Work vs. Leisure – Differences in Avatar Characteristics Depending on Social Situations

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ABSTRACT

User avatars are a critical component in collaborative Virtual Environments. A multitude of tools exist, employing various avatar types for self-representation and the representation of others. However, the optimal appearance for these avatars remains unclear. Consumer applications predominantly utilize stylized avatars, which are less prevalent in enterprise sectors. To investigate users' avatar preferences, we conducted three user studies in both non-immersive and immersive environments, exploring whether social contexts influence virtual self-avatar selection. We generated individual avatars based on photographs of 91 participants, comprising 71 employees in the automotive industry and 20 individuals external to the company. Our findings indicate that work situations, irrespective of the occupational domain, significantly impact self-avatar choices. Conversely, we observed no correlation between the display medium or personality dimensions and avatar selection. Drawing upon our results, we provide recommendations for future avatar representation in work environments.

CCS CONCEPTS

• **Human-centered computing** → **Virtual reality**; *Empirical studies in HCI*; Interactive systems and tools.

KEYWORDS

avatars, virtual reality, user study

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1 INTRODUCTION

Avatars are a prevalent means of representing users in Collaborative Virtual Environments (CVEs), enabling remote collaboration in a virtual space through immersive technologies [41]. A wide range of avatar-supported CVEs exists [3, 22, 39, 75], varying in the degree of realism and human similarity of avatars. Entertainment-oriented applications, such as *VRChat* [75], often employ stylized and non-human avatars, as users may prefer non-realistic self-representation [56]. In contrast, work-related applications tend to utilize more realistic avatars. *Vive Sync* [39] features stylized yet work-oriented avatars, while other applications may resort to robot-like or abstract representations [3]. Adequate representations are essential for distinguishing peers and fostering social relationships [40].

This paper investigates whether users' preferences for self-avatars, based on face geometry and material style, vary across different social situations. We aim to uncover differences between work and leisure environments, focusing on the automotive industry as a representative work context [35, 69]. Additionally, we explore factors influencing avatar selection and examine the potential impact of personality traits on visual representation [36]. We investigate the impact of two factors on avatar selection: face geometry and texture material. As these factors determine the look of the virtual character and vary between realistic and stylized avatars [13, 82].

In order to delve deeper into these aspects, we conducted three studies with 91 participants, creating a tool to customize avatars by face geometry and texture based on a user photo. The initial study involved 71 participants from an automotive company, and a replication with 20 unaffiliated participants to examine internal and external user differences. A follow-up immersive VR study was conducted with 17 participants from the primary study.

Our findings show a preference for more realistic avatars in work vs. leisure contexts, with no significant disparity across mediums or fields. This research discusses the implications of avatar selection within our studies, contributing to understanding in CVEs for future virtual environment design.

2 BACKGROUND & RELATED WORK

We narrowed our review of related work to the cited areas, ensuring a focused exploration of avatar selection influenced by situation and representation style. These factors are essential in comprehending and contextualizing our exploration of avatar selection within

CVEs. It is crucial to understand how individuals perceive themselves and their avatars in a virtual environment (VE) [8, 40, 42], as specific avatar forms influence the social entity [53]. For avatars in collaborative tools, the collaboration context must be considered when determining an appropriate representation style [80].

2.1 Avatars in Immersive Environments

Avatars play a significant role in immersive environments. They not only serve as proxies in the virtual world for communication but also have the potential to represent users' behavior and mental states [52]. Consequently, avatars in an immersive VE enable a similar social experience to that of the real world [27, 28].

Research has engaged with defining the term avatar itself. In general, the concept of an avatar is quite broad and could also refer to a 2D image in a video conference. Most research acknowledges an avatar as a digital representation [10, 59, 61, 68] of an associated entity. However, the most common distinction made in research is to use the term agent for representations controlled by a computer and the term avatar for those controlled by a human [5, 26, 51, 60]. In this study, we focus exclusively on human avatars.

