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The Effect of Avatar Realism on Character Resemblance, Enjoyment, and Data-Safety Concern in Self-Avatar Video Games

ABSTRACT

This paper investigates whether the degree of visual realism of a player's self-avatar affects user experience in video games, building on a 2024 pilot study (Kerac et al., 2024). While the original study used a third-person runner game with lower-fidelity avatars generated through Ready Player Me, the present study applies the same experimental paradigm to a third-person shooter game using Avaturn, a newer and more realistic avatar-creation platform. Responses from two temporally separated samples (2024, n = 17; 2026, n = 36) were compared on perceived character resemblance, enjoyment of the character-creation process, attitudes toward applying this approach to other media, and privacy concerns, alongside gaming skill level as a control measure. Data were analyzed using the Mann-Whitney U test due to violations of normality. No statistically significant differences were found between groups on any of the measured variables, including character resemblance (p = .724), enjoyment of the creation process (p = .571), attitudes toward other media (p = .761), or privacy concern (p = .165), and the two samples were comparable in gaming skill level (p = .163). These findings suggest that, at least within this sample, increased avatar realism alone does not produce a measurably different user perception.

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Digital avatars, avatar realism, identification, user experience, data privacy

1. Introduction

Digital avatars have become an integral part of contemporary interactive media, from video games and virtual reality to social platforms and online shopping. With the development of digital technologies that aid in creating three-dimensional models based on user photographs, as well as generative models with the same practical use, it can be observed that the degree of virtual realism of avatars is increasing.

This rapid growth over that past half a decade raises the question of how this change affects user experience and importantly for this particular paper, player's sense of identification with their own digital representative.

Existing research indicates that avatars are not purely aesthetic elements, but significantly influence users' attention, engagement and behaviour (Kao & Harrell, 2015), and that the process of identification with an avatar is dynamic and dependent on a range of factors, including the authenticity of the experience, the narrative description of the character as well as the interactivity of gameplay. However, researchers in the field have not reached a consensus on whether, and to what extent, a given type of avatar affects the experience in digital environments.

This paper builds on a pilot study conducted in 2024 (Kerac et al., 2024), which used an experimental third-person-perspective (3PP) runner-type game featuring

avatars of a lower degree of realism, created via the Ready Player Me platform. In this paper, the same experimental paradigm, adapted to the shooter genre (3PP shooter), is applied using a newer, more realistic avatar-creation platform, Avaturn ("Avaturn | Realistic 3D avatar creator," n.d.). By comparing the responses of participants from two temporally separated data-collection cycles (2024 and 2026), the paper aims to examine whether and how the degree of avatar realism together with a simultaneous change in game genre, story depth, environmental realism, and the way players are onboarded into the game affects the perception of character-player resemblance, enjoyment of the character-creation process itself, attitudes toward extending this approach to other media, and concern for privacy.

In this paper besides introduction and conclusion, there are four other sections. In section two, the relevant literature is displayed, in section three the experiment design and setup, together with the participants' data is showcased. Section four serves as the results showcase, while section five displays discussion of the results together with the limitations.

2. Background

As with other products, user experience in games has no single definition that everyone agrees with. The experience of playing a game can be viewed as a subjective relationship between the player and the game, one that goes beyond the technical-technological implementation of the game (Bernhaupt, 2015). Since this relationship is subjective, it is almost impossible to define (Popper, 1994; Bernhaupt, 2015).

Unlike other interactive products, a game alongside its user interface has one more dimension, which occupies a significantly different space in user-experience research compared to other products that are focused on the user interface and data architecture.

2.1. The Concept of a Video Game

(Bergonse, 2017) managed to reduce the definition of a video game to five points. First, a game enables interaction between a computer, a player, and in some cases multiple players; then, this interaction takes place in a fictional context formed in the player's mind through interaction and the recognition of visual patterns on the screen, as well as the relationship between input via some of the computer's peripheral devices and the actions produced by that input. These patterns are defined by a collection of instructions in the form of computer code or hardware. "Interaction is sustained through the player's emotional attachment and the outcomes of their actions within this functional context" (Bergonse, 2017).

If we look at the user experience according to (Klimmt et al., 2008; Klimmt et al., 2009), it could be studied through player enjoyment and is based on three factors:

5. the experience of the game's feedback,
6. recurring feelings of relief and tension, and
7. fascination stemming from being drawn into a fictional or new world.

Thus, control, tension and relief (which for the sake of this this paper be viewed through flow) and immersion are, according to (Csikszentmihalyi, 1990; Murray, 1998; Brown, 2004; Ermi & Mäyrä 2005; Klimmt et al., 2008; Klimmt et al., 2009; Calleja, 2012), among the basic pillars of user, i.e., player, experience in video games.

