Humans and humanoids: the effect of virtual human emotional stickiness in the subconscious perspective

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Abstract: In recent years, virtual humanoid images such as Yoo Night Hee and Tian Yu have started to appear in large numbers. However, it has been observed that the general public pays more attention to virtual human images in their initial stages, after which their attention decreases. However, the popularity of such avatars is still high. The questions studied in this paper include: Do fans develop emotional stickiness to avatars? What factors drive fans to be emotionally attached to avatars? This study uses questionnaire survey method to carry out the research, and found that: the stronger the degree of simulation of virtual idols, the stronger the emotional stickiness of fans. The stronger the fans' identification with the avatars, the stronger the emotional stickiness. And the stronger the interaction between fans and virtual characters, the stronger the emotional stickiness.

Key words: Subconscious theory, virtual characters, emotional stickiness

1 Introduction

With the development of artificial intelligence, virtual digital and other related technologies, "virtual worlds" are becoming more and more innovative and commercialized. Virtual humans are virtual images that exist in digital form and rely on intelligent technology to display their appearances, characteristics and behaviors as human beings.

At present, virtual characters are generally divided into two categories: one category is heterodimensional humanoid characters, whose designs are mainly based on human beings, such as the virtual human Yoo Night Hee positioned as a virtual beauty master, which enriches the watchability of videos through plot, interaction, and close-ups, and builds imaginary scenario fields for audiences. Another category of non-human characters, such as Groot in the Marvel series, Pikachu in Pokémon, and Yagu Beast in Digimon, is mostly designed with animals as the main tone.

Internet users have a relatively strong curiosity about the first category of avatars, so avatars such as Luo Tian Yi and Liu Yexi have been widely sought after their launch. However, after the curiosity decreases, netizens no longer pay attention to whether the external image of avatars meets the human-like criteria, but this type of avatars still gets a large amount of attention. So, besides whether the avatars meet the human-like criteria, what other attributes of avatars do Internet users pay attention to? What are the factors influencing people's emotional stickiness to avatars? These are the questions that will be focused in this paper.

2 Literature review

2.1 Virtual human literature review

The explosion of "avatars" has led to multi-perspective research in the academia. Foreign scholar Mike Poznanski (2005) argues that in virtual reality, virtual characters with personalities become more believable and interesting, and that simulated characters with complex personalities produce more exciting and diverse behaviors. For avatars, such as Japanese virtual idols, Daniel Black (2013) argues that a unified sensibility and logic can be seen in the representation of the human form, the flow of technology, and the design of cuteness, and that these three themes converge in the image of a virtual idol, which is simultaneously a representation of the human body, technology designed on organic principles, and a cute character. Nowadays, virtual characters are widely used in video games (Dimitris Folinas, 2008), media (Daniel Black, 2006) and other fields, and are flourishing.

At present, the research on virtual human mainly focuses on the research of "digital virtual human general system framework", including task image, speech generation module, animation generation module, audio and video synthesis display module and

interaction module. In the field of journalism and communication, the research focuses on the change of news communication practice brought by AI, mainly the application and impact of AI in news collection, production, distribution and verification. Shen Jiayi (2021) argues that people's love for avatars lies in the fact that people imagine it, making it become real and concrete because of imagination, and people project layers of emotions on it, assigning meanings to it and the relationships they associate with it. If previously avatars were only at the level of good-looking "skin", today's avatars have the temperament of "both inside and outside". According to Chen (2021), besides being talented and capable of doing things, avatars also have more emotional interactions, which to some extent cater to the diverse emotional needs of users. Dong Jingyi (2021) points out that the virtual human market is still in its infancy, but the refinement of core technology, the improvement of public awareness, and the favorable national policies also provide a broader space for the development of virtual digital humans.

The focus of contemporary research is still on the technical aspects of implementing avatars and seeing their social value, while research results on the relationship between avatars and user stickiness and likability are relatively scarce.

