GENDER REPRESENTATION IN VIDEO GAMES

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This thesis explores how female stereotypes conveyed through popular video games have changed over the past ten years. The author uses visualizations to demonstrate the changes in female character clothing, outward appearances, and features, including the percentage of skin exposure.

The author determines the top twenty games of the past ten years according to the IMDb and compares the number of playable female and male characters in these games. The results examine whether female stereotypes have changed.

The author selects ten female characters aged 16-50 from each year's top games. The body shapes and skin exposure percentages of these characters are analyzed using Adobe Photoshop. Data on the width of hips, shoulders, and waist, as well as leg length, reveals if there is any change in appearance over time.
INTRODUCTION

Ten years ago, researchers found out that most video games target male players as the main player group (Cassel and Jenkins, 1998; Provenzo, 1991). Analyses of video game content have found female video game character portrayals to be infrequent and sexually objectified (e.g., Beasley & Collins Standley, 2002; Dietz, 1998; Heintz-Knowles & Henderson, 2002). The most common goal in these games is to rescue a princess or another woman character. Female characters either need a male character’s help or appear in supportive roles to the male characters. This places the female characters in games as the weaker group or as the factors that satisfy male player’s needs.

While some games have female main characters, those same characters are often non-playable. For example, Princess Zelda is the main character and namesake for the game Zelda, but players cannot actually control that character. Instead, players can control a male character named Link whose objective is to always save Zelda. This is a typical scenario where players operate a male “hero” character to save a female character.
Another example is Super Mario who rescues Princess Peach in *Super Mario Brothers*. In James D. Ivory’s (2009, 107) article he states, “Consistent with the findings of previous studies, female characters were found to be underrepresented and proportionally more often sexualized in comparison to their male counterparts.” James finds out that when players post their reviews on gaming blogs, players talk about male characters’ ability or mechanics, and female characters’ outfit and body shape. However, female character body stereotypes have changed in recent years due to social and educational reasons among others. Now, there are more diverse female characters who appear in video games.

The elements in video games often exaggerate the needs and ideas of people in real life. The protagonist is very brave and smart, such as Link in *Zelda*. He has been given a lot of fighting and life skills by game designers. He is a kind person who helps others and saves the world. In 19 main series *Zelda* games, Link saved Princess Zelda and Hyrule 19 times. This almost perfect character does not exist in reality. Because of people’s pursuit of good things, this almost perfect character is very common in games. This is also a good ideal for the game. Designers expect this setting to have a positive impact on the player.

Things that cannot be realized in reality are realized in the virtual world, for example in MMORPG game players can dominate and challenge other players that they can’t do in real world. Kuss DJ. mentions that “Reputation and admiration from the gaming community for gaming achievements are further key factors motivating players to keep playing.” (Kuss DJ. 2013) Players escape the real world and create another life in virtual world. Depends on Yee’s research “Immersion in the game is denoted by discovery, ie, exploring the game and “hidden” game content, role-playing via one’s avatar, customization of one’s online character (such as sex, race, profession, appearance), and escapism, ie, playing in order to avoid real life (Yee N. 2006 772-775) This is why more people are attracted to the game world. Today, as the game industry is rapidly rising, the status of female characters does not keep up with the changes of the times. Female characters are weakened in the game—objectified. Howev-
er, these stereotypes of female characters have existed in video games for a long time. “Lesiure Suit Larry in the Land of the Lounge Lizards” from the late 1980s, the final goal for main character, Larry Laffer, is having sex with different women. On that game, female character as a trophy. Male character solves the problem and try to get the best girl.

By collecting 200 game characters over the past ten years—playable and non-playable, female and male, game types, and non-human—we discover the changes in the designers’ and players’ perceptions of female character abilities. By comparing game sales in recent years, the relationship between the number of female characters and game sale is easy to see.

Most researchers, like James D Ivory, use simple line graphs to express the relationship between playable and non-playable female characters. Most researchers use line and bar charts for quantitative data analysis. Additionally, they calculate the average and slope to see future trends. There is no cross-comparison of game data with another field, such as comparing game sales to the number of female characters, comparing with female characters’ clothes style with real human clothes style. Different fields of data may show some different trends.

The body shape and appearance of female characters reflect developers’ inherent impression of women. This paper would collect images of 3D female models and concept art renderings of ten female charac-
ters each year—one hundred in total. Most of the female characters had hyper-real bodies in the games and some characters had outfits that were unfit for the game background and context. Male characters tend to appear “normal” and fully clothed, yet female characters are shown in revealing dresses on the same screen. For example, an armored male character walks in with a female character who wears a short Japanese uniform skirt. Street fighter is a good example to talk about here. Street fighter is a fighting and action game. Player can choose character to fight with other party. On Street fighter image, all male character wear something related to real world sports game, such as Kongfu, sumo and boxing. Female character outfit looks really inappropriated, such as skirt, and tight. In order to observe the changes in the body shape and outfit of female characters, the I collected data from one hundred images from various video games. To better understand the relationship between the images, and the body dimensions they represent, each female character’s head was resized to be the same. Then, the author progressed by measuring the shoulder, waist, hip width, shoulder to waist, waist to hip, and leg length. This process digitizes the image, calculates the average data of the character’s measurement data each year, and then designs an average model. The average model shows the character body shape of a particular year. This process produces an image that is simple and clear. In data visualization, there is a small amount of image and numerical data available for cross-comparison. Other image studies mostly compare and contrast the same character’s multi-year changes. The most famous one is Lara Croft in *Tomb Raider*. This research paper’s visualization was inspired by Lara Croft’s visual work. Cross-comparing number and image data of female characters over the past ten years provides more information to draw conclusions about the body image changes of female game characters over time. Therefore, the author categorizes the clothing from one hundred pictures of characters including daily wear, low-cut, porn styled, tights, work suits, school uniforms, miniskirts, and armored. Through image processing, shows which kind of outfits are more popular in the game industry. At the same time, this result reveals what game designers think about female characters.
The game genre also influences the changes in the number of characters and shape of game characters. Through observation of various popular games, people can see the development pattern of the game industry and the players’ requirements for games. This investigation focuses on console and desktop computer games. There is also some mention of games published on both mobile phones and PCs. Multiple platforms mean that a particular game has more reach and impact. In 2017, video game sales reached $104.57 billion dollars. Console, PC, and mobile games share the whole game market. (PWC, Statista) A typical family usually does not own all the devices. If one game published in a different platform, it provides more opportunities for a player to try it. Different game types will influence characters’ clothing style. For example, in a first-person shooting games usually contain guns and a battlefield. Depending on the background story, the character will wear army clothes, body armor, and use guns to protect themselves. Dresses and high heels seem inappropriate in such contexts, yet it is not uncommon to see female game characters in these types of items.

The following is a brief list of game classification types.

Different game type will target different player group. Different type of game will create different player group. Different group may have similar habits. MMORPG usually attract more player to attract into game world, because of the relationship in the game. Players has more rights to create their own character. Education game may be the least popular game, most players are trying to learn something.
GAME TYPES

From Jane Hurst’s *12 Types of Computer Games Every Gamer Should Know About* (Jane 2015):

[1] Massively Multiplayer Online (MMO)
   These games are played over a LAN (local area network) or via the Internet. Players use a network and interact with other players in the virtual game room. You can play against people from all over the world. The creation of these games involves thousands of hours of programming, giving you, the player, the most amazing gaming experience possible.

