Towards Inclusive Avatars: A Study on Self-Representation in Virtual Environments

Ailton Ribeiro[1], Murilo Guerreiro Arouca[1], Ana Maria Amorim[1],
Maria Clara Pestana[1], Vaninha Vieira[2]

[1]Programa de Pós-Graduação em Ciência da Computação, UFBA

[2]Instituto de Computação, Universidade Federal da Bahia, UFBA

`{ailton.ribeiro, murilo.guerreiro, ana.amorim, mpestana, vaninha}@ufba.br`

Abstract. *Avatars, digital representations of users in virtual environments, play a central role online, especially in the emerging context of the Metaverse. The customization of avatars provides individuals with the capability to craft personalized depictions, yet the process of self-representation is intricately influenced by various factors, encompassing identity, self-expression, and contextual considerations. However, there are gaps in research on the inclusive representation of avatars. This study investigates self-representation through avatars in virtual environments. We collected data through an online questionnaire with 133 participants. The findings are promising and underscore the need to make avatars more inclusive and representative, promoting diversity in virtual environments.*

1. Introduction

The term "avatar" originally refers to a deity in Indian mythology who, by assuming a human form, aimed to provide humanity with new perspectives, self-awareness, and self-realization. In the context of virtual environments, avatars serve as digital representations of their users [Bailenson et al. 2008]. Widely utilized in online games, virtual stores, online messaging, and forums, avatars have been found to wield influence over users' perceptions and behaviors. A change in avatar representation can lead to a modification in user behavior, a phenomenon identified as the "Proteus Effect" [Yee and Bailenson 2007].

Avatars play an essential role in various virtual contexts, and the vision of a Metaverse centered on avatar-based interactions further emphasizes their relevance and representativeness [Lee et al. 2021]. The ability to customize avatars offers ample opportunities for individuals to construct a digital representation of themselves. However, various factors influence this customization. In the study by [Wu et al. 2023], the authors found that self-representation in virtual environments is directly influenced by users' identity and self-expression, addressing the conflict between personal attitudes and societal expectations. Additionally, the virtual context will also influence users' self-representation. The visual resemblance of avatars to users varies based on individual perceptions in virtual environments. In casual social spaces, users are more open to self-disclosure and inclined to customize avatars to reflect personal ideals or fantasies [Wu et al. 2023].

While previous research has concentrated on investigating how avatars should be conceived and customized, considering the context of specific activities, there has been a scarcity of studies covering the creation and customization of avatars in a wide range of activity contexts. Specifically, there is a significant lack of research exploring

the promotion of inclusive avatar representation in virtual environments [Wu et al. 2023, Mack et al. 2023, Zhang et al. 2023, Whitehouse et al. 2023].

The primary objective of this research is to investigate and analyze the factors influencing decisions related to self-representation through avatars in virtual environments, with a particular emphasis on assessing strategies aimed at fostering the inclusive self-representation of these avatars. This involves considering the inherent complexity of the context and the expression of users' identities in their online activities. To achieve this objective, the study adopts a methodological strategy of qualitative data collection through an online questionnaire. This approach seeks to obtain information directly from individuals of diverse age groups and genders, aiming to understand how people use avatars as a means of self-representation in virtual environments.

The manuscript follows a structured format: Section 2 explores background and related works, Section 3 details the research methodology; Section 4 presents results; Section 5 examines and discusses findings; Section 6 highlights research limitations; and, finally, Section 7 the conclusion and future works.

2. Background and Related Work

This section addresses fundamental concepts of avatar identity and self-expression, exploring their diverse representation with a focus on opportunities for vulnerable groups.

2.1. Avatar Identity and Self-expression

Identity is a comprehensive concept that, as defined by [Leary and Tangney 2011], encompasses an individual's self-perception, including personal, cultural, social, and psychological characteristics that constitute their uniqueness. It is shaped by life experiences, culture, and social roles and may undergo evolution over time. Conversely, self-expression serves as a subset of identity, focusing on how individuals convey their identity to the external world. This manifestation encompasses various aspects such as attire, behavior, language, artistic creation, and engagement in social interactions [Giddens 1991].

