Motion Capture as a Tool of Empowerment for Female Main Characters

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Abstract. In this work, we intend to explore how motion capture technology can be used in the video game industry as a form of empowerment for female protagonists. We aim to highlight video games in which motion capture was used to portray reality and humanity and whose characters challenge both normative patriarchal and sociocultural values throughout the narrative.

For this purpose, we will start by examining the portrayal of women in different media to classify the stereotyped form of their performance, further exploring this representation in video games. The case studies will stem from the Tomb Raider series and the development of the character Lara Croft through motion capture, to recent video games that feature female protagonists such as "The Last of Us Part II" (2020), "Hellblade: Senua's Sacrifice" (2017) and "Assassin's Creed III: Liberation" (2012).

This way, technology can break standards and enhance the details of action and emotion, revolutionizing the stigma associated with the personality and behavior of female characters in video games. We can conclude that several methods can be used in the industry, however, motion capture is the method that stands out the most in large productions for providing realism and immersion into the narrative. With this study, we were able to understand that it is possible to subvert gender stereotypes and how motion capture technologies were used in video games that intended to abolish the stereotypes associated with these characters.

Keywords: Motion Capture · Gender stereotypes · Video games · Female heroines · Sex roles

1 Introduction

We will start by characterizing the representation of gender in different media, with the aim of understanding which aesthetic and narrative stereotypes are most commonly repeated, contributing to the generalization of a sexist ideal, especially in the videogame industry. Next, we will analyze motion capture technology and contextualize its use for development of virtual characters. Finally, we will examine case studies of videogames which feature female protagonists that appeal to feminist ideologies, that is, characters that challenge patriarchal and socio-cultural normative values and have emotional evolution throughout the narrative.

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When talking about digital bodies, it is necessary to talk about representation. The main question we intend to answer in this study is how motion capture technology can be a feminist representation tool by granting characters' veracity of movements and emotions, as opposed to the typical video game portrayal of the female character as damsels in distress or hypersexualized heroines. Studies show that gender dichotomy is usual in video games, and that female characters are more likely to be portrayed in a sexualized fashion than male ones. However, this dichotomy seems to go unnoticed by video game reviewers or editorials, contributing to an industry-accepted standard of sexualization [1].

As the arts can be considered a mirror of society, we can see in the entertainment industry how women can be treated as the lowest in the hierarchy of the gender binary. According to patriarchal codes, if men are strong, women are weak, and because they can be seen as "other", their identities can be denied [2]. As digital arts have enormous power to manipulate imagery, subjectivity is used as a political weapon to break stereotypes and deconstruct identities, contributing to postmodern intersectional concerns in giving voice to social minorities through medium specificities [3]. Paul Wells, in his work "Understanding Animation" [4], wrote that animation has the power to blur the lines of gender representation, and sometimes the exercise we do to define a character as male or female comes from the connection of traits we associate with masculine and feminine. Wells also notes that animation can deconstruct gender norms, even though contemporary mainstream cinema tends to present male characters with strong, muscular, and spectacle bodies (visually consistent with live-action male representation), while female bodies are presented with feminized gestures and eroticism.

2 Representation of Female Protagonists in Video Games

In the video game industry, the design of female characters is criticized by many scholars, with the biggest concern being related to the sex appeal built around these characters. As virtual characters, the figures can be altered according to the intention of their creators, but the heteronormative and unhealthy dimension of the games industry reveals itself in the only concern for thin waists, large buttocks and provocative clothes of many of the female characters. As much as critics and creators have tried to fight against the standard, the industry remains reluctant to change, promoting hypersexualized female characters and stipulating that the games women should be playing are different from games designed for male players, ignoring any notion of gender being a continuum and not a binary model [5].