[2] Simulations
   These games involve taking control of real-world vehicles, including tanks, ships, and aircraft.

[3] Adventure
   These are usually single player games and are often set in fantasy or adventure worlds. Gamers complete puzzles to advance levels. The game generally starts with a backstory of your character, and let you know what your mission is. Players have to figure out how to complete the mission.

   For these games, you usually need to build up your inventory of items, armies, etc. Similar to a strategy game, RTS games move in real-time, and players can play at once without taking turns so you can play together at the same time.
[5] Puzzle

There are many levels, from beginner to expert, and games usually have colored shapes and simple actions. These are brain games, with no action involved.


Complete challenges by fighting with enemies and use a character of your choice to represent yourself and jump into the action.

[7] Stealth Shooter

These tend to be war games or spy-based games, where you use stealth to defeat your enemies.

[8] Combat

Fight one on one with opponents, up close and personal.

[9] First Person Shooters (FPS)

You are the protagonist, and the game is viewed through your eyes. You can really get into these games. The only downfall is that you are not able to see how you look in the game, because you are seeing things through your own eyes.

[12] Educational

While many parents and teachers complain about video games, there are some great educational games out there that can help with the learning process. Train in a variety of subjects, using games to make learning fun instead of boring.

This paper also examines the number of video game characters per gender, noting that in most popular games, there are many more male protagonists than female ones. Additionally, in games, female characters typically need help and seem less powerful. In fact, the main goal of several popular games, including Super Mario, Zelda, and Final Fantasy is saving the princess or an other female character. The stereotype conveyed by these games affects the perceptions of young women. At the same time, it also misguides adults by suggesting. “Video games can be used as a virtual playground for players to experience the cognitive, motivational, emotional, and social benefits of gaming” (Granic, Lobel, & Engels, 2014). Depends on Granic, Lobel & Engels’ point on the other hand it can mislead player to the wrong side, especially teenager.
RESEARCH QUESTIONS

This project analyzes how the female character and feminine elements were changed over the past ten years. How have female character stereotypes been formed around sexual objectification and unfair gender roles? How do female characters change in a video game over time? Which aspects constitute this change? What is the stereotype present in video game attractiveness?

"Projects realized at the end of the 90s and the early 2000s deconstructed stereotypical gender representations and judged video games to be a biased medium" (Dietz 1999, Gailey 1993, Smith 2003). To answer these questions, this thesis collects data from top twenty video games over the past ten years with attention to the following: playable female and male characters, non-playable male and female characters, and the visual image for main characters. All the data comes from Forbes.com, Imdb.com, and other player voting websites. Top twenty games represent the most popular and influential video games for a given year. This paper provides a virtual census in video games, documenting gender, age, and race in video games. The authors pick top two hundred video games from 2008 to 2017. In this thesis, the author uses visualization to demonstrate the stereotype changes of the outward appearance and features of female characters over the past ten years.
LITERATURE REVIEW

Drawing inspiration from James D Ivory’s paper ‘Still a Man’s Game: Gender Representation in Online Reviews of Video Games’ (2009), the author describes the situation of female characters in video games though analyzing game reviews.

The thesis asserts that:

[H1] Male character references would outnumber female character references in online reviews of video games, both in text and images.

[H2] Male characters are described as active and playable characters proportionally more often than female characters in reviews, whereas female characters are featured as passive objects of gameplay proportionally more often.

[H3] Female characters are described and visually depicted in a sexually suggestive manner proportionally more often than male characters in reviews.

[RQ1] How do video game reviewers regard the prevalence and sexually suggestive representations of male and female video game characters in game content?
Ivory’s (2009) paper provides a powerful conclusion about how male characters have more topics, playable or nonplayable, on websites. When people talk about female characters, their attractiveness and sexuality were disproportionally mentioned in more reviews than that of males. On the game discussion blog area, player talk more about female character’s outfit, and body shape. On the other hand, player discusses male character’s ability and skills. Ivory’s thesis was published in 2009, about ten years before this thesis. The data shows that at that time more male characters were playable, and players cared more about the appearance of female characters. Players treat male character as human, but treat female character as an object. This paper demonstrates the change in female game character stereotypes over the last ten years. Players care more about the sexual representations of female characters. However, for male characters, players care more about features or functions.

The limitation of this research is that at that time, there were many more male players than female players, so most of the reviews are from male players. The technology and culture of that time also influences a player’s opinion. Most of the female characters in the game are presented as weak or in need of help. Game designer’s bring their own biases when giving female character’s their “jobs.”

The paper Gender and Racial Stereotypes in Popular Video Games mentions this same situation of how disproportionate gender representations and stereotypes of game characters could explain why girls dislike video games and play them less than boys do (Hartmann & Klimmt, 2006).

This thesis shows how female characters as a protagonist in video games are much less than males’ character because the game designer or the game industry believes that women do not like video games and, therefore, won’t buy them. According to Nick Yee, the co-founder of game analytics company Quantic Foundry, study that 70% of women play three family/farm simulation games. However, on first-person shooters, tactical shooters and racing games, only 2% of players are woman. (Yee Game Audience Reports) Most PC and con-
Controller games are adventure, action and shooting game which are not popular in female players. When designer realize that they focus more on male players. This creates a bad cycle because when the game designers make a game, they give more consideration to male players’ need. Other media or social factors drive designers and artists to design the female characters in these stereotypical ways.

From the thesis *Roles of Female Video Game Characters and their Impact on Gender Representation* the author mentions how other factors, such as the media, influence female characters in video games. The thesis also explains the concept of gender in the video game. “Since the womanly images this study is concerned with are of a social and not biological character, this term has to be explained in its historical value as well as in its current use in video game theory” (Paulina, P13). Social media and other factors are major influences in the game industry. Game designers and companies are willing to hear feedback from players. Depends on Daria’s research “a number of structural game characteristics have been found to increase the risk for developing Internet gaming addiction, namely online relative to offline gaming, positive reinforcement, the enjoyment of particular game features, such as adult content, finding rare in-game items, and watching game cut scenes, and viewing one’s virtual persona as better than oneself.” (Daria, P125-137) Players usually hope the character looks nice or has perfect body shape because they cannot see that easily in the real world. This creates the sexual objectification and unfair gender roles that surround female characters.

This paper shows why people have these kinds of stereotypes. People want to see the perfect body shape which is hard to see in daily life. Those desires lead to the formulation of how female characters are currently represented. On the other hand, the female characters in the video game will also create stereotypes in people’s mind, especially the new generation.

That social influence continues to exist. For example, lots of women want to diet or lose weight even though they are not fat. In general, people believe skinny body types look better or are healthier.
This perception may have improved in recent years, but it is hard to say. A similar situation also exists in different areas of video games. For example, race and age can be an issue. It’s rare to see an elderly lady as a primary character in games. The white male usually is the most popular primary character.

From the thesis, *The Virtual Census: Representations Of Gender, Race, And Age In Video Games*, Williams explores more about race gender and age representation in different kinds of games. The research shows that men are primary characters much more frequently than women. Williams search 8572 characters and find out: “male characters are vastly more likely to appear than female character in general. The overall difference of 85.23/14.77 percent is also a large contrast with the 50.9/49.1 percent distribution in the actual population.” (Williams, P824)

80.05% primary characters possess white skin than other skin tones. In that paper, Williams calculated all the characters’ gender, race, and age in the most popular video games. This revealed a strong trend in more male characters and playable male character than others. That result shows the game industry has strong preferences, as mentioned before, to satisfy the male player’s fantasy. The game designers and artists draw the female characters more and more like a “supermodel.” To compare with real human body size, the author finds out the biggest differences.