2.2. Identification and Its Effects as an Element of User Experience

Avatars and digital characters do not have a purely aesthetic role; they significantly affect users' attention, engagement and thinking, both in interactive media and video games and in educational settings (Kao & Harrell, 2015).

This influence largely stems from the fact that users tend to identify with digital characters. Identification represents an imaginative process through which an audience member or player adopts the identity, goals and perspective of a given character, and it is clearly distinct from simply rooting for or liking a character (Cohen, 2001).

In video games, identification with an avatar is not constant, rather, it becomes dynamic and depends on the player's current state. Factors that promote and reinforce this process include, among others, the authenticity of the experience during play (Christoph et al., 2009), the narrative definition of the character, which increases the implicit association between the character and the player's self-concept (Klimmt et al., 2010), interactive gameplay (Hefner et al., 2007), and the flow effect (Chen & Koek 2020).

Although a player can identify with several different elements during play, such as the game itself, the group of players, or the avatar, the focus of this process remains on the connection between the user and their digital representative. A high level of identification with the avatar can reliably predict deeper immersion in the game, adopting the role of the character, escapism, but also the occurrence of specific psychological effects (Van Looy et al., 2010).

Besides its effect on engagement with the game, identification also carries certain effects with it, such as stereotype threat, the Proteus effect, social presence, and the psychological sense of salience in the mind or memory.

The effect of salience in the mind or memory (Avatar Identity Salience, AIS) strengthens the association of avatar traits, i.e., it plays a part in using remembered examples to understand and create the categories to which the avatar belongs (Harrell, 2009). Social presence is understood as the influence of social and para-social interactions occurring over the internet in the situations for learning and performing in a digital environment (Kreijns et al., 2022). The Proteus effect is an effect that occurs at the personal level and can lead to a change in an individual's behaviour so that it comes to match the avatar's presentation (Yee & Bailenson, 2007), for example, if a player in a game plays as an avatar that appears to do good deeds, the players themselves will also start doing good deeds (Happ et al., 2013).

Stereotype threat is an effect that, unlike the Proteus effect, is external, that is, if a player has the feeling that other players hold a negative image of them, they themselves will start to behave in accordance with that image. For example, a person performs worse when playing with an avatar belonging to the same stereotyped group as themselves (for instance, it is thought that women are bad at shooting games, so a woman playing with a female character may, because of this, get a worse result) (Kaye et al., 2018). Fraser et al. (2024) examined whether users within a virtual environment prefer more or less realistic characters. They concluded that there is no statistically significant difference between stylized and more realistic characters. (Mull et al., 2015) concluded that people would rather interact with avatars they find attractive, and that such avatars receive a higher level of trust. Imangi et al. (2025) reached a similar conclusion, finding that participants trusted attractive avatars more, perceiving them as likeable and conveying a sense of authority.

2.3. Choice of Game Perspective in the Context of Player-Resembling Characters

In order to better understand whether there is a preferred point of view for the player in digital and virtual environments (VE), this section reviews literature dealing with computer games and other computer-based interactive multimedia, as well as literature examining the player perspective in virtual reality (VR).

Won & Zhou (2024) investigated whether playing in first-person perspective (1PP) increases player movement in virtual reality, and whether 1PP offers an advantage in promoting the mimicking of a digital avatar's movement. Moreover, they also examined the influence of a lookalike avatar on users' movement and mimicking. They found no significant difference in movement or mimicking between the use of a lookalike avatar and a non-lookalike avatar. Another interesting question for research in digital and virtual environments is whether first-person perspective or third-person perspective (3PP) offers superior spatial understanding and more intuitive movement for participants with varying levels of gaming experience. According to Wang et al. (2025), 3PP helped increase spatial awareness and cooperation in larger-scale, complex tasks in VR. They also found that 3PP allowed for higher social presence. Regarding the feeling of ownership over the digital avatar, Gorisse et al. (2019) found that the first-person perspective is the more favourable one. However, they note that ownership scores remained notably high in the third-person perspective as well. Dufresne et al. (2026) conducted a comparative study of avatar embodiment and identification in 1PP VR and a 3PP mobile game. Of particular significance for this paper, they found that while 1PP VR grants higher embodiment along with embodiment-related identification, owing to higher avatar ownership, embodiment in 3PP on mobile was achieved through similarity identification, and possibly wishful identification. These findings suggest that when researching avatar identification through similarity or lookalike avatars, a 3PP non-VR experience represents a valid methodological approach.