2.2. Self-Representation and Avatar Customization

Self-representation entails expressing one's identity and personality through avatars in virtual environments, involving the customization and utilization of avatars to portray the person controlling them [Lin and Wang 2014]. Avatars in diverse virtual settings manifest different levels of self-expression awareness, with some individuals selecting avatars that authentically capture one aspect of themselves while inaccurately representing another [Szolin et al. 2023a]. Certain users choose anonymous avatars to preserve internet anonymity, while others leverage this representation to experiment with identities and traits they might not reveal in real life [Wan and Lu 2023].

Avatar customization constitutes a specific process linked to self-expression, visually tailoring virtual avatars to mirror the identity and preferences of the controller [Salagean et al. 2023]. Notably, there has been significant progress in avatar customization in recent years, exemplified by findings in [Ning et al. 2023]. In various virtual environments, users now can employ artificial intelligence technologies, such as the Lensa AI App[1], for creating avatars using image capture techniques [Moga and Rughiniş 2023].

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[1] Available at: https://lensa-ai.com/ Accessed on: January 10, 2024

2.3. The Influence of Context

The context plays a significant role in how identity, self-expression, and avatar customization manifest in self-representation. For example, the nature of online activity and the self-representation of vulnerable groups can be influenced by various factors [Wu et al. 2023]. In virtual environments, such as video games, users are encouraged to express themselves freely, even if it does not correspond to their appearance in the physical world [Szolin et al. 2023a]. Individuals with visible disabilities often choose to represent avatars without disabilities [Takano and Taka 2022]. On the other hand, on messaging platforms and social media, people tend to closely reflect their real identities in their avatars. Audience expectations online, such as colleagues versus friends, also influence these choices, especially when offline stereotypes apply to the virtual context [Whitehouse et al. 2023].

2.4. Representation of Vulnerable Identities: Disability and Gender

Avatars offer opportunities for entertainment, social interaction, and exploration of identities. However, avatar creation platforms may inadvertently perpetuate socio-racial stereotypes, raising relevant concerns. Previous research supports the presence of embedded biases in avatar customization options [Ratan and Sah 2015, Oliveira et al. 2022, Hatfield et al. 2022, Mack et al. 2023]. For instance, studies have revealed the persistence of racial stereotypes in certain games, evidenced by assigning lighter skin tones to protagonists and darker skin tones to antagonists [McArthur et al. 2015]. However, it is important to emphasize that comprehensive representation of people from different ethnicities goes beyond simply modifying skin color, encompassing physical features such as eye shapes, facial traits, hairstyles, and hair textures [Iantorno and Consalvo 2023].

Various avatar platforms provide exemplifications of identity representation through avatars. The online game Overwatch 2[2], for instance, features multiple characters using prosthetics, including an elderly woman of Black descent and another neurodiverse character; Meta Avatar[3] and Bitmoji[4] offer options that allow individuals with disabilities to visually represent their assistive devices. In this work, we adopt the Social Model of Disability [Shakespeare et al. 2006]. This approach perceives individuals not as disabled due to their physical limitations but rather as victims of social barriers created by a society that fails to consider the diversity of bodies and mental capacities.

Researchers have proposed various strategies to mitigate prejudice, sexual harassment, and sexism in digital environments, taking into account both the attributes and limitations of the online environment and their consequences for the gender expression and identification processes of non-cisgender users [Kosciesza 2023]. These strategies include encouraging the use of diverse pronouns and eliminating clothing options that impose restrictions based on gender [Whitehouse et al. 2023]. Furthermore, it is advisable to allow any combination of physical characteristics and avoid rigid gender dichotomies [Oliveira et al. 2022]. In analyzing gender-related issues and gender diversity, it is important to adopt an explicit understanding of the concept of gender. In this article, we follow the conceptual approach proposed by Levitt [Levitt 2019], which views gender as a social construct encompassing interrelated concepts such as gender identity, gender expression, and sexual orientation.

