

Improving Game Design by Understanding the Gender Differences: The Cognitive Approach

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Abstract

We are addressing game designers as the driving creative forces behind computer games. Thus, we will outline an overview of the gaming situation both in game development and gameplay and how it currently affects women. Following these facts is an outline of the current employment situation for women in the games industry and a look at their reasons for playing. Also, the cognitive reasoning of women and how female behavior and culture is shaped during early childhood will be analyzed. We will then draw a conclusion from the current situation of the industry and the cognitive facts from research. By understanding these differences between the genders, the game industry will hopefully understand and apply this knowledge to the established traditional genres for games and change design paradigms towards better games and a broader game market.

1. Introduction

Most game designers create games without looking intensively at their potential players of both genders. Ironically, they are game players as well and thus shape their digital worlds according to their dreams and assumptions. In simplified terms, one could say that it is not surprising that male designers design games for male players. This paper discusses three elements which contribute to the gender aspect of the game market and industry – 1) games and education, 2) game players, and 3) game developers. These elements bring up one big question: What are the gender preferences for games?

Game researchers such as Gee [4] and Prensky [15] have argued for the use of electronic games (including computer, video, console and hand-held games) as a useful device for learning. Although many researchers believe that by using electronic games, students can also gain computer skills and improve their hand-eye coordination, a report in 2000 noted the decrease of women graduating in computer science and showing a 24% drop over the last decade [5]. Are young women starting to lose interest in computer games or are developers simply not designing right for this huge part of the market?

2. Game Industry

In the games industry today, most game designers create games without targeting at the full market potential of their games. Most game designers, though being male, are trying to design and develop games for both genders – male and female. On the other hand, one has to consider that the game designers are also the game players. Thus, it is a matter of fact, nearly all titles target male players. Their gender preferences seem to influence their design decisions more than wanted.

The games industry is starting to wonder and realize that women, small children and senior citizens (so-called Silver Gamers) are still an untapped market. Surprisingly, as these groups not only have money, in general, they also have the time for playing and they increase the percentage of people contributing to the computing industry. Many companies such as HerInteractive, GirlGames, Girltech, and Purple Moon have emerged on creating a 'girls' market for the gaming industry. Their attention is mainly directed to women's struggles to make their ideas accepted within the male-dominated fields. One of their positive findings with regard to young women's games is the customization feature in games.

The interest in customization started in 1996 when *Barbie Fashion Designer*, a CD-ROM game for girls was released [1]. The game from Mattel Media sold more than 200,000 units within the first month and became the number one Christmas present for young women from the age of five years and above. The game was a game that allowed players to design clothes for Barbie dolls. They could even print their work on a light fabric with any laser printer. Generally speaking, without using electronic games, young women like doing this anyway: designing and giving their toys a more attractive appearance – similar to shopping and improving their looks.

The customization feature in *Barbie Fashion Designer* has had an impact on game design itself. More games are designed to incorporate this feature. For example, the World Wrestling Federation games enable players to design their wrestler's clothes, hair, select their own montage, music and even choreograph their own movement. The same is valid for *Need for Speed: Underground* series, where players can customize their car's appearance, performance, and accessories. Considering this fact, one might argue that boys also like being "pretty and pink", although their choice of color does not necessarily have to be pink.

2.1. Games and Education

Games, not only in their digital form, have always been described as means for education or figuring out new ways to use the information for solving problems in life. Recently, this aspect of games was always used for edutainment games that incorporate both educational and entertainment aspects of games. Unfortunately, many game designers like to classify this genre as only suitable for children and educational purposes. Ironically, as games inherently teach the players their rules, all games can be regarded as educational (in their own way) and all game players are children – be they big or small.

Games and education can be divided into two dimensions. The first dimension is about the educational aspects of teaching games. This can be seen as the willingness of people to join the games industry. More and more educational institutions are starting to offer game design and development courses as a subject or study discipline. These courses teach all about game design, game development tools, game prototyping tools, game programming, game art, and other related areas. Despite the interdisciplinary subjects taught, which are providing core skills needed in the computer science field, unfortunately, most of the students are male.