2.2 Emotional stickiness study

Gillespie, a foreign scholar, believes that having the ability to keep users browsing the web for a long time and that the frequency of users visiting the site in the future will increase. It can be considered that user stickiness is a behavior that allows users to voluntarily visit a website with high frequency.

Domestic scholar Wang Haiping (2009) believes that user stickiness is the emotional dependence formed by consumers on websites, which is the external expression of consumers' subjective psychology and does not reduce the frequency of visits to preferred websites due to the influence of other factors. Domestic scholar Zhao Qing (2012) believes that web stickiness is a psychological over-behavior formed gradually by users in the process of continuous use.

While social identity and identity both increase the emotional stickiness of the masses.In the 1960s and 1970s, the Birmingham School, in its collective work Ritual Resistance, paid deep attention to and studied the subcultures of working-class adolescent groups in Britain in the social context of the time. Subculture usually involves the resistance of marginalized and disadvantaged groups to the dominant

culture and power, and is a form of cultural dissidence that challenges the authority of the dominant culture through a particular style, thereby building identity, and has been the focus of cultural studies. In the field of psychology, Rachel Kaiser (2002) used a psychological analytical framework to study the professional identity of clinicians; Gordon W. Allport (1924) discussed the psychological process of self-personality formation based on Sigmund Frend. George Herbert Mead (1934) argued that whether a person has reached the level of "ego" depends on whether he can play the role of ego as well as others when he perceives the attitude of others, and further proposed that the concept of "ego" contains two kinds of "I" and "me", in which "I" refers to an independent individual not as an object of consciousness, while "me" refers to a person who is not an object of consciousness. The "me" refers to the ego that is formed through role-playing in the social environment.

Although these studies have examined the emotional, psychological, and browsing behaviors, they have neglected the subconscious level of users.

2.3 Subconscious Theory

Freud believed that the human psychological world is composed of three components: the conscious, the subconscious and the unconscious. Among them, the unconscious and subconscious occupy most of the space in the psychological world, and the unconscious conflicts and desires largely determine the occurrence and development of the human psychological world. The unconscious and subconscious are the root of these phenomena or problems.

According to Gong Wenmiao (2020), subliminal advertising makes use of the "subconscious" mentioned in Freudian psychoanalysis to present product information to the audience in a non-advertising form without the audience's consciousness, taking advantage of people's subthreshold perception to control the intensity of stimulation below the threshold of consciousness without being noticed by consumers. According to Cai Liyuan (2011), in Freud's view, although the subconscious mind is repressed, it is always striving for self-satisfaction. But it is always struggling for self-gratification. The repressed primitive impulses or desires that do not conform to social norms are expressed in a constructive way that conforms to social requirements. Thus, the consumer projects his ego into the individual goods, i.e., the purchased goods and services become an extension of his personality to satisfy the repressed subconscious in his soul.

With the development of new media, the application of subconscious theory in the field of communication has become more diverse. The idea of communication is instilled in the audience's subconscious mind, which is constantly accumulated and stimulated, thus inducing them to behave accordingly.

3 Research Methodology

3.1 Research Questions

This paper will therefore attempt to answer the following questions in terms of Freudian subconscious theory.

Why do users have problems with emotional stickiness to short videos of avatars? How do these dynamics influence the phenomenon and make it appear specific? What other factors have influenced the phenomenon?

3.2 Research hypothesis

Based on the above questions, the corresponding hypotheses are presented here:

H1: The stronger the simulation of the virtual human, the higher the emotional stickiness of the user is likely to be

H2: The stronger the user's identity with the avatar, the stronger the emotional stickiness

H3: The higher the interactivity of the virtual human video, the higher the emotional stickiness of the user is likely to be

To prove the hypothesis, this study used a questionnaire method to sample the total population and create a questionnaire.