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[2]Available at: https://overwatch.blizzard.com/pt-br/ Accessed on: January 10, 2024
[3]Available at: https://acesse.dev/meta-avatar Accessed on: January 10, 2024
[4]Available at: https://encr.pw/bitmoji-avatar Accessed on: January 10, 2024

3. Methodology

The study utilized an online questionnaire distributed to a convenience sample. The questionnaire was chosen for its capacity to engage a diverse range of participants [Leitão and Prates 2017].

3.1. Procedures and instruments

We created a form on Google Forms[5] consisting of i) Informed Consent Form (Part 1 of the form), providing participants with detailed information about the study's objectives and their rights; ii) Verification Question (Q2) to validate the target audience, where participants were reintroduced to the questionnaire's target audience. In case of an affirmative response, they proceeded to answer the questionnaire; otherwise, they were directed to the end of the form, concluding their participation; iii) Participant Profile Data (from Q3.1 to Q3.8), collecting demographic information and relevant characteristics; iv) Questionnaire: questions were grouped into thematic sections, covering About Virtual Environments (from Q4.1 to Q4.3), About Identity and Self-expression (from Q5.1 to Q5.4), Context Influence (Q6.1), Diversity and Inclusion (from Q7.1 to Q7.7), and Feedback (Q8.1 and Q8.2).

The questionnaire was distributed using a snowball recruitment method [Kvale and Brinkmann 2009], leveraging diverse channels, including social media, academic email lists, professional and academic groups, game servers, and online course platforms. Participants were informed that the estimated time for completing the questionnaire was approximately 10 minutes. The complete questionnaire is available online (Appendix A: Supplementary Data).

3.2. Participants

The intended audience for the questionnaire comprises individuals who have employed avatars in virtual environments for interactive purposes, encompassing a diverse array of contexts, such as the metaverse, video games, artificial intelligence applications, social networks, emojis, immersive virtual worlds, and video conferencing scenarios. This information was explicitly conveyed in the participation invitation, on the questionnaire's landing page, and within Q2 after obtaining informed consent.

The data collection period spanned from October 13 to 25, 2023, yielding 133 valid responses, with an additional 11 responses excluded based on non-compliance with the specified target audience criteria in the screening question (Q2). Table 1 displays the demographic information of the participants.

Upon examination of the age distribution, the predominant cohort of participants falls within the 18 to 28 age bracket, encompassing 52.6% of the entire sample. A noteworthy segment (27.1%) falls within the 29 to 39 age range, indicating a diverse range of ages, including participants aged 50 and above (4.5%). Concerning gender identification, the majority align with the male gender (cisgender), constituting 51.9% of the participant cohort, followed by those identifying as female (cisgender), representing 45.1% of

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Table 1. Participants' Demographic Data. The 'Frequency' column presents the absolute values corresponding to the sample (n=133).

Variable	Frequency	F (%)
Age Group (years)		
Below 18	17	12.8
18 - 28	70	52.6
29 - 39	36	27.1
40 - 50	4	3.0
Above 50	6	4.5
Gender		
Male (cisgender)	69	51.9
Female (cisgender)	60	45.1
Non-binary	2	1.5
Fluid	1	0.8
Prefer not to say	1	0.8
Conditions		
Person with Hearing Impairment	2	1.5
Person with Visual Impairment	4	3.0
Person with Vitiligo	1	0.8
Neurodivergence		
Autism Spectrum Disorder (ASD)	4	3.0
Attention Deficit Hyperactivity Disorder (ADHD)	22	16.5
Dyslexia	5	3.8
Others	2	1.5
Location		
Bahia	87	65.4
Sergipe	31	23.3
Other states (SP, RJ, RS, ES, MS, RO, SC, MG)	15	11.3
Other countries (France, USA, Portugal, and England)	5	3.8
Race/Ethnicity		
White	46	34.6
Brown skinned	49	36.8
Black	33	24.8
Yellow	2	1.5
Prefer not to say	3	2.3
Total	133	100.0

the sample. Moreover, a small percentage opted not to disclose their gender. Additionally, some participants reported experiencing hearing impairment, visual impairment, or vitiligo.

