You Are What You Play? A Quantitative Study into Game Design Preferences across Gender and their Interaction with Gaming Habits

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ABSTRACT
Gaming is rapidly gaining popularity as a pastime among women. One explanation for this could be the industry targeting female gamers through specific 'girl game' releases. This could imply that there are a priori differences in game design preferences between female and male gamers. The purpose of the present study is to explore these differences to see whether there is a mediating effect of previous experience with certain game genres on subsequent design preferences of male and female gamers. More particularly, we distinguish between 'core' genre players (CP) and 'non-core' genre players (NCP). By means of a 2*2 ANOVA design using an online survey, we examine the main effects of gender, core genre players (CP/NCP) and the interaction effects between both independent variables. The results show that game preferences of male CP, female CP and male NCP are generally in line with one another whereas those of female NCP differ significantly.

Keywords
Gaming, gender, stereotypes, game design

INTRODUCTION
In recent years, the interest in gaming and gender has grown rapidly. A central issue in this discussion is the absence of women from a male-dominated gaming scene and industry. Video games have traditionally been seen as boys' toys. Since the introduction of video games, male teenagers were perceived as the main target audience by the game industry and largely continue to be so until recently (Laurel, 2008). In the early years, arcades were filled with science fiction shoot-'em-ups, race-, and sports games which

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mainly attracted a male teenage audience. This tradition continued with the first console and computer games and later with violent titles such as *Mortal Kombat* (Midway Games, 1992) and *Doom* (id Software, 1993) which further shaped the medium's reputation (Subrahmanyam & Greenfield, 1998). As a reaction against this view of games as boys' toys, a Girl Games Movement emerged in the mid 90s, which aimed to create video games especially for girls in order to level the playing field. However, it was not until the release of *Barbie Fashion Designer* (BFD) (Mattel©, 1997) that companies started thinking that there was a large enough market for girl games (Cassell, 2002). With more than 600 000 copies sold in the US alone, BFD was considered to be a great success (ELSPA, 2004). Feminists, however, saw BFD as a 'doll' game, presenting a stereotypical view of womanhood and therefore no contribution to the empowerment of girl and woman gamers. Moreover, subsequent game releases which copied BFD's girly style, failed to match its success (Graner Ray, 2004).

Academic research

Many researchers have looked for (e.g. Cassell & Jenkins, 1998, Graner Ray, 2004), and are still looking for (e.g. Kafai, Heeter & Denner, 2008, Vosmeer, 2010) 'the ideal' girl game by focusing on intrinsic differences in game design preferences between male and female gamers. They have tried to find gendered patterns of playing styles in order to rethink game design in favor of girls. Hayes' (2005) critical research review, however, has cautioned against focusing on these presupposed innate gender differences. In her view, the problem with those initiatives is that they tend to be linked to broad theories about biological or psychological gender differences which fail to take into account the effects of previous history and social context. The aim of this paper is to present an empirically grounded account of the differences between female and male game preferences with respect to previous knowledge of specific game genres. In order to do this, we draw upon a quantitative survey study exploring design preferences across gender, taking into account players' previous experience with core game genres.

GIRL GAMING

Despite the persistent view of games as boys' toys, there is evidence that women are gaming more frequently but for shorter periods of time than men and that they play other genres. A large scale quantitative study of the Pew Internet & American Life Project (PIP, 2008) demonstrated that 94% of the female respondents play games, which is almost as many as the male respondents with 99%. Likewise, a study from the BBC's Audience Research department (2005) showed that the gender split (55% males versus 45% females) can almost be found in all age groups. According to the PIP (2008), however, boys are playing video games with higher frequency (39% of the boys reported daily game play versus 22% of the girls) and for longer periods of time than girls (34% boys versus 18% girls playing more than two hours per day). As an explanation for this discrepancy, the ELSPA (2008) refers to typically female genres which are less time-consuming and require less commitment. Women seem to prefer abstract, short and easy-to-master games such as casual [e.g. *Tetris* (Pajitnov, 1984)] and social network games [e.g. *CityVille* (Zynga, 2010)] (Nielsen, 2009; IGDA, 2009; ISG, 2010, Sung et al., 2010), while men are more likely to play 'core' genres (Kerr, 2003). The latter category typically refers to skill-based games which are time-consuming and generally feature high-quality three-dimensional graphics [e.g. *Grand Theft Auto IV* (Rockstar, 2008)].

Gender split

In our study we see 'core genres' as including shooters, fighting, action-adventure, sports, racing, strategy, survival horror, roleplaying and MMO games. Non-core genres include platform, adventure, simulation, party, serious, classic and casual games. Except for racing games, the PIP (2008) has found that the given core genres are played more by males than by females, indicating a gender split between players of core and those of non-core genres. Moreover, the study found that women are fonder of puzzle games, while racing, rhythm, simulation and virtual games are played by both women and men. In addition, the BBC study (2005) found that women favor party games (such as music and dance games) and classic 'retro' games [e.g. *Pong* (Atari, 1972)]. Furthermore, it is assumed that popular game genres among women, mostly non-core genres, are opposed to 'regular' games, the latter referring to core genre games which are primarily played by boys. As a consequence, regular games are generally considered to be played by 'real gamers', re-enacting the notion that video games are in fact still boys' toys (Carr, 2005; Dickey, 2006).

Men in charge

Although there is an increasing number of female gamers, high profile games are still generally developed with male gamers in mind and many draw on genres typically associated with masculinity, such as war and sports. Furthermore, high-end video games are consistently marketed towards a male audience which brought along an expansion of male gamers disregarding other segments (Carr, 2005). Many marketing initiatives try to attract this core public through media channels which are particularly popular among men. Huntemann (cited in: Fron et al., 2007) confirms this by contending that video games are often advertised on TV channels and in magazines with a predominantly male audience. Furthermore, a large part of the advertising content which is used to attract a male audience is seen as objectionable by Fron et al. (2007) because of the female-unfriendly content or the complete absence of women. In this respect, Millers and Summers (2007) conducted a content analysis of video game magazine articles which resulted in the identification of two consistent patterns: (1) The representation of males as muscular heroes and powerful main characters; and (2) The assignment of subordinate roles for female game characters which are often presented as sexy, innocent and scarcely dressed beings. Next to a male-orientated marketing strategy, women are also more sparsely employed in the gaming industry. As an explanation for this gender bias, Flanagan (2005) claims that female game designers have few opportunities to comment upon game content, interaction styles, avatar representation and reward systems. Furthermore, the study of Herrling (2006) indicates that recruiting advertisements are explicitly directed towards men, again excluding women from an opportunity to engage in the game industry.