2.4. Sense of Security in the Context of Data Protection

Users' privacy concerns can be directed toward two "addresses": the first is toward other users of the platform (for example, whether another social-network user will misuse published data), and the second is toward the platform itself (Waldman, 2016). The second "address" is the one of interest in this paper, since the platform used in both studies is not a social-networking platform.

However, users were still required to take a photograph of themselves and upload it to the platform in order to generate their in-game character. Madden (2014) reports that a large majority (91%) of respondents (based in the US) agree that users have lost control over how companies collect their personal data, while 80% of them are concerned about how businesses and advertising companies use that data. On the other hand, over 50% of respondents in Madden's study are willing to share their personal data with such companies if it means they can use their services for free.

2.5. Research Questions and Hypothesis

Following the literature review, the following research questions were formulated:

- RQ1: Do respondents who used the newer, more realistic avatar-creation system judge their character to resemble them more, compared to respondents who used the older, less realistic system?
- RQ2: Does the degree of enjoyment of the character-creation process itself differ between the two versions of the system?

- RQ3: Does the attitude that other media should also adopt this way of creating characters differ between the two versions?
- RQ4: Does the degree of privacy concern differ between the two versions of the system?
- RQ5: Are the two samples comparable in terms of demographic characteristics and gaming experience (gender, gaming habits, skill level), so that any differences in attitudes can be attributed to the avatar system rather than to differences in sample composition?

Following the literature, specifically building on to the knowledge of (Fraser et al., 2024) the following hypothesis is set:

- H1: The level of realism in digital avatars in video games should not impact the preference of players when it comes to the adaption of technology as long as players do not report high worry towards data safety.

The research questions were formulated with the intent of examining whether the different level of realism of the characters the players played with, and the different game design, affects how much players identify with the character, how much they like the way the character is made, and whether it affects concern for security/privacy.

3. Experiments and design

This chapter addresses the design of the experiment, both the stimulus, i.e., the game used in the experiment, and the setup of the environment in which the experiment took place.

The purpose of this paper is to compare players' self-avatar characters when using the Avaturn platform, which produces more realistic characters, versus the Ready Player Me platform, which produced less realistic characters. The experiment that used the Ready Player Me platform was published two years ago, and the game design, methodology, and participant information can be found in (Kerac et al., 2024).

This video game was purpose-built as a software tool for conducting empirical research in the field of user experience and for measuring neurophysiological responses during interaction with digital avatars.

The 2026 experiment used a third-person shooter set in a dark, post-processed environment designed to evoke an abandoned, post-apocalyptic arena. Onboarding was handled diegetically rather than breaking immersion with external menus, instructions were integrated into the world via a wall-mounted board, which also directed players to create their avatar on the Avaturn platform. Pictograms on the board distinguished hostile non-playable characters, NPCs (red smoke, "KILL") from friendly ones (blue smoke, "FRIEND").

Gameplay was structured into rounds and waves, with enemy timing randomized on each playthrough. Entities were split into a red (enemy) and blue (friendly) team, spawning in fixed zones and advancing toward the player along a central path until clicked on by player ("shoot") or until it crossed a red line. Central to the experiment was avatar integration for NPCs: each player's Avaturn-generated 3D model was stripped of its controls and colliders by a custom script, turning it into a visual "shell" used for enemy and ally NPCs. Non-functional decorative elements (furniture, plants, terrain features) were added purely to help players suspend disbelief in an otherwise absurd premise of occasionally being "attacked" by NPCs wearing their own face.

Player flow was roughly the same for each experiment participant. The game followed these steps:

Terms of participation → Avaturn privacy terms → select/create avatar → QR-code photo capture → body/skin selection customization → hair customization → clothing choices → glasses → shoes → return to game (Next) → preview clone (C key) → start game (R key).

For the first 5 minutes, NPCs are faceless, distinguished only by team-colored smoke. After 340 seconds, player-modeled entities begin appearing sporadically (red team roughly twice as often as blue).

The experiment took place in the measurement laboratory of the Department of Graphic Engineering and Design, Faculty of Technical Sciences, University of Novi Sad, using: one computer, two laptops, keyboard, mouse, monitor, mbt EEG smart headsets, and a Pupil Labs eye tracker. The room was air-conditioned and dimly lit, with comfort checked with each participant. Participants received water and a snack, and signed a consent form (with an optional photo-consent clause) before beginning. Compensation was either course credit or payment equivalent to half an hour's wage; participation was voluntary and withdrawal possible at any time, including opting out of any piece of equipment.

3.1. Participants

A total of 36 participants took part in the study. The majority of participants were female (N = 29, 80.6%), while male participants made up a smaller part of the sample (N = 7, 19.4%).