In video game commercial covers, males are nearly five times more likely to be portrayed as the main character and four times more likely to be sidekicks than females. This difference is probably due to the discrepancy between the number of male and female characters in general. In these games, male characters are presented as adventurers, protectors, or guides, while female characters serve as adjuncts. It is important to note that there are more male than female main characters, and this minority, in addition to often being accompanied by a primary male character, is usually portrayed unevenly among themselves. In addition to the fact that the female characters are not represented and when they have a role in the story, they usually share the spotlight with another male

character, the frequency of exaggeration or physical glorification of the characters is also notorious. While male characters have musculature that will be useful for fighting enemies in action games, female characters' big muscles are no more common than big breasts [6].

Due to the poor quality of graphics at the beginning of the video game industry, female characters were presented in less sexualized ways until the 90s, but quickly from that date onwards the appeal to the male gamer came down to sexualizing characters who continued to rarely be part of the main story. According to studies, male gamers who play games with sexist elements tend to think of sexism with benevolence and are instilled into thinking that women are inferior. These patterns promote violence, gender inequality, and rape-accepting behaviors [7]. Despite there being a large number of female gamers, the visibility women have in video games, which is constantly ignored by the industry, harms their apprehension of the world, causing them to doubt their abilities and lose confidence [8].

3 Tomb Raider and the First Motion Capture Approaches to the Character Lara Croft

Until the 1980s, there were few female characters in games and the ones that existed were portrayed as objects to be retrieved or rescued. This cliché was broken by the character Lara Croft, contributing to the success of the video game series "Tomb Raider". Lara is a main character with a personality far from the princess stereotype, being an independent, strong, and tough woman. This distinguished her from the other female characters and made her a role model for women in gaming. Although some players and scholars associate Lara with a powerful icon that expresses sensuality and strength, others classify Lara as an aggressive and violent character who has the same personality as male protagonists, being often described as a female Indiana Jones. One major problem is that Lara is a character designed for men, with large breasts, tiny pants, and an erotic fantasy figure, making her more of an object than a subject, and pushing her away from the "girl power" idol she could be [9]. In the first "Tomb Raider" (1996) game, Lara broke patterns by being a female main character, and since this game there has been a growth in the number of female heroes. However, in the video game Lara can be both "self" and "other", because some women cannot identify themselves with Lara, and men do not easily identify with female characters [10] (Figs. 1 and 2).

Fig. 1. Lara Croft in "Tomb Raider" (1996).

Fig. 2. Lara Croft in "Tomb Raider: Underworld" (2008).

It is after "Tomb Raider: Underworld" (2008) that Crystal Dynamics (the developer since "Tomb Raider: Legend" (2006)) focused on improving the game's realism. For this effect, Crystal Dynamics used motion capture technologies instead of hand-animated movements to achieve realist and fluid motion and facial expressions, giving priority to what they felt the character was able to do.

To create a video game character that can perform and be emotionally expressive, a vast range of techniques can be applied in conformity with the realism that is intended for that virtual character. It is important that their modeling can express both body and facial motions to show the particularities of each character without trivializing their interpretation [11]. For this result, the developer decided to use motion capture, an animation tool that consists in digitally tracking and recording movements of objects or living beings in a controlled space [12], with the potential of helping animators to model complex emotions, natural motion, and plausible timing to the virtual world. The real-time results of this technology separate it from the previous animation technique *rotoscopy*, which is the use of live footage as a reference for drawing. Instead, motion capture creates digital bodies animated by data that the computer receives from the actors' suit sensors, speeding the process of GC (Computer Generated) 3D animation [13]. With this technology, animators and visual developers can use the full motion of the actor or manipulate it for their artistic purposes [14]. The coding generated from the actors' movements provides the character with distinct behavior postures and patterns that help the spectator feel empathy and affection in the digital body movements [15].

For "Tomb Raider: Underworld", the motion capture actor was Gold medalist Heidi Moneymaker, for her athletic prowess and for the knowledge of the physical limits that a character like Lara would face during the gameplay. After capturing the movements, additional animation was used to give Lara more flexibility and the possibility of multitasking with the same amount of realism. This videogame, unlike the previous ones, has had reports that the character's appearance was more appealing to female fans [16].