Contextual factors

Some authors have also argued that contextual factors are partially responsible for women's low profile in the gaming world. Bryce and Rutter (2001) have identified several thresholds of access in public, domestic and virtual spaces preventing girls from engaging in gaming activities. LAN parties are an example of gendered public spaces, in which males are dominating the space and girls stand out by virtue of their rarity (Bryce and Rutter, 2001; Beavis & Charles, 2007). When girls are attending, they mostly fulfill acceptable feminine roles such as mothers and girlfriends giving support to the male competitor. Although domestic spaces provide a less gendered gaming environment for female gamers, men are also likely to dominate this space. Bryce and Rutter (2001) refer to the work by Schott and Horrell (2000) who indicated that men considered themselves

as ‘experts’ in gaming situations. Although the console was owned by the girl, men took access by justifying their play as collaborative or supportive, when in fact they undermined the girls’ skills. Virtual gaming spaces, however, are providing an opportunity for women to anonymously compete against males without limitations in terms of gender. It offers them a possibility to avoid the negative consequences of geographical spaces (Bryce & Rutter, 2001, 2003). Nevertheless, research suggests that also virtual gaming spaces are subject to gender dynamics. Whereas male players are more inclined to help female avatars in online worlds, the latter are often the object of banter and flirts. This goes along with tiresome attempts to gain information about the players’ real sex (Lin, 2008). According to Bertozzi (2008), access to online spaces is also confined by traditional societal gender roles which women and men are supposed to fulfill. Bertozzi argues that virtual certainty of cross-gender competition might be an important factor in deterring women from digital games. Both men and women find it difficult to transgress general cultural norms because of rigid gender divisions. For instance, female players who are overtly aggressive and competitive against others in virtual spaces often experience harassments as a result of their mismatch with socially acceptable feminine roles.

IDEAL GIRL GAME = ILLUSION?

Besides issues of access, game content has also been widely discussed as a deterrent for many women. As a reaction, a growing amount of scholarly research emerged in the early 1990s, trying to identify patterns of preferences in game design across gender. This approach however has received a considerable amount of criticism. According to Carr (2005) three problems arise when following this line of thinking. First, this vision tends to ignore the diversity of computer games that are already available. Second, analysts run the risk of abstracting a perceived problem from processes surrounding gaming production, marketing, consumption and reception. And finally, the question of “what games do girls like?” also implies an essentialist view of preferences not taking into account issues of access and previous experience.

Jenson et al. (2007), however, have pointed to a move from simple preference discourses (e.g. violence versus no violence) to highly contextual discourses. Carr (2005) has advocated a contextual approach by conducting research about girls’ gaming preferences through the frames of game, play and cultural contexts. By means of observations and interviews over the course of a school term, Carr found that preferences change and reflect previous access. The initial preferences expressed by the girls seemed to be related to games they had access to previously. Their inclinations, however, changed by offering these girls access to alternative games in a novel situation. In other words, these findings suggest that there is a consistent relationship between previous access and the expressed game design preferences. Like Carr, Hayes (2005) has pointed out that gender differences are often based on conclusions drawn from the types of games that women and men are already playing without taking into account accessibility, past experience and knowledge of different game genres. Likewise, Jenson et al. (2007) countered many gender differences found in previous gender studies by means of a longitudinal study which involved girls and boys in an after school gaming club. Their results indicated that once girls have genuine access to the technology in everyday practices, most differences were no longer present.

GENDER VERSUS CORE GENRE EXPERIENCE

As noted in the introduction, the aim of our study is to present an empirically-grounded account of the differences between female and male game preferences with respect to

players' experience with core genres. In our study we consider respondents who play core genres (shooters, fighting, action-adventure, sports, racing, strategy, survival horror, roleplaying and MMO games) at least once a week to be core genre players (CP). The remaining group of gamers is considered to be non-core genre players (NCP). The latter includes respondents who play more or less than once a week non-core genres (platform, adventure, simulation, party, serious, classic and casual games) and/or less than once a week core genres. Our goal thereby is not to define absolute categories but rather to make an ad hoc distinction between those gamers with extensive experience with core genres and those without for the purpose of this inquiry. We expect that gender differences in game design preferences will diminish among CP because of more similar interests and experience. For testing this assumption, we first provide an overview of literature about typically female game preferences and challenge them by formulating hypotheses with respect to previous experience with core genres.

In-game violence

An issue which has conceived considerable attention in discussing game content is the general focus on traditional male interests and practices in games, which is considered as less appealing to women. Lazzaro (2008, p. 199) has pointed out that the game market is saturated with specific themes: *"If a game does not involve war, sports or Tolkien, it is hard to find at retail."* Some authors have claimed that those subjects are more strongly preferred by men because of their focus on *direct competition* which refers to conflict for territory or money and power (Gorriz & Medina, 2000; Graner Ray, 2004; Denner & Campe, 2008). Graner Ray (2004) has argued that this conflict concept has been anchored in games and therefore has become a synonym for the meaning of gaming. She has claimed, however, that women are more attracted to *indirect competition* elements such as scenarios that are not based on conflict or unjust violence. Accordingly, the American Association of University Women (AAUW) (2000), and Denner and Campe (2008) have contended that women prefer to solve a problem instead of defeating someone or conquering something.

Hypothesis 1a: Women will be less attracted to in-game violence than men.
Hypothesis 1b: Gender will be related to the type of player (CP/NCP) for determining players' preferences for in-game violence.

