How CGI has enhanced or affected the stop motion production and result, taking as reference *The Nightmare before Christmas* and *The Boxtrolls* stop motion animations.

Abstract

The art of stop motion has numerous techniques from the more traditional methods until the more innovative processes with CGI. However, it has always been a challenge how to determine which one is more cost effective, and which one has the best result. Using as reference two known stop motion animations, *The Nightmare Before Christmas* and *The Boxtrolls*, this critical report explores the techniques used in these two films and the pros and cons found in traditional stop motion and stop motion with CGI.

Key words

Stop motion, CGI, stop motion evolution, Nightmare Before Christmas, Tim Burton, Henry Selick, Boxtrolls, Laika Studios, Phil Tippett

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1. Introduction

This critical report is going to be an analysis of how stop motion is still being used to create great animation movies such as *The nightmare before Christmas* by Henry Selick and Tim Burton, which has a unique and more refined aesthetic, but it could also be a more expensive process. It will also evaluate how CGI has taken more presence in the animation and VFX industry because of its lower cost of production and its faster creative process. Lastly, it will be also studied how stop motion and CGI are being mixed to achieve even greater and more effective results shown in movies like *The Boxtrolls* by LAIKA Films.

2. Literature review

Barry Purves explained in his *Basics Animation C4: Stop-Motion* book (2010) the origins of stop motion animation and its development until today's techniques. I chose this book for this critical report because it also analyzed stop motion elements such as the lack of motion blur in this discipline and how it was solved, the texture, lighting, realism, and detail that can be achieved with the addition of CGI, and as counter argument to this last statement, the unique personality that traditional stop motion offers.

This book was the base reference of this research supported by two documentaries found in YouTube: *Making the Dance: A Look Behind the Scenes at The Boxtrolls | LAIKA Studios* (LAIKA Studios, 2018) and *The Making of Tim Burton's The Nightmare Before Christmas* (BbaGumpSkrimp, 2012). These documentaries showed the making of these two movies

explained by the directors, producers, animators, and other professionals involved in the making of these animations. These two movies *The Nightmare Before Christmas* and *The Boxtrolls* are the chosen references to compare the traditional stop motion techniques and the stop motion with CGI techniques.

For additional information, Lord and Sibley's book *Cracking Animation: The Aardman Book of 3-D Animation* (2015), enunciates the unique and original style of Burton's stop motion film and how it was distributed and successful worldwide.

On the other hand, an online video made by VFX Geek (2019), *Stop motion animation in VFX,* shows a documentary that explains how stop motion can be time consuming, costly, and describes its weaknesses like the lack of motion blur in its movements and how stop motion artists like Phil Tippett created new techniques like 'go motion' to help with these flaws.

3. A brief history of stop motion and CGI

Georges Méliès was an illusionist in the nineteenth century that when filming the street of Paris, for a few seconds his camera jammed, resulting into a cut between frames. This cut resulted into what we know today as stop motion. Mixing animation and puppetry, stop motion was originally used for the creation of illusions or special effects to trick the audience's eye. The stop motion animator is not seen by the audience as each frame is shot independently, and the illusion of independent and continuous movement is created. This continuous movement credibility depends on how each frame is shot and connected with the

others in terms of composition, colour, and movement. Comparing a stop motion scene with a live action scene (both normally shot at 24 or 25 fps or frames per second), the main difference lies in the blur trail that indicates the direction of the movement, called 'motion blur'. In traditional stop motion there was no motion blur, so the movement needed to be emphasised on each frame (for example, using techniques like stretching or squashing the puppet to define the weight and inertia of the movement), and the environment reaction to the character's movement needed to be precise (Purves, 2010, pp. 14-20).

Phil Tippett, a stop motion animator that worked in famous movies like *Jurassic Park* and *Star Wars*, developed a technique to add motion blur to stop motion called 'go-motion'. This technique uses a computer that is programmed to move some parts of the puppet during each exposure of a frame, resulting in a more realistic effect of motion blur (VFX Geek, 2019).

Stop motion used as special effect itself stopped being used in the 90s with the raise of CGI (Computer Generated Imagery). This CGI evolution was shown in the first *Jurassic Park* movie in 1993 where the physical puppet armature motion was transferred to the 3D model. Stop motion nowadays is easier because of the introduction of digital cameras that allows the animator to preview the shots taken and correct errors in the moment, whereas with analogue cameras, the animator needed to be deeply focused on the shot and puppet movements, with no distractions or breaks in between, as they could not preview the result of the movement between frames or pictures until the whole sequence was made.

4. Traditional stop motion: *The Nightmare Before Christmas*

The Making of Tim Burton's The Nightmare Before Christmas (BbaGumpSkrimp, 2012) shows how Tim Burton and Henry Selick spent three years on the making of this movie and recruited a team of over a hundred artists and technicians to finish this film only using traditional handmade stop motion animation frame by frame. They needed to hire animators, artists, puppet makers, set builders, prop makers, and specially trained camera operators. All of them had to create and build hundreds of sets and individual puppet characters, since shooting at 24 fps meant that the character needed to be posed 24 times in one second. All this work and attention to detail involves that one minute of finished film would take an entire week of shooting. Moreover, every facial expression of each puppet meant that a different head needed to be sculpted and, in this case, they used over 400 different heads. In this film, they also had to take in consideration ambience effects such as fire, smoke, snow, lighting bolts, shadows, and flying objects. These effects were added in post-production with rotoscoping techniques or hand-drawing directly on the physical film a frame at the time. Burton and Selick's animation had also the inconvenience of being shot with analogue cameras, which put a lot of pressure in the animators: if a single frame had a mistake that could not be corrected in post-production, they had to retake the whole sequence from the beginning (see fig. 1). As Tim Burton said in this making of documentary, "stop motion is like making a live action movie in slow motion really".

