



Analysis of the Uncanny Valley Theory and the Effect of Character Realism

Ding Li*, Xu Yi

School of Art, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China.

How to cite this paper: Ding Li, Xu Yi. (2022) Analysis of the Uncanny Valley Theory and the Effect of Character Realism a. *Journal of Humanities, Arts and Social Science*, 6(3), 334-337. DOI: 10.26855/jhass.2022.09.006

Received: July 12, 2022

Accepted: August 8, 2022

Published: August 18, 2022

***Corresponding author:** Ding Li, School of Art, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China.

Abstract

The combination of realistic 3D computer animated characters and motion capture technology has revolutionised the production of animated films, making it possible for “real” and “virtual” characters to co-exist. The use of technology has also made it possible for creators to avoid the uncanny valley. The uncanny valley in animated films has been brought to the forefront by the rapid development of computer graphics technology. The development of technology has given wings to the human imagination, allowing us to easily bring our infinite imagination to the screen, but the success of the film depends on how much the audience identifies with the story and the characters. According to the uncanny valley theory, until virtual technology is perfected, excessive pursuit of appearance simulation should be avoided and the use of simulated anthropomorphic looks or voices should be used with caution. The combination of anthropomorphic likenesses and unlikenesses, and perhaps unlike appearance with like disposition (brand personality) would be more interesting and appropriate. As long as the product can speak and express ideas, and the brand can be personified and become a virtual presence in the online media, even if it is just an anthropomorphic cartoon figure or anthropomorphic object, it can also achieve the purpose of marketing communication.

Keywords

Analysis, Uncanny Valley Theory, Character Realism

1. Uncanny valley theory

The uncanny valley theory is a hypothesis about how humans feel about robots and non-human objects. It was developed in 1970 by Japanese robotics expert Masahiro Mori, who drew on his many years of experience in building robots to make the bold assumption that humans have a positive psychological attachment to robots that resemble them, but that when the resemblance between robots and humans reaches a certain level, humans become very uneasy and unbearable, and that this is when robots fall into the uncanny valley theory effect. This theory means that the more realistic or human-like the appearance and movements of robots and other humanoid simulacra are, the more affinity people will have with them; but when their resemblance to humans exceeds a certain level, their affinity for them begins to decline steeply, until they become repulsive and even frightening. The influence of the uncanny valley theory on the creation of animation cannot be underestimated, and this theory is also at work in a number of fields, including robotics, the gaming industry and the film and television industry. In the animation industry, this theory has also been of great significance to creators, guiding them to use the uncanny valley theory effect to create specific animated expressions while avoiding its negative effects, which is a practical exploration of the theory. It is worth exploring whether the pursuit of virtual character realism can be the ultimate goal of animation.

2. The uncanny valley theory effect

One of the important psychological reasons for the feeling of terror in humans is the unfamiliarity and lack of understanding of something unfamiliar. The same person will feel terror about the same thing if they interact with it for the first time, but they will not feel the same way every time, at least to a different degree, because humans possess a great capacity for adaptation. The uncertainty, classification difficulties and weirdness that can arise are largely reduced if people have an understanding of what the robot can do and are already mentally prepared for the process of interacting with it.

2.1. Uncanny valley of Humanoid

The valley of horror is generally considered to be the basic cause of the uncanny valley effect, whether it is the “human-faced dog” that has suddenly become popular on the Internet or the various robots with a human appearance, or even some “over-processed” portraits, all can more or less. The human eye is naturally sensitive to anything that resembles a human being. In psychological terms, this phenomenon is thought to arise from an instinctive self-defence mechanism against potential danger, as evidenced by the theory of perceptual mismatch.

2.2. Uncanny valley of Sound

The sound uncanny valley, as one of the causes of the terror valley effect, may not be as intuitive as the person-like terror valley, but that does not negate the existence of this cause.

2.3. Uncanny valley of Thought

The uncanny valley of Thought can be said to be the deeper cause of the uncanny valley effect. Whether it is a visual or auditory sensation, the ultimate fear effect is reflected in the viewer’s mind as a question of whether or not the object of observation is “alive”. Professor Hiroshi Ishiguro of Osaka University has supported this idea through experiments in which he observed changes in the brain activity of subjects to confirm the existence of the uncanny valley phenomenon, and has proposed the “lateral inhibition hypothesis”. According to Hiroshi Ishiguro, the uncanny valley phenomenon is mainly due to the brain’s “lateral inhibition” function, which is the human brain’s ability to distinguish between “human” and “non-human”. If an objective object is “not anthropomorphic enough”, then the part of it that resembles humans becomes more prominent and conspicuous, even creating an affinity for it; if an objective object is “very anthropomorphic”, then its non-human features become the part that If an objective object is “very anthropomorphic”, then its non-human features become the more conspicuous part, creating a sense of fear.

As a form of artistic expression that encompasses a wide range of artistic techniques, all aspects of animation, such as image design, screen style, sound effects and story content, require comprehensive consideration and careful design. The uncanny valley theory, as one of the aesthetic guidelines for animators, is not only an aid to character design.

The uncanny valley effect is an objective phenomenon, which has been well documented in many empirical studies. However, it should be emphasised that the uncanny valley effect includes multiple aspects and dimensions, and not just the most prominent - the horror, that is, the valley part of the Uncanny valley. In the relevant literature, no strict distinction has been made between the various different feelings of terror, discomfort, weirdness, etc. In-depth study of the uncanny valley effect is important for both humanists and scientists. For scientists and technologists, a focus on the Uncanny valley effect will clearly help to design intelligent products that are more accessible to people. For humanities scholars, relevant research can help promote the ethics of AI and AI philosophy in depth. In any case, the Uncanny valley effect should not be allowed to become an invisible barrier to the development of robotics and AI industries in the smart era.