Researchers [31, 58, 77, 83] have found that avatars can enhance social interaction in collaborative virtual environments (CVEs). Nevertheless, the avatars in these studies exhibited considerable variation in fidelity. As social interaction is influenced by avatar quality in terms of behavioral realism [37], body ownership [48], and trust [30, 45], a lower avatar quality might hinder such interaction. In CVEs, the impact of collaboration partner representation has been extensively researched [63, 70]. However, most studies do not distinguish between use cases or varying degrees of stylization or examine how self-representation affects collaboration.

According to studies investigating the effect of presence and realism of avatars in CVEs, visual representations increase the feeling of social presence [48, 62], both for the collaboration partner and for self-representation. Other studies [17, 64] found that the presence of a remote avatar improved the sense of social presence and communication in a CVE. Waltemate et al. [76] suggest providing personalized avatars, as they enhance social interaction [63]. However, it remains unclear whether users prefer realistic over stylized self-avatars for different use cases or for themselves.

2.2 Situational Fidelity of Avatars

To examine the effect of situations on visual representations in CVEs, we must first identify the factors influencing avatar appearance. The term fidelity is commonly used to describe the degree of accuracy with which real-world experiences are replicated in the virtual world [32]. Gamelin et al. [29] argue that a moderate degree of visual accuracy is sufficient, also noting that the effect of visual fidelity remains unclear. However, high avatar-owner resemblance is not always necessary in VEs, suggesting that the effect might be dependent on the specific situation [33].

The term situational fidelity often refers to the strategic context that drives an individual's actual behavior [1]. In semantic theory, a situation is described by relational meaning containing information [15]. Nevertheless, a situation cannot be defined by a series of symbols alone [71]. Social science posits that social behavior is a product that emerges from a situation in conjunction with an actor's interpretation of it [19, 69], incorporating both objective and subjective factors [12]. In this paper, we define a situation as a state of affairs that affects an individual at a specific time and place based on their learned behavior patterns. To the best of our knowledge, the impact of situational context on the fidelity of one's avatar has not been systematically investigated.

2.3 Virtual Character Design

Researchers [2, 48, 84, 85] discovered that specific features play a major role in the perception of a virtual character's appearance. Notably, face geometry and texture influence the way a virtual human representation is depicted [13, 82]. Related to the uncanny valley [57], MacDorman et al. [53] found that reducing realism can make a face look more attractive and less terrifying. According to these studies, stylization influences pleasantness ratings. Combinations of visual elements might even result in negative effects [82]. Therefore, we study the effects of combining various levels of stylization for shape and material, which are the two key parameters governing visual appearance [82]. By stylization, we summarize different representation styles that deviate from natural realistic shapes and color, such as cartoon or abstract styles.

In this paper, we compare a realistic and an overly stylized virtual avatar of the user in different situational contexts. Our work puts emphasis on creating individual avatars that are used in different situations. Recent related work [82] identified the two most influencing factors that define the look of a virtual character, which we adopt to define a realistic and a stylized avatar model.

3 METHODS

To investigate the impact of situational context on avatar appearance preferences, we designed a series of studies that required participants to create and manipulate avatars based on two parameters, *face geometry* and *texture material*, within two different situational contexts: *work* and *leisure*. We conducted three studies: an initial study with participants from an automotive company (*Study I*), a subsequent study with external participants (*Study II*), and a follow-up study in an immersive Virtual Reality (VR) environment (*Study III*). An overview of all conducted studies can be found in Table 1. In this section, we provide a detailed description of our avatar prototype, study design, and setup.

Table 1: Overview of our three studies with used display devices for the situational condition and the number of participants from within and outside an automotive company.

Study	**I**	**II**	**III**
Situation	condition *leisure* vs *work*		
Device	desktop		VR HMD
Setting	within company	outside company	within company (subset)
Participants	71	20	17
Findings	difference between condition *work* and *leisure* regarding face geometry and texture fidelity	similar to Study I, no evidence for a difference regarding the field of work	no evidence for a difference between immersive and non-immersive environment

3.1 Avatar Prototype

We developed a prototypical tool enabling users to adjust their digital representation within a continuous spectrum from a realistic to a stylized avatar appearance. Utilizing a slider interaction [55], participants could modify parameter values and observe the resulting visual changes in their avatar (see Figure 1).