3.3 Research Methodology

The study used a questionnaire method for data collection. The questionnaire method is one of the basic research methods in psychology that collects information through a questionnaire consisting of a series of questions to measure human behavior

and attitudes. The independent variables are the simulation of the avatar, the user's sense of identity with the avatar, and the short video interactivity of the avatar, while the dependent variable is the user's emotional stickiness to the avatar. The questions were entered and designed in questionnaire.com, and the questionnaire was exported after production. The questionnaires were distributed in Weibo super talk, Douban group, and WeChat group. The research object corresponding to this hypothesis is the Generation Z group (referring to people born between 1995 and 2009). As the aborigines of mobile Internet, Generation Z has more independent thinking ability and multi-dimensional thinking ability, and is confident in its vitality; they are brave to express themselves on the topics they care about, and does not follow the clouds. Among the self-portraits of Generation Z, the keywords of Internet, tolerance, creativity, vitality, openness and diversity were selected most frequently. Virtual people is an industry that fits the aesthetics of the Z generation. The influence of Generation Z has laid a solid foundation for the explosion of the avatar industry, and Generation Z accounts for most of the avatar fans, so research on this group can more accurately understand the relationship between the independent and dependent variables.

The questionnaires were distributed with July 21, and a total of 180 questionnaires were collected, of which the number of valid ones was 162.

4 Research results

4.1 Analysis of study results

In this study, the simulation variables include dimensions such as the virtual character's facial features, hair, skin, and personality, and the variables are measured in the form of a five-level Likert scale, which measures the virtual person's simulation by asking respondents to perceive the virtual character's similarity in dimensions such as facial features, hair, and skin compared to the real person. The identity variable, on the other hand, includes aspects such as the user's identification with the virtual idol fan base and identification with the virtual idol, also measured in the form of a five-level Likert scale. Interactivity indicates the user's willingness to interact with the virtual idol, and "fondness" is used as a descending statement of emotional stickiness.

Variables	Average value
Simulation	3.99
Sense of identity	4.09
Interaction willingness	4.02
User Stickiness	4.02

The descriptive analysis of the variables revealed that the sample group considered the level of virtual idol simulation to be relatively high, with a mean value of 3.99 points for the human-like degree. In terms of identity, the overall sample group also has a relatively strong sense of identity for virtual idols, with a mean value of 4.09 points. The users' willingness to interact and stickiness to virtual idols are at a relatively high level.

		Simulation	**Sense of identity**	**Interaction willingness**	**User Stickiness**
Simulation	Pearson Correlation	1			
	Sig. (bobtail)				
	Number of cases	162			
Sense of identity	Pearson Correlation	.488**	1		
	Sig. (bobtail)	0.000			
	Number of cases	162	162		
Interaction willingness	Pearson Correlation	.364**	.400**	1	
	Sig. (bobtail)	0.000	0.000		
	Number of cases	162	162	162	
User Stickiness	Pearson Correlation	.304**	.481**	.336**	1
	Sig. (bobtail)	0.000	0.000	0.000	
	Number of cases	162	162	162	162
** Significant correlation at the 0.01 level (two-tailed).					

The Pearson correlation analysis found that simulation degree, identity, willingness to interact and user stickiness all have significant positive correlations, which indicates that the higher the simulation degree of avatars, the stronger the user's stickiness to them, and the research hypothesis H1 is supported. The higher the user's sense of

identity of avatars, the stronger the stickiness to them, and the research hypothesis H2 is supported. The stronger the user's willingness to interact with the avatars, the more stickier they are to them, and the research hypothesis H3 is supported.

5 Summary and Reflection

This study theorized the phenomenon of users' stickiness to avatar videos by questionnaire method, through which H1/H2/H3 were found to hold.

5.1 Positive correlation between virtual character simulation and emotional stickiness

This study found that the higher the degree of virtual character simulation, the stronger people's emotional adhesion to virtual idols. With the rapid development of technology, virtual idols are continuously humanoid in terms of facial features, hair, personality, and timbre. Virtual idols are made through painting, animation, CG and other forms, independent from the original closed creative context, and highly interactive with the real world, using the information and emotions provided by the real world as an organic part of building themselves, so that people can put their emotions on a specific image. Virtual singers and virtual anchors are the two major types of virtual idols at present. The virtual singers appeared earlier, represented by Hatsune Miku and Lotte, are based on voice synthesis technology. The virtual singers have their own image settings and sound source library, and fans can input the lyrics and tones they create through their sound source library software to synthesize songs with human voice effects, creating the effect of having the idol "sing for me". The holographic projection technology allows virtual singers to go from online to offline and get closer to their fans through concerts. Subsequently, the birth of virtual anchors, represented by Trip Love and A-Soul, is based on motion capture technology, in the live performance of the image of the virtual anchor, sometimes singing and dancing, sometimes chatting and interacting with fans to form a deeper level of companionship and communication.

