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The Psychology of Avatars: Real Life Effects of Virtual Communication

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Abstract

Avatars have become the major forms of media access to virtual environments. The characteristics and perception of avatars are related to the sense of presence in virtual environments. Understanding the communication and social action between users and avatars, referred to as "avatar-mediated communication" (amc), as well as its potential effects, is therefore a key issue for presence research.

This panel brings together distinct, yet complementary research on the creation and perception of avatars in virtual environments and video games. The first paper addresses the importance of measuring the users' avatar-perception for presence research. The second paper introduces an architecture for the inducement of facial gestures of avatars. The study presented in the third paper addresses how virtual representations influence the users' self-concept in video games. The fourth paper investigates the influence of task structure and life satisfaction on the process of avatar creation in video games.

Keywords--- **Avatars, Avatar-Mediated Communication, Anthropomorphism, Realism, Avatar Characteristics, Facial Gestures, Self-Concept, Life Satisfaction, Avatar Creation, Video Games**

1. Introduction

Avatars, or computer-generated virtual representations of individuals, have become one of the major forms of media access to virtual environments, such as video or multiplayer online games. Via an avatar, a user can elicit all kinds of human-like behavior and social interaction. Thus, communication between user and avatar evolves to a new form, and it has potential effects on user identity as well as on the experience of virtual environments. The characteristics of avatars and the users' perceptions of these characteristics are related to the sense of presence in a virtual environment [1, 2]. For presence research it is therefore crucial to investigate the relationship between users and avatars and to answer the questions of how users perceive avatars and specific avatar features, how people want to be represented in virtual worlds, and how virtual representations influence the users' communication behavior and experience.

This panel brings together four papers that address the creation and perception of avatars in virtual environments and computer games from various perspectives. The first paper is concerned with methodological challenges in avatar and presence research: Anthropomorphism and realism of avatars can influence the sense of presence and seem to be obvious avatar characteristics, but research has shown that users' perceptions of these features vary considerably [3, 4, 5] The paper summarizes the literature on the effects of avatar anthropomorphism and realism on the corresponding user perceptions and discusses the importance of measuring user perceptions of these constructs in presence research.

The second paper addresses characteristics of embodied agents, virtual representations of computer controlled characters, from a design point of view. It focuses on facial gestures such as nods, head movements, and eyebrow gestures, and how facial gestures of embodied conversational agents can be triggered in real time from inducements such as text or speech. An architecture for producing and using statistical models for facial gestures based on any form of inducement is presented.

The third and fourth paper in this panel will discuss the how's and why's of avatar perception and avatar creation in video games. Despite both papers do not focus the experience of presence in particular; the results of both studies are of

interest for the use of avatars in presence research. The third paper presents an experimental study on the influence of virtual representation on self-concept in terms of participants' and virtual characters' gender in the massively multiplayer role playing game World of Warcraft. The results illustrate that men and women respond differently to gender switching of avatars in terms of self-evaluation, attention, and amusement.

In the fourth paper, the authors present an experimental study that investigated how task structure of a video game and life satisfaction affect the creation of avatars gamers would like to play with. Results indicate that players prefer avatars similar to themselves in non-competitive games, whereas the player's personality has less influence on avatar choice in competitive games. In both competitive and non-competitive games, identification with an avatar and entertainment experience are positively related. Furthermore, the study provides evidence for the fact that players with low satisfaction with life create their avatars dissimilar to themselves.

2. Feeling present with anthropomorphic or realistic avatars

Avatars, or computer generated images, are increasingly being used to represent people or computer programs during interactions. These avatars and their visual characteristics has been shown to increase the sense of presence in virtual environments, message processing, and source attribution [1, 6, 4, 5, 7]. The pages that follow will briefly summarize the literature on the effects of avatar anthropomorphism and realism and discuss the importance of measuring users' perceptions of these constructs for future researchers using avatars to study presence and related questions.

While many characteristics have been shown to influence perceptions of avatars and those they represent, the level of anthropomorphism (having human characteristics) and level of realism have been heavily studied and shown to influence expectations for behavior [8, 9, 10, 11]. Avatars that are non-human animals or inanimate objects are typically perceived as less anthropomorphic [4], although they can be morphed to increase their anthropomorphism. Realism is related to mediated depictions of characters and events perceived to represent something typical and probable (frequently occurring), factual (has a specific correlate in the physical world), involving (eliciting identification), pervasive (creating a compelling and coherent illusion), or consistent [12, 9, 13]. The level of perceived realism of an avatar is associated with the plausibility of its behavior and existence offline [14]. The extent to which mediated stimuli are perceived as realistic influences viewers' processing of source information and judgment [15].