3.1.1 Creation of Individual Avatars. Our study necessitated the design of various levels of stylization for each participant's avatar, derived from their 2D photo. The face geometry parameter refers to the degree of realism or stylization in facial features, whereas the material parameter concerns the depicted skin texture style.

Based on the participant-provided photos, we generated individual avatar models using the *Character Creator 3* software [66]. The resulting models required minimal manual adjustments and were compatible with web browsers. Our 3D artists further refined the realistic base model by designing stylized avatars that matched the realistic models (see Figure 2). As our focus was on face geometry, we incorporated rudimentary hair models based on the photos. A skilled artist developed stylized textures for each avatar.

To enable morphing between models, we created blend shapes for face geometry and a texture blend shader for skin details. We incorporated four universal facial emotions (anger, happiness, sadness, and surprise) [20], along with a neutral expression, into each avatar. To enhance the sense of social presence, we added random blinking and eye movement [43, 79].

3.1.2 System Description. Our online study employed *Unity's* WebGL export for avatar interaction, which was embedded into a website accessible via a VPN network. Data storage was managed through an MSSQL database.

3.2 Study Design & Setup

We employed a between-subject design to compare the avatar parameter choices, face geometry and texture material, between two conditions: (A) *leisure* and (B) *work*. The situational condition serves as our independent variable.

3.2.1 Conditions. We designed a sequence of three situations for each condition. The *leisure* condition represents public and private social interactions involving acquaintances and strangers. The *work* condition encompasses social interactions with known and unknown peers of varying hierarchies within a professional setting. Participants were asked to immerse themselves in these situations while adjusting their personal avatar. They could refer to the assigned set of situations at any time.

3.2.2 Tasks & Procedure. Our user study comprised two parts. (1) Initially, participants were instructed to upload a frontal image of themselves with a neutral facial expression. We then created individual avatars for each participant and provided them with a unique access key. (2) Subsequently, participants engaged with their avatars throughout the study, which consisted of the following components: (a) an introduction to the system and experiment, (b) a demographic questionnaire, (c) the avatar selection, which included an explanation of the interactive features and a situational context (either *leisure* or *work*), and (d) a series of concluding questions.

The demographic questionnaire asked for age, gender, country, and job status. We also assessed participants' experience with 3D games, character creation (e.g. *The Sims* [21]), VR, and their affinity for new technologies. To measure participants' personality traits, we used the short version of the Big Five Inventory (BFI-10) [65].

Next, participants familiarized themselves with the avatar selection tool through a brief tutorial. The interface featured sliders for adjusting face geometry and texture material (see Figure 1). After acquainting themselves with the tool, participants were presented with their assigned situational context and instructed to modify their avatar accordingly. The context was conveyed through text and illustrative figures to accommodate participants with limited availability. Upon finalizing their avatar appearance, participants responded to a set of concluding questions.

4 USER STUDY I - COMPANY

In our primary study, we aimed to examine the situational influence on selecting avatar representations in *leisure* and *work* environments within our target group from an automotive company.

4.1 Study Design

We employed the same study setup described in Section 3.2.

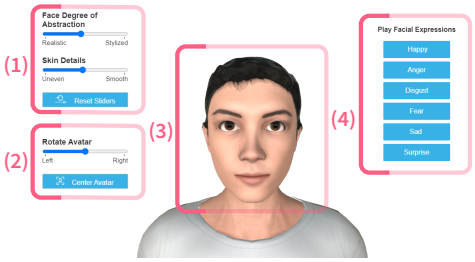

Figure 1: The interface consists of four components: (1) slider to adjust parameters, (2) *only desktop* elements to rotate and center the avatar, (3) avatar, and (4) buttons to display facial expressions. Desktop interface is shown as an example.