3. Realistic characterisation effect

Digital video art mainly refers to the digital audio-visual art based on computer digital image design, with animation, games, film and advertising as the main form of expression. Because digital video art involves character virtualisation, character virtualisation is a kind of simulation design and creation, which inevitably cannot avoid the problem of the Uncanny valley, and it can even be said that the Uncanny valley theory is an aesthetic principle of character virtualization (Berger et al., 2018). The combination of realistic 3D computer animation characters and

motion capture technology has revolutionised the production of animated films, and the development of technology has made it possible for “real” and “virtual” characters to co-exist. The use of technology has also made it possible for creators to avoid the Uncanny valley. Cameron’s *Avatar* does not take the viewer into the Uncanny valley; the blue humanoids, the Na’vi, appear to be non-real aliens, and the faces of the Na’vi do not remind the viewer of humans because they are not human at all. The phenomenon of the “Uncanny valley” in animated films has come to light with the rapid development of computer graphics technology. The development of technology has given wings to the imagination of mankind, making it easy for him to bring his unlimited imagination to the screen, but the success of the film depends on how much the audience identifies with the story and the characters (Kim et al., 2019).

In the digital age, although the means of characterisation remain somewhat traditional, the embedding of digital technology has given the characterisation a great deal of freedom and liberation, turning previously unavailable images into a “anything goes” reality. The dinosaurs in *Jurassic Park*, with their unmistakable appearance, movements and voices, are so convincing that the audience is convinced they are the real prehistoric beasts. Everyone knows it is a virtual dinosaur, but they believe it to be what it was. Despite the existence of dinosaur fossils, no one had ever seen a real dinosaur, and no one knew what a dinosaur really looked like, but the audience believed that the dinosaurs in *Jurassic Park* were real dinosaurs (Schwind et al., 2018).

Jurassic Park’s “hyper-realistic” dinosaurs represent a type of virtual character simulation that gives the audience the impression of near-100% realism. In *Avatar*, on the other hand, the Navi character on the planet Avatar is only a moderate simulation of an Earthling, although it is easy to tell that the Navi is an animated virtual character, but *Avatar* was still well received and a huge success. *Avatar*’s portrayal of Na’vi certainly represents a moderate type of simulation. There is also the less realistic type of character simulation, such as the lion in *King of the Jungle*, the panda in *Kung Fu Panda* and the big brown bear in *Open Season*. These are often purely animated films, with characters that tend to be low in simulation, and we can see that they can also be enjoyed by audiences and be well received.

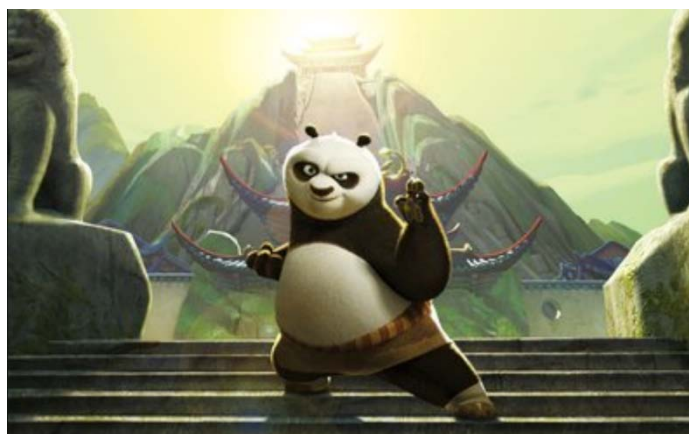


Figure 1. *Kung Fu Panda*.

Now that we’ve talked about its use, it’s time to talk about the use of the uncanny valley curve. Firstly, as mentioned above, 2D animation is not prone to the uncanny valley effect due to its style, but this does not mean that 2D animation has nothing to do with the uncanny valley theory, some good 2D animation can even use the uncanny valley effect to enhance the story. The Japanese animation “Kowabon” uses rotoscoping to create a look that is somewhere between the real world and the 2D world, and the subject matter is very close to modern urban life – “stories about various shots” - and the themes of each episode are very relevant to our lives. The overall atmosphere created by the unique sound effects makes it hard not to be drawn into the horror trap it sets (Zhang et al., 2020). What’s even better is that each episode has a regular thirty-second end credits sequence to introduce the people behind the scenes and the bloopers, seemingly to hold up the length but actually to give the frightened viewer an emotional outlet, consciously using the bloopers to guide the viewer out of the horror.

4. Summary

The Uncanny valley effect affects the creation and reception of digital video art. Firstly, the level of realism in the design of a virtual character can result in different psychological experiences for the audience. When the level

of realism is low, the audience will be bored and rejected because the character is too distorted; when the level of realism is close to medium, the ratio of cartoon and human characteristics of the character tends to be harmonious, the audience will like and appreciate the psychological attitude; when the level of realism is slightly above the threshold, the ratio of cartoon and human characteristics of the character is the most harmonious, the audience will have the best acceptance experience, physical and mental. The audience will have the best experience and feel comfortable (Diel et al., 2021). The phenomenon of the Uncanny valley is perhaps indicative of the emotional depression that follows the accidental discovery that one has been lied to, hoodwinked or fooled, and the resulting 'fear'. If it is known from the beginning that it is a form different from humans and under human control, and if one realises that everything is within the realm of one's own foreknowledge and manipulation, one can stand back and enjoy or integrate oneself into the plot, and as the plot develops, one may have the desire to introduce something external to one's life that has been poured out with emotion.

Fund Project:

Anhui University of Finance and Economics University-level project "Research on the Uncanny Valley Effect in Virtual Reality Animation Design" (ACKYC19052).

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