utmost importance, facilitating the move into challenging thematic, observational and historical modes.

Conclusion

As discussed, the media can at times be irresponsible of its coverage of emergent interactive forms, thus negatively shaping the perception and awareness of potential audiences. Existing reality-based, or indeed 'documentary' games have been shown to possess a subjective re-interpretation of events which have often been poorly considered and defended in response to external scrutiny. Nevertheless there is a great potential within the interactive form to successfully and sensitively deliver an appropriate factual experience. The fact that the majority of videogame development exists hidden behind Non-Disclosure Agreements impacts on the transparency of a production, with the public and press unable to be presented with a rational, and satisfying overview of the development process. If controversial themes or content is being tackled, the game developer has to be able to respond with a justification of their methods, intentions and an awareness of the issues surrounding a production. For videogames to be a powerful form of communication, handling historical and contemporary realities, the challenge rests with researchers, artists, designers and developers to challenge established perceptions of the videogame form and confidently follow in the footsteps of artists such as Spiegelman, who was motivated by the notion that "history was far too important to leave solely to historians."[13]

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Why Bridge the Uncanny Valley?
Photorealism vs Suspension of Disbelief in Animation

Robin Sloan

In recent years, the Uncanny Valley theory has been used to frame critical analysis of hyper-real character animation in both film and computer games. The theory predicts that, as characters become more human-like in appearance, they run the risk of becoming unsettling to audiences. This dip in acceptability is the Uncanny Valley, and on the other side of this valley are the theoretical human simulants – characters so convincing that they are undistinguishable from real humans. However, the theory – which has its origins in robotics – can distract us from one of the primary aims of animation. While some character designers might be concerned with wowing their audiences with photorealistic character appearance and movement, other character animators are more concerned with exploring what it means to be human. Indeed, it can be argued that imagined characters that are unnatural in appearance and movement can in fact be more believably human than those that focus on visual mimicry. This article makes a case for an alternative approach to the Uncanny Valley for judging the aesthetics of human-like animation, with specific focus on the intentions of the animator in presenting characters that reflect human experience rather than replicate human appearance.

The uncanny valley and the quest for photorealism

The notion of 'realism' in computer-generated imagery (CGI) has long been associated with photorealism. As Darley[1] notes, the aesthetics of CGI hinge on the "resemblance of an image to the phenomenal everyday world that we perceive and experience (partially) through sight." (p.17). The realism movement in art supports this stance to a degree. Realist artists have, since the nineteenth century, aimed to depict the world as it exists empirically. Notably, however, realist art is not confined to the pursuit of photorealism. How the artist approaches and represents

objective reality can vary in visual style and presentation (see Malpas[2]). The aesthetics of realist art may therefore be considered in terms of the beauty inherent in the skilful and artistic representation of reality, rather than its photographic accuracy. We need not be fooled into thinking that what we are observing is reality itself. And yet, in recent years, increasing critical appraisal of CGI has centred on the notion of 'the uncanny' – in particular using adapted versions of Masahiro Mori's Uncanny Valley theory[3] as a tool for analysing animated characters. Before we can properly examine the theory and evaluate its true value to animation, it is important that we first consider the origin of the uncanny aesthetic.

Sigmund Freud[4] raised the notion of the uncanny in his 1919 essay 'Das Unheimliche', in which he discussed the experience with reference to examples from literature. Freud stated that the uncanny is a feeling of fear triggered by something unfamiliar – notably the feeling that an apparently animate object appears unreal. Freud provided the example of realistically crafted dolls to illustrate the point. The dolls were intentionally designed to fool people into believing that they were 'real', and the negative emotional response to this mimicked reality was the uncanny feeling. It was largely from this premise that Mori developed the Uncanny Valley theory as a means of evaluating the realism of humanoid robots (or androids). The connection between the realistically crafted dolls discussed by Freud and the androids of Mori is clear – both artefacts seek to fool the spectator into accepting them as authentic. The 'valley' of the Uncanny Valley theory, Mori predicted, was the point at which an android becomes highly human-like in appearance, but lacks some subtle (yet crucial) elements

of human realism. Effectively, there are minor flaws in appearance or movement that lead us to doubt that the android is what it pretends to be. It is not human, and our response is one of fear, disgust, and suspicion. In other words, the object appears uncanny.