Complexity

Some authors have highlighted the importance of simple and transparent video games for getting girls to play. In the study of Van den Abeele (2009), girls have asserted that they prefer games which provide easy-to-master gameplay. Similarly, Denner and Campe (2008) have stressed the importance of clear and predictive in-game rules. Likewise, Graner Ray (2004) has drawn attention to designing understandable software which includes intuitive, logical and easily learnable game mechanics. Furthermore, she has claimed that the players' actions resulting in particular consequences could form a barrier for girls. Many current titles punish in-game failure through the irretrievable loss of life, skill or character and therefore seem to hinder girls in their play. Similar to these assertions, Miller et al. (1996) have argued that girls appreciate a good challenge but it must be an attainable one. We therefore predict that:

Hypothesis 2a: Women will be less attracted to complex gameplay than men.
Hypothesis 2b: Gender will depend on the type of player (CP/NCP) for determining players' needs for low complexity in games.

Sexual representations

Several researchers have devoted considerable attention to negative representations of female characters in video games. Although a number of opportunities are currently given for choosing gender and customizing a game character, women and girls are still under-represented and often portrayed as helpless (e.g. damsel in distress) and sexual beings in games (Ogletree and Drake, 2007; Downs & Smith, 2009; Martins et al., 2009). These results are congruent with original findings conducted by Dietz in 1998. However, it is shown that the perception of female game characters also depends on the level of play of women and hence gaming experience. Royse et al. (2007) have distinguished between female non-gamers, moderate users (1-3 hours gaming/week) and power users (3 < hours gaming/week), indicating different patterns of usage and attitudes. The study has developed a more nuanced understanding of images of females in games whereby female power users are aware of the hyper-sexualized representation of female avatars, but without this reducing their pleasure. Moreover, they prefer playing with a strong, feminine and even sexy character. Unlike power users, moderate players do not care much about their game avatar because of a lack of identification with game characters. Non-gamers, however, are the most negative and critical about sexualized content in games. These results indicate that the presence of stereotypical images does not necessarily cause aversion to gaming but that its effect varies according to the type of player. Nevertheless, negative representations of women in games could imply a potential threshold for female gamers. According to Taylor (2003), female players of *EverQuest* (Verant Interactive, 1999) often struggle with the meanings and representations surrounding their avatars. The female gamers in the study indicated they wanted more options for choosing and creating a game character than the stereotypes found in many video games. Therefore we predict that:

Hypothesis 3a: Women will be more annoyed by sexually represented female avatars than men.
Hypothesis 3b: Gender will be influenced by the type of player (CP/NCP) for determining players' annoyance for sexual images of female game characters.

Avatar customization

Taylor (2003) has argued that girls like to experiment with several game identities. Similarly, Denner and Campe (2008) have found that girls like to have the opportunity to customize their avatars. Furthermore, De Jean et al. (1997) have claimed that girls prefer to play with predominantly female protagonists. We distinguish between the customization and exploration of game characters and the preferred avatar's sex by proposing following hypotheses:

Hypothesis 4a: Women will be fonder of exploring with different game characters than men.
Hypothesis 4b: Gender will be related to the type of player (CP/NCP) for determining players' preferences to explore with multiple game characters.

Hypothesis 5a: Women will be more attracted to customizing a game avatar than men.
Hypothesis 5b: Gender will depend on the type of player (CP/NCP) for determining players' preferences to customize game characters.

Hypothesis 6a: Women will be more attracted to playing with an avatar of the same sex than men.

Hypothesis 6b: Gender will be influenced by the type of player (CP/NCP) for determining players' inclinations to play with an avatar of the same sex.

Game settings

Research has shown that women prefer to play in realistic game settings [e.g. *The Sims* (Maxis, 2000)] rather than in fantasy game settings [e.g. *Dragon Age* (BioWare, 2009)] (Denner et al., 2005). Van den Abeele (2009), however, has claimed that girls particularly enjoy cheerful cartoony and 2D games, indicating a preference for imaginative game settings. In line with Van den Abeele, Schott and Horrel (2002) have found evidence for fantasy elements supported by girls' inclinations for playing with animals or other in-game creatures rather than with realistic human-like characters. Therefore we predict that:

Hypothesis 7a: Women will prefer fantasy game settings more strongly than men.
Hypothesis 7b: Gender will depend on the type of player (CP/NCP) for determining players' preferences for fantasy settings.

Social interaction

Games which involve elements of social interaction seem to be preferable to women (ELSPA, 2004). Accordingly, a study conducted by the game design company Purple Moon has found that girls are strongly attracted by virtual relationships between game characters (Gorriz & Medina, 2000). Likewise, Dyson (2008) has confirmed this consistent pattern in her research about girls' motivations for playing *The Sims*. Her study has shown that social in-game scenarios are vitally important for girls' enjoyment while playing the game. Furthermore, Taylor (2003) has found that the growing population of women in massively multiplayer online games (MMOs) can partly be attributed to the fact that these games provide a sense of community and social structure which stimulates women to play. In addition, Taylor has claimed that socialization tools, such as chat and online boards, are particularly favored by women. Hence we hypothesize that:

Hypothesis 8a: Women will be more attracted to build virtual relations between game characters than men.
Hypothesis 8b: Gender will be related to the type of player (CP/NCP) for determining players' inclinations to build virtual relations between game characters.

Hypothesis 9a: Women will be more attracted to social interaction with other players while gaming than men.
Hypothesis 9b: Gender will be influenced by the type of player (CP/NCP) for determining players' preferences for in-game social interaction.

Narrative elements

Research has shown that humor plays an important part in girls' enjoyment of playing video games. In the longitudinal study of Carr (2005), the most popular video games eventually were those which offered a great amount of humoristic content. Carr has even claimed that humor was so highly valued by the girl players that it might well negate the potential thresholds of a game's content.

Hypothesis 10a: Women will be fonder of humoristic games than men.
Hypothesis 10b: Gender will depend on the type of player (CP/NCP) to determine players' partiality for humoristic games.

Furthermore, girls are claimed to have a partiality for sideline activities besides the main goals of a game and to prefer engaging narratives. Graner Ray (2004) has drawn attention to the attraction of sideline assignments which have no bearing on the outcome of the overall quest, but are nonetheless popular among girls. Moreover, the inclination towards multiple activities is in line with girls' preferences for games with rich narratives and storylines (AAUW, 2000; Kelleher, 2008). According to Taylor (2003), the popularity of MMOs among women is partially determined by elements such as strong narratives. Likewise, the ELSPA (2004) has claimed that both men and women engage with narratives which offer the opportunity for exploration on the player's own terms, although this appears more salient for women.

