considerable factor for popular mobile games. The charts analysis demonstrated that the most popular mobile games maximized the player's touch-based enjoyment with swiping, dragging or sliding. In addition, these games contained at least two of following features: simple rules, social interactions or no enemies against which to fight when accomplishing a mission.

For paid games, this factor was even more relevant. The most downloaded paid games for iOS (i.e., *Angry Birds Star Wars II*, *Duck Dynasty*, *Heads Up!* and *Cops N Robbers (Jail Break)*) have simple rules. The mission of the most notable game, *Angry Birds*, is to simply fling birds from a slingshot using a one finger flicking motion. The goal of the game is to get rid of the pigs, but they do not fight. Just swiping or flicking one's finger is all that is needed to play *Duck Dynasty*. *Heads Up!* is a simple social game. One player places a mobile device on his/her head and guesses the word on the screen from the other person's clues. In terms of the *Cops N Robbers (Jail Break)*, multiplayer are connected online and help each other break out of jail.

Another feature that some of the top paid games had in common was that they were originally released on other gaming platforms before being released in the Play Store. For example, *Need for Speed* was initially released for a video game console, while *Minecraft* and *Plants vs. Zombies* were originally computer games. As such, brand awareness might have positively influenced the download motivation of "Hard-offs," who download the mobile version of a hit console title (Chehimi et al., 2008).

When it comes to ranking fluctuations, the paid game charts were more stable than the free game

charts. The standard deviation for the top 10 paid iPhone game chart was 2.69 and the variance was 7.26. The standard deviation for the top 10 paid iPad game chart was 2.88 and the variance was 8.27. In addition, the standard deviation for the top 10 free iPhone game chart was 2.05 and the variance was 4.19. The standard deviation for the top 10 free iPad game chart was 1.28 and the variance was 1.64. These numbers imply that a couple of paid games were steadily downloaded by gamers, while the free game charts were subject to fluctuations. In the case of the free games, a gamer's decision to download a game was not weighted toward one certain game.

However, no significant differences existed between the free and paid charts for Android games. The standard deviation for the top 10 free Play Store game chart was 2.91 and the variance was 8.47. The standard deviation for the top 10 paid Play Store game chart was 2.92 and the variance was 8.50.

CONCLUSION

Today, game developers attempt to blur the boundaries between virtual and reality by using developed technologies in order to give gamers more of a presence within a game. Various applied technologies in mobile media have allowed numerous types of mobile games from social to hybrid and augmented reality games. On the other hand, when it comes to telepresence, which is usually created via high-quality 3D and sound reality technology, mobile games are falling behind console and computer games. Thus, in order to overcome these limitations, until the technology has been perfected, game designers must rely on making the most out of the technology of today and make the games as addicting as possible. Since mobile media are deeply involved in the contemporary users' lives, mobility is the strongest asset of mobile games. In order to make the games addicting they must rely on features that appeal to the gamers.

Indeed, the most downloaded mobile games have the common technological and gaming design features (RQ1), such as touch-based enjoyment, the ability to play the game wirelessly, social interactions, simple rules, and the removal of enemies and missions that do not require defeating an enemy to complete. Furthermore, renowned games for video consoles or computers are popular for mobile platforms.

Mobile game developers should consider gaming platforms (RQ2) and price (RQ3). Games that need high-resolution and dynamic controls to play tend to be more popular for tablets, as it discussed above. Even though it is not free, games that have the popular games' features are likely to be downloaded more.

In contemporary society, mobile games are no longer a toy for young people. While the younger generation of gamers would be interested in more involved, complex games, older generations may prefer casual games that allow them to pass time, such as *Tetris* and *Bejeweled*, as they can have a positive influence on their mental and social health (Plaza et al., 2011). As the age of gamers varies from the very young to the very old, game designers must take the aforementioned main features of contemporary popular mobile games into consideration.

LIMITATIONS AND FUTURE STUDY

The investigation period for this study was relatively short and, as new games are released daily, a longer investigation period may be useful in determining more conclusively the features that appeal to gamers. In addition, this study only focused on the top 10 games downloaded in the United States. In order to create a more robust data pool, future studies should also include other nation's charts as cultural differences might emerge when comparing the top charts of different nations.

As gamers have a tendency to follow the crowd and download popular applications, top 10 charts presented by third-party and market websites may actually influence the purchase decisions of gamers. Hence, future studies should focus on whether and to what extent these charts influence gamers' purchase decisions.