Animated characters that are more or less human-like in appearance can be critiqued using the Uncanny Valley theory. Fig 1 shows the Uncanny Valley, plotting human-likeness versus perceived familiarity (the common measure used to denote our feelings towards an android). In this example, a series of CGI feature films have been placed along the graph by the author. Here, we can see that, as CGI characters become more empirically realistic and human-like in appearance, they run the risk of falling into the Uncanny Valley. According to the theory, if animators can successfully mimic real humans to a sufficient degree, then the Uncanny Valley can be bridged, and the end result will be a character that is aesthetically superior to all other designs. Audiences will see the character as being indistinguishable from a real human, which, according to this theory, is the aesthetic ideal. This is more difficult to achieve than it sounds, however, and - as we shall discuss shortly - potentially flawed as a means of judging the aesthetic of an animated character.

One of the classic examples of uncanny animated characters oft cited in the animation studies literature is *Final Fantasy: the Spirits Within*[5]. This attempt at photorealistic humans was widely panned by critics, primarily due to its uncanny characters. Three years later, more advanced technologies and techniques underpinned the production of *The Polar Express*[6]. Here, the motion-captured performances of actors such as Tom Hanks
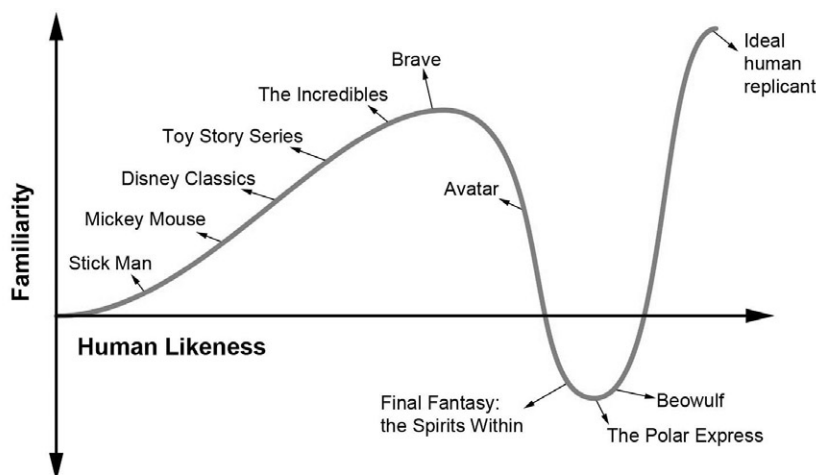

The Polar Express[12] © Warner Brothers

were fed into the character animation pipeline. The resulting characters were almost universally met with disdain[7] – the director's intention was to present characters that were realistically human-like in appearance, and the result was animation that fell into the Uncanny Valley. Since then, a common argument has been that further advancement in motion-capture and rendering technology would allow the Uncanny Valley to be bridged. However, while subsequent motion-captured animations such as *Beowulf*[8] and *Mars Needs Moms*[9] made use of advanced technologies and techniques, critics still discussed the uncanny feeling these films generated[10, 11]. It is clear that improvement in technology did not eliminate the audiences' capacity to identify uncanny artefacts within the animation of human-like characters. Even when films featured characters that were clearly not human (such as *Avatar*), audiences demonstrated that they could continue to find characters unsettling when the filmmaker's intention was to situate the characters within empirical reality. In other words, the Na'vi of Avatar had realistic movement (captured from actors) and realistic form and texture, which brought them closer to empirical reality and provided audiences with reasons to find fault in their presentation.