There is some confusion about how to determine which avatars are realistic and anthropomorphic and how to interpret the various studies on the topic. While anthropomorphism and realism have been manipulated in a variety of studies, the definition of the constructs varies across studies as do the manipulations. Anthropomorphic avatars have consistently

been shown to influence perceptions, but there are conflicting results on the direction and intensity of this effect. Some studies have found that anthropomorphism increases involvement and attraction [16, 17], others have found that anthropomorphism may decrease involvement and attraction [10, 2]. These differences could be due to the variance in the level of anthropomorphism of the avatars, or a variation in the context of the study that may moderate the direction of the effect.

Avatar studies typically do not measure users' perceptions of avatar realism and anthropomorphism, meaning that manipulation checks have not always been conducted to ensure that participants perceive variance in the avatars on the dimensions being examined [16, 10, 2, 17]. Similarly, other characteristics of the avatars shown to influence perception are not always controlled for in these studies. It is quite possible and likely that manipulations of anthropomorphism or realism may also vary other constructs as well (e.g. level of detail, credibility or masculinity); those other constructs may influence perceptions as well [14]. As with anthropomorphism, an assessment of realism is a subjective judgment [18] influenced by an interaction of personal experience and content features of the stimulus [15]. The same avatar may be perceived as realistic or anthropomorphic in one context but not realistic or anthropomorphic in another context or with another population. This leads to difficulty in comparing results across studies, particularly when results point in different directions.

There is also an interaction between the constructs in that avatars perceived to have a matching level of realism and anthropomorphism are rated more favorably than when there is a lack of consistency [9]. Avatars with abnormal features tend to be rated as less realistic and pleasant, particularly when the avatars are highly anthropomorphic [19, 20, 5].

People reliably assign avatars to categories based on the visible characteristics of the avatar, including anthropomorphism, and realism, but not always in predicted ways [20]. Realism and anthropomorphism can be measured as separate constructs, and exert distinct influence on people's perceptions of avatars. Importantly, not all people perceive avatars as belonging to the same categories. Individual differences such as certain types of computer use and experience influence how ratings of anthropomorphism and realism ratings of the same avatars [21, 4, 5]. It is the perception of the characteristic that drives people's judgments of the likeability and credibility of those represented by the avatar and it is the perceptions of the characteristics of avatars that determine which avatar users will choose to represent them. Suggestions for how to measure user perceptions of avatar characteristics when using avatars in presence research will be discussed.

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3. Generating facial gestures for virtual characters

Facial displays are an extremely important communication channel fulfilling a wide variety of functions in discourse and conversation. Humans use them naturally, often subconsciously, and are therefore very sensitive to the application of such displays in Virtual Characters. In this work we concentrate on one particular class of facial displays, the facial gestures. Facial gestures include various nods and head movements, blinks, eyebrow gestures and gaze, i.e., all facial displays except explicit verbal and emotional displays (visemes or expressions such as smile). Consciously or subconsciously, facial gestures play an important role both in discourse and in conversation. They are instrumental in turn taking, emphasizing, providing rhythm, and can be connected to physiological functions. While verbal and emotional displays may be regarded as the explicit, perhaps even obvious, the facial gestures are less tangible - yet they are largely responsible for what we intuitively call natural behavior of the face. In other words, an embodied conversational agent (ECA) pronouncing a sentence using perfect coarticulation mechanism for the lips and displaying a carefully modeled expression of surprise will still look unnatural if the facial gestures are not right as well. It is therefore extremely important for an ECA to implement facial gestures well. While there is a large body of knowledge on this topic both from psychology and ECA literature, it is quite scattered. We will give a brief overview of various types of facial gestures and their typical usage based on [22]. Furthermore, we will discuss our universal architecture for statistically based HUman GEsturing (HUGE) [23], for producing and using statistical models for facial gestures based on any kind of inducement. As inducement we consider any kind of signal that occurs in parallel to the production of gestures in human behavior and that may have a statistical correlation with the occurrence of gestures, e.g. text that is spoken, audio signal of speech, bio signals etc. The correlation between the inducement signal and the gestures is used to first build the statistical model of gestures based on a training corpus consisting of sequences of gestures and corresponding inducement data sequences. In the runtime phase, the raw, previously unknown inducement data is used to trigger (induce) the real time gestures of the agent based on the previously constructed statistical model. We will present the general architecture and implementation issues of our system, and further clarify it through two case studies. We believe that this universal architecture is useful for experimenting with various kinds of potential inducement signals and their features and exploring the correlation of such signals or features with the gesturing behavior.