Hypothesis 11a: Women will be more attracted to games which include sideline activities than men.
Hypothesis 11b: Gender will be related to the type of player (CP/NCP) for determining players' preferences for sideline activities.

Hypothesis 12a: Women will prefer rich and good in-game storylines more strongly than men.
Hypothesis 12b: Gender will be influenced by the type of player (CP/NCP) for determining players' inclinations to play games with rich and good storylines.

METHOD

Two exploratory focus groups were undertaken with the following objectives: (1) to reflect upon findings about girls' game design preferences identified in literature; (2) to collect additional information, opinions and potential thresholds; and (3) to guide the design of the survey questionnaire. We assigned the participating women to two age groups, one comprising teenage girls age 16 to 18 and another one adult women age 21 to 24. The first group of participants was recruited in a high school situated in Deinze, Belgium, and consisted of 10 girls. The other group was selected on the basis of snowball sampling and comprised 7 participants. We based our selection on the principle of purposeful sampling whereby our participants had to meet two criteria: (1) being female; and (2) regularly playing a video game. We used the following reference for defining the concept 'video game' both in the focus groups and in the survey:

"It can mean anything from simple games played on mobile phones like Snake, PC- and web-based games such as Solitaire and Bejeweled, up to massively multiplayer online titles like World of Warcraft and Star Wars Galaxies which enrapture millions of subscribers every month" (BBC, 2005, p. 2).

Participants were instructed to reflect upon their gameplay and preferences, which was aided by the use of projective techniques such as *free association*, *fototalking* and *thirdperson empathy* (De Pelsmacker & Van Kenhove, 2006). Furthermore, we made a theoretical overview based on existing literature to expound girls' play patterns and preferences for specific game design elements. These findings served as guidelines to design the survey questionnaire, which was further completed by our focus groups. Before launching the self-reporting questionnaire, we conducted a pre-test with an informal person to search for difficulties or ambiguities. Next, the survey was complemented by the review of a research gaming expert. After several iterations, the final survey was set up online and distributed on online gaming forums, a gaming website (*9lives*.be), (women-specific) forums, social network sites and via emailing. Furthermore, we collected data by handing out flyers at a dancing school, a fitness club and on the

university campus. Although we indicated that only gamers could fill out the survey, we had to eliminate a few respondents who indicated they never played games. After data cleaning, we retained 962 valid and usable cases. In order to encourage respondents to complete the form, an incentive (*Nintendo DSi*) was presented and randomly handed to one participant at the end of the study. Respondents were asked to rate each item on a five-point Likert scale ranging from *strongly disagree* to *strongly agree*. Another five-point Likert scale was used for measuring playing frequency of specific video game genres, ranging from *never* to *every day*. By means of a two-way ANOVA design, we examined the main effects of gender (men versus women), experience with core game genres (CP versus NCP) and the interaction effects between both independent variables.

RESULTS

Demographics

Overall, the sample comprised more male gamers (64.20%) than female gamers (35.80%). The CP group consisted mainly of men (85.90% of men and 42.7% of women), while the NCP group consisted primarily of women (57.3% of women versus 14.10% of men). In addition, there were more CP than NCP (70.50% compared to 29.50%). CP were more heavily involved in their hobby, playing more than four times the amount of game hours of NCP per week (M = 17.44 hours for CP versus M = 4.31 hours for NCP). Furthermore, by means of a Mann-Whitney U test, we found that men are playing core genres more often than women who primarily play non-core genres. These findings confirm the assumption of a distinction between the group of CP (which consists mainly of men) and the group of NCP (mainly women). The male respondents play core genres more often than women which we have preliminary defined as fighting, shooting, action-adventure, survival horror, MMO, strategy, racing, role-playing and sports games. Men are however also playing more adventure games which were defined as being a non-core genre. Female respondents indicated that they play more often platform, simulation, party and casual games than their male counterparts. There were no statistically significant differences found for whether men or women play more classic retro games or serious genre games.

Perception of violence

Women (M = 2.50) are generally more annoyed by violence than men (M = 1.46), pointing to a significant main effect of gender ($F(1,958) = 155.501$, $p < .001$, partial $\eta^2 = .140$). This suggests that women are more exasperated by in-game violence, and thus supporting hypothesis 1a. In addition, there is a main effect of whether a person is a CP or NCP ($F(1,958) = 77.076$, $p < .001$, partial $\eta^2 = .074$), indicating that CP are less annoyed by in-game violence than NCP (M = 1.53 for CP versus M = 2.55 for NCP). There is, however, an interaction effect between both independent variables ($F = (1,958) = 30.624$, $p < .001$, partial $\eta^2 = .031$), indicating that female NCP are most exasperated by violence in games, while male CP are least irritated. Figure 1 (see below) illustrates the means of both female CP/NCP and male CP/NCP on the variable 'the annoyance of in-game violence'. A similar pattern is found for the likeability of games which raise adrenaline levels, indicating that separately males ($F(1,958) = 51.233$, $p < .001$, partial $\eta^2 = .051$, M = 4.00 for males and M = 3.40 for females) and CP ($F(1,958) = 34.675$, $p < .001$, partial $\eta^2 = .035$, M = 3.94 for CP versus M = 3.34 for NCP) like them the most. Both independent variables are thereby interacting ($F(1,958) = 11.193$, $p = .001$, partial $\eta^2 = .012$). The interaction effect (see figure 2) indicates that experience with CP has a moderating effect on gendered preferences of violence in games, supporting hypothesis

1b. Although the partial eta squared size of gender is largest for elements of violence, there are no gender differences found for whether a player wants to 'solve a problem' instead of 'conquering something' ($F(1,958) = .012$, $p = .911$). Only NCP ($M = 3.30$ for NCP and $M = 2.99$ for CP) are significantly more interested in problem solving than in defeating an opponent compared with CP ($F(1,958) = 20.640$, $p < .001$, partial $\eta^2 = .021$). This finding does not interact with the player's sex ($F(1,958 = 0.315$, $p = .575$). The latter indicates that the general assumption of women disliking *direct competition* cannot be confirmed by our study.