In the year 2005, a game programming course was offered at the University of Derby, UK, and it had 106 applicants – none of them was female. According to one of the lecturers, women did show interest in the game industry but not in the development departments [8]. As the annual *Game Developer's Salary Survey* shows, most of them can be found in administration, marketing, business and legal or production [2]. There are not only concerns on the developers' side on the low share of women in game programming [8].

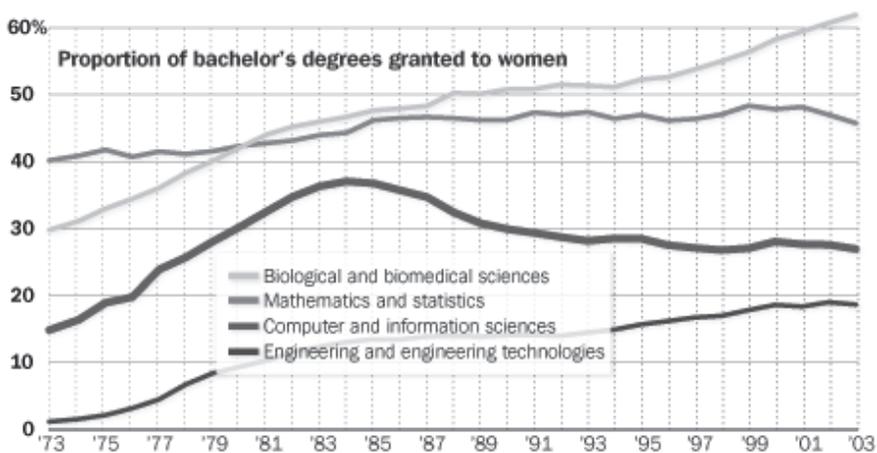


Figure 1: Proportion of bachelor's degree granted to women; source: <http://chronicle.com/free/v52/i19/19a03501.htm>

Looking from a wider perspective, the National Center for Education Statistics, USA, reported that in the past 20 years (1973–2003), fewer women have shown interest in information science [7]. But at Carnegie Mellon University, the number of women enrolled in their computer science undergraduate program increased from 7% in 1995 to 38% in 1999 due to an intensive effort by the department towards getting more female candidates. The details of how they increased the numbers of enrolled women are described at [20] and we will specify on those here. However, this case clearly unfolds how more women can become interested in computer science with the help and continuous effort from educators and administrators alike.

In the faculty of Computer Science of the University of Magdeburg, there have been many courses on game design and game development, which were all designed to be a hands-on experience as well as an interdisciplinary approach incorporating students from various disciplines. Though the majority of students are male

(2005: roughly 70%), there is a significant percentage of female students (2005: 30%) due to a specific media curriculum. We believe that the higher percentage of female students in our projects will have a significantly positive impact on the game design decisions, and thus on the games themselves. This allows us to throw a very brief glimpse at the enormous potential for the game industry, which will be discussed in Section 2.3.

The second dimension comprises games that educate people. Electronic games motivate people in a way that formal education does not. So, the element of learning happens inside the electronic game itself and players somehow do not realize the learning process, because they enjoy playing the game, which is unlike learning in the structured and more formal way. A number of researchers contributed to this new aspect of digital games. One of the earliest advocates, James Paul Gee, listed 36 principles that can be applied to teaching and learning from playing games. All principles are in some way related to teaching and learning, and not only restricted to computer literacy [4].

Salen and Zimmerman [18] wrote one of the first textbooks on games, their structure and functions, and it is used by many game designers, game developers, and researchers in game academia as a reference. It is the primary source for game design disciplines and offers many ideas, strategies, and methods for understanding games and looking at games from a new perspective.

The whole new generation of Serious Games, as described in [14], is beginning to explore how to tap education, training, healthcare, and more, by using custom-made games (i.e. games that are purposely develop for any product or service on any subject). More and more games are being used as teaching and learning tools in and out of the classroom, in companies and universities.

