The Ethical Implications of CGI in Media

by

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Introduction

Computer-generated imagery (CG or CGI) is the creation of still images or animations using imaging software for use in a variety of media such as films, television, advertising, engineering, the medical field, and architecture.

While this technology has been available since Ivan Sutherland's foundational work at MIT in the 1960s (Sutherland, 1964), recent advances in computer software and hardware have enabled higher quality results with lower costs. This has allowed access to the technology to a larger group of people than in the early stages of development. These improvements have led to far more believable scenes in movies and television but like the double-edged sword in Hebrews, this technology can lead to ethical challenges based on the thoughts and intentions of the heart.

The use of advanced computer systems today allows the production of realistic special effects (e.g. explosions), smoke, fur, and skin texture, as well as, de-aging current actors or even recreating deceased actors. This second use of CGI, for de-aging/recreation, is where the ethical dilemmas arise.

History

The use of photographic "tricks" is not a new phenomenon and did not originate with the development of computer-generated imagery. A classic example of early techniques is found in Alfred Hitchcock's "North By Northwest" (1959). Near the end of this movie, made in the pre-digital era, the stars approach a modern house cantilevered over the edge of a mountain near Mt. Rushmore in South Dakota. After the movie was released to the public, requests were made to be able to visit the house. In actuality, the Frank Lloyd Wright-inspired house never existed. It was produced through a combination of matte paintings and studio sets. All of the interiors were stage sets and the exterior shots were achieved through a clever combination of studio sets and

matte paintings.

Other famous use of photographic techniques includes the parting of the Red Sea in *The Ten Commandments*, 1956, the tornado effect from the *Wizard of Oz*, 1939, and the Death Star explosion in Star Wars: A New Hope (1977). For the Ten Commandments, large studio tanks of water were filmed as they were being dumped and then the film was replayed sideways and the footage was reversed to achieve the desired effect. The tornado effect in the Wizard of Oz combined real tornado footage with a miniature set and an approximately 30-foot silk stocking filled with sand. This effect was so well done, that the black-and-white imagery stills hold together today. In Star Wars: A New Hope, the Death Star explosion was achieved through the use of a large, chemical explosion inside of a studio. The camera was placed on the stage floor aimed at the ceiling and the explosion was set off near the top of the studio. The streams of falling, explosive material give this classic shot its realism.

The Ethical Dilemma Begins

None of the aforementioned special effects pose any ethical dilemmas but in more recent years, the use of technologically advanced computers and advances in software have led to a new area that can lead to ethical questions. Some films from the last decade have included scenes where an actor has been "de-aged" through technology.

A partial list of recent films that utilize this technology includes Tron Legacy (2010), Furious 7 (2015), Rogue One: A Star Wars Story (2016), and Captain America: Civil War (2016). Often these effects are achieved through the use of a combination of stand-in actors, archival footage, voice recordings, and computer-generated imagery. Early attempts at achieving these effects using computer technology were combined with dimly lit scenes, or using shade, in an attempt to hide the relatively crude results.

In Tron Legacy (2010), actor Jeff Bridges was digitately de-aged. In this example, the actor appeared as his current self as Flynn, a computer-based character named "Clu", and a de-aged version of the Flynn character showing Jeff Bridges face de-aged by 28 years. A second actor, Bruce Boxleitner is also de-aged digitally in this movie for scenes that flashback to the first movie: Tron(1982).

In Furious 7 (2015), the late actor Paul Walker is recreated. Mr. Walker died in a car accident in 2013. At the time of his death, large portions of the movie had not been completed so the studio was faced with the dilemma of dropping the film and facing a financial loss, or trying to recreate his image. Mr. Walker's likeness was recreated using three actors (including two of his brothers) who had similar builds and mannerisms. In other scenes, his face was digitally recreated.

In Captain America: Civil War (2016), actor Robert Downey, Jr. was digitally de-aged in order to include a flashback scene where a young Tony Stark interacted with his parents shortly before their death. Much of the process used for this film involved CGI but also included many hand edits of the footage. In Captain America: The Winter Soldier (2014), actor Hayley Atwell is aged to show what her character would look like when elderly.

In all of these previously mentioned movies, the degree of success in digitally de-aging actors achieved both positive and negative feedback from both film critics and the general audience. These problems will be detailed later in this paper.