In the paper *Video Game Characters With Average Body Types* (Bulimia 2018), US women’s body measurements are Photoshopped (PS) onto popular characters in video games. The original characters are compared with the PS characters. The audience can easily spot the differences. Comparisons are a good way to let people find differences by themselves.

The author compares real human body shapes and female characters in video games in this same way. The result allows audiences to compare real female body measurements with the of game characters each year. The image below shows the big difference between the proportions of a video game character and an
average real human.
The paper *Understanding the Structure of Stereotypes of Women: Virtue and Agency as Dimensions Distinguishing Female Subgroups* provides three important concepts. Researchers in this tradition have consistently shown that people possess a schema of the stereotype of women that is organized in terms of three major subgroups: homemaker, professional, and sex object (Deaux, Winton, Crowley, & Lewis, 1985; Eckes, 1994a, 1994b; Six & Eckes, 1991 p396-404). These three subgroups are the main concepts that the author uses in the article.

The study analyzes stereotypes women in the world. The authors mention that people believe women more likely to serve someone. As a homemaker, women work as mothers and wives. They are responsible for picking up their children, taking care of family members, and doing the housework. That’s one stereotype that people used to have. The second subgroup is the professional. In this role, women work like men. They work for a company or they have their own business. Professional women work more independently. Finally, the last subgroup is the sex object. When people see a female, they judge her based on her outfit and body shape. The authors found that people view the women belonging to the first and third subgroups as attractive but see women with strong businesses or careers as less attractive to men. This study supports my work in exploring...
caused some changes in video games. However, some stereotypes still exist. For example, the paper *Examining the Role of Gender in Video Game Usage, Preference, and Behavior* (Phan, M. H p1496-1500) explains that when companies develop video games and products with females in mind they often base their game designs on stereotypical gender roles. For instance, many game companies believe that female players are attracted to games with the color pink—fashion, shopping, and dating games—and that they dislike games with violence, gore, and complex scenarios. “This thinking is likely to be oversimplified, misleading, and reflects the stereotypical beliefs of the male-dominated gaming indus-

why female characters looks like that. Society puts a lot of pressure on women. Traditional stereotypes believe a woman should serve her family and be sexually attractive.

Another important aspect is about how female characters are featured or their roles in the game. This paper provides data to show that most of the female characters are non-playable, but this situation is changing in recent times. The stereotype of women in society changed in the last decade which
CONCEPTUAL FRAMEWORK

This thesis shows how female characters have changed in the last decade. How have female character stereotypes been formed around sexual objectification and unfair gender roles? To show the changes, the author collects all the characters models from the most popular video games in IMDb in the past ten years. The most popular games mean that most people buy them and love them. According to essential facts about the computer and video game industry report in 2017, “67% OF US HOUSEHOLDS own a device that is used to play video games. 65% OF US HOUSEHOLDS are home to at least one person who plays three or more hours of video games a week” (ESA 2018 P4). In the US, the video game is an important part of family life. In this thesis, the author collects data from video games including which platform—PC, Mac, and controller (controller including Xbox, PS3 PS4, etc.). Mobile games and other mobile devices are not be counted in this thesis because most of the “hardcore” games are not publicly available on the mobile phone.
CONCEPT MAP

This thesis uses terms and sub-groups from the paper *Understanding the Structure of Stereotypes of Women: Virtue and Agency as Dimensions Distinguishing Female Subgroups* to analyze why female characters seem more diverse now than ten years ago. There are three main female stereotypes: homemaker, professional, and sexual object.

To simplify the large amount of data, the visualization will use simple colors to represent gender. The visual methodology will be separated into two parts: the characters’ function and appearance. The details on the methodology is introduced in next section. The results of the visualization combine the final summary charts and visual character data.
[ 1.1 ] Background Of Game Industry

To explore the issue of women’s stereotypes in different industries, the author used video games from the last decade as a case study. The visualization is divided into two parts: quantitative data and image data. The number of female characters in video games and playable female characters in each year shows a broad change in flow. All games come from the IMDb website and number of characters are from the FANDOM website. FANDOM is “a global entertainment media brand powered by fan passion” (FANDOM.com). The data all includes game name and type, playable male and female characters, non-playable male and female characters, and non-human characters. Playable character means that the player can maneuver a character to perform actions or interact with other characters. The 3D image data comes from the official game website, or game screenshot. The image data includes the female body shape and skin exposure which shows how the stereotypes change based on outward appearance.
[1.2] The Common Stereotypes in Video Games

1.2.1 Rescue The Princess

In the past ten years, the video game industry has continuously grown. As mentioned previously, most of the popular games are male-led games. In those games, the female characters are in a fundamentally weak situation or need rescuing. For example, *The Legend of Zelda* is “set in the fantasy land of Hyrule, the plot centers on a boy named Link, the playable protagonist, who aims to collect the eight fragments of the Triforce of Wisdom in order to rescue Princess Zelda from the antagonist, Ganon” (*The Legend of Zelda* pp. 3–4). The first version of Zelda was published in 1986 and soon became one of the most popular video games in the world. In 2017, *The Legend of Zelda: Breath of the Wild* released to the public. Players love this new explore system which allowed player cooking, catching horse or fighting the final boss at beginning. There is no level system or mission has to be finished before kill the final boss. Game designer gave player so many freedoms to explore this world and do what they want to do. The new *Zelda* jumped to the most popular game in 2017. It won numerous awards, including several games of the year awards. By September 2018, *Breath of the Wild* had sold over 11.7 million copies worldwide. There is no doubt that *Zelda* is a successful video game. From 1986 to 2017, the Nintendo EPD published more than ten versions of *Zelda*, but in every version of the game, Princess Zelda needs to be rescued by Link.

For the past twenty years, Link has remained as the main playable character. Despite the game being named *Zelda*, the princess is limited in the things she can do in the game. Her job is waiting to be rescued by Link. This game is not a special case. *Super Mario Brothers* provides a similar example. Princess Peach appears in fourteen of the core *Super Mario Brothers* platform games. Of these fourteen games, she was kidnapped in thirteen of them. This is a main game story line or goal—to save a lady. “The playable protagonist is usually a smart or strong male character. The damsel trope typically makes men the subject of the narrative while relegating woman to the role of the object. This is a form of objectification because women become a prize to be won. The lady is typically beautiful and helpless. This capitalizes on the male power fantasy in order to sell more games to young boys and men.” (Brodsky)

The “damsel in distress” prototype
is also seen in animations, movies, and novel industries. For example, in the animation *Popeye the Sailor*, the storyline always involves Popeye rescuing the kidnapped Olive Oyl. Similarly, in games, for example *Zelda*, *Final Fantasy 15*, that rescue the princess, female characters become disempowered at some point.
1.2.2 Females As The Support Character

There is another type of female character: the female character on your team doing the support jobs. A good example of this can be seen in *Grand Theft Auto*. The first version of this game was published in 1997. The company published several subsequent editions most of which were popular. “The series, which has led to five main entries and several special edition games over 16 years, has sold more than 150 million units as of September 2013” (McGinty. 2013). Currently all playable protagonists in *Grand Theft Auto* are young males, but there are female characters who assist the main characters. In this game, female characters wear sexually suggestive clothing. Their poses and actions are also sexually suggestive. From this game we can see two stereotypes here. One is that of the dependent female character. They are not independent and rely on the male characters or players. Their job is to help the male character and to make players feel needed. Female character as an object in game. Game designer not treat them like male character or human. The real world and Nathan DeWall’s paper show that people believe men can do professional work better than women. Many still hold the opinion that a woman’s place is in the house and therefore her work is “housework.”