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References:

- Anderson, S. (2012, April 4). Just one more game...: Angry birds, Farmville and other hyperaddictive 'stupid games'. The New York Times. Retrieved from <http://www.nytimes.com/2012/04/08/magazine/angry-birds-farmville-and-other-hyperaddictive-stupid-games.html?pagewanted=all>
- Chehimi, F., Coulton, P., & Edwards, R. (2008). Evolution of 3d mobile games development. *Personal and Ubiquitous Computing*, 12, 19-25.
- Choe, S. (2009, May 24). In South Korea, all of life is mobile. The new york times. Retrieved from <http://www.nytimes.com/2009/05/25/technology/25iht-mobile.html?pagewanted=all>
- Deniozou, T. (2013, March 29). [Web log message]. Retrieved from <http://mobilegbl.wordpress.com/2013/03/29/mobile-game-genres/>
- de Souza e Silva, A. (2006). From cyber to hybrid: Mobile technologies as interfaces of hybrid spaces. *Space and Culture*, 9(3), 261-278.
- de Souza e Silva, A. (2009). Hybrid reality and location-based gaming: Redefining mobility and game spaces in urban environments. *Simulation & Gaming*, 40(3), 404-424.
- eMarketer. (2010, August 17). [Web log message]. Retrieved from <http://www.emarketer.com/PressRelease.aspx?R=1007880>
- Emerson, R. (2011, December 31). The most popular apps of 2011. The Huffington Post. Retrieved from http://www.huffingtonpost.com/2011/12/23/most-popular-apps-2011_n_1167623.html
- Gu, J., & Duh, H. B. L. (2011). Mobile augmented reality game engine. In b. Furht (Ed.), *Handbook of Augmented Reality* (pp. 99-122). Springer, NY: Springer Science Business Media.
- Hartmann, T., Klimmt, C., & Vorderer, P. (2009). Telepresence and media entertainment. In C. Bracken & P. Skalski (Eds.), *Immersed in Media Telepresence in Everyday Life: Understanding Media Users' Everyday Experiences* (pp. 137-157). New York, NY: Routledge.
- Hjorth, L. (2011). Mobile@game cultures: The place of urban mobile gaming. *Convergence: The International Journal of Research into New Media Technologies*, 17(4), 357-371.
- International Society for Presence Research. (2012). About ISPR. Retrieved from <http://ispr.info/>
- International Telecommunication Union. (2010). Recommendation ITU-R M.1645 (06/03). Retrieved from http://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.1645-0-200306-!!!PDF-E.pdf
- International Telecommunication Union. (2011a). [Graph illustration the ITU November 16, 2011] Key Global Telecom Indicators for the World Telecommunication Service Sector. Retrieved from http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom.html
- International Telecommunication Union. (2011b). Definitions of World Telecommunication/ICT Indicators. Retrieved from http://www.itu.int/ITU-D/ict/material/TelecomICT_Indicators_Definition_March2010_for_web.pdf
- International Telecommunication Union. (2013). Mesearing the information society. Retrieved from <http://www.itu.int/pub/D-IND-WTID.OL-2013>
- IntoMobile's article. (2011, September 1). Study: smartphone penetration hits 40% of overall U.S. mobile market Retrieved from <http://www.intomobile.com/2011/09/01/study-smartphone-penetration-hits-40-of-overall-u-s-mobile-market/>
- Katz, J. E. (2007). Mobile media and communication: Some important questions. *Communication Monographs*, 74(3), 389-394.

Nielsen. (2013, August 06). Who's winning the U.S. smartphone market?. Retrieved from <http://www.nielsen.com/us/en/newswire/2013/whos-winning-the-u-s-smartphone-market-.html>

Plaza, I., Martín, L., Martín, S., & Medrano, C. (2011). Mobile applications in an aging society: Status and trends. *The Journal of Systems and Software*, 84, 1977-1988.

Portio Research. (2013). Mobile applications futures 2013-2017: Analysis and growth forecasts for the worldwide mobile applications market. Retrieved from <http://www.portioresearch.com/en/major-reports/current-portfolio/mobile-applications-futures-2013-2017.aspx>

Richardson, I. (2011). The hybrid ontology of mobile gaming. *Convergence: The international journal of research into new media technologies*, 17(4), 419-430.

Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. (p. 672). Cambridge, MA: MIT Press.

Sheller, M., & Urry, J. (2006) The new motilities paradigm. *Environment and Planning A*, 38(2), 207-226.

Teleco. (2013, December 15). LTE. Retrieved from http://www.teleco.com.br/en/en_lte.asp

Wirth, W., Hartmann, T., Boecking, S., Vorderer, P., Klimmt, P., Schramm, H., et al. (2007). A process model of the formation of spatial presence experiences. *Media Psychology*, 9, 493-525.

Wisely, D. (2007). Cellular mobile : the generation game. *BT Technology Journal*, 25(2), 27-41.

Wilson, J., Chesher, C., Hjorth, L., & Richardson, I. (2011). Distractedly engaged: Mobile gaming and convergent mobile media. *Convergence: The International Journal of Research into New Media Technologies*, 17(4), 351-355.