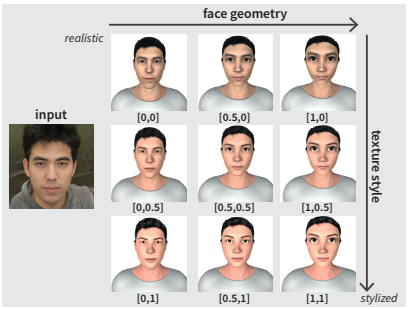

Figure 2: Sample visualization for a male avatar sorted by face geometry and texture style (realistic →stylized) in brackets as *[face geometry, texture material]*. We generated the avatar using a styleGAN image [47].

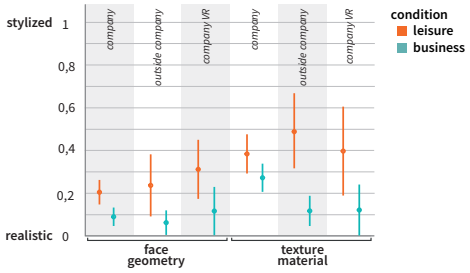

Figure 3: Face geometry (left) and texture material (right) based on the 95% confidence interval for each condition for the degree of stylization *(0: realistic - 5: stylized)*. The plots are divided into the different study setups: company (Study I), outside company (Study II), and company VR (Study III).

4.1.1 Participants. This study comprised 71 participants (51 male / 20 female) from an automotive company. Our objective was to investigate different avatar choices based on the presented situational condition (*leisure* or *work*) to understand the preferences for avatar representations. We recruited participants through mailing lists and social networks. The mean age was 35.1 years (20 to 65 years). 96% of the participants stated that they frequently or very frequently work with new technologies. On average, participants estimated their experience with virtual reality at 3.89 (SD = 0.96; *1: very bad - 5: very good*) and their experience with tools to create characters, e.g. in computer games, at 3.62 (SD = 0.95; *1: very bad - 5: very good*). The working areas of the recruited participants ranged from engineering (requirement validation, data viewing, ergonomics) to assembly planning and e-learning.

4.1.2 Design & Variables. We designed a between-subject study setup. Conditions were randomly assigned, resulting in 35 participants being presented with the *leisure* condition and 36 participants with the *work* condition. The measured data included data collected from the slider interaction (face geometry and material texture), along with data from the BFI-10 [65]. To gain further insights into the participants' thought processes during the study, we incorporated a Likert scale questionnaire inquiring about the perceived situational fidelity and avatar representation parameter adjustments. We also collected subjective feedback through optional text fields.

4.1.3 Hypotheses. Based on our study design, we propose the following hypotheses:

- **H1** If users are in a *work* condition, the values for face geometry will be lower compared to the *leisure* condition.
- **H2** If users are in a *work* condition, the values for the texture material will be lower compared to the *leisure* condition.
- **H3** Personality, as measured by the BFI-10, will correlate with avatar choices in terms of texture material and face geometry.

4.2 Results

We present our results, including computed means and standard deviations (see Table 2, *company*). Effect sizes are depicted graphically with 95% confidence intervals (see Figure 3, *company*).

Table 2: Descriptive statistics for each group of participants.

	Group	N	Mean	SD	SE
face geometry	*company*	71	0.1358	0.1509	0.01791
	outside company	20	0.1455	0.17383	0.03887
texture material	*company*	71	0.3223	0.23592	0.028
	outside company	20	0.297	0.26825	0.05998

We measured the degree of stylization in two conditions: *leisure* and *work*. No evidence was found for a difference between both conditions (see Figure 3). Since we formulated directional hypotheses in *H1* and *H2*, we used a one-tailed p-value of the two-sample t-test. For *leisure*, the values indicated a higher mean value for *face geometry* compared to *work* (*95%-CI* $[-0.97, -0.03]$, $t(69)$=2.1, p=.019, d=-0.05). Similar results were obtained for the texture (*95%-CI* $[-0.95, -0.007]$, $t(69)$=2.02, p=.024, d=-0.48). The findings indicate that participants tended to choose more realistic avatars for *leisure* compared to *work* situations, thus confirming *H1* and *H2*.