We can see that many games indicate that men can protect women and complete difficult missions but that they also need women’s support. The same is true with some movie scenes; the man saves the world and gets the love of a woman. This storyline coupled with the “rescued princess type” supports the notion that women are the final prizes to be won.
1.2.3 Female Character As On-Demand Sex Provider

This stereotype is about sexual objectification. Webster’s Dictionary (Webster, 2011) defines “sexy” as:

[1] Sexually suggestive or stimulating: EROTIC
[2] Generally attractive or interesting: APPEALING

In video games, it is not uncommon to find some female characters dressed scantily, while male characters dress more suitable for background and environment. This situation also appears in animations. The designer tries to use a sexy female character to attract audiences. The sexy lady not only appear when players play the game but also before players buy the game. Female as an object appear before and after selling games. In Steam, which is a “digital distribution, digital rights management, multiplayer, and communications platform developed by the Valve Corporation”, (Fandom.com Steam wiki) when a player is looking for games, some of the games use sexy female characters as the logo or banner to attract audiences. When the audience clicks into page details, there is a chance they will buy it. Players can also see sexy ladies on the game cover or advertisement. On that time female character as a sexual object to attract male player to try the game.

After players buying or trying this game, female character begins to play same role, sexual object, during the game. In Grand Theft Auto, female characters wear sexy shorts and bikinis. This stereotype
has not changed over past ten years. Final Fantasy is a famous adventure and action game. The sexy female components always exist in all series games. The latest one Final Fantasy 15, includes a lady who works at gas station and is dressed in jacket with a bra and shorts. That would not happen in the real world. Furthermore, the female character engages in sexually suggestive behavior such as cleaning the car windshield with her cleavage in full view. Some scenes imply that male characters are having sex with the female characters. This reflects that Nathan DeWall’s second stereotype of women as “sexual objects”. In DeWall’s paper, a sexual object is a traditional stereotype for women. From human nature perspective, women attract men for procreation. The breasts and other body parts are aspects that men find attractive. The body shape and amount of skin exposure changing in game will show how the stereotypes change in video games. It might or might not look more like a real person. Additionally, the female character might or might not wear a sexy dress. In the next section, the image data shows the change of body shape and skin exposure over the last ten years in video games.
Female as a sexual object not only show in game environment but also can be sold in real world. Players can buy DLC which provide gamers the opportunity to play with and ogle female characters in more sexualized outfits or situations for example in Dead or Alive 5 Ultimate (2013) the Custom pack DLC offers sexualized variants of female game characters. Final fantasy 13 offer ‘beachwear’ for main character of the game. All of them cannot be unlocked by gameplay, instead they could be unlocked by money. ($2.00 and or $0.99)

The female characters don’t have enough power and ability to change their situation. This stereotype appears in so many popular games. The game never allows the female characters to run or save themselves or to be controlled by the player. Compare with male character, most male characters especial main character is smart. Even he is weak at beginning, but he learns fast and growing up (level up) during the game. Their outfit and body shape tell the store, for example a strong man with muscle usually has good at fighting. A man looks weak but he usually smarter than others. Their body shape and outfit related to their ability, but most female characters never have those abilities.

This research shows that the number of playable female characters in video games is much less than male characters over the past ten years, for example 2008, playable male character is 6 times more than playable female character. However, this situation is getting better in recent years. Players have more choices and the number of playable female characters keeps growing. Comparing with 2008, 2017 playable male characters is 0.7 times more than playable female character. The stereotypes for female characters seem to be changing too.

In male-led games, the number of playable female characters is a main factor to measure how the game industry changes. Also, comparing the slope of playable female and male characters with player game spending in past years shows the relationship between female stereotypes changing and increased revenues.
1.2.4 Female As A Trouble Maker

In order to satisfy players’ sense of accomplishment, game designers often create a series of challenges and tasks which would be hard to complete in real life. Since when the female characters play a troublemaker role in the game. In the storyline, female characters seem to problems and obstacles for male characters. The male character plays the role of a hero or helper. They need to help female characters or solve problems. By the end of the game, the male character usually gets a reward for his effort or success. The inherent impression of this troublemaker seems to be more than just a game. It also exists in popular cartoons or other film and television dramas.

In the game, male characters may also be harmed, incapacitated, or imprisoned at some point during the journey but the character can always rely on their skills and intelligence to engineer their own escape. The player is typically represented by the smart male character. The number of characters and their playable or non-playable status is dependent upon gender. Female characters are considered to be incapable of the same sort of actions as males.
[2.1] Data Collection Process

The data collection part will be divided into two parts. The first part will use the same method as the paper, *The Virtual Census: Representations of Gender, Race, and Age in Video Games* used. This involves collecting quantifiable data from the top twenty of the most popular games from the past ten years. The data includes game ID and name, year of publication, number of male characters, number of female characters, playable male and female character numbers, non-playable male and female character numbers, non-human characters, game genre, and device type. This gaming data comes from the IMDb website. All of the most popular games from that year are selected by the players. Specific data for individual games is sourced from their respective official game pages. All the data is placed into a CSV file. The author uses “R” to show the relationship between year and numbers of male and female characters in video games. The relationship between year and playable male and female character. The female and male character’s number changes in different game genre. The first part will use a way to show the change in the past ten years. The visualization is simple and easy to see how numbers and body shape changing in past ten years. It will show on the visualization and case study section.
The second part of data concerns the body shape and skin exposure percentage changes for female characters. In this part, the author collects all the available female characters from the 200 games. If the game doesn’t include a female character or depend on a real human body ratio then the author does not incorporate that information. For example, Minecraft is a pixel game. Even if Minecraft has a female character, the author cannot use it because the character style is built using a highly stylized geometric structure of large pixel blocks and only vaguely references a real human form. Additionally, the author only collects data on female characters aged 16-59, in the other words, adult women. This thesis data does not include elderly women or young children to ensure the data is standardized. Some games, such as Little Big Planet, don’t have human characters so the author won’t take those games into consideration. The non-human or different-styled characters would impact the accuracy of the measurement.

Some games may have more than ten female characters. For example, League of Legends has as many as 200 characters. The author only includes one to two characters from each game. Each character will be classified into the different game genres. The action and adventure games will be the main study cause to dig into.
[2.2] Rules To Collect Image Data

These are the rules and methods used to collect visual data and measures of the body shape.

METHOD 1
Rules/Methods to measure the body shape:

[1] Collect each game’s character from a real game or YouTube video (real game video).

[2] All the characters should face the audience and stand naturally without posing.
Example from Overwatch:

![Image from Overwatch official website](Image from Overwatch official website)

[3] Place the character’s head into the model frame and make sure the head size is within the line of the circle (without hair).
[4] Use the ruler on the model frame to measure the length of shoulder, waist, and hips. Use the shoulder, waist, and hips to divide character into four horizontal parts (head to shoulder, shoulder to waist, waist to hips, and hips to feet). Measure the vertical length of these four parts. (See Example 3. A1, A2, A3, A4)

[5] The shoulder and hips length should be the widest line between two sides. Waist length should be the shortest line between two sides. (See example 2.)