Concerning neurodivergences, attention deficit hyperactivity disorder (ADHD) is the most prevalent condition, affecting 16.5% of participants, followed by dyslexia and autism spectrum disorder (ASD). The majority of participants reside in Bahia (65.4%), followed by Sergipe (23.3%) and other Brazilian states (11.3%), as well as Brazilians living in other countries (3.8%). Regarding self-declaration of color or race/ethnicity, the sample is diverse, with 63.2% of participants identifying as non-white. Three participants (2.3%) chose not to declare their color or race/ethnicity.

4. Results

This section analyzes themes from our questionnaire study, including virtual environments for avatar customization, online identity, contextual influences on self-representation, and concerns about discrimination in virtual settings.

4.1. Regarding Virtual Environments

An analysis of participants' preferences regarding virtual environments for avatar creation (Q4.1) yields valuable insights into the dynamics of digital self-representation. The prominence of "Traditional Social Networks" suggests that platforms such as Facebook, Instagram, and Twitter play a pivotal role in users' digital expression, underscoring the significance of conventional social interactions in this context. The popularity of "Social Virtual Worlds" underscores the growing relevance of environments like Second Life and Roblox in shaping online identities [Lee et al. 2023]. The predominance of "Multiplayer Online Games" implies that avatar customization is an integral component of the online gaming experience, indicating an interconnection between gameplay and digital expression [Szolin et al. 2023b].

The utilization of "Educational Environments" emphasizes the presence of these avatars in learning contexts, possibly indicating an increasing integration of digital elements in education [Chen et al. 2023]. The adoption of "Teleconferencing" and "Collaboration Environments" suggests an expansion of digital presence into professional and remote work contexts. The limited mention of "Immersive Social Networks" and "AI Applications" underscores potential areas for innovation and future research. The avatar-driven experience in virtual environments is shaped by a mix of challenges and opportunities (Q4.2 and Q4.3), detailed in Table 2.

Table 2. Challenges and opportunities of avatars in virtual environments.

Challenge/Opportunity	Number of Responses
Challenges	
Lack of suitable customization tools	81
Difficulty finding avatars I identify with	72
Inappropriate user behavior	27
Unrealistic beauty standards or stereotypes	36
Complexity of customization (difficult and time-consuming)	26
Technological barriers	19
Privacy and security concerns	22
Opportunities	
Freedom to customize avatars	113
Exploration of virtual worlds or 3D environments	79
Social interaction and communication with other users	71
Collaboration on projects or activities	46

A significant challenge highlighted by 81 respondents is the "Lack of suitable customization tools." Additionally, 72 participants noted the challenge of "Difficulty in finding avatars that represent users' identity." Challenges include inappropriate behavior, unrealistic beauty standards, customization complexity, and technological barriers, alongside privacy and security concerns. Conversely, participants recognize opportunities like extensive customization, immersive 3D exploration, social interaction, and online collaboration.

4.2. Exploring Identity and Self-expression

The results presented in Table 3 reflect the agreement and disagreement among various respondent profiles regarding three specific questions related to the use of avatars in virtual environments. These inquiries denoted as Q5.1, Q5.2, and Q5.3, delve into participants' perceptions concerning their capacity to convey their gender identity, cultural nuances, and racial/ethnic attributes through avatars, all while considering the contextual backdrop.