Participants were also asked to complete a BFI-10 questionnaire to assess their personality traits and determine whether these traits influenced their choice of avatar appearance. We found no statistically significant correlation between the degree of stylization and the dimensions of personality assessed with the Big Five Inventory. Consequently, we cannot confirm *H3*.

5 USER STUDY II - OUTSIDE COMPANY

To validate our results beyond the automotive company context, we conducted a follow-up study with 20 participants from the general population. To ensure comparability, we utilized the same study setup and will only discuss differences in the following paragraphs.

In our main study, we investigated the differences in avatar appearance depending on the situation within a target group from an automotive company. In the follow-up user study, an exploratory methodology was adopted to investigate potential differences in avatar appearance choices regarding the examined parameters among participants not affiliated with an automotive company. To ensure comparability, we utilized the same study setup and will only discuss differences in the following paragraphs.

5.1 Study Design

Similar to Study I, we employed a between-subjects design to compare the selected parameter values for both conditions. The conditions were equally distributed among the participants. In contrast to Study I, we aimed to determine if a specific company affiliation influenced the avatar choices based on the presented situation. Therefore, we added questions about the participants' field of work.

5.1.1 Participants. We recruited 20 participants (13 male / 7 female) using mailing lists and social networks. The mean age was 31.9 years, ranging from 20 to 59 years. 70% of the participants reported working with immersive technologies frequently or very frequently. Participants had a self-estimated experience of 3.25 ((SD = 1.45, *1: very bad - 5: very good*) with virtual reality and a 3.55 experience with using tools to create characters, such as in computer games ((SD = 1.4,*1: very bad - 5: very good*). The majority (12 of 20) of participants worked in the public sector or education system (e.g., as teachers or university employees), while six of 20 were employed

in mechanical engineering or software companies. Two participants reported working in different fields.

5.1.2 Design & Variables. We employed the same conditions and measures as in Study I. Our hypothesis is that, despite different fields of work, participants will not choose a significantly different avatar appearance compared to those within the company.

5.2 Results

Considering our small sample size, we employed Bayesian Independent Sample Inference and used commonly accepted thresholds for Bayes factors [44, 50] to interpret the results. We estimated the Bayes factor using Rouder's method. The Bayes factors for the parameters face geometry (5.094) and texture material (4.851) ranged between 3 and 10, indicating moderate evidence for a non-existent difference between both participant groups, which replicates the findings of Study I. The effect sizes are shown graphically with 95% confidence intervals (see Figure 3, *outside company*). *[Result tables can be found in the supplemental material.]*

6 USER STUDY III - COMPANY VR

Due to the ongoing COVID-19 pandemic, we initially opted for a web-based study that participants could complete from home rather than an in-person study with VR head-mounted displays (HMDs). However, as in-person studies became feasible during the course of this work, we conducted a follow-up study with a 17 participants from Study I in a VR environment. The objective of this study was to see if our findings are also applicable in immersive virtual reality (VR) environments. We adhered to the same general setup, highlighting differences in the following paragraphs.

6.1 System Description

The foundation for this study was the avatar application presented in Study I. As we developed the application using Unity, only minor adjustments were required. We added a neutral room in which the avatar and the situation were displayed (see Figure 1 (b)). Participants wore an HTC Vive Pro 2 HMD and used VR controllers to adjust the parameter sliders via a laser pointer.

6.2 Study Design

This study employed a shortened version of the questionnaire. We omitted the demographic and personality questionnaires, as we had previously collected this data from each participant. Nine participants were presented with the *leisure* condition, and eight participants were presented with the *work* condition.

6.2.1 Participants. We invited a group of 17 participants (11 male / 6 female) who had already participated in Study I to partake in a follow-up study. The mean age was 31.8 years, ranging from 20 to 59 years. The time that elapsed between Study I and Study III was between two to four months. This study was conducted as a supervised user study using HMDs, either in-person or remotely via a conference system.

6.2.2 Design & Measures. Since every participant in the follow-up VR study had already participated in Study I, they had been exposed to one condition. Consequently, in Study III, participants were assigned the opposite condition to prevent learning effects and counterbalance the conditions. With this study setup, we aimed to identify potential differences between immersive (VR) and non-immersive (desktop) environments.