Despite all the years of work and effort that this film required, and according to *Cracking Animation: The Aardman Book of 3-D Animation* by Peter Lord & Brian Sibley (2015, p. 43), "*The nightmare Before Christmas* was the first stop-motion feature film to receive worldwide

distribution". The unique, grotesque, and imperfect style of Tim Burton's characters was created by some of the best stop motion animators in the world. They needed the best professionals they could find to elaborate that detailed world with imperfect angles, shapes, and textured materials to recreate the cross-hatched style drawings that Burton designed in his original drawings. An example of a masterpiece model design is Jack Skellington, the main character of the film, with a skeleton-like look, a black suit, and long and skinny legs and arms. Despite the creepy look of this character, the stop motion animation of it was elegant and neat, and still nowadays, this film is an important reference amongst animators and filmmakers. The results of the old school stop motion have an added value and personality that CGI by itself rarely has, since human errors made during the creative process can sometimes become part of the personality and aesthetic of the film and, consequently, make it unique.
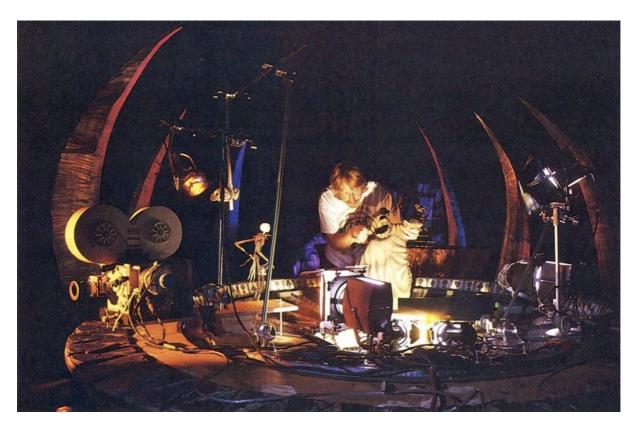

Fig. 1 Mike Belzer animates Oogie Boogie and Jack during their climatic battle on the roulette wheel, Kozachik (2021)

5. Stop motion and CGI: *The Boxtrolls*

Nowadays, with the introduction of digital cameras and CGI, animators have less pressure when shooting a stop motion sequence since they can preview the animation progress in real time and replace specific frames that have any errors by new corrected frames. Taking *The Boxtrolls* film by LAIKA Studios as a reference, there are certain elements of a scene like floating hair or cloth, that are achieved with the help of CGI. To make a dance scene with both cloth and hair moving, first they had to take a real dance scene as reference to see how they moved. They also asked the dancers to create a choreography and movements so they also could include them in the scene with the puppets. Since the puppet's cloth is not rigid, they had to attach the dress fabric to a joined mesh which was articulated to let the animators moving and fixing the desired position to take the shots of the sequence. However, since the scene consisted in a room full of dancing characters, and to create an articulated puppet for each one would be costly and time consuming, they decided to only use traditional stop motion with the main characters and add the secondary characters with CGI, taking as reference the hand-made puppets. This dancing scene has four hand-made puppets and around 50 to 60 CGI characters to fill the gaps and make it look like a crowded dance event (see fig. 2). The aesthetic of the hand-made puppet was reproduced digitally, and its mistakes and imperfections were also transferred to the CGI puppet, making it look more realistic than it would have been by simply designing the characters in digital 3D without a reference. This is a clear example of how CGI and stop motion can be beneficial to each other and better results can be achieved.

In addition, CGI could also be a useful tool to add effects, textures, lighting, etc. Many stop motion animations plots were restricted by the impossibility to reproduce credible abstract effects such as smoke, water, fire, etc. With CGI, animation plots limit is the imagination since any effect could be added easily with the new 3D and animation software.

Fig. 2 Dance Scene in The Boxtrolls, Robertson (2014)

6. Conclusion

The implementation of CGI in stop motion has been a revolution and a relief to many team members in a stop motion film, as it lets them achieve a result that is quicker and cheaper, and it also permits to break boundaries and make a plot in which the limit is only in the imagination. However, this does not mean that traditional stop motion is disappearing. This

discipline is best known for its uniqueness and originality, fruit of the mistakes that human errors can make in the creating process. Moreover, it has an added value behind it because of the hard work and creativity that an artist needs, to resolve the physical problems that traditional stop motion can present to the plot. The combination of both disciplines can permit to preserve the unique aesthetic and creative process of the traditional stop motion (as well as being a reliable reference point for CGI character modelling) and it can also provide the advantages that the CGI offers with better timing, cheaper budget, and limitless reproduction of complicated plot scenery and characterisation.

Word count: 1783

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10. List of figures

Fig. 1 Kozachik, P. (2021). *Mike Belzer animates Oogie Boogie and Jack during their*
climatic battle on the roulette wheel. Available at: https://theasc.com/articles/nightmare-
before-christmas [Accessed 20 December 2022]

Fig. 2 Robertson, B. (2014). *Dance Scene in The Boxtrolls.* Available at:
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in-No-More.aspx [Accessed 20 December 2022]

11. Links to blog and video presentation

Link to my blog

https://mngonzalezsanchez.myblog.arts.ac.uk/category/design-for-animation/

Link to my video presentation in YouTube

https://www.youtube.com/watch?v=sYBBs_LNa_E