Regarding question Q5.1, scrutinizing whether respondents feel at ease deploying avatars reflective of their gender identity, the majority within the General Profile (n=133) evidenced a noteworthy concordance rate, reaching 80.5%, juxtaposed against a discordance level of 9.0%. Question Q5.2, probing respondents' comfort in adopting avatars emblematic of their cultural affiliations, yielded akin results, showcasing a concordance of 78.2% and a discordance of 6.0%. In the domain of question Q5.3, examining the utilization of avatars embodying racial/ethnic facets, the concordance levels escalate further, reaching 83.5%, coupled with a discordance rate of 7.5%.

Table 3. Concordance and Discordance by Profile Regarding Gender Identity (Q5.1), Culture (Q5.2), and Racial/Ethnic Aspects (Q5.3)

Profile	Question	Concordance	Discordance
General (n=133)	Q5.1. My gender identity	80.5%	9.0%
	Q5.2. Aspects of my culture	78.2%	6.0%
	Q5.3. Aspects of my race/ethnicity	83.5%	7.5%
Non-white Race/Color (n=85)	Q5.1. My gender identity	74.1%	10.6%
	Q5.2. Aspects of my culture	75.3%	7.1%
	Q5.3. Aspects of my race/ethnicity	81.2%	8.2%
White Race/Color (n=46)	Q5.1. My gender identity	91.3%	6.5%
	Q5.2. Aspects of my culture	84.8%	4.3%
	Q5.3. Aspects of my race/ethnicity	89.1%	6.5%
Non(white and male) (n=41)	Q5.1. y gender identity	75.6%	14.6%
	Q5.2. Aspects of my culture	75.6%	9.8%
	Q5.3. Aspects of my race/ethnicity	78.0%	14.6%
Below 18 years old (n=19)	Q5.1. My gender identity	44.4%	16.7%
	Q5.2. Aspects of my culture	61.1%	22.2%
	Q5.3. Aspects of my race/ethnicity	66.7%	22.2%
40 years old or older (n=10)	Q5.1. My gender identity	100.0%	0.0%
	Q5.2. Aspects of my culture	90.0%	0.0%
	Q5.3. Aspects of my race/ethnicity	100.0%	0.0%

Nonetheless, a granular examination of the results stratified across diverse respondent profiles discloses noteworthy differentials. For instance, among respondents identifying with a non-white race/color (n=85), the agreement concerning the use of avatars encapsulating racial/ethnic attributes diminishes, registering a concordance of 81.2% and a discordance of 8.2%, intimating a heightened sensitivity to this matter in contrast to the overall profile. Conversely, the "White Race/Color Profile" (n=46) manifests elevated concordance across all inquiries, ranging from 84.8% to 91.3%, underscoring a heightened inclination of these respondents to embrace avatars representing their gender identity, cultural background, and racial/ethnic identity.

Conversely, the "Non-white and Non-male (cis) Profile" (n=41) manifests a more pronounced discordance, particularly concerning the question of race/ethnicity (Q5.3),

where discordance ascends to 14.6%. This suggests that this subgroup might grapple with more pronounced challenges associated with the representation of racial/ethnic dimensions in avatars, conceivably attributable to heightened cultural sensitivity. Within the "Under 18 years old" cohort (n=19), the most conspicuous discordance emerges across all inquiries, spanning from 16.7% to 22.2%, indicative of a developmental phase marked by exploration and identity evolution among these respondents.

In contrast, the "40 years old or older" cohort (n=10) manifests elevated concordance rates, achieving 100% concordance concerning gender identity and race/ethnicity, and 90.0% concordance concerning cultural facets, hinting at a more defined and stable self-perception among these respondents. These findings highlight the nuanced and complex landscape of participants' perceptions and attitudes regarding the representation of identity through avatars in virtual environments.

The examination of question 5.4 (*Have you ever felt compelled to create an avatar that aligns with other people's expectations instead of reflecting your personal preferences?*) revealed that the majority of participants (55.2%) have never experienced the obligation to shape an avatar that deviates from their personal preferences due to external expectations. Conversely, a noteworthy proportion (28.4%) acknowledged having encountered such pressure. Moreover, 16.4% of participants expressed uncertainty or a lack of clarity regarding this situation.