Avatar[13] © Twentieth Century Fox

The important point here is the situation of the CGI characters within an apparent empirical reality. To come back to Freud, it is clear that context cannot be detached from our aesthetic experience of the uncanny. Freud tells us that we find objects uncanny only in relation to the reality in which they exist. In this sense, objects within imagined worlds are not necessarily met with the uncanny response that is much more likely to occur when objects are placed within our empirical reality, as Freud explains:

Fig 1. Potential placement of animated features along the path to Uncanny Valley

"Among the many liberties that the creative writer can allow himself is that of choosing whether to present a world that conforms with the reader's familiar reality or one that in some way deviates from it. We accept his choice in every case. The world of the fairy tale, for example, abandons the basis of reality right from the start and openly commits itself to the acceptance of animistic beliefs." (p.156)

It is this idea – that the intention of the director can manipulate whether an object appears uncanny or not – that leads us to another way of thinking about the design of animated characters. When the director's intention is to bridge the Uncanny Valley, the emphasis is on a world that aligns with our empirical reality. But most animation is unconcerned with empirical reality, instead having an emphasis on imagined reality, granting animators the freedom to explore human experience without being overly focused on visual representation and accuracy. With the latter approach, the intention is to suspend audience disbelief through the design of engaging animated characters that trigger emotional responses, rather than 'fool' an audience into believing that the animated character exists in our reality.

The uncanny and suspension of disbelief

In animation studies, it has been argued that the original Uncanny Valley theory – which compares perceived familiarity with human-likeness – can be better understood if familiarity is replaced with the idea of aesthetic engagement[14]. This aligns with the concept of suspension of disbelief, which may be more appropriately used to describe how appealing a character is based on their human-like emotions and behaviours, rather than their photorealistic appearance. In animation, therefore, the aesthetics of characters are better understood through character appeal and believability rather than visual appearance and familiarity. In discussing aesthetic engagement, Butler and Joschko[14] used a case study of the Incredibles[15] and *Final Fantasy: the Spirits Within*, with the former film being posited as a more positive aesthetic experience despite the less photorealistic appearance of the characters.

Further critique of the original Uncanny Valley theory is prevalent in the literature. For example, investigation into the uncanny appearance of game characters has shown that non-human appearance is more appealing. Schneider et al.[16] argued that the "safest combination for a character designer seems to be a clearly non-human appearance with the ability to emote like a human". This implies a conscious effort on the part of character animators to aim for an effective design for the character, rather than a photorealistic appearance. The positive impact of good design (rather than realism) on perception has been demonstrated. For instance, one study showed that toy robots were received as more likeable than photographs of real people[17]. In this example, the concept of an Uncanny Valley was confronted with the argument that what may exist is in fact an Uncanny Cliff, with the most likeable characters being those which we find appealing rather than those which are more human-like in appearance. Another proposed concept is the Uncanny Wall[18]. In this alternate theory, the Uncanny Valley can never be bridged because, as technology advances and allows ever more human-like appearances and movements, the ability of observers to detect ever-smaller differences between real and virtual humans advances also. We encountered this notion earlier, when discussing the continued uncanny responses to motion-captured film despite rapid improvements in technology.

Increasingly, then, design knowledge has informed a shift away from the original Uncanny Valley theory for robots[19] and characters[20], to emphasize the need to make aesthetically pleasing characters rather than convincing replications. Ultimately, we can make two observations; that striving for photorealism will not necessarily lead to characters that viewers will find more appealing, and that believable characters are in fact the product of deliberate design rather than replication. Regardless of whether the Uncanny Valley can be bridged or not, proponents of the push towards photorealism are somewhat missing the point. Recall the study that demonstrated a greater appeal of toy robots than real humans. Audiences like characters that are designed to grab our attention. They enjoy exaggeration – the method of caricature that Walt Disney described as a form of hyperrealism[21]. Graphics experts may allow animators to cross the valley, but all that we would end up with are characters that are merely simulations of human beings. When designed according to design principles, animated characters can be much more human. Take another Disney animation – *The Lion King*[22] – as

an example. The animators here clearly did not aim for photorealism. The style is a descendent of the traditional Disney cel animation aesthetic. Neither is the movement of the characters captured from reality. On top of this, the characters are clearly not meant to be human beings, but anthropomorphised animals. And yet these characters are more believably human in their emotions, interactions, and stories than films such as *Final Fantasy: the Spirits Within* or *Beowulf*. The audience of The *Lion King* never questioned the visual realism of the characters – they wilfully suspended their disbelief and accepted the characters as they were. It therefore seems a bit strange that, according to the Uncanny Valley theory (see Fig 1), *The Lion King* would somehow be considered less 'human-like' than The *Polar Express* or *Avatar*.