6.3 Results

Analogous to Study I, we utilized a two-sample t-test to compare both conditions of the VR users. We obtained similar results: In the *leisure* condition, the values exhibited higher mean values for face geometry ($t(15)$=2.5, p_2=.024) and texture ($t(15)$=2.6, p_2=.021) compared to the *work* condition. The effect sizes are shown graphically with 95% confidence intervals (see Figure 3, *company VR*). When comparing the confidence intervals for both groups, we observe differing medians, which could be attributed to a smaller sample size compared to Study I. Yet, the tendency toward a more realistic avatar for the *work* condition persists for both parameter measures.

7 JOINT RESULTS

To investigate factors influencing the selection process for individual avatar appearance, we conducted a detailed examination of the collected data. Where appropriate, we analyzed the resulting data collectively. *[Data for each study group is included in the supplemental material].*

To uncover potential factors that could be interpreted as underlying motivational aspects of avatar appearance choices, we employed principal component analysis (PCA) to analyze the questionnaire items (see Figure 4), using data collected in Study I and Study II. PCA enables the analysis of multivariate data described by quantitative variables and visualizes the information in tabular form [78]. To ascertain whether the correlation of our items is strong enough, we applied the Kaiser-Meyer-Olkin (KMO) criterion and Bartlett's test of sphericity to assess the data's suitability for performing a PCA and calculated measures of sampling adequacy [23, 73]. Based on the reviewed literature, we extracted factors that were likely to be correlated. Consequently, we present the correlation matrix of all items integrated into the principal component analysis (see Figure 4). To determine the number of components to retain for a PCA, we used a scree plot to identify the eigenvalues of the correlation matrix. A thorough evaluation based on identifying the knee point and interpretability of the data led us to a three-factor solution.

We selected the Oblimin rotation method ($delta = 0$) to extract the correlated factors, as it is empirically justified [34, 46]. Most questionnaire items loaded highly on one of the factors (see Figure 4, *communalities*). Only items *q5* ($h^2 = 0.23$) and *q11* ($h^2 = 0.17$) exhibited no correlation with other variables. Variables should be inter-correlated and need to have at least one correlation equal to or greater than .3. The three-factor solution displays an interpretable matrix of the loadings (see Figure 4) to describe potential factors that influence avatar appearance selection. We propose that these factors form the foundation for adapting and accepting one's avatar in a VE: (1) *individual desires towards avatar appearance* that increase acceptance, (2) *comfort in the presented situation through the avatar*, and (3) *customization of the avatar appearance.*

Figure 4: Correlation matrix of Principal Component Analysis (PCA). Correlating items are visualized through a hierarchical dendrogram. Together with communalities in the top row and a scree plot, we identified 3 correlating factors that have an influence on the avatar selection. Factor 1: Individual desires towards avatar appearance. Factor 2: Comfort in the presented situation through the avatar. Factor 3: Customization of the avatar appearance. *q11* and *q5* do not correlate. $N = 91$.

7.1 Interaction Effects

Every participant in Study I and II was presented with a tutorial explaining the tool's interactive features. At the tutorial's conclusion, we asked participants to adjust the avatar in a manner they deemed *suitable*. We compared the results from their initial input during the tutorial with their input for the scenario. Visual exploration of the graphs implies that a potential interaction effect might exist (see Figure 5) when deciding on avatar representation. The plot reveals that stylization levels are marginally higher for the *leisure* condition. We cautiously surmise that this is due to the more playful nature of the situations presented in the *leisure* condition.

7.2 Subjective Feedback

We were also interested in the extent to which participants identified with their individual avatars and their satisfaction with the representation in the presented situation. As we did not find evidence for a difference between participants from Study I and II, we combined the results of the Likert scale responses and reported them together in Figure 6. The Likert scales indicate that participants rated their satisfaction with, as well as the acceptance of their virtual avatar for the presented situation, rather highly. In comparison, the statement regarding an increasing effect on self-confidence (item *q2*) received lower ratings. We speculate that the lower ratings are due to the fact that overall, participants already experienced an increased feeling of comfort in the presented situation, and thus, the avatar's appearance *"neither positively nor negatively influenced"* their self-confidence.