CALCULATION & RE-CREATION
Total for all games and each game genre:

[1] Average shoulder, waist, and hip length
[3] The ratio between shoulder, waist, and hip length
[4] The ratio between A1, A2, A3, and A4 length
[5] A1 = head size, A2= S-W, A3= W-H, and A4 = leg (all which is shown in the next measurements and visualization section)

The author creates a model for all games and each genre to compare the female characters of each year. The real-world female model that the author creates depends on average measurements for women from the National Center for Health Statistics American. By comparing all the female characters with US female body shapes, the audience sees the change of height, and body shape across ten years.
METHOD 2
Methods for collecting skin exposure for each character:

[1] Use the same characters collected from M1.
[2] Clear up the background
[3] Catalog character by their clothes.
[5] Find the percentage of this special clothe styles.
[6] Create icons for each kind of clothes. Red color shows the average clothes and gray color shows the skin exposure.
[7] Show the summary of each percentage of clothes style and skin exposure.
[8] Visualized the summary of the data
[3] Results & Visualization

3.1 Visualization

This thesis provides basic information about game types and how they influence the character’s stereotype. This paper uses visualizations to show how the number of playable female and male characters and non-playable female and male characters have changed over the past decade. The visualization shows the trend for female characters. The visualizations also indicate changes by game type. For example, audiences see how characters were changed in first person shooting games, adventure games, MMORPG games, etc. The author summarizes all of the popular games. Then the author selects one of the most popular game genres and compares and contrasts the changes from this genre with the changes of different game genres. Some characters of specific game types may never change. Others may change a lot. Perhaps, the playable female character’s number increased. Maybe the male and female character seem to be balanced. Comparing present stereotypes of female characters with main game characters may show a difference than what was true ten years ago. This paper provides its own rules calculating the ratio between a characters’ shoulder, waist, hip and leg length. Then, an average is calculated to create a model. The author also uses the same characters to collect skin exposure area and uses average numbers to create the model. Using the model to draw comparisons, the audience can see how the female character stereotype changed over time. Initial experiments and work reveal the details in how to create the visualization and how to play with it. The final visualization display is a playable book which is easy to see the comparisons across ten years data. Lastly, the paper discusses why this happens. There are so many
causes for this situation.

Recently, more women have become interested in video games. Now, 53% of game players are ladies (Entertainment Software Association 2017 P6) With an increase in attention on women's rights and its impact on psychological and social behavior changes, a push in changes to the game industry is also taking place. Female players spend more money on the virtual items, for example buy virtual gold to make game easier. Real money to buy virtual money are more popular in Facebook games and phone games. It doesn’t mean MMORPG or online shooting games can’t use real money to buy virtual money. This system is more popular in phone games and Facebook games. Also, female players collect virtual customs for characters, even though they know the customs without any additional power. The buying power of female players is a factor that influences the game industry. Gender representation in video games has changed in various aspects. For instance, more female characters are playable, and more games are adding new mechanics to attracting female players, for example in Zelda, game designer add cooking system which never had before. New cooking system allowed players explore new recipes and different recipes will provide different dishes with different powers. Lots of players begin to explore the new recipes. Players are now finding more diversity among the game characters. No longer are all female characters skinny, beautiful, and sexually attractive. In 2016, the popular game Overwatch had a Chinese female character named Mai who was not skinny by game standards. This character is still popular and breaks the old stereotype for female characters. The paper provides more example like that to explain how gender representation has changed. Some games even ask players to customize their avatars. As more diverse characters continue to appear in video games, players are accepting these changes. Such changes will bring more enjoyment to even more players.
3.2 Quantitative Data

What does it look like overall? How does the visualization show a clear result? Those are questions audiences usually have. In this section all the visualizations will shows the result of characters number changes in past 10 years.

The line chart shows the overall trend of all male and female characters in past ten years. The blue color represents males. The orange color represents female. Light Orange and blue colors will represent playable female and male characters respectively in all visualizations. The vertical line represents the numbers of characters and the horizontal line represents number of years to show the relationship between numbers of characters and years. Comparing the position of the orange and blue lines, you can clearly see the difference in the number of male and female characters, as well as the trend of change.
Line charts are a better way to compare numbers, trends, and relationship. This line chart shows how male characters outnumbered female characters over the past ten years, especially from 2008 to 2013. After 2013, the number of male and female characters increased until 2016. In 2017, female characters kept increasing while the number of male characters decreased. The second line chart shows that the number of playable male characters was greater than playable female characters, especially in 2008. After 2008, playable male characters decreased immediately. From 2009 to 2014 the number of playable male characters continued to steadily decrease. From 2014 to 2017, the number of playable male characters began to increase. Conversely, the number of playable female characters continued to be less than male characters. The number of playable male characters is usually twice or more than that of female characters. In 2008 alone, playable male characters were eight times that of female characters. Overall, the number of playable female characters has remained at a very low level. There is a steady growth trend after 2013 with the highest peak in 2017.
In recent years, the gaming industry realizes that the number of female players is rapidly increasing. Given the widespread changes resulting from recent women’s rights activists, gaming companies are changes to character control ability and appearances. In order to increase the diversity in games, game companies have produced more games that feature female characters as the main protagonist. Not only does this satisfy the needs of some female players but it also addresses the lack of female representation in the gaming market. This action has been recognized by society. Between 2015 and 2017, more playable female characters emerged in the game market and became classic characters. Game companies have won more honors and rewards because of those games. For example, in 2015, Life Is Strange introduced player controls for Max Caulfield, a female protagonist who takes an adventure.2 In 2017, another adventure game, Hellblade: Senua’s Sacrifice allowed for the control of Semua, a main protagonist who explores the world.3 In recent years, more games have provided more choices for players. In some games, players can create their own characters. They can choose gender, skin, outlook, and body shape.
Life Is Strange and Hellblade: Senua’s Sacrifice
Pie charts show the percentages of each component. As stated previously, the orange and warm colors are represented females and blue and cold colors represent males. The first chart, *Male and Female characters percentage 2008-2017*, shows that there were fewer female characters than male characters in the last decade. Female characters accounted for 27% of the total, while male characters accounted for 73%. There were three times as many male characters than female characters. In the second chart, the proportion of female characters is even less. Playable female characters accounted for only 22.11%, while male characters accounted for 77.89%. Game designers were more inclined to let players control male characters. From the data, the number of female characters is much less than male characters. Why is this happen? In virtual world female characters defiantly can has same ability as male character. It looks like Game designers believed female characters could not be the main protagonist because of female stereotypes. Compared to males, females are seen as weak in lots of games for example Zelda, Super Mario and FF15. Females usually need to be protected. Those stereotypes existed in the minds of the designers and players. Designers didn’t want to give female characters the same abilities as the male characters because they were unsure that players would buy it. Female main protagonists were a big challenge for companies because they were uncertain that these games could sell.
In the pie charts and graphs below, the light-yellow part is the non-interactive and controlled female character (NPC = non-playable character). The orange part is controllable by the player. The gray-blue part is a male character that can be controlled by the player, while the blue is a male character that the player can control. 65.75% of the main female characters in the game are not controllable by the player, while for male characters that number is 55.12%. Nearly half of the main male characters are controllable in the game. Only one-third of the main female characters are controllable by the player.
This difference shows the dominance of male characters within the sample set. Of the 200 games collected, only four had female main protagonists and did not offer a controllable male character. On the contrary, most games are dominated by male characters and players can control a variety of male characters. Female characters are mostly supporting characters, such as Zelda, Princess Peach, and so on. Most female characters are in the background of the story or rewards for the mission.