In terms of age structure, the sample predominantly consisted of a younger population. The largest number of participants belonged to the 18 – 24 age group

(N = 32, 88.9%). A smaller number of participants were aged 25 – 30 (N = 3), while only one participant belonged to the 50 – 65 age group. In line with the age structure, the participants' educational profile indicates that they are primarily students. 32 participants (88.9%) reported that they were currently studying. Two participants hold a master's degree, one holds a doctorate, and one has completed secondary school.

In addition to demographic characteristics, data on participants' gaming habits were also collected. The largest group of participants (N = 13, 36.1%) stated that they played computer games when they were younger but no longer play them. On the other hand, a quarter of the sample (N = 9, 25%) are regular players who play video games several times a week. The remaining participants play games less often than once a month (N = 5), at least once every two weeks (N = 4), at least once a month (N = 2), or at least once a week (N = 1). Two participants stated that they never play, nor have ever played, computer games.

On a five-point scale assessing their own video-game playing ability (skill), where 1 is the lowest and 5 the highest rating, the average rating was 3.17 (SD = 1.01). The largest number of participants rated their skill with an average score of 3 (N = 14).

Finally, participants answered questions about their experience of their in-game avatar using a five-point scale (0 = not at all, 4 = completely). On the statement that the in-game character resembled them, participants gave an average rating of 2.97 (SD = 1.11), indicating moderate to fairly strong agreement. In addition, participants largely enjoyed the way the character was created, reflected in a high average rating of 3.33 (SD = 0.96) for this item.

4. Results

Participants' responses were placed into two groups. The Old group consists of responses recorded in 2024, while the New group consists of responses collected in 2026.

Data were analysed using Jamovi. Prior to the primary analysis, the assumptions for parametric tests were checked. The Shapiro-Wilk normality test showed that the response distributions significantly deviated from a normal distribution for all examined variables (SkillLevel: $W = 0.95$, $p = .035$; Q1_Resemblance: $W = 0.85$, $p < .001$; Q2_Like: $W = 0.76$, $p < .001$; Q3_OtherMedia: $W = 0.83$, $p < .001$; Q4_Privacy: $W = 0.88$, $p < .001$), which was expected given the ordinal nature of the scale (0 – 4) and the pronounced clustering of responses at higher scale values. Levene's test of homogeneity of variances did not show significant deviations for any variable (all $p > .09$), meaning the assumption of homogeneity of variance was not violated.

Because the normality assumption was violated, the Mann-Whitney U test was used as the primary test of between-group differences.

Descriptive statistics show that participants from both groups gave, on average, similar responses. For the New group, the median rating of character resemblance (Q1) was 3 ($M = 2.97$, $SD = 1.11$), while for the Old group ($n = 17$) the median was also 3 ($M = 3.12$, $SD = 0.99$). Similarly, enjoyment of the character-creation system (Q2) had a similar median in both groups (New: $M = 3.33$, $SD = 0.96$; Old: $M = 3.53$, $SD = 0.72$), as did the attitude toward applying such a system in other media (Q3), where the median was also 3 in both groups (New: $M = 3.03$, $SD = 1.06$; Old: $M = 3.12$, $SD = 1.05$). The only difference in medians was recorded for privacy concern (Q4), where the New group had a median of 1 ($M = 1.33$, $SD = 1.15$) and the Old group a median of 0 ($M = 1.00$, $SD = 1.41$). Gaming skill level (SkillLevel) was likewise comparable between groups (New: $Mdn = 3$, $M = 3.17$, $SD = 1.01$; Old: $Mdn = 3$, $M = 2.71$, $SD = 1.40$).

The Mann-Whitney U test did not show statistically significant differences between the groups for any of the examined variables. For character-resemblance rating (Q1_Resemblance), the difference was not significant, $U = 288.00$, $p = .724$, rank-biserial correlation $r = .06$. For enjoyment of the character-creation system (Q2_Like), the difference was also not significant, $U = 279.50$, $p = .571$, $r = .09$. For the attitude toward applying the system in other media (Q3_OtherMedia), no significant difference was found, $U = 290.50$, $p = .761$, $r = .05$. For privacy concern (Q4_Privacy), the difference did not reach statistical significance, although it showed a somewhat larger, small-to-moderate effect, $U = 235.50$, $p = .165$, $r = -.23$. Finally, gaming skill level (SkillLevel) did not differ significantly between groups, $U = 228.00$, $p = .163$, $r = -.23$, confirming that the samples are comparable on this characteristic.