4 Recent Uses of Motion Capture in Video Games Female Protagonists

4.1 "The Last of Us Part II" (2020)

In the games that succeeded the controversial "Lara Phenomenon", more female main characters were developed to attract the women's side of the market, even with the

industry focusing its efforts on the tastes of male players. One of the games that we are going to explore featuring a powerful feminist lead is Naughty Dog's "The Last of Us Part II" (2020). In the first game, "The Last of Us Part I" (2013), not only do the female characters influence the narrative and embody powerful roles, but their clothing is also designed for a narrative (rather than sensual) purpose, reflecting the characters' struggle to survive in the apocalyptic world of the gameplay. Here, we play with multiple characters, Joel being the main protagonist. This is one of the concerns we described earlier, as the probability of a game having several playable characters but male characters having more playability than female characters is a dominant trope. Apart from Joel, we play with several characters, and each has its own story and connects to Joel in different ways, being two of them Joel's daughter, who is killed at the beginning of the game, and Ellie, the co-protagonist who can save the world. The concept of the game centers on the bonding between Joel and Ellie, a strong-willed character that is immune to the virus that caused the apocalypse, and Joel protects her as if she were his family. In addition to following Ellie's story in the main plot, the first game has an extension episode entitled "Left Behind", in which the player can understand Ellie's backstory on how she found she has immunity and witnesses her relationship with Riley, with whom she had a romantic interest [17] (Figs. 3 and 4).

Fig. 3. Ellie and Joel in "The Last of Us Part I" (2013).

Fig. 4. Ellie in "The Last of Us Part II" (2020).

In the following game of the series, "The Last of Us Part II", set in the post-apocalyptic world years after the first game, the main characters are Ellie and Abby, two female enemies who seek revenge from each other. This game had a lot of negative reviews from the players for two reasons: one is because the game did not star Joel, due to him being killed by Abby early in the game, and the other is for the introduction of LGBTQIA + characters. Ellie is presented as a lesbian woman, and her girlfriend Dina and Lev, a transgender man, are secondary characters, which lead to queer and transphobic discourse from some players that had played the first game [18]. In "Left Behind" there can be seen a romantic involvement between Ellie and Riley, who is killed in the end of the episode, following the stereotype for killing queer character while they are in a healthy romantic relationship [19]. This trope, called "Bury Your Gays", consists of stating that a character is queer, but due to the majority of the public disapproving of this discourse, the production makes this character disappear shortly after coming out [20].

Between "The Last of Us Part I" and "The Last of Us Part II" there were major technological differences, mainly because Naughty Dog wanted to make elements even

more lifelike. To achieve this goal, the game uses motion capture technology with different approaches from the first game of the series, due to the developer's goal to reach for humanity and realistic emotions. This is done by the combination of organic movement (motion capture performance) and interactive responses from the character (key-frame animation). In an interview with stuntwoman Amy Johnston [21], she talks about her experience of doing mostly motion capture for Abby, but also movements for other characters in the game, both human characters and creatures. Since Abby is a physically tall and strong character, when Johnston had the challenge to play Ellie or enemies who were mostly smaller than Abby, she had to vary her performance and fighting style every time. According to the stuntwoman, during filming, there were days when she had to play several characters or occasionally she spent weeks acting a single scene to get the emotion of every detail right.

Two motion capture techniques we want to highlight in the production of "The Last of Us Part II" are, firstly, that there was no use of facial capture during gameplay. The cut scenes and cinematics are facial and body captured and, while playing, the facial animations are synthetic. This was because the animators created a display of emotions for each character so that this character could perform while saying the line of dialogue [22] (Figs. 5 and 6).

Fig. 5. Facial motion capture for Ellie.

Fig. 6. Baby JJ Motion Capture splitscreen.