In recent years, some games have provided players with more choices. Male or female characters can be selected at beginning of the game. This change increases the number of female playable characters in the database, but that number is still significantly less than male characters. Female characters as independent protagonists are still scarce in the market. To see the changes in the number and appearances of female characters each year, see the information below.
The four pie charts show:

[1] The Percentage Of Male And Female Characters Respectively In Past Ten Years
[2] The Percentage Of Playable Male And Female Characters Respectively In Past Ten Years
[3] The Percentage Of Female And Playable Female Characters Respectively In Past Ten Years
[4] The Percentage Of Male And Playable Male Characters Respectively In Past Ten Years
From 2008 to 2017, there were much fewer female characters than male characters, especially in 2008 when the number of male characters were 35.19 times that of female characters. In 2008, *FIFA09* which are series of football video games, made this number unusual. Players could choose 5500 football players to control in the game, but none of them were female football players. The FIFA game didn't provide female players until the release of *FIFA16* in a 2015 re-published version. This situation was changed in recent year. Depending on Owen S. good’s article “Sports video games finally have their Year of the Woman” (Owen S) In 2018 NBA live’s 19, EA Sports UFC 3 and FIFA 19 expanded more female characters in games. Designers give players more choices. Compare with 10 years ago, female characters get more ability in sports game. Even after removing the 5500 outliers of male characters in 2008, the female characters were still much less than male characters. Male characters are more than twice as many as female characters in most of the years. In 2008 and 2009, there were many more game characters than previous years. This is because on during those two years Combat, MMORPG, and other sports games were more popular than the other years. During that time, independent video games, usually were developed by single person, small group or small studio, (indie games) doesn’t create too much games in the market. They don't have much technology or money to develop game by themselves. Big game company control the market. Most of the games came from the AAA companies like EA, and Blizzard. “Indie gaming saw a rise in mainstream popularity in the latter half of the 2000s, primarily due to new online distribution methods and widely available video game development tools.” (Irwin, Indie Game Developers Rise Up) After the indie game development of the later 2000s, players had more choices. Most indie game genres are action or adventure. Those two kinds of games usually have one or two main protagonists and players have storylines to follow. Compare with Multiplayer online battle arena (MOBA) game and sports game the adventure and action game usually have less playable characters which cause the playable character numbers to suddenly reduce
from 2008 to 2017. Additionally, players don’t have much of a choice with respect to the main protagonists, such as with *Getting Over It with Bennett Foddy*. Those are all adventure and action games. There is no choice for main protagonists. In 2010 and 2012, the playable female characters were even less than twenty which means 27 of the 40 games didn’t have any playable female characters. The number of male characters decreased in the same year, but players still had 106 choices for male characters. None of the years had playable male characters amount to less than twenty. Game designers have the ability to create more playable female characters, so why doesn’t that happen? Couldn’t Link be a girl and Zelda be a boy? If that happened, would the game still be popular like it is today?
Between the year 2010 to 2014, the number of male and female characters decreased in the same time. In some years, the female character was even less than one hundred. The main protagonist decreased because indie games were more popular. Indie games, usually called independent video games, are designed by a small team with limited budgets and without significant support from a video game publisher. A famous example is Minecraft. Indie games are not usually as popular as AAA company games due to limited budgets. Some game designers don’t even think about making money in the beginning. The famous indie games usually have impressive mechanics but limited atheistic factors. The male character is still usually the main protagonist. Female characters appear in the background as usual, or sometimes they don’t appear at all as the case in 2017 with the popular game Getting Over It with Bennett Foddy, which is a platform video game. “It is a simple, devious game about climbing a mountain using only a sledgehammer (the blunt end) and wearing nothing but a cauldron” (Wood, P1). Over 2.7 million players tried that game. However, that game only had one male character. To add a gender selection feature is not that hard for designers, but in this case the designer failed to do that.

There are other factors that also influence the number of male and female characters. The first thing is that more and more game designers care about storytelling. Adventure games have gradually increased since 2009. About 80% of popular games from 2016-2017 were all adventures. The rise in adventure games illustrates the need for game designers and players to story tell. More game designers consider the importance of the story in the game. Most stories often require a protagonist. Male characters tend to have more advantages in the story because they appear to be smarter and more capable in the story. The rise of adventure games has reduced the existence of other of game genres in a limited market. MMO games and combat games no longer seem to dominate the game market. At the same time, indie game studios seem to be more daring than AAA companies and they dare to try out different elements in game development. “People are
afraid to put something into games they haven’t seen before, but indie games have done a lot to change that.” (Tim Schafer, P1)

Different elements such as non-human protagonists, third-party perspectives, and more are attracting players to explore indie games. This increases the diversity of players’ choices. In 2014, Plants vs. Zombies: Garden Warfare was published on the PC. Because of its popularity on the mobile phone, the PC version undoubtedly became one of the most popular games of the year. Plants vs. Zombies: Garden Warfare the main characters are various plants. Players need to place plants and let different plants fight zombies to protect their home. This puzzle and strategy game were fantastic which attracted many female gamers and non-gamers to try it. This game mode has been loved by many players. Games with only male or female protagonists is gradually reducing. Games have entered a more diverse market.

Even though the number of human characters is reducing, the number of female characters is still increasing slowly. With the gradual reduction of male roles and the steady increase of female roles, sales in the US game market have gradually increased from 2011 to 2017, and the growth rate between 2016 and 2017 is much larger than other years. At the same time, the number of male characters in video games is declining, while the number of female characters is increasing. This phenomenon indicates that players have positive perceptions of the increase in female characters. The reduction of male characters will not have a negative impact on the sales of games. This cross-comparison shows that both the game designer and players are changing their perspective about female stereotypes.
3.3 Qualitative Data

The change in the number of female characters in the game is only a reflection of the change in stereotypes of women. The body types and clothing of female characters also reflect the change in stereotypes. One hundred years ago, women were required to wear a traditional waist, and long dress. They were not allowed to wear pants like men. Now, women can wear any clothes they desire. In the real world, people seem open to female outfits and body shapes. Women's bodies and clothing choices are rarely judged or assessed publicly. Most of the time, people just say, “I like your outfit” or “I like your dress.” People try to be nice. However, they might still be judging you in their mind. In private, many people still discuss others and even judge the bodies of women. In fashion magazines, people often see beauty pageant queens, and so on. These “most beautiful women” have become the benchmark for women. Many men use this to criticize the weight and beauty of other women. Some women take beauty standards from magazines as a goal, even sometimes turning to surgery to achieve it. Weight loss surgery became popular. Depending on American society for metabolic and bariatric surgery’s data in 2011 158,000 people did bariatric surgery. It was increasing year by year. In 2017, 228,000 did bariatric surgery. (ASMBS)

In this “ideal” female, people think that women have big breasts, hips, thin waists, and long legs. If a lady is overweight, she seems does not popular or ugly. In Brian, Alexzander’s research on Today (online post), British scholars allowed forty unmarried men and women to use a 3D model system to build the objects that they thought represented the best male or female. Researchers compared average female body proportion 3D models with the “ideal” models. “Essentially, the male ideal is an inverted pyramid with broad shoulders and small waist, while the female ideal is an hourglass with a small waist-to-hip ratio. Second, both women and men preferred slimmer female bodies than the real female participants possessed.” (Brian, A) The experiment confirmed that compared to males, the public seems to have more requirements for females. This is all about female stereotypes. Cultural, social, or personal backgrounds may influence their decisions. Among the reasons for these stereotypes, the media, culture, and historical influence are particularly important. These stereotypes are
obvious in the virtual game world.