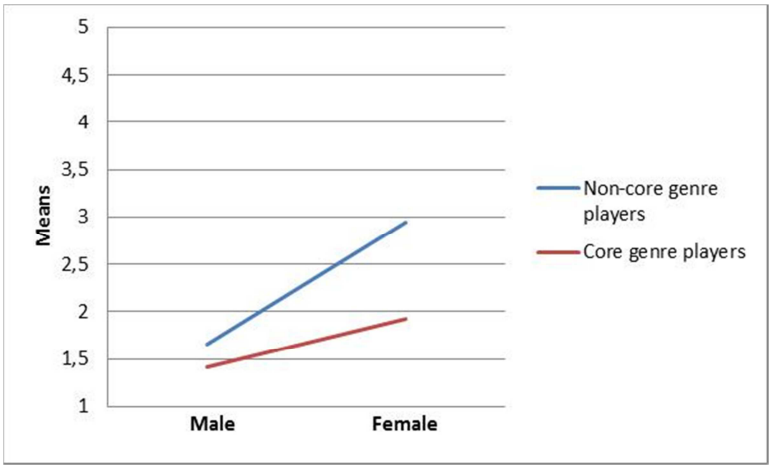

Figure 1: Annoyance of in-game violence

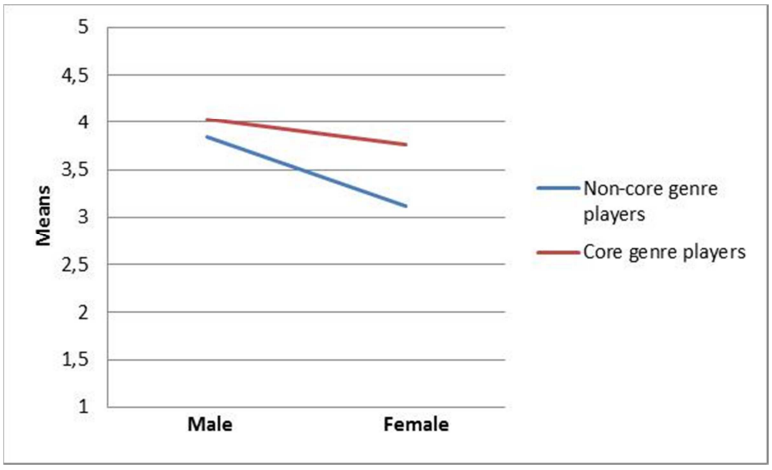

Figure 2: Preference for 'adrenaline-raising games'

Complexity

Six items (table 1) examined preferences for low complexity in video games. Except for item 2, all statements refer to a partiality for instinctive, easy, accessible and clear games. For testing hypothesis 1a and b, we drew upon a principal component analysis which indicated that a factor 'game facility' is underlying all the giving items. The eigenvalue of the component was greater than 1.0 and all the items revealed factor loadings larger than 0.5. The total variance explained was 43.43%. Cronbach's alpha for the 'game facility' factor was .736 and thus indicated a high internal consistency. A two-way ANOVA analysis revealed significant main effects of gender ($F(1,958) = 45.790$, $p < .001$, partial $\eta^2 = .046$) and experience with core genres ($F(1,958) = 33.823$, $p < .001$, partial $\eta^2 = .034$), indicating that women ($M = 3.09$ for the women versus $M = 2.68$ for the men) and NCP ($M = 3.12$ for the NCP and $M = 2.71$ for the CP) prefer easy-to-master games the most. Hypothesis 2a, that women will be less attracted to complex gameplay than men, is therefore supported. In addition, we found an interaction effect ($F(1,958) = 5.485$, $p = .019$, partial $\eta^2 = .006$) between being a CP/NCP and male/female gamers, supporting hypothesis 2b. Accordingly, figure 3 (see below) illustrates the means of all four groups, showing that female NCP are the most attracted to simple games while male CP are their opposite.

1.	A video game has to be easy and logical
2.	I only like competition when the video game is easy to handle
3.	I prefer to play a video game on a low level
4.	I only play video games with an attainable challenge
5.	A wrong movement during gaming may not have punishment or death of the game character as a consequence
6.	Clear and predictive in-game rules are a must for me