Secondly, this game had a very important goal to capture humanity, as in the first game, and every character and creature relied on body motion capture to help with this purpose, yet, it was a challenge to motion capture baby JJ, the biological son of Dina. Although JJ only appears in a small segment of the game, his movements needed to be natural, realistic, and variated, so for this effect two actors were used, one to act as JJ and the other to act as the person holding him, so that in the gameplay, when the player interacted with him, a strong sense of empathy could be created [23].

4.2 "Hellblade: Senua's Sacrifice" (2017)

In video games, despite the narratives and the worlds are often a fantasy, as is the case with the series "The Last of Us", that does not mean they cannot be realistic. In this medium, realism is a multi-dimensional concept, which includes both factual and graphical resemblance to the real world (due to representation of social context, identity, perceived utility, among others) [24]. Another video game recognized for its realism and immersion is "Hellblade: Senua's Sacrifice" (2017). This video game by Ninja Theory,

based on Celtic and Scandinavian mythology, follows Senua, a Pict warrior from the ancient British Isles, on her journey to Helheim to save the soul of her beloved Dillion in the afterlife (contradicting the damsel in distress stereotype). Senua is a historically accurate character, her clothes and physique are something you would find in Vikings' depictions, and she has both the strength and dexterity of a warrior. For this character, great care was taken with the quality with which she expresses emotions, which were captured by real-time motion capture systems in great detail. The expression of emotions in this game is essential not only for the credibility of emotion/reaction, but also becomes fundamental for the narrative, because throughout the game we are immersed in Senua's psychosis and experience illusions that accompany us throughout the narrative [25].

"Hellblade: Senua's Sacrifice" is known for subverting tropes. As we mentioned earlier, Senua's physical appearance was not influenced by the stereotypical sexualized physical appearance of video games, and the representation of her mental illness with visual, auditory, and sensory hallucinations while fighting creatures and facing her prejudices, prove how a character from a marginalized group can become a great hero [26] (Figs. 7 and 8).

Fig. 7. Senua in "Hellblade: Senua's Sacrifice" (2017).

Fig. 8. Melina Juergens live performance of Senua.

Performed by actress Melina Juergens, Senua's performance was captured by live 3D motion-capture and facial camera-rigs systems, in order to catch every detail of her facial expressions. The intense graphic work allowed the designers to experiment with different approaches to represent the character's hallucinations and develop camera tricks, textures and depth perception. Motion capture and binaural sound recording techniques turned this gameplay similar to what would be experienced by someone suffering from psychosis, providing the highest possible level of empathy. One criticism this game has is that the combat moves, all recorded by motion capture, are repetitive. The justification given was that the objective of the game is not to fight, but to follow Senua's inner journey [27].

4.3 "Assassin's Creed III: Liberation" (2012)

Another action game that uses motion capture and features a female character is "Assassin's Creed III: Liberation" (2012), developed by Unisoft, this videogame from the "Assassin's Creed" series has been noticed because of its cultural portrayal. This game is a set in the colonial culture of 18th century Louisiana, New Orleans, through the eyes of

an Afro-French assassin named Aveline de Grandpré. In this game, we follow Aveline, a mixed-race woman that can embody different personas depending on the quest: a lady, an assassin and a slave. This outfits are about class, culture and legal status. While in the lady outfit Aveline can bribe, seduce and enter public spaces without being noticed, in the assassin outfit she can climb, fight and kill, and in the slave outfit she can climb, fight, and not be detected as a villain [28]. "Assassin's Creed" is one of the few popular video game series that features a female protagonist. In the gameplay, Aveline has the same physical abilities as the other protagonists of the series, so there have been studies in which players claim choosing the games within the series for the narrative and that the character's gender does not influence the decision. Notwithstanding, some of the players say that "Assassin's Creed III: Liberation" is a game they particularly admire because they can relate to the main character [29] (Fig. 9).

Fig. 9. Aveline's outfits as a lady, an assassin and a slave in "Assassin's Creed III: Liberation" (2012).