From the subjective feedback we collected in the form of optional free-text fields from each participant, we found that customization was frequently mentioned in the 580 comments collected from all participants. Almost 75% of the participants expressed a desire to adjust additional avatar parameters. We summarized all comments targeting the adjustment of extra facial features and grouped them into corresponding topics. Most comments (21%) expressed a desire to adjust their (facial) hairstyle and hair color. These comments were followed by requests to modify face shape (12.6%), eye shape (11.9%), skin texture (8.3%), mouth features (7.4%), nose (4.5%), and ears (2.1%). Additionally, 4.1% of the comments expressed a desire for further modifications such as makeup, jewelry, and glasses.

8 DISCUSSION

Our investigation provides significant insights into the choice of avatar representation within collaborative virtual environments (CVEs). We summarize our findings from the three conducted studies in Table 1 and delve into an extended discussion of how these outcomes intersect with existing literature and offer implications for design and practice.

8.1 Context-Specific Avatar Selection

Our studies suggests that the context of avatar use strongly influences the selection of facial geometry and texture material, affirming previous studies suggesting user behavior modulation based on situation [72]. This finding supports the notion that more realistic avatars are preferred in professional settings, as users may not wish

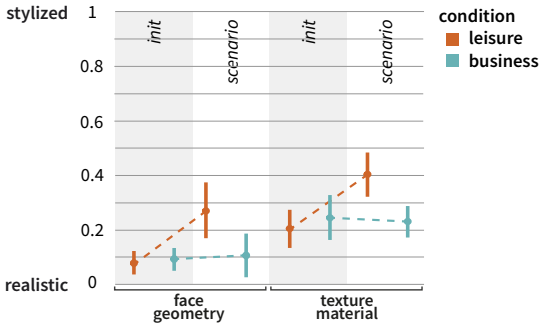

Figure 5: Plots based on 95% confidence intervals visualize a potential interaction effect between the initial avatar selection and the selection for the given situation based on condition *leisure* or *work*. The plots are computed from the data of all participants ($N = 91$).

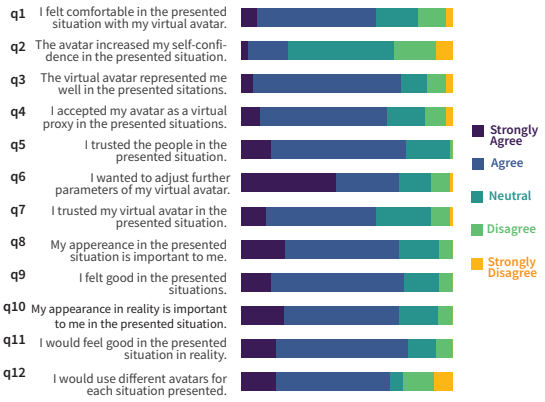

Figure 6: Likert questions asked after the situation presentation and avatar selection. $N = 91$.

to appear like cartoon characters in front of colleagues or superiors [6]. This context dependency aligns with Social Identity Model of Deindividuation Effects (SIDE) theory [49], emphasizing the social influence of contexts on self-representation. While research has largely focused on abstract versus anthropomorphic avatar design, our study provides empirical evidence to guide realistic avatar design for professional settings. To align CVE design with user preferences, designers should consider context-specific avatar customization options.

8.2 Influence of Display Medium

Exploratory results from Study III add a new dimension to the discussion: the possible effect of display medium on avatar selection. This insight finds resonance with studies indicating distinct user behavior between desktop and VR environments [11, 14, 81]. VR's immersive nature potentially amplifies context effects on avatar selection, a consideration that CVE designers should take into account when building systems intended for different display mediums. However, our results should be interpreted cautiously, given the small sample sizes of Study II and Study III. Future research could further investigate the effect of display medium on avatar selection behavior.