4.3. Contextual Dynamics in Self-Representation

The data for Question 6.1 is illustrated in Figure 1, examining participants' preferences regarding the representation of their avatars in various online activities. The results delineate participants' preferences into two distinct categories: Similar and Different. In the context of online work or academic meetings, the majority of participants (91.0%) express a preference for their avatars to closely resemble their actual appearance. Dissent is comparatively minimal, accounting for 9.0% of participants.
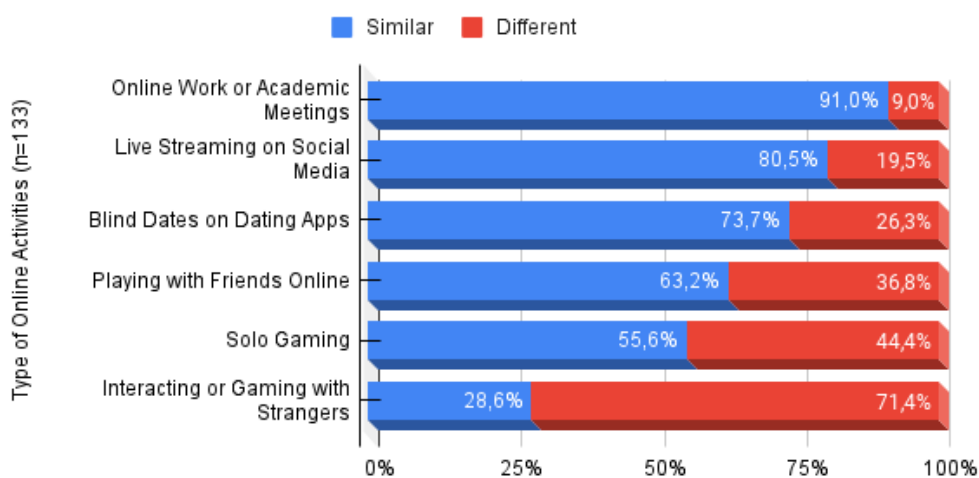

Figure 1. Self-Representation Preferences in Different Online Contexts and Activities (n=133).

For Live Streaming on Social Media: During live broadcasts on their social media platforms, there is a notable inclination toward similarity, as 80.5% of participants select avatars mirroring their real appearance. This inclination implies a desire for authenticity when engaging with online followers.

Blind Dates on Dating Apps: In the realm of virtual dates, the majority of participants (73.7%) express a preference for avatars resembling their actual appearance. Playing with Friends Online: In the context of online gaming activities with friends, a significant preference for similar avatars is observed, with 63.2% of participants choosing this representation. However, there is substantial disagreement, reaching 36.8%, indicating a divergence in preferences. Solo Gaming: When engaging in solitary virtual environments, the majority of participants (55.6%) still favor avatars that closely resemble their real selves. However, a 44.4% disagreement underscores a division in preferences. Interacting or Gaming with Strangers: The preference for distinct avatars is conspicuous in this scenario, with 71.4% of participants opting for virtual representations that differ from their actual selves.

These findings align with prior studies that underscore the substantial impact of context on virtual self-representation [Wu et al. 2023]. In more formal or intimate settings, the prevalence of a preference for similar avatars highlights the significance of authenticity. Conversely, in situations involving interactions with strangers or gaming with friends, the preference for different avatars elucidates the intricate nature of virtual representation choices and the pursuit of anonymity or identity experimentation.

4.3.1. Diversity: Representation of Vulnerable Groups Through Avatars

Table 4 presents results pertaining to diversity and inclusion in virtual environments, addressing three questions related to the representation of vulnerable groups through avatars. In 7.1 - Representation of Indigenous People, 81.3% of participants reported not finding avatars representing Indigenous people, while 18.7% reported the opposite, highlighting a notable lack of ethnic diversity. Regarding 7.2 - Representation of Vitiligo skin, Albinism, or Dwarfism, the majority (80.6%) did not find avatars with these characteristics. In 7.3 - Representation of People with Disabilities, 66.4% reported not finding avatars with disabilities, while 33.6% had this experience. These results underscore the need to promote diversity and inclusion in virtual environments, ensuring that virtual representations through avatars encompass a wide range of identities and characteristics.