2.2. Female Players

Playing games can have many purposes. Players can benefit both emotionally and socially from experiencing play. The most popular games offer these aspects and successfully engage the player in the game. The emotional help to create fun environments for the players and add pleasure to their daily life. Among the social benefits gained by playing electronic games are establishing social contact among players and participation of individuals across demographic and geographic boundaries. Researchers are exploring the beneficial effects of video games, for example, some scientists at Michigan State University, USA, who have shown that by playing electronic games brain activity is increased [11]. Also, it was found that players can improve their hand-eye coordination, increase their self-esteem towards a computer, and stimulate their way of thinking [3].

Despite the current trend in discussing positive effects of digital games, there is an unexpected decrease of women using games. A comparison figure from the Entertainment Software Association (ESA) on the computer and video games industry for year 2005 and 2006 shows that the market penetration of gaming according to gender gradually decreased [13],[12]. In 2005, 43% of gamers were prospected to be female, compared to 2006, when female gamers were only 38%.

However, these numbers have to be handled with care, as the ESA is not independent as an organization, lobbying for the games industry, which often leads to overly positive estimation in their figures. But there is a trend towards including more female players in the future, and the games industry is reaching out towards this new market.

For comparison, a recent study in Germany, the JIM study shows that 52% of young boys are interested in computer games, in contrast to a 15% minority of young women [21]. So, one could argue that the decision of which gender plays which computer games is made in the childhood years. Of course, it is often the social context, which may keep young women from playing digital games, in contrast to the playing behavior of boys, which is often considered to be the norm. Surprisingly, these figures depict no trend towards a more balanced usage of games, as one would have expected. Somehow, the splitting of genders seems to be constant.

Researchers also found that despite the diversity of the phenomena related to cognitive ability, there are only a few who have tried to describe its influence on decision-making and problem-solving skills. These skills are important when people play games, and not everyone plays it the same way. Are the designers missing something? Do the designers design games only for male or only for female players? So, how should games that interest both male and female players be designed, without considering the player's gender? These questions remain to be answered.

2.3. Female Game Developers

In the U.S., the electronic gaming industry supported more than 100,000 full-time jobs in 2004, and it is expected that 250,000 jobs will be needed in this industry by 2009 [10]. A range of jobs across major disciplines in the game industry can be found and they still lack female employees.

There are many job opportunities in the games industry from diverse fields such as game design, game programming, art, 3d modeling, sound, marketing, publishing, and quality assurance. To find out where most women work in these fields, we will have to look at the 5th Annual Salary Survey of Game Developer Magazine [2]. From 2003 to 2005, the percentage of women employed in the games industry in total has increased from 7% to 10%.

Stating that “a more diverse development team will result in a more diverse market”, the article also shows that women still earn a lower wage than men (almost US \$5,000 less). Interestingly, the areas of game development that have the highest average salary – production, business and legal area – also have the highest share of women with 27% working in the business and legal area and 21% working in production. So we can observe that women, when working in the games industry have less creative influence on the game as a product than on the administrative tasks surrounding it.

Therefore, it is not surprising that the lowest share of women work in the programming department (4%) and even women game designers only average a 7% share. We see a huge potential in these two areas for women to take creative influence on the content, scale and focus of games. With the 21% of women working in

production, a step in the right direction is being taken, and we will hopefully see a positive change in this direction in the near future.

In Germany, there are no official figures on the average percentage of female developers in the gaming industry, but one can expect the numbers not to vary much from [2], because the 2005 survey included European data for the first time in its history. However, for the Games Convention 2005, Europe's biggest sales and marketing event for computer games, an increase of female spectators was announced, which may also lead us to question the utilization of female stereotypes to sell the games at such conferences. A good example was the E3 2006, where for the first time, there was a dress code for the so-called "booth babes", a term referring to model-oriented female stereotypes that are used to excite the young male target group.

As more women enter the gaming industry, many expect to see more positive female characters portrayed in electronic games that will be avidly played by both genders. Ubisoft, for example, one of the big publishing and developing companies, has its own women-only play group named the Frag Dolls to help them market their new titles, playing with old stereotypes to predict their market. This leads to lessening gender stereotypes in female characters and to putting fewer negative female images in games. Apart from that, engaging more women in the gaming industry is an advantage, since they bring more money and boost the economy.