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4. Proteus in World of Warcraft? The effects of being represented by a gender-typical avatar on behavior and self-concept

The World Wide Web and its different features have long provided the possibility to play with identities. While initially virtual identities were mainly created and used within chats, recent developments permit the presentation of the virtual identity via sophisticated human-like virtual representations (as for example in Second Life or online role playing games such as World of Warcraft). With regard to both kinds of virtual identities, either represented by nicknames or via avatars, the phenomenon of role change and especially gender-switching or gender-swapping has been described. Men disguise as women and vice versa. Thus, the WWW does not only offer the opportunity to represent the actual self, but also to test a new virtual self [24] or to experiment with a pseudo identity [26]. Besides other questions that have been tackled with regard to this phenomenon (e.g. description of users who engage in gender-swapping, motives) recently the effects of this behavior have been focused. Here, especially Yee and Bailenson [26, 27] investigated whether the representation as an avatar with specific attributes affects the attitudes as well as the behavior of the participant. Yee and Bailenson [26] for instance showed that clichés could be minimized through placing a person into the virtual body of someone else. When participants were represented in a virtual environment by the body of a senior citizen, negative stereotypes towards the elderly decreased significantly. The authors summarize that "immersive virtual environments provide the unique opportunity to allow individuals to directly take the perspective of another person and thus may lead to a greater reduction in negative stereotypes" (p. 1). But not only attitudes but also actual behavior might be affected: An even more compelling demonstration of changing self-representation in virtual environments is given by Yee and Bailenson [27]. In studies on the so-called Proteus Effect they showed that the experimentally controlled variation of self-representation has an effect on user's behaviors. Here, the attractiveness of the assigned avatar was related to the extent of how intimate participants were willing to interact with a stranger. Moreover, they report that "participants who had taller avatars were more willing to make unfair splits in negotiation tasks than those who had shorter avatars, whereas participants with shorter avatars were more willing to accept unfair offers than those who had taller avatars. Thus, the height of their avatars impacted how confident participants became" (p. 285) [27].

Given these recent results, a further question is whether not only attitudes and behaviors but also the explicit self-concept of a person might be influenced by the virtual representation. Also, it has not been shown yet whether effects can be observed within a natural online setting such as a massive multiplayer online role play game (e.g. World of Warcraft). We thus asked: Has the gender switching activity in a MMORPG an effect on the self-concept of a person? The concept of self,

however, is described to be robust throughout a plenitude of different situations. It is an assemblage of knowledge of own abilities, attributes and skills immanent to everyone. The self consists of three components: the cognitive or descriptive, the emotional or evaluative and the conative or affordance part (see e.g. [25]). The cognitive part refers to the knowledge of the individual, concerning cognitive adjudgements of him- or herself. This may also be called "self-concept". The emotional section evaluates the adjustments and abilities and is named "self-esteem". Conative structures deal with the attention to the self that an individual ventures about his- or herself. All components combined lead to a consistent self-image [25]. However, the self-concept is not fixed, it is dynamic. Depending on the situation, a certain self-concept is salient, whereas the person's numerous other self-concepts are not activated.

To analyze whether the virtual representation will actually influence the self-concept, we focused on the MMORPG World of Warcraft (WoW). As with other MMORPGs, in "World of Warcraft" thousands of people worldwide change into the role of a gnome, elf, orc, undead or simply into a human being. They control the avatar within a persistent game world, immerging into a fanciful virtual reality, exploring the landscape, fighting monsters, performing quests, training skills, interacting and communicating with PCs (Player-Characters) and NPCs (Non-Player Characters). Functions like voice- and text-chat as well as voice- and text emotes offer various forms of communication between the characters.

Against the background of the results reported above as well as based on well-described gender stereotypes we hypothesized that women represented via and acting as a male avatar will experience themselves as more masculine as women who are represented by a female avatar. Additionally, they will behave in line with the gender stereotypes, e.g. while chatting with other avatars. The hypotheses for male participants were formulated accordingly.

Sixty students took part in the study. In a 2x2 design we varied the independent variables sex of the participant and sex of the avatar. Attracted by e-Mail, an internet forum and poster ads, the thirty women and thirty men were randomly assigned to one of the four conditions: a) woman acting as virtual man (experimental group woman), b) man acting as virtual woman (experimental group man), c) woman acting as virtual woman (control group woman), d) man acting as virtual man (control group man).