The next step in the de-aging process is the potentially more ethically challenging ability to recreate deceased actors. Again, looking at Rogue One: A Star Wars Story (2016), the late actor Peter Cushing was digitally recreated using CGI techniques. Mr. Cushing died in 1994 and his estate was contacted before his visage was digitally recreated to obtain permission. In this

same movie, Carrie Fisher was digitally de-aged to mimic her character's appearance in the 1977 original Star Wars movie. Carrie Fisher will be digitally recreated in the Star Wars: The Rise of Skywalker (Episode 9) movie scheduled to be released at the end of 2019.

The ethical challenges of recreating deceased actors are potentially great and have not been adequately addressed. A few examples of this potential include recreating actors and not paying their estate, placing deceased actors in situations on film that they would not have been comfortable with, and eventually, the possibility that actors can be essentially created in CGI and not based on any existing person. Once this technology becomes widely available, there would not be a need to hire actors.

While this "de-aging" effect can produce very life-like images, in some cases, the final results can be slightly upsetting or disturbing. When the final results on the screen look close to correct but not quite, we have entered the 'uncanny valley'.

The Uncanny Valley

The uncanny valley can best be described as the reaction of viewers to an image or a robotic face as it changes and becomes closer to a human appearance. This phenomenon was originally observed by a roboticist named Masahiro Mori in 1970 (Mori, et al, 1970). While this phenomenon was originally observed in still images, Mori determined that movement increased or deepened the effect known as the uncanny valley. At the time this observation was originally made by Mori, most robots were designed for pure functionality and looked similar to today's industrial robots. The only human resemblance was the existence of arms and possibly crude hands. Mori's research indicated that as a computer-generated face or robotic face becomes closer to realistic, that viewers will feel uneasy. In other words, people seemed to be fine with either truly robotic looking faces or with real faces. They became uncomfortable when the

generated face came close, but not quite, appearing real. Even if a person has never used any of this technology to create a CG image, they have a strong ability to determine when something is off in a character's appearance or movements (Hodgkinson, 2009). This phenomenon was further studied in robotic science where a level of discomfort was seen in audiences when a robot had a human-like expression, but the movements identified the object as a robot (Walter, et al., 2005). Several other factors have been identified that contribute to the uncanny valley effect but additional research into specific factors is needed (Saygin, et al., 2012).

One of the largest challenges in using computers to produce human-like faces is just human face changes as it ages. Studies have shown that the lower half of a human face changes more dramatically than the upper half for the same period of time. Thus, the overall layout of a human face changes over the years. (Choi, et al., 2017). Duplicating this aging process accurately through technology is difficult.

In recent year, focusing on 2010-2019, the uncanny valley continues to exist. While this problem still affects robots, digitally de-aged or digitally recreated actors can have the same challenges. Some of the main difficulties experienced include actors' skin appearing artificial with a plastic appearance. The eyes of digitally created screen images can appear expressionless, blank, and lifeless. Facial expressions can appear stiff and mechanical with less movement and expressiveness than real actors. Note that these problems also impact the animation industry as computer animators worked to achieve not only realistic facial appearances but human-like movement as well (Christophers, et al, 2011). The challenge becomes being able to "embrace technology while retaining the expressive individuality that animation can provide?" (Hodgkinson, 2009). It should be noted that while the uncanny valley effect has been frequently observed, it has not yet been confirmed with psychological research (Seyama, et al., 2007).

Future Development and Uses

As technology advances in CGI are made, a key requirement is to reduce the amount of hand-editing that is needed in the current process. The uses of hand-editing is both costly and time-consuming. Recent films, such as the aforementioned Captain America: Civil War and in the Lord of the Rings trilogy, considerable effort was made to hand-edit the final images and remove unwanted objects from the scenes (Abbott, 2016).

In September 2019, the entry point for using digitally-created images was lowered once again, as a company called Icons8 announced that there were releasing 100,000 digitally created facial images free for public use (Barnes, 2019). Many of these images are very well done and are difficult to distinguish from photographs of actual people. An exciting future use of de-aging techniques includes the ability to reverse the process and age people. As this technology improves, it will provide more accurate results for searching for missing children and adults. Through the use of artificial intelligence, it will become possible to achieve a higher level of accuracy depicting what people would look like five or ten years after their disappearance. This technology will also be used to improve existing face detection and face recognition applications.

Conclusion

The research article presented details on the ethical impacts of CGI technology and how this emerging technology can be used both beneficially and negatively. While general audiences seemed to be fascinated with digital de-aging and the ability to recreate a deceased actor's visage and studios like the technique for saving costs, a number of ethical dilemmas presented in this paper need to be addressed or resolved the use of this technology will only increase in the near future as the basic techniques themselves improve and costs are lowered. As with any new

technology, the techniques themselves can be used for good or evil, depending on the condition of the user's soul.

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