Table 1: Game facility factor

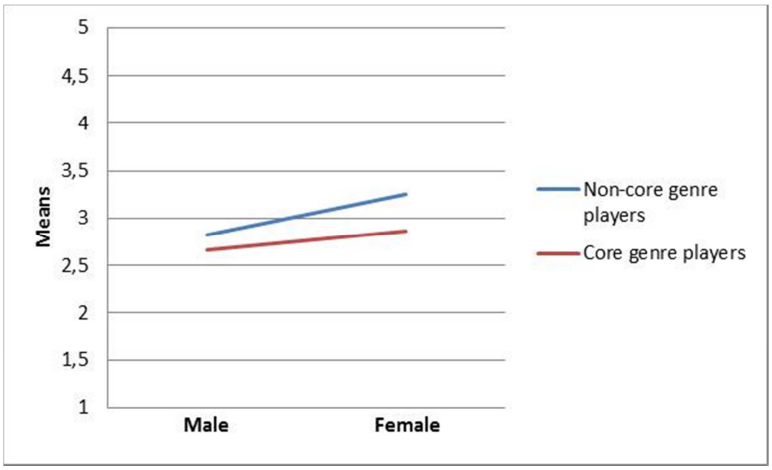

Figure 3: Preference for game facility

Sexual representation

Hypothesis 3a posited that women will be more annoyed by sexually represented female avatars than men. For testing this, we again conducted a principal component analysis on the basis of following items: 'I do not want to play games which represent women as sexual objects', 'I am annoyed by the over-emphasis of female body parts in reality games, but less in other game settings' and 'I only play games that portray women on a non-sexual way'. As a result, one factor 'sexual representation' was underlying the given variables with an eigenvalue larger than 1.0 and factor loadings greater than 0.5. The total variance explained consisted of 69.76% and the Cronbach's alpha was .781. A two-way ANOVA analysis revealed that there are significant main effects of gender ($F(1,958) = 60.794$, $p < .001$, partial $\eta^2 = .060$) and CP/NCP ($F(1,958) = 7.386$, $p = .007$, partial $\eta^2 = .008$) on the 'sexual representation' factor. The results indicate that women are more annoyed by such games than men ($M = 2.77$ for women versus $M = 2.24$ for men), which supports hypothesis 3a. A similar pattern is found for NCP who are more annoyed by sexual representations of women in games than CP are ($M = 2.71$ for NCP versus $M = 2.31$ for CP). Hypothesis 3b, that gender will be influenced by the type of player (CP/NCP) for determining players' annoyance for sexual images of female game characters, is not supported however ($F(1,958) = 3.137$, $p = .077$, partial $\eta^2 = .003$), which indicates that the gender differences do not depend on the level of experience someone has with core genres. Nonetheless, one item in the survey probed someone's opinion towards physically attractive game avatars. Surprisingly, the results showed that women are significantly more interested to play with attractive game characters ($F(1,958) = 4.989$, $p = .026$, partial $\eta^2 = .005$) than men ($M = 2.97$ for women versus $M = 2.83$ for men). There was however no main effect of experience with core genres found for this issue ($F(1,958) = 1.614$, $p = .204$), nor an interaction effect between gender and CP/NCP ($F(1,958) = .095$, $p = .758$). This indicates that an attractive avatar is of considerable importance to women, even though they are more averse to sexual representations of female game characters than men.

Avatar customization

We formulated three hypotheses concerning avatar preferences in order to identify gender differences and their relation with previous core genre experience. First, hypothesis 4a, that women will be fonder of exploring with different game characters than men, was not supported ($F(1,958) = 7.636$, $p = .006$, partial $\eta^2 = .008$). Although the means of both men and women were rather high, male gamers ($M = 3.78$) are more attracted to experiment with different game characters than female gamers ($M = 3.47$). Furthermore, there was a main effect of being a CP/NCP on the variable ($F(1,958) = 18.354$, $p < .001$, partial $\eta^2 = .019$), indicating that CP have a greater partiality for experimenting with multiple avatars than NCP ($M = 3.78$ for CP versus $M = 3.40$ for NCP). Both variables were not interdependent however ($F(1,958) = .006$, $p = .939$), which indicates that the same gender differences could be seen for both CP and NCP, which does not support hypothesis 4b. Secondly, hypothesis 5a, that women will be more attracted to customizing a game avatar than men, was tested by means of the item 'I like to determine how my game character looks like'. Female players ($M = 3.38$) reported a higher preference for avatar customizing than male players ($M = 3.32$) ($F(1,958) = 10.108$, $p = .002$, partial $\eta^2 = .010$), supporting hypothesis 5a. There was also a main effect of CP/NCP on this item ($F(1,958) = 14.691$, $p < .001$, partial $\eta^2 = .015$), suggesting that CP are fonder of determining the looks of avatars ($M = 3.40$ for the CP and $M = 3.18$ for the NCP). Hypothesis 5b, that gender will depend on the type of player (CP/NCP) for determining players' preferences to customize game characters, was also supported ($F(1,958) = 8.231$, $p = .004$, partial $\eta^2 = .009$). This indicates that the gender differences

in customizing game characters depend on the level of experience someone has with core genre games. Figure 4 reports the means of each group, showing that male NCP are the least attracted to this game feature while all other groups have similar results. Female CP are the most enthusiastic about deciding on their avatar's appearance. Thirdly, hypothesis 6a stated that women will be more attracted to play with an avatar of the same sex than men. The two-way ANOVA analysis revealed that there was only a main effect of gender ($F(1,958) = 7.199$, $p = .007$, partial $\eta^2 = .007$) in which female players reported liking to play with female avatars more than male players with male game characters ($M = 3.25$ for the women and $M = 3.03$ for the men). Hypothesis 6a was thus supported, although this was not the case for hypothesis 6b that posited that gender will be influenced by the type of player (CP/NCP) for determining players' inclinations to play with an avatar of the same sex ($F(1,958) = .032$, $p = .859$).