Table 4. Diversity Representation in Avatars in Virtual Environments (n=133)

Question	No (%)	Yes (%)
7.1. Representation of Indigenous People	81,3	18,7
7.2. Representation of Vitiligo skin, Albinism, or Dwarfism	80,6	19,4
7.3. Representation of People with Disabilities	66,4	33,6

In question 7.4, participants affirming responses from 7.1 to 7.3 expressed diverse perspectives on avatar representation and encountered virtual tools/platforms. A participant articulated, "I find avatars representing diversity very interesting because they can feel more represented in that environment." Additionally, the mention of indigenous

avatars surfaced among participants. One individual emphasized, "I found indigenous avatars in the game Red Dead Redemption Online. It is worth noting that these are Native Americans, integral to the game's environment and theme." Some participants noted that avatars might lack intricacies: "They are good, but not very detailed, and I don't think they would be suitable for use in an immersive system."

In the analysis of Question 7.5 in the questionnaire, participants provided insights to enhance the representation of diverse identities and groups within the context of Vlibras, a tool dedicated to Brazilian Sign Language (Libras) translation. As highlighted by one participant, there is a need to include "Avatar with more types of skin tones available to better represent the Brazilian population". Another participant shared that "People of other races are essential, having three white people is not acceptable, especially in Brazil."

4.3.2. Concerns and Encounters with Discrimination Through Avatars

In the analysis of questionnaire question 7.6 (Table 5), which explores the consideration of ethical aspects when personalizing avatars in virtual environments, such as avoiding stereotypes or representations deemed offensive, approximately 29.9% indicated they had never thought about it but expressed the intention to start considering. About 14.2% mentioned considering ethics sometimes, indicating a possible variation based on context. Another 14.2% expressed never having reflected on this ethical issue and do not consider it important. Notably, one participant highlighted that, after a personal experience, they recognized the importance of accurate representation in their avatars, following surgery that altered their physical appearance.

Table 5. Answers to Question 7.6 on Ethical Aspects in Avatar Customization.

Answers (n=133)	(Frequency %)
Always take into consideration	37.3%
Never thought about it, but will start considering	29.9%
Sometimes take into consideration	14.2%
Never thought about it and don't find it important	14.2%
Others	4%

Through question 7.7, the questionnaire sought to understand if participants had ever faced situations of discrimination or prejudice in virtual environments based on the appearance or identity of their avatars. The results revealed a variety of experiences among participants. One participant described: "Yes when I used a female-looking avatar with a female name, I was harassed in the virtual environment of the game I was playing. Since then, I started using masculine characteristics and a masculine name." Another participant reported a similar experience, stating: "Yes (Female avatar), especially in games where the majority are men."

Other participants also described situations of harassment and discrimination based on the gender of their avatars. One participant stated: "Yes, due to gender. Harassment and insults." Genders have frequently been marginalized or portrayed in a biased manner, especially in environments with misogynistic traits, such as overly sexualized gender representations [Mack et al. 2023].

Furthermore, there were reports of discrimination related to the appearance of avatars. One participant shared: "Yes when I created a character in a virtual world game with a black skin tone, curly hair, and using a light blue color for clothing, several players mocked and made jokes about my character." Another participant described: "Yes when I created a character in a virtual world game with a black skin tone and curly hair, several players mocked and made jokes about my character." In the subset of data related to non-white respondents, the majority did not report experiences of discrimination related to the appearance or identity of their avatars in virtual environments.