The virtual idols have a high degree of simulation in terms of voice, appearance and movement, which to a certain extent caters to the diversified emotional needs of users, thus deepening the public's acceptance of virtual characters and their emotional stickiness.

5.2 Virtual character identity is positively correlated with emotional stickiness

This study also found that the stronger the user's identity with the virtual person, the stronger the emotional stickiness. Unlike traditional idols, the uniqueness and interdimensionality of virtual idols determine that they are not accepted by everyone, so their followers also engage in the construction of social identity and identity in the process of following them.

The unique UGC production method of virtual idols gives their fans a direct identity. Unlike the traditional idol-fan model, the relationship between virtual idols and fans is no longer "I approve of whatever the idol decides", but a more equal and crowd-sourced model of "I can decide the idol". Take the fan base of the virtual singer as an example, besides simply liking the works and image of the virtual idol, there is also a group of fans with the desire to create, and the platform gives them the opportunity to present themselves, and the fans can create their own songs for the virtual idol to sing, which makes the fan base truly participate in the process of raising the virtual idol. There is no threshold for this creation, and the audience can judge whether it is hot or not. At the same time, when the works of virtual idols are recognized, the creators can also get the corresponding self-satisfaction and identity.

In virtual idol fan groups, fans often look for groups with common interests through their related websites and communities, and when individuals enter a group, they will find recognition of what they love from the group and find a sense of like-mindedness and empathy, thus generating greater motivation to maintain intra-group relationships and love for their idols.

They affirm themselves and gain a sense of identity and satisfaction from it.

The issue of the emotional stickiness effect of avatars in the subconscious vision reflects the development of Freud's subconscious theory phenomenon in the virtual world. The subconscious domain of the user is the creator of the avatar short video for the user's psychological needs, and the users' resonates with it, producing a sense of identity to the avatar, so that the user is interested in the avatar and sincerely accept it.

5.3 Virtual character interactivity is positively correlated with emotional stickiness

This study also found that the higher the interactivity of short virtual human videos, the higher the user emotional stickiness is likely to be. Whether in the production process based on interactive technology or in ritualistic interactive activities such as singing in virtual idol concert events, the ritual of interaction between virtual idols and fans and between fans and fans needs to be accomplished jointly by the audience and virtual idol personification. In the development of the relationship between virtual idols and fans, the role of human-machine interaction as an interaction ritual is expressed in the continuous repetition of the interaction behavior. Virtual idol fans can not only communicate through the acts of creating idols and producing contents with interactive nature, but also such interactive acts can be used as signals for virtual idols to contact with fans, and these signals always remind fans of the increased interactivity of the connection between fans and virtual idols help to increase the audience's sense of participation. And on the basis of intelligent interaction, virtual idols meet the conditions for physical and psychological interaction with the audience. The human-computer interaction allows for more contact between idols and fans. Under the conditions of this new link, the emotional stickiness between virtual idols and fans increases under its influence.

However, it is worth noting that this study also found that the phenomenon of users becoming sticky to avatar videos can lead to increasing dependence on avatars, and people even become immersed in the satisfaction that avatars and virtual worlds bring them, thus escaping from the real world.

In addition, this study had some problems in the research methodology because of technical reasons, such as the sample contact was dominated by college students and the results were biased. The sample recovery time was tight and the number was not enough to reflect the whole picture. In future studies, researchers in the field of avatars may need to pay more attention to the phenomenon of emotional stickiness of avatars in the subconscious perspective, as well as to extend the research and practice of Freud's subconscious theory.

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