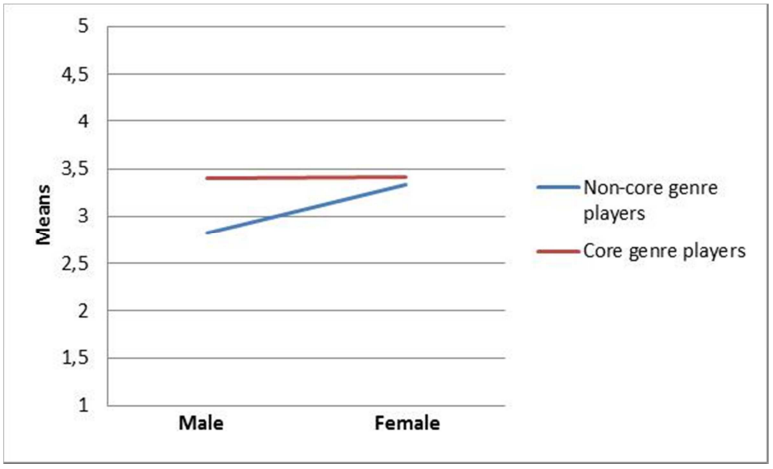

Figure 4: Preference for customizing game characters

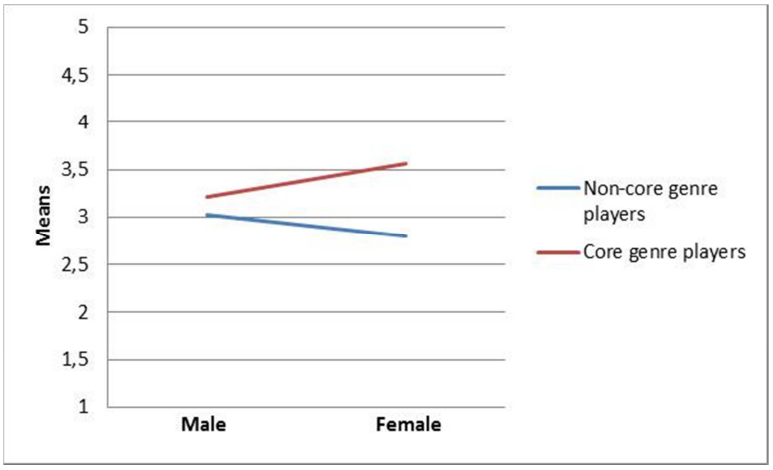

Figure 5: Preference for fantasy game settings

Game setting

Hypothesis 7a, that women prefer fantasy game settings more than men, was tested on the basis of the item 'fantasy game settings are a must for me'. No support was found, however, that women prefer them the most because there was no statistically significant main effect of gender ($F(1,958) = .500$, $p = .480$). Furthermore, CP ($M = 3.28$) reported more than NCP ($M = 2.87$) that they like to play games with fantasy settings ($F(1,958) = 28.725$, $p < .001$, partial $\eta^2 = .029$). Also, an interaction effect was found between gender and experience with core genres ($F(1,958) = 10.697$, $p = .001$, partial $\eta^2 = .011$), supporting hypothesis 7b. Figure 5 (see above) illustrates a pattern in which female CP and female NCP are strongly each other's opposite. Female CP are the most enthusiastic about fantasy game settings which suggests that women do like them if they frequently play core genre games.

Social interaction

Male players ($M = 3.89$) reported liking virtual relations between game characters more than female players ($M = 3.26$), which does not confirm hypothesis 8a ($F(1,958) = 52.349$, $p < .001$, partial $\eta^2 = .052$). Furthermore, CP seem to like social interaction in games more than NCP ($M = 3.85$ for CP and $M = 3.20$ for NCP) whilst there is a main effect of players' experience with core genres ($F(1,958) = 34.133$, $p < .001$, partial $\eta^2 = .034$). The liking of games which include social interaction and relations between avatars, however, depends on the interaction effect between CP/NCP and gender ($F(1,958) = 12.764$, $p < .001$, partial $\eta^2 = .013$), indicating that female NCP are the least fond of these games while the other players have more comparable interests (see figure 6). A similar pattern is found for the preference for social interaction with other players, showing that gender ($F(1,958) = 22.963$, $p < .001$, partial $\eta^2 = .023$) and CP/NCP ($F(1,958) = 61.100$, $p < .001$, partial $\eta^2 = .060$) have main effects on the item 'I like to communicate with other players during gaming'. Again, men are more socially motivated than women ($M = 3.72$ for men versus $M = 3.09$ for women), while the same applies to CP who have a stronger preference for communication during gaming than NCP ($M = 3.73$ for CP and $M = 2.93$ for NCP). There is, however, no interaction effect ($F(1,958) = .595$, $p = .441$), indicating that gender and experience with core genres are not interdependent for determining in-game communication preferences. We therefore reject hypothesis 9b.

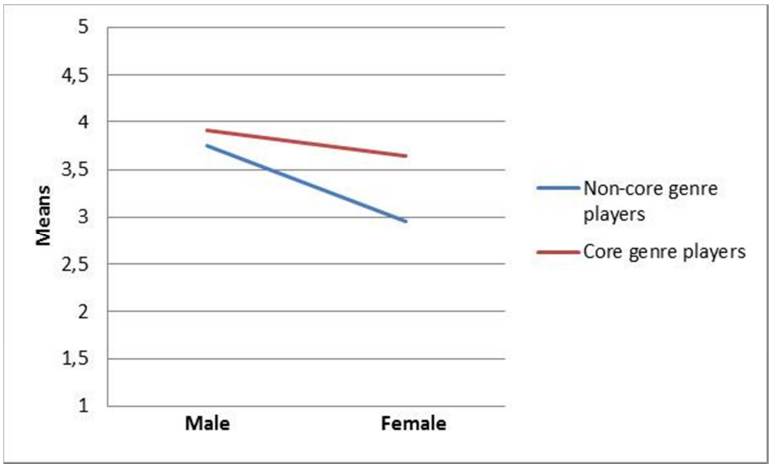

Figure 6: Preference for virtual relationships between avatars

Narrative elements

Hypothesis 10a posited that women will be fonder of humoristic games than men. This statement was however not supported in that there was no main effect of gender on the variable ($F(1,958) = .015$, $p = .904$). On the other hand, players' experience with core genres does have an effect on the preference for humoristic games ($F(1,958) = 18.337$, $p < .001$, partial $\eta^2 = .019$), indicating that primarily NCP prefer them ($M = 3.19$ for NCP versus $M = 2.92$ for CP). This effect, however, depends on the player's sex as there is an interaction effect between gender and CP/NCP and thus supporting hypothesis 10b ($F(1,958) = 8.876$, $p = .003$, partial $\eta^2 = .009$). Surprisingly, female NCP prefer humoristic games the most while, conversely, female CP are the least interested in such games (see figure 7).