The Lion King[23] © Disney

Surely another means of judging the aesthetics of animated characters is therefore required? Why should The Lion King be considered 'less ambitious' than films that try to mimic empirical reality, when in fact the ambition of capturing what it means to be human is much more daring? In Fig 2, an alternative approach is proposed in order to understand the aesthetic quality of animation. It is suggested that human-likeness as a measure of ambition be replaced with depiction of humanity – the extent to which the animators have succeeded in capturing the human condition within their films. As we can see, as characters become more believably human, the aesthetic experience of the audience improves. There is no valley here – this graph simple shows that, by following the design principles for animation in order to produce characters that are believably human, the audience experience will be enhanced appropriately. In particular, note that a mix of different films could potentially be plotted along this graph. Those that aim to achieve empirical realism are not necessarily weighted to the lower end of the graph. The makers of *Avatar*, for instance, aimed for empirical realism and technological accomplishment, as well as human story and relationships. As a result, it can be considered an aesthetically
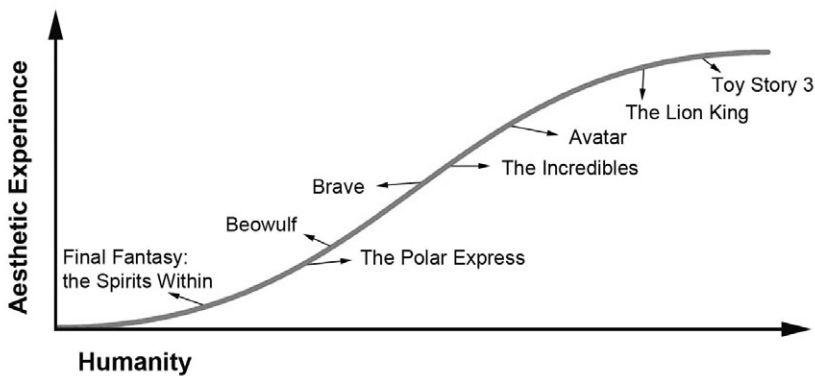
Fig 2. Potential placement of animated features when the human realism of the characters is considered against the aesthetic experience of the film.

engaging film in terms of the human-like emotions and experiences depicted, despite its potential uncanny characters. Perhaps most importantly, though, films such as *The Lion King* and *Toy Story 3* – two of the most highly praised animated feature films of all time – can be clearly highlighted as such on this graph. These films are among the very best at reflecting humanity in their character performances. Would it not therefore be appropriate to see characters such as these as the aesthetic ideal, rather than the hypothetical human simulant of the Uncanny Valley? Visual appearance is not as relevant – variation in visual style and animation method is allowed, because the ideal animated character is one that encourages the audience to wilfully suspend their disbelief.

Conclusion

Our acceptance of the world that surrounds an animated character is key to our ability to suspend disbelief and receive the character performance as something familiar to us. With *Toy Story*[24], for instance, Darley[1] proposed that it could be considered a step towards photorealism when compared with previous Disney animations, but that, ultimately, it is still just a cartoon. He goes on to state that the stories of Pixar films are "rather unexceptional, particularly to those who are familiar with Disney cartoons" but that the "images themselves are not." (p.20). As this analysis includes *Toy Story*, still one of the most highly regarded feature films of all time (listed as 124 in the IMDb top 250 at the time of writing[25]), it appears rather unfairly dismissive of the quality of the character performances (which do owe much to Disney) while emphasising the importance of the CGI rendering quality. In other words, because the film is a fully 3D CGI feature, photorealism becomes an assumed benchmark for quality. According to Darley, suspension of disbelief rests on how convinced we

are by the visual appearance of the world, not how convinced we are by the depth and quality of human emotion imitated by Pixar's virtual puppets. While it is indeed legitimate to look at CGI with a critical eye towards its success at achieving empirical reality, the separation of CGI from other forms of animation puts CGI animators at a distinct and unfair disadvantage. Films such as *Toy Story 3*[26] (see Fig.2) should instead be examined in terms of the quality of the human performances exhibited by their characters, rather than visual fidelity of the rendering or, in the case of animated features that make use of motion-capture, the accuracy of the replication of 'real' human movement.

Toy Story 3[27] © Disney/Pixar 2010

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