3. Know Your Gamers

People who play games have different characteristics: mentally and physically. By analyzing and integrating the human cognition, perception, and physiology, game developers can explore opportunities and undiscovered potential in games for educational purposes. Knowing the differences between genders can help game developers to create better games.

Cognitive ability is described as the mental ability including a human's judgment, memory, learning capabilities, understanding, and reasoning. The human way of thinking and judgment is different among individuals and it can bring positive or negative impact towards human decision making and problem solving. Furthermore, the human brain's cognitive development has been studied intensively and the central theory in human development (started when a child was born) was pioneered by Piaget. In 1966, following Piaget's theory, Kohlberg suggested that children between four and six years old seem to understand and to be able to distinguish the gender concepts. This is known as gender stability. Starting at this age, according to Kohlberg, gender stays the same through time, but others believe that gender consistency starts before three years of age. However, the gender concepts are applied from early childhood, and this has to do with the children's way of choosing and playing with toys (same-sex or opposite-sex toys). Toys that children choose when they are young may already give a hint to their favors in playing electronic games.

Creating electronic games for young women has the potential of inviting more of them into the computing industry. Of course, there are multiple causes that have

an impact on how electronic games are perceived and how they position themselves as a gaming culture.

Often, if young women get a negative impression during their first experiences of computer usage, it can turn them away forever. While the reason for this is assumed to be mainly traditional role models, researchers believe there are major differences between males and females in how they use their brain and their abilities. It is important to note that sometimes the gap between these abilities also has some overlapping elements [2]. Many researches proved that there are significant differences in female/male game-playing behaviors.

3.1. Sense of Belonging

Women like to feel the 'sense of belonging' and 'ownership' when it comes to playing games both emotionally and intellectually [17]. In other words, they like to enjoy playing the game and treat the game as a medium of communication and expressing their emotion. Games such as role-playing and adventure genre games are their favorites, because the elements of emotion and story are of high importance here. The media touches them and allows them to enter the story without even noticing it.

Fantasy is one of the other favorable elements existing in some game genres. Both genders are fond of fantasy. The power of games in providing and allowing them to play with fantastic roles make a plus to get more gamers. But the fantasies of the two genders differ significantly. Women do not like games that reinforce stereotypes of female characters (such as *Lara Croft* from the *Tomb Raider* series or *Kasumi* from *Dead or Alive* series). In contrast, many men like those characters specifically because they simplify the female sexual stimulus that is used in the advertising industry as well. Ironically, men like to play male characters, too, while women are more selective in choosing a game character and a game to play.

3.2. Games Appearance

Selecting characters in games seems to be different according to gender. In the last decade, game developers started to create game characters that transport a macho image in their games (*Duke Nukem* being an example) and thought these elements can narrow the gap in the women gaming market. It turned out that women strongly dislike these stereotypical characters [19]. For women, combining 'cute – humor – clever' comes first, not the 'brain and beauty'. Characters such as the world-famous Italian plumber named Mario (Nintendo's Mario series); a blue-furred bear-like giant named Sulley (Disney/Pixar's *Monsters, Inc.* movie), and a black mage named Vivi Ornitier (Square Enix's *Final Fantasy IX*) made a favorable impression and the share of women playing these games is much higher than for others.

In reality, the idea of 'cute – humor – clever' also appeals to boys. Pokémon, for example, has had a huge market share not only in young men but also in young

women since 1996. The multibillion dollar franchise, originally from the Game Boy video games, have been merchandised into a television program, manga, trading cards, toys and even the character named Pikachu is a 'cute-humor-clever' mascot.

Other than the game character, the game avatar also plays an important role for women to select games. Avatars or pictures that a player selects for visual display to represent him or herself have become popular in modern games and are used in software as well as 'buddy icons' or 'emotion icons' (with text messengers being the most popular example). It is also important to let women customize their own avatar. Choosing the right avatar can project the player's identity to it and has potential for designing a more successful game.

