Towards Realistic Female Avatar Creation

A Tool for Virtual Actor Design and Player Choice

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Abstract. Female gamer numbers are on the rise, but females have been disproportionately underrepresented and inaccurately portrayed in video games. Recent findings also reveal many negative effects misrepresentation can have on women's self esteem and body image. Based on a review of the literature on media effects, and using available anthropometric data, we propose a more realistic and responsive character creation tool for the designers of virtual agents and as a basis for researchers to assess the impact of female character models on the enjoyment and self-concept of the players. We first report on studies regarding media effects on women as well as the current situation regarding female player avatars as well as NPCs in games, followed by our approach towards more realistic avatar creation.

Keywords: Virtual actor design, social impact, character modeling.

1 Introduction

The portrayal of female body proportions in various media has been a heavily debated topic for years. While there have been many studies done on the sexualization and mistreatment of women in games [1] [2] [3] [4], studies that examine the body proportions of female game models regarding realism are still rare [5]. Sexualization of a character may sometimes be a subjective argument. However, offering realistic proportions of a female body to gamers should be a choice that is more widely available in all genres of games. Currently, there is a distinct disparity between video game character body proportions and real life measurements and, if left unaddressed, this disparity is likely to lead to serious negative effects in gamers' perceptions of gaming and self-concept [1] [6] [7] [8].

Research suggests the image of the body often becomes paramount to women's sense of personal identity and self worth [9]. Furthermore, research shows that media plays a significant role and becomes a source of comparison through which women and men form gender expectations and norms of females. The constant conflict that women have between the media's portrayal of the female body and their own body is an issue that may last until old age. The idealized body images found in media can lead to body image dissatisfaction in women [10] [11] [12]. Young girls briefly exposed to idealized female body images developed lower self-esteem about their own

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bodies [13]. Exposure to idealized media images predicted bulimia, anorexia, and body dissatisfaction in middle and high school female students [14].

There are many varieties of *3D character creation tools* in video games. Different genres of video games such as action, shooter, or adventure all have distinct features regarding character creation. Not only do gamers create their avatars using these character creation tools, game developers often use the same toolset to create NPCs that populate the game as intelligent virtual agents.

In the popular MMORPG *World of Warcraft*, the character creation process involves choosing between gender, race, and cosmetic options such as hair color. However, changes to the individual body parts and proportions are not available. In the online world *Second Life*, the character creation process also allows choosing between genders and even allows players to choose options such as becoming animals, robots, or even vehicles. While the Second Life tools offer premade templates for players to choose from, full customization of the body parts is only available if players choose to upload their own models or purchase them from other players. While *EVE Online* is a persistent-world MMORPG and the game's focus is on spaceships and galactic economy, EVE Online also boasts one of the most robust and intricate avatar creation systems. Even though players spend the majority of the game without their avatars on screen, the level of detail customizable with the creation tool is similar to that of a 3D modeling/sculpting tool. In the latest iteration of the second best selling shooter franchise Battlefield, *Battlefield 4*, the character creation process is also limited to cosmetic changes such as weapon/gear textures, skin tone, and hairstyles. There are also options to choose between male and female, but the models are largely covered up by uniforms and have no options to change body proportions. In *Call of Duty: Ghosts*, the most recent release of the best selling shooter franchise, female character models are introduced for the first time. However, female character models utilize the same model sizes as the male models, to ensure fairness of the characters' "hitbox" in game. The character creation options are again limited to cosmetic changes to the skin, hair, and gear. No changes to the body proportions are available.

2 Realistic Avatar Creation

The use of a more realistic and responsive character creation tool, both in-game and for game designers, is a step towards assessing the impact of female characters' models on the enjoyment and self-concept of players. As a first step towards such a tool, we created appropriate models and a character creation tools based on the above literature review. It is intended as a proof-of-concept for such a tool and preliminary qualitative evaluation has shown interest in such a tool among game designers.

We created the "Realistic Avatar Creation" (RAC) tool for the game engine Unity based on the toolset of Unity Multipurpose Avatar (UMA). In its final incarnation, the RAC tool will have six realistic model templates based on anthropometric data sets from the U.S. Army Anthropometric surveys, the Center for Disease Control and cross-referenced with data from ANSUR and ASTM, see Fig.1. RAC also includes extensive options for body part customization, including the width and girth of chest,

stomach, waists, buttocks, arms, and legs. As part of the responsive feedback for users of the tool, the tool indicates where the current choices fall on the standard deviation based on the database chosen.

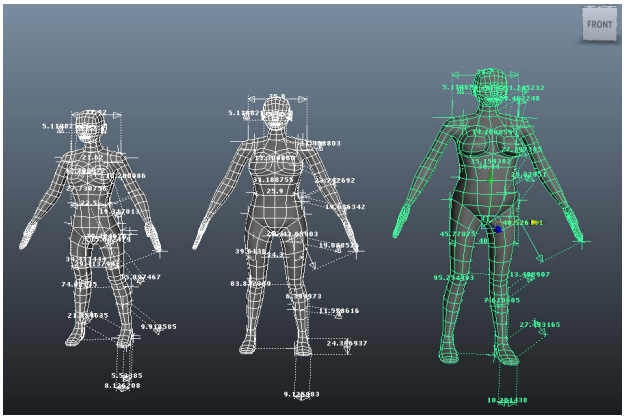

Fig. 1. 3D models based on anthropometric data

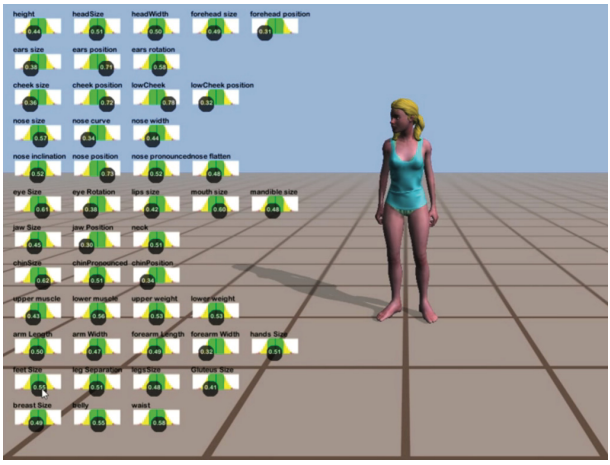

Fig. 2. Variation for displaying standard deviations in the RAC tool

The tool includes realistic model templates with body proportions based on the data sources. The goal is to recreate models that are completely proportionately accurate representations according to NSRDEC anthropometric surveys from 2007 - 2010. Based on the database from CDC and NSRDEC, the user is able to see the standard deviation displayed behind the input elements that control different body parts. This standard deviation is tied with the specific demographics requested by the user, for example, the 20 year-old female civilian CDC data. RAC also incorporates a display option that allows users to view their avatars from the side, top, front, and perspective view simultaneously. This allows users to assess their avatar's body proportions from

multiple angles. To achieve usable options in the interface, models utilizes at least 20 measurements from the data sets to reproduce models of the first, fiftieth, and ninety-ninth percentile of the NSRDEC or CDC data sets respectively.

Throughout the development of the RAC tool, feedback is collected from game developers, the UMA community, and gender studies researchers to evaluate how RAC can help studying video game's effects on body image and self-efficacy. In future work, we plan to extend RAC to help game designers and gender studies researchers understand player choice regarding 3D character body proportions. Methods from game telemetry can be used as an element to document choices that users make when designing virtual agents, providing feedback for game designers on choices for the various body parts as well as the amount of time spent on each option.

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