5. Discussion and limitations

The results of this study provide no evidence that the perceived resemblance of the character, enjoyment of the avatar-creation process, attitude toward applying this approach in other media, or privacy concern differ statistically significantly between participants who used the older, less realistic avatar system and those who used the newer, more realistic system. These findings suggest that, at least based on this sample, increased avatar realism by itself does not lead to a measurably different user perception along the dimensions examined.

RQ1 (character resemblance): No, respondents who used the newer, more realistic system (Avaturn) did not judge their character to resemble them more than those who used the older system.

Median resemblance ratings were identical across groups (Mdn = 3 for both), and the Mann-Whitney test found no significant difference, U = 288.00, p = .724, r = .06.

RQ2 (enjoyment of the creation process): No, enjoyment of character creation did not differ significantly between versions, U = 279.50, p = .571, r = .09. Both groups rated this highly, which likely reflects a ceiling effect, the creation process was well-liked regardless of which platform was used, leaving little room for a realism-driven difference to emerge.

RQ3 (attitude toward extending the approach to other media): No significant difference was found, U = 290.50, p = .761, r = .05. Both groups showed similarly favorable attitudes (median of 3 in both), indicating that enthusiasm for seeing this style of avatar creation adopted elsewhere is not contingent on how realistic the specific system experienced was.

RQ4 (privacy concern): Privacy concern did not differ significantly between versions, U = 235.50, p = .165, though this produced the largest effect size in the study (r = −.23, small-to-moderate), with the New (more realistic) group trending toward slightly higher concern (Mdn = 1, M = 1.33) than the Old group (Mdn = 0, M = 1.00). This result is a possible signal, while it did not reach significance, possibly due to the unequal and modest sample sizes (n = 36 vs. n = 17), it should motivate for future research in the field of data gathering. It is unclear in this experiment if the change is due to the avatar realism, or general lack of trust in digital companies collecting such personal data that has been occurring in the past two years globally.

RQ5 (sample comparability): The samples were comparable in terms of gaming skill level, indicating that differences in participants' gaming experience likely did not act as a hidden factor that could explain the absence of differences in the attitudes examined. Similarly they are comparable in terms of education and somewhat in age.

The results lend support to H1. Neither the enjoyment of the character-creation process (Q2) nor the attitude toward extending this kind of avatar system to other media (Q3) differed significantly between the Old (less realistic) and New (more realistic) groups, U = 279.50, p = .571 and U = 290.50, p = .761 respectively. Following Q2 and Q3 results, avatar realism, on its own, did not shift how favorably participants viewed the system or their willingness to see it applied elsewhere.

Privacy concern (Q4) was low in both groups (medians of 0 – 1 on a 0 – 4 scale) and did not differ significantly between them, U = 235.50, p = .165, even though it produced the largest effect size of any variable (r = –23, small-to-moderate). In other words, the condition specified in H1 was satisfied for this sample: nobody reported high privacy worry.

Several methodological limitations must be taken into account when interpreting these results. First, and most importantly, the groups differ in the game genre (runner versus shooter) and in the two-year time gap between data-collection periods.

Because of this, even if significant differences had been found, it would not be possible to confidently attribute them solely to avatar realism rather than to game genre or some other factor.

Second, the sample sizes were unequal (n = 36 versus n = 17), which reduced the statistical power of the tests, particularly for the Old group. This is especially relevant to the result for privacy concern, where a small-to-moderate effect was recorded (r = –.23) that did not reach significance at this sample size, but the possibility that this difference would prove statistically reliable with a larger and more balanced sample should not be ruled out.

6. Conclusions

This paper compared two self-avatar games that were made with different levels of detail, different genres, and different approaches to onboarding players into the game. Through the literature, the topics of usability, functionality and aesthetics as elements of user experience were covered, along with user experience in games, identification and the effect of identification, together with character likeability. The paper also covered the choice of game perspective and the sense of security in the context of data protection.

The research questions and the hypothesis examined whether the level of avatar realism affects the level of avatar-player similarity, whether there was a change in the degree of enjoyment of this way of creating characters, and whether there was a change in opinion regarding whether people would like to see this way of creating characters used in other media as well. One question also compared attitudes toward data protection in the context of these two games, and, finally, whether these two samples are at all comparable in terms of demographic characteristics and gaming experience.

The results of this study provide no evidence that the perceived resemblance of the character, enjoyment of the avatar-creation process, attitude toward applying this approach in other media, or privacy concern differ statistically significantly between participants who used the older, less realistic avatar system and those who used the newer, more realistic system.

These findings suggest that, at least based on this sample, increased avatar realism by itself does not lead to a measurably different user perception along the dimensions examined.

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