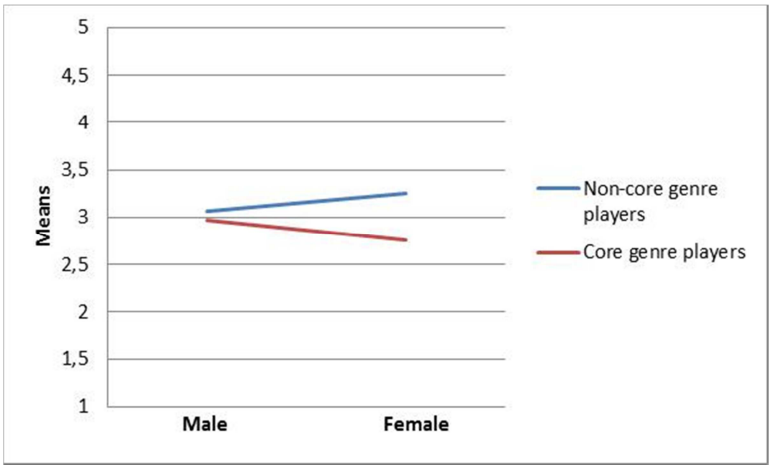

Figure 7: Preference for humoristic games

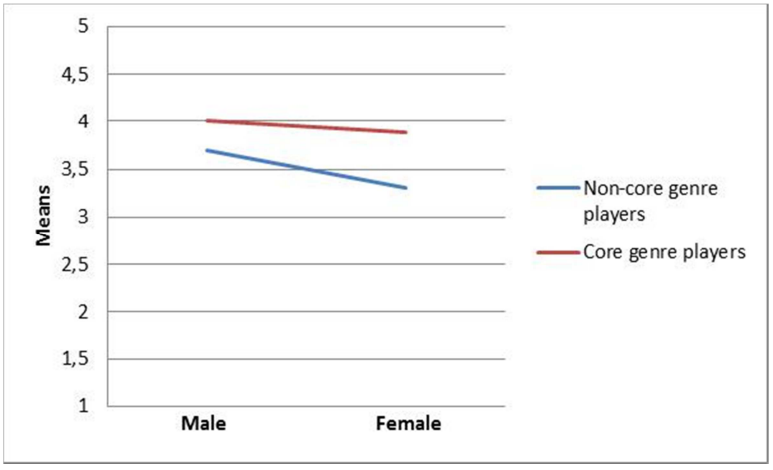

Figure 8: Preference for sideline activities

Hypothesis 11a, that women will be more attracted to games which include sideline activities than men, is not supported ($F(1,958) = 14.584$, $p < .001$, partial $\eta^2 = .015$) since male players reported being more attracted to them than female players ($M = 3.95$ for the men and $M = 3.56$ for the women). Again, experience with core genres has a main effect ($F(1,958) = 43.960$, $p < .001$, partial $\eta^2 = .044$), suggesting that CP have stronger inclinations for extra in-game activities than NCP ($M = 3.97$ for NCP and $M = 3.43$ for CP). This effect, however, depends on a player's sex and thus supports hypothesis 11b which suggested an interaction effect ($F(1,958) = 4.791$, $p = .029$, partial $\eta^2 = .005$). Figure 8 (see above) illustrates the results, showing that male CP are most fond of sideline activities and female NCP the least.

Finally, we tested hypothesis 12a, that contended that women will be more attracted to rich in-game storylines than men. This statement is not supported, however, whilst there is a main effect of gender ($F(1,958) = 100.265$, $p < .001$, partial $\eta^2 = .095$), indicating that male players ($M = 4.37$) find good storylines more important than female players in games ($M = 3.51$). Similarly, a main effect of CP/NCP ($F(1,958) = 67.287$, $p < .001$, partial $\eta^2 = .066$) shows that CP appreciate rich storylines more than NCP ($M = 3.98$ for CP and $M = 3.16$ for NCP). Furthermore, a significant interaction effect is found between gender and the type of player (NCP/CP) ($F(1,958) = 13.999$, $p < .001$, partial $\eta^2 = .014$), confirming hypothesis 12b. Male CP seem to have the greatest partiality for rich storylines whilst female NCP have the least (see figure 9).

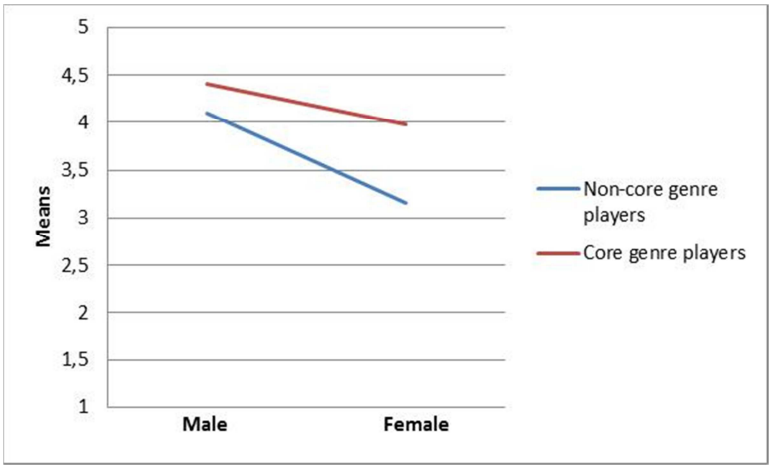

Figure 9: Preference for rich storylines

DISCUSSION

The present study focused on the identification of gender differences in game design preferences by means of an empirically-grounded quantitative study. Specifically, we tried to gain insight into the relationship between gender and previous game experience with certain game genres on gaming inclinations. We therefore made a distinction between core-genre and non-core genre players. The results indicated a consistent pattern of female CP, male CP and male NCP whose gaming preferences were often in line with one another, while those of female NCP were different. This confirms our expectation that gender differences diminish among CP because of similar interests and experience. It was however remarkable that the preferences of male NCP were also similar to those of CP, irrespective of their experience with core genres. A possible explanation could be that the group male NCP were also more experienced with the gaming technology than female NCP. It may be speculated that this is probably so because of cultural, physical and spatial thresholds which are limiting the opportunities for women to engage into gaming activities. Furthermore, the results indicated that the gaming inclinations of male CP were particularly opposed to those of female NCP, indicating a persistent divergence between both groups.

Overall, gender seemed to be an important element for determining game design preferences, suggesting that men and women have distinct playing styles. However, we also found that differences across gender can depend on a player's previous experience with core genres. Accordingly, the analyses indicated that for most design preferences there was an interaction effect between gender and the type of player. These findings reinforce the view that preferences are alterable and reflect previous access, past experience and knowledge of different game genres (Carr, 2005; Hayes, 2005; Jenson et al., 2007). In other words, gender differences in game design preferences are consistently present whilst previous experience substantially affects these findings.

Nonetheless, as with any study, there are a number of limitations. Methodologically, it would have been more rigorous to exclusively distinguish between gamers who have much experience with non-core genres and those with core-genres. In our case, we made an ad hoc distinction between gamers with extensive experience with core genres and those without. The distinction core vs. non-core players therefore does not contain equal categories, as CP could also play non-core genres more than once a week while NCP could have little experience with non-core genres. Furthermore, the current study might not represent the whole population of gamers because answers on the survey items could have been affected by respondents' self-selection. Moreover, this study took an exploratory step towards quantitatively examining gender differences in game design which caused us to use non-validated scales and items. This could have influenced the interpretation of items among players with various levels of game experience. Future research should therefore concentrate on developing scales to measure preferences for game design elements. For doing this, social scientists should cooperate with design experts to find a proper balance between game characteristics and how they can be integrated in the design of a questionnaire.

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