To represent the historical reality where each game of the series takes place, many technological approaches are used to replicate the scenery, the lights, textures, and the surround sound, focusing for this study on the large-scale motion capture animations and physics simulations [30]. In this video game, real-time motion capture was not only used for the characters, but also for the crowds. As "Assassin's Creed" games are open world, to give realism to the crowds, animators use real-time technology to record actions on stationary poses and locomotion, conversations, and facial expressions [31]. Large production companies like Ubisoft have access to big-budget motion capture technology, which use cameras with the ability to capture multiple actors and large areas, called Optical Motion Capture Systems. These systems are revolutionary because, in addition to guaranteeing realism, for companies that produce series production becomes much faster and graphics maintain the high-resolution standard of the industry [32].

5 Discussion

Throughout these case studies, we can conclude that several animation methods can be used in video games, however, motion capture is the method that stands out the most in large production companies to provide realism and immersion in their narratives. The video games we chose to analyze were action/adventure games that featured female protagonists. At first we analyzed two video games from the "Tomb Raider" series for their differences. Even though the first "Tomb Raider" game does not use motion capture technologies, we chose to highlight it for the sexist controversial presentation

of the main character, Lara Croft. Years later, in the game "Tomb Raider: Underworld", developed by Crystal Dynamics, the production was focusing on deconstructing the stereotype associated with Lara's figure and performance, and sought to present her more realistically, so, instead of hand-made animation, they decided to used motion capture systems. Recent video games we chose to study were "The Last of Us Part II", "Hellblade: Senua's Sacrifice", and "Assassin's Creed III: Liberation", due to the interdisciplinarity of their contexts and main character representation. In Naughty Dog's "The Last of Us Part II", we follow the stories of Ellie, a strong-willed lesbian, and Abby, a woman with a muscular physique that would typically be associated with the male gender. In this video game, motion capture was used as a basis for both human characters, from babies to adults, as well as the non-human creatures of the post-apocalyptic world.

In the video game "Hellblade: Senua 's Sacrifice", from Ninja Theory, we live the experience of Senua and follow her journey and fight against the prejudices about mental illness she suffers. Here, live motion capture systems are used to give the character emotional realism, and the particularity of the results being seen in real-time allowed the actress and the developers to work in the details of Senua's performance. The criticism that is made of this game in terms of movements is that there is not a wide variety of fighting movements, although this is justified by the producer as being a non-relevant part of the story, that consists of the inner fight and not action.

Finally, in "Assassin's Creed III: Liberation", we can play as Aveline de Grandpré, a mixed-race female assassin who can embody different personas. In her missions, Avelina can wear a lady, assassin, or slave outfit. Her movements vary with outfit, each one having particular abilities and influencing the people around them differently. This game has an added cultural relevance, as the possibility of playing with a black heroine gave players the chance to identify themselves with the character. Concerning the other games in the series, Aveline has the same abilities as the male assassins, and the variety of choice of genre of the protagonists makes this game relevant. As in the other games from Ubisoft, a developer with access to high-tech technology and big budgets, it was possible to work with Optical Motion Capture Systems, which, moreover to being able to capture actors, are also able to capture large areas. Since "Assassin's Creed" games are open world, the ability to capture buildings and crowds not only made the games more real but also helped the production in more practical and faster ways.

With this work, we were able to understand that it is possible to subvert the stigma associated with female characters, and that motion capture technologies were used in several games that intended to abolish the stereotypes associated with these characters, like being damsels in distress, hypersexualized, and created to please the male audience. The role of developers like Crystal Dynamics, Naughty Dog, Ninja Theory and Ubisoft in changing the tropes of the industry is critical and should be both recognized and encouraged. These producers used motion capture as a system to capture the reality and humanity of their characters and enhance the details of each one's performance and emotions, revolutionizing the thinking associated with the personality and behavior of female characters in video games.

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