3.3. Play for Fun or Play to Win

When playing games, in most genres there is a strong competition either against other players or the computer player. Women are more ambivalent when it comes to succeeding and winning. For them, games usually are a medium for social interaction. They do like to win but more privately and not arrogantly telling everyone, while men are more focused towards skills to be mastered and challenges to be conquered [10]. Games that incorporate elements such as winning, domination, scoring points, and conquest are preferred by men [19]. As noted, women enjoy the complexity of character relations and the complexity of the game itself. To enjoy playing certain games with others, make women more open towards social interactions and relationships rather than competing in mastering of a skill with one another.

Men are serious in mastering a game's challenge by developing playing skills and winning it. For them, games challenge them mentally when speed and action are core elements. But for women, winning is often not enough motivation to play [16]. They like to accomplish more than just winning. They want mutual benefits among players – be it virtual or real. They want social relationships and communication. Women want to use games in ways to promote human social interaction.

3.4. Time and Hardware Availability

The term *availability* also refers closely to the context of genders and gaming. In Thomas' and Walkerdine's research [19], young women showed less interest in playing console games compared with playing personal computer games. Furthermore, the availability of a game console and games in their family or at their friends' influence their choice of computer games and coincides with the initiatives of major gaming companies to provide multiplatform games. However, looking at modern customs, we still find the traditional role model present: many boys receive Nintendo's Game Boy or Sony's PSP for their birthdays or Christmas, whilst girls get cute and adorable pink-and-fur teddy dolls. Despite all gender equality traditional role models dominate, influencing girls' access to games.

Young women play games less than young men – even though they might have more time, but they prefer other (often social) activities [19]. According to that

research, women have a 'full-diary syndrome' that limits their gaming time because of other activities such as theater, swimming, choir class, music, dance, cheerleading, or others. Parents are very concerned with their daughters in contrast to their sons and provide them with a whole range of activities. These 'leisure' activities somehow make women more multitasking capable and multiskilled. Thus, women can be enthusiastic and responsible for their jobs and actions. They do experience high excitement while working with what they can do best, and this includes playing games. Since women are responsible in their actions, this could lead to next stages where women are not just a player but a skillful player in the context of gaming. A good example of this are many women who out-skill men in yearly quake or other ego-shooter conventions.

The mobile game industry in Japan has created a new kind of communication, information and entertainment. Mobile games, especially 3G mobile games, have a high impact on Japanese women. Oesch, a program manager from Fenix reported, in 2003, new lifestyles and trends have boosted Japanese digital games market, especially for mobile phones [6]. Young women are interested in decorating their mobile phones, including customization of their ringtones, adding new content types, short movies, pictures, mangas and of course, games. With the advancing 3G technology, females have come right into the market. Sega, for example, has 40% female users that are willing to pay any price just to get games on their phone. According to Digital Content Association of Japan, the on-line game market was about 1.4 billion JPY in 2001, 6 billion JPY in 2002 and is expected to total 22 billion JPY in 2003.

5. Conclusion

By understanding the cognitive differences between the genders, hopefully the game industry and especially the developers will understand and apply this knowledge to the traditional games genres. The discussion on the impact of understanding the differences between the genders can be used as a model in developing the game, as well as improving it towards a better and broader game market. The increasing interest in the gaming industry towards women as gamers and game developers has just started, and hopefully it is going to change women's visibility and influence the billion-dollar gaming industry positively.

Looking at the game industry, more jobs are being offered to women. Despite the limited workforce in these areas, more women should enroll to game focused education and get along with computer science, especially with gaming industry. To encourage these women, many incentives can be done by people surrounding them, including those who are involved in education, the gaming industry, relatives and friends.

Especially the game designers, to tap the hidden potential markets (especially women), should know, besides integrating the element of fun for both genders in their games, they also should familiarize more with the female players of the games. By conducting focus group usability testing or a simple survey, game designers can understand the secret behind choosing and playing games particularly for women.

Knowing and understanding these needs of women in games will somehow give some input to the game designer especially in designing games. Now, people in the gaming industry are talking about playing games seriously, in any fields including government, health, corporate, military and education. To develop these games, as game designers, knowing your player's needs is the important key in designing your games.

Since the element of education has become more "serious" in games, women can get the mutual benefits in using and playing them. Besides, there is plenty of opportunity for women to become one of the key players in the game industry, since the industry does offer great jobs. However, only positive female role models can foster girls' access to both games and technology.

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