We used the virtual environment of the massively multiplayer online role-playing game (MMORPG) "World of Warcraft" [28] for our experiment. In the fantasy world Azeroth a player usually can design an avatar by him- or herself. For the purpose of the experiment we created two stereotypically looking characters that had to be used by the participants. In order to make the characters look prototypically male/female, the virtual woman was a so called "Human Mage" and the male avatar a "Human Warrior".

The subjects had to fill in two questionnaires: The first one, before entering Azeroth, collected basic demographic and personality data. After the online interaction, mood, self-concept [29] and sex roles [30] were assessed via questionnaire. As additional dependent variable the chatting behavior of the participants during their online interactions was assessed and analyzed. Social presence was not measured directly but engagement and involvement of the participants were assessed.

When entering the virtual world, participants were first given some time to adjust to the situation by exploring the environment and to experience themselves in their role while completing an easy task. Then they were faced with two communication situations. In the first one, an avatar of the same sex of their own avatar began to talk with them about two gender stereotypic topics: As a typically female topic "clothes and looks in WoW" were chosen while as a typical male topic "fighting and weapons in WoW" were selected. The subjects had the possibility to chat (IRC) with the interlocutor and to show emotes, i.e. emotions and simple gestures. In the second situation an avatar of the opposite sex of the subjects' avatar began to flirt with them.

The MANOVA shows that the men represented as a male avatar evaluate their appearance significantly better than the men acting as a woman in WoW. Furthermore, the women of the experimental group rate their verbal abilities as significantly better than those women who were represented as women. The gender switching thus seems to have a negative effect on men's self concept of appearance and a positive one on women's self concept of verbal abilities. However, the subjects who switched gender reported significantly more attention and amusement after the virtual interaction.

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5. Competition or Coping? The Effects of Satisfaction with Life on the Choice of Avatar Features

Many recent computer games enable users to create their own avatars. Several studies demonstrate the effects of avatars on the experience of presence [31], entertainment [32] and even on user behavior [27]. Hence, it is important to understand what processes underlie avatar choice and why players design their avatars in specific ways. Game worlds may grant players the possibility to overcome individual shortcomings and to create idealized virtual selves [33]. The results of one of our previous studies [34] demonstrate that the choice of avatar features is guided by game requirements as well as player characteristics. In a quasi-experiment, participants equipped avatars for games that had previously been rated as requiring primarily masculine features predominantly with masculine attributes whereas avatars for games that had been rated feminine in the pretest were primarily equipped with feminine attributes. Furthermore, the participants' own biological sex affected the choice of the avatars' biological sex with men preferring male and women preferring female avatars [34].

The aim of this new study was to investigate the effects of task structure and satisfaction with life on the choice of avatar features and to gain insight into the role the similarity between player and avatar plays for identification and entertainment. In a 2 (competitive game vs. non-competitive game) x 2 (high vs. low satisfaction with life) quasi-experimental design, $N = 666$ participants read descriptions of 6 computer games and designed an avatar for each of these games by choosing from a set of personality characteristics. An adapted version of the 10-item Big Five Inventory (BFI-10) [35] was used to assess the personality characteristics of the participants and their avatars. The Satisfaction with Life Scale (SWLS) [36] was used to measure the participants' global satisfaction with life.

The results illustrate that participants designed their avatars more in line with their own personality in case of the non-competitive games than in case of the competitive contexts. Furthermore, participants with high satisfaction with life showed higher similarity to their avatars than participants with low satisfaction with life who showed a tendency to compensate for own deficits by creating idealized avatars.

Using structural equation modeling, the effects of the similarity between player and avatar on identification and entertainment were investigated. The results show a significant positive relation between player-avatar similarity and identification. Hence, high similarity between player and avatar facilitated identification with the virtual alter ego. Interestingly, this correlation was stronger in case of the non competitive games. In case of competitive games that often require exceptional avatar features (e.g. extraordinary physical strength, resilience, recklessness) that impede a high similarity between player and avatar, identification seems to underlie different processes than in case of non competitive games such as The Sims or Second Life that enable players to created virtual alter egos that show high resemblance to themselves. For both competitive as well as non competitive games, the data showed a positive relation between identification and entertainment. While identification seems to evolve from different processes in competitive and non competitive games it nevertheless is a key component of the entertainment experience in both categories of games.

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