5. Discussion

Our data offer pertinent insights into individuals' preferences when using avatars to represent their identity and other essential characteristics. Previous studies have demonstrated that users generally prefer personalized avatars that align with their self-representation preferences [Hepperle et al. 2022, Zimmermann et al. 2023]. In our research, participants shared information about avatar usage in various online activities, suggesting that the selection of an avatar for self-representation correlates with the type of online activity they engage in. We observed that participants lean towards creating and customizing avatars in widely used virtual environments, such as traditional social networks, social virtual worlds, and games, with no significant variations among them.

Contextualization emerges as a pivotal element in comprehending the underlying motivations behind the selection of specific virtual representations. Certain participants lean towards utilizing avatars in fantasy scenarios, such as games and role-play. One participant articulated, "I have a strong affinity for role-playing games and often fashion avatars or characters that do not resemble me because I appreciate the role-playing experience." In tandem with preceding research [Salagean et al. 2023, Park et al. 2023], certain participants opted for the creation of more realistic or idealized avatars in online endeavors such as work and education through video conferencing tools. In such contexts, individuals may perceive the environment as more formal and serious in contrast to the more laid-back and informal atmosphere of social gaming, aligning with the findings by [Zhang et al. 2022].

Corroborating studies on racial, age, and gender stereotypes in avatars [Carrasco et al. 2017, Lee et al. 2018, Beltran et al. 2023], participants' encounters signify that they frequently grapple with stereotypes during avatar creation, necessitating judicious decision-making to sidestep them. Researchers have proposed various strategies to mitigate bias, sexual harassment, and sexism in digital environments [Kosciesza 2023]. These strategies include encouraging the use of diverse pronouns and eliminating clothing options that impose restrictions based on the avatar's gender [Whitehouse et al. 2023]. Additionally, it is advisable to allow any combination of physical features, avoiding rigid gender dichotomies [Oliveira et al. 2022].

The configuration of avatar creation software, rather than reflecting the broader diversity of human identities, can, as evidenced, marginalize social groups by perpetuating stereotypes. In [Zhang et al. 2023], the authors contend that participants reporting disabilities wished to leverage avatars to make their disability experiences more accessible. Specifically, while past research focused on participants with visible disabilities, our survey incorporated a substantial proportion of neurodiverse participants (24.8%), shed-

ding light on the diverse preferences of individuals with disabilities, especially those with invisible disabilities.

One participant mentioned shaping a slimmer avatar due to body-shame, underscoring how societal pressures and beauty standards can sway choices in virtual representation. As articulated by one participant, "Even though I have a considered standard appearance, I once crafted a slimmer avatar out of shame for revealing that I was overweight." In sum, participants' responses encapsulate the intricate nature of virtual representation, underscoring the pivotal role of equity, diversity, and accessibility in avatar creation.

6. Limitation

The study results are promising, but it is important to recognize its limitations. Increasing the sample size would enable a more comprehensive analysis, including diverse age groups, gender identities, and individuals with other disabilities. Qualitative interviews could offer more in-depth insights. This research specifically concentrated on avatar customization, and the scope of the investigation was confined to this aspect.

7. Conclusion and Future Work

Avatars play a central role in virtual environments, enabling the digital representation of users. The primary contribution of this research lies in understanding self-representation through avatars in virtual environments, emphasizing the need to make these representations more inclusive and representative. By engaging 133 participants through an online questionnaire, the study provides insights into perceptions and experiences related to avatar customization. The emphasis on the need to make avatars more inclusive and representative aligns directly with the objectives of collaborative systems. In collaborative virtual environments, where user interaction is fundamental, avatar representativeness plays an important role in ensuring an inclusive experience for all, directly impacting group dynamics and interaction quality. Future work is directed toward i) mapping resources and trends in avatar design and customization platforms, ii) exploring different virtual activity contexts with vulnerable groups, iii) developing customization options that cater to a wide diversity of users, and iv) providing strategic recommendations to promote inclusive avatar customization.

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A. Appendix (Supplementary Data)

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[6]Supplementary Data - ([Available URL](#))