Out of 200 games, the author picked one to two female characters from each game and found related 3d or 2d concept art of character designs from the Internet. By collecting data on the hips, waist, shoulders, and vertical height of the characters, the average measurements for female characters’ body shapes was calculated. It’s obvious that female characters are rarely overweight in games and most tend to be the ideal figure proposed in the *Today* experiment.
From the following visualization, people can observe the changes in the female characters’ body shape. From 2008-2016, the characters’ legs gradually grew, while the waist became thinner and the hips slowly grew larger. This change reflects the changes in people’s aesthetics. In the virtual world, people are more likely to pursue a perfect image of women. Female body shapes are idealized in games. Imperfect female characters, such as those considered obese, too short, or ugly in appearance are mostly for unimportant roles and rarely exist in games.

The same thing happens with male characters. In the game, we rarely find the ugly or ‘unperfect’ characters as the protagonist or part of the protagonist team. For example, in Final Fantasy XV, players have four teammates and all of them have some skills and look like ideal figures. In the same movie, the protagonist is a beautiful-looking male or female and the villain is plain or even ugly. In some movies, the villain might be in good shape, but people with ordinary appearances only play inconspicuous roles. Actors usually maintain much better physiques than average people. In recent years, more actors without perfect bodies have become popular, but they are still much less popular than their prettier or handsome counterparts. The propaganda of media and the influence of traditional culture have led to more extreme stereotypes of women. In the Today report, “Kerri Johnson, an associate professor in the departments of communication studies and psychology at UCLA, thinks it's likely we've evolved to have certain preferences, but that culture mediates those preferences. When she asks people to pick out how their mind’s eye sees the ‘average’ woman, test subjects choose thinner
women with smaller waist-to-hip ratios than reality” (Brian, A). People think that the “average” body shape tends to be more like an ideal figure in the same way that people see the characters in the game. Players don’t feel that game characters are very different from real humans. The characters look more beautiful. When comparing real human measurements with female characters in the game, people find huge differences.
To make sure the measurements are accurate, all the characters show the same head size. When displaying the body shape models of female characters side by side, it can be seen that the female characters in 2009 have wider hips. In 2014, the characters have the narrowest shoulders and the thinnest waist, while in 2016 female characters have the longest legs. The length from the shoulder to the waist of the female character and the longitudinal length of the waist to the hips did not change a lot. It can be said that within ten years, the female characters have increased in leg length so that the characters have better body proportions. In the horizontal direction, narrow shoulders, big hips, and narrow waist seem to be a new trend. The reduction in shoulder width and the increase in hip circumference are more obvious than the reduction in waist circumference. In the past ten years, the body proportions of female characters have changed somewhat, however, they are all still thin. In the next visualization, all female characters’ images are displayed in a 10x10 grid according to the year. Even with one hundred randomly selected examples from 200 games, it is still difficult to find a person with a fat body. Most of the characters have a sexy body shape.
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The outfit of female characters also shows objective and sexual suggestion in games. As can be seen from the visualization, most of the characters’ costumes reflect game backgrounds and stories, but some female characters are very exposed or even inconsistent with the background of the game. For example, in the first-person shooting (FPS) game, some female characters wear shorts and vests on the battlefield. It looks cute but is not appropriate for that setting. This kind of dressing is impossible in the real Army. In 2016, PlayerUnknown’s Battlegrounds, the first-person shooting game published on Steam, players can choose clothes for their characters. Even though people know this is a battle game, the most expensive item is a school uniform set. According to HTR’s report, the 10 Most Expensive PLAYERUNKNOWN’S BATTLEGROUNDS Item Listings Revisited, the most expensive item is the “Ivory School Uniform Set” which contains a school uniform skirt. (HTR) This set sold for more than $1000. Players paid money to show their characters’ leg in the battlefield. Even though the skirt provides no extra power to players, many players still wanted one. The clothes of female characters do not have any effect on the gameplay, the purpose is for them to be exposed. These types of dress have appeared from 2008 to 2017 and shows no signs in reduction. In the game, we often see a male character with a normal outfit and a female character dressed in revealing clothes. The outfit of these female characters is considered inappropriate in the real world, even though they are very popular in the games. Other examples are R. Mika in Street Fighter V, Ivy in Soul Calibur, Juliet Starling in Lollipop Chainsaw, and Mileena in Mortal Kombat IX. Mika is a character in Street Fighter V which is a 2D fighting game. Player choose characters and use ability and skills to fight each other. Mika’s outfit is inappropriate for this setting and circumstance, but she is still a popular character. Street Fighter V’s popularity saw accumulated lifetime sales of close to 2.5 million (Yoshinori Ono, 1). On the left side of the image below is Juliet Starling, a main character in Lollipop Chinsaw which is a hack and slash video game. Players play as Juliet as she fights through hordes of zombies to save the world.
Zombies are not a brand-new topic for games, movies, or TV shows. In movies or TV, people would not see a woman dressed in that manner while fighting with zombies. The Walking Dead is a good example to compare game TV show and real world. The Walking Dead is a horror television series based on a comic book. It talks about main character tries to find his family member and fights with zombies. The popular female character in this shows wear daily dress, jeans and t-shirt or shirt. None of them wear mini skirt or bikini to fight with zombies. (Image) Even the whole store of the TV show is not real, but still they wear normal clothes. It’s rarely seen sexual suggestion here. This video game seems totally different. Characters can save the world while wearing skirts and bras.
In games, especially in the early game industry, the purpose of female characters was to attract more players. As mentioned above, the outfit, pose, and body shape of characters attract players. In the game, the female character is objectified and becomes a trophy or reward for completing the task. As a reward, the outfit and a nice look are important for attracting players. The appearance of female characters seems to have more sexual implications. Game designers design the female characters in overexposed clothing to attract more male players because of market competition. Players seem to have the same opinion, some players in the website GAMEFAQ which found 1995 hosts questions and guide for more than 40000 video games.