8.3 Factors Determining Avatar Appearance

Our analysis illuminates three major factors influencing avatar appearance choice: (1) individual desires, (2) comfort in the situation, and (3) customization. This aligns with Self-Perception Theory [7], suggesting that people develop their attitudes (including self-representation) by observing their own behavior and considering what must have caused it.

8.3.1 Individual Desires. Individual desires indicate a motivation to improve self-presentation, consistent with studies discussing users' tendency to adjust unflattering avatar features [38, 67, 72]. For designers, this underscores the importance of providing sufficient customization tools to enable users to create avatars that accurately represent (or perhaps improve upon) their self-perceived image.

8.3.2 Comfort in the Situation. Comfort in the situation is an essential factor affecting avatar choices. Users' feelings of comfort in the presented situation influenced their avatar selection, suggesting that avatar-supported CVEs should consider these factors to make users feel comfortable using their virtual avatar.

8.3.3 Customization. Customization reveals the desire for dynamically adjustable features, such as hair and accessories, to make their appearance feel more personal. This corroborates with studies highlighting the importance of customization in enhancing users' identity and presence in CVEs [9, 18, 74]. Designers could consider providing a broad set of options, including aspects that users can change dynamically to mirror their real-world changes.

8.4 Personality and Avatar Choice

Contrary to expectations, our study did not find a significant correlation between Big Five personality traits and avatar selection, echoing some research [16, 54] while contradicting others [4, 24, 25, 63]. This discrepancy invites further research to disentangle the complexities between personality and avatar choice.

8.5 Implications

Our findings contribute to the understanding of user preferences in avatar representation and the design of avatar-supported CVEs. We advocate for context-specific design approaches, reinforced by extended customization options that factor in the individual desires and comfort of the users.

However, future research should explore other variables influencing avatar selection, such as cultural backgrounds and different kinds of work situations and fields. Moreover, more extensive studies investigating the influence of display medium on avatar selection are warranted to solidify our preliminary findings. While no correlation was observed between participants' age and occupation in avatar selection, future research could specifically probe these demographic factors for potential influence. Additionally, future studies could investigate the potential influence of personality traits on avatar choices and further examine the factors affecting users' comfort and customization preferences.

9 LIMITATIONS

Our results apply to our specific set of stimuli, using a particular style for the avatars, which may limit our conclusions. However, the degree of stylization in face geometry and texture material is believed to have some portability. Small sample sizes in Study II and III necessitate further investigation, and findings may not be generalizable beyond our specific work context.

We included facial expressions in avatar customization but did not explore the animations applied to avatars. We expect an interdependence between the motion and avatar representations and want to look into this in future studies.

10 CONCLUSION & FUTURE WORK

In this paper, we examined the situational impact on the choice of the avatar representation and conducted three user studies (see Table 1) with 91 participants. Specifically, two different situational contexts, a work and a leisure context and individual virtual avatars with which the participants took part in the study. We statistically analyzed the data and also collected qualitative feedback. With regard to the selection of avatar appearance, we also revealed three correlating factors: (1) individual desires, (2) comfort in the situation, and (3) customization. We did not find evidence that users' personality traits have an influence on the selection of the avatar.

In conclusion, the study offers empirical evidence for context-driven avatar selection, emphasizing the need to consider individual preferences, situational comfort, and customization in professional avatar-supported CVEs. Addressing these factors may create more engaging and effective virtual work spaces. Future research should explore the varying factors influencing avatar selection and their collaboration and performance implications within CVEs.

Our findings suggest that more realistic avatars in CVEs could enhance immersive experiences, particularly with the rise of remote work. Utilizing individual avatars may increase immersive CVE acceptance in enterprises. Further research should explore self-representation through multiple avatars, co-presence, and their role in fostering social relationships. Despite no significant disparities in avatar preferences between internal and external company participants, exploring the impact of diverse work fields could provide nuanced insights into avatar selection.

Lastly, examining avatar fidelity's influence on performance and collaboration in CVEs may deepen our understanding of workplace avatar design. This could guide best practices for avatar design in CVEs, enhancing virtual work experience and productivity.

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