Why are the main females ALWAYS wearing skimpy clothing in JRPGs nowadays? JRPG means Japanese Role-playing Game. Player Lemon Kween staaa posted, “But approximately 90% of games featuring female main leads are hyper-sexualized.” This situation is not unique to Japanese games, but also games in the US. For example, *Lollipop Chainsaw*, Lara Croft of *Tomb Raider*, and *Hitman Absolution’s Latex Nuns*. All of them include inappropriate outfits for their female characters, yet all of them are popular.
Compare female characters and male character in the same game, Street Fighter is a good example to talk about here. Street Fighter is a fighting and action game. Player can choose character to fight with other party. On this image, all male character wear something related to sports game, such as Kongfu, sumo and boxing. Female character outfit looks really inappropriated, such us skirt, and tight. When female characters are dress in impractical armor or clothing, it encourages player view them as a sex object.
I categorized the appearance of 100 female characters created over the past 10 years, sorting from the most suggestive costume to less suggestive armor. I hypothesized that neutral clothes would be the most common, but the most common everyday clothing and workwear were installed in only 30 of the 100 female characters. Instead, I found that bikinis (that are uncommonly worn in everyday life) are 8 percent, tight-fitting bodysuits are 17 percent, and low-cut corsets, miniskirts, and Japanese-style school uniforms account for 31 percent. The relatively extreme porn costume and armor also clothe 5 characters and 10 characters respectively. When collecting these images, most of the authors were looking for a costume that was worn by the female character as a default costume, which is what the character wears most commonly. I compared the game patterns and background stories of these hundred characters. I found that most female characters were not at the beach when they wore bikinis or school when wearing a school uniform, and more than 80% of the games were categorized as action games, that is, female characters are active in the game. These characters do fighting actions such as punching and running instead of going to work, going to class, or being on vacation. This phenomenon proves that many games are more objectifying in the design of female characters, and the main purpose of these characters is attracting male players. The female character itself is ignored. It’s hard to imagine that more than 50% of women are wearing sexy outfits in real life. The reality is that more than 50% of women will choose everyday dresses, work clothes or student wear. If I saw a woman walking in a busy street in Boston wearing a bikini, I would feel that this woman was out of place with the environment. In the game, the player never feels that this sexually suggestive dress
isn’t normal. Game designers exacerbate this phenomenon by using camera angle movement to focus on the female buttocks and breasts. This gives the player more room for objectification. This kind of production method can attract a large number of players to play and discuss that game in a short time, and the price is that the female character becomes the commodity being discussed. Because of this vicious cycle, more people have inherent prejudice towards female characters.

Figure 1

How to see the data visualization
If the character has any skin shows in this area then this area was count in skin exposure area.

Example:
If the image like figure 1, the skin exposure area will be 1, 2, 4, and 5.

- = Area 5
- = Area 4
- = Area 3
- = Area 2
= Area 1

This character = 1, 2, 4, and 5

Sexual suggestive:
Strong
Weak

○ ○ ○ ○ ○ ○ ○ ○ ○ ○
After the classifying of the clothing, I divided the exposed skin area. Make a square first and divide it into 5 rows. Place the female character in the center of a square, ensuring that the character’s head and feet are halfway between the first and last rows. If any skin exposed in the row, this area is recorded as the corresponding circle.

(Skin Exposure Key) As shown in the visualization: The closer to porn custom, the more skin is exposed, and the closer to armor, the less skin is exposed. The tight bodysuit is different from other clothes. Even though tight bodysuit has less skin exposure, but it made the female body shape clearly visible.

The sexual cues it brings were no less than low cut clothes or bikini. It can be seen from this visualization that the skin exposure rate of female characters in games is generally high, and most characters have 3 or more areas with skin exposed. Considering that most characters came from the action and adventure games, and the randomness of the weather, and background stories, this exposure rate is extremely unreasonable.

Compared with the real society, if I meet 100 ladies randomly in the United States in a year, more than 50% of ladies wearing sexy clothes is a small possibility. The game world designs for people’s fantasies, but there are more
objective and sexual cues for the shaping of female characters. This kind of design attracts a large number of male players to play the game in the short term. Some young players are attracted by the content of the game during the game. In the process of the game, players learn skills in the game will also have the stereotype of female characters.
In recent years, game designers have focused more on the creation of characters’ backgrounds and abilities. Appearance and clothing are appearing to more closely resemble that of ordinary people. More players are willing to spend the time to read the characters’ story. Characters’ outfits, an ability usually related to their story. Characters’ clothes are more reasonable. For example, Overwatch, the popular 2016 game, has more than twenty agents at the beginning. All of them have different stories. As a third-person shooter, the diversity of character sets in this game gives players more choices. It allows players to see the progress of the game industry. Blizzard, which creates this game, is the leader of the game industry. It provides different cultures, races, and social factors in this small virtual world. In this game, the female character is no longer the ideal figure or support role. They have a variety of body shapes, such as Mie (left image). She is from the Chinese Antarctic Research Station. Her cheerful personality and excellent control ability make her popular. She can freeze enemies and has the ability to heal herself. Those perfect abilities belong to a cute Chinese girl. Tracer (right image) is an agent from the UK. She possesses superb mobility and damage ability and is very popular among players. She does not have the traditional feature of big breasts and her lovely girlfriend’s name is Emily. Players also love this character very much. This character was evaluated by players as one of the hardest to play agents in Overwatch. Her speed is so quick, and players’ eyes can’t catch her on the screen. This special ability makes the hero unique and really difficult to play, because players usually feel uncontrollable when they use their power. Players tend to pay more attention to the personality of the female character, while the appearance factor is less and less influential. The stereotype of the perfect body shape is seemingly changing.
DISCUSSION

Interpretations

The number of female characters increase slowly but still much less than male characters. Female character doesn’t have enough ability in games because the playable female characters much less than male characters. This situation is getting better and better. People realize female character can be the main character and they can be independent in game. Even more game decided to use female characters as a main character, the Female character is still a sexual object design for player. This situation didn’t get better, because of the commercial reasons. Though the case study female character wear sexual suggestive outfit much more than real life. More than half of the character wear sexual suggestive clothes. Some of the outfit of the female characters are not related to game background. Some of them even not consistent with the male character in the game.

This result of this study shows that even the stereotype of female character is getting changed, but it still waiting on the surface level. The character like BAYONETTA was created really successful. She is smart and has ability to kill the enemy. However, when player play this game, the clothes she wears, her behavior and camera movement all content sexual suggestive. This is a selling point for this game. It’s one of the main reasons why this game was so popular. This is so important because when young generation play games they learn from game. These stereotypes of female characters will influence the judgement of female in real world.
Limitations Of The Work

The limitation of this method and result:

[1] The accuracy of the collection process. When the I collected the area of skin exposure, different close or pose may cause different results. It’s hard to accurately circle the skin area. When I measure the shoulder, hips waist, S-W, W-H and leg lengths, different pose may cause the measurements different. I tried to find almost same pose. If I can get all the character’s 3D model measurements, then the data will be more accurate.

[2] This data base is included 200 the most popular games in past 10 years. There are more good games may have more female characters.

[3] Other social factors may influence the result, for example fashion, social media, political events, publishers. This paper didn’t mention all of them.
Future Work

The solution here is not simply create more female characters in game or make male character like sexual object. Equal display outfit or number of characters not the answer. The solution is de-emphasizing their body shape and outfit, so that players are encourage not to watch and objectify female characters, but to identify and emphasize them as people, for example Lara Croft. Even in Movies, there are so many successful female characters, for example Black widow in Avengers. Players love these female character because of their personality, not their outfit or bodyshape. There are so many beautiful female characters, but not all of them are successful.

In the future, the game industry may not have a huge change. Today people focus more on diversity. The game industry will gradually develop. Games like Overwatch will emerge more and more in the future. People's bias of female characters may not be changed greatly in a short period of time, but with the changes in education, social media, and the environment, people's bias will be changed. I hope female characters will receive equal treatment with male characters in the future. When people talk about female characters, they discuss their abilities, background stories and personality, no longer the outfit, and body shape.
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