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DIGITAL CHARACTER COSTUME DESIGN IN COMPUTER-ANIMATED FEATURE FILMS

The public defence of Maarit Kalmakurki's doctoral dissertation in Costume Studies was held at Aalto University, School of Arts, Design and Architecture, Department of Film, Television and Scenography on 10 December 2021. Prof. Drake Stutesman (New York University) acted as Opponent and Prof. Sofia Pantouvaki (Aalto University) as Custos.

INTRODUCTION

The topic of my doctoral thesis stems from my personal interest and background as a professional costume designer, in which I have experienced the integration of digital technology in developing the visual appearance of characters. In my colleagues' work, the same is shown in many contemporary films in which many aspects of character costumes are built digitally. With the technology aspect in mind, I found that in animated films, the design of costumes has been folded into the process of character animation, rather than existing as a separate process executed by a costume designer. The animators act as auteurs of character and costume design, where the process and decisions behind costume colours, materials, and construction are integrated into the phase of character development. As a result, the different phases and significance of animated character costume design remain relatively unknown. I found it surprising that costume design has previously been sidelined in animation and that animated films mostly do not engage professional costume designers in productions. Therefore, studying costume design in animation from the viewpoint of a costume designer opened a perfect research platform and I framed my doctoral research to focus on computer-animated films and digitally created characters.

Prior to 2016 when I started my doctoral study, only six films gave credit to the work of a costume designer, among hundreds of computer-animated films produced in Hollywood. To embrace the contribution of costume designers in the development of computer-animated films, I framed the research to investigate those rare films that engaged a costume designer in the production. I focused on the work of costume designer Isis Mussenden on DreamWorks' *Shrek*, *Shrek 2* and *Puss in Boots*; Israel Segal's costume design for *Shrek the Third*; Ruth Myers' contribution for ImageMovers' *Monster House*; and Danny Flynn's costume designs for Disney Animation *Big Hero 6*. In order to investigate the costume designers' work across the case study films, I formulated the main research question as: What are the key characteristics of costume design for digital characters in computer-animated films? As the scope of the main research question covers broadly the theme of costume design for digital characters and the work of the designer, I formulated two sub-questions, where the first one asks: How does technology development in computer animation affect the costume design process and the final outcome of the character's digital costume? In order to explore the commonalities and differences between physical materiality and digital materiality, I framed the second sub-question as: In what ways are tangible materials part of digital character costume design?

To answer the research questions, I interviewed costume designers, art directors, production designers, and animators who worked on the case study films. This enabled me to collect first-hand insights and tacit knowledge of these professionals' experiences working in computer-animated film productions. Interviews with the costume designers also gave me access to their personal archives. I was able to see, for example, costume drawings and fabric swatches, which were important pieces of primary evidence of production phases that typically remain hidden. Content, comparative and visual analysis of the oral records and visual references such as costume drawings, images of key scenes, and characters from the films illuminated thematic areas related to costume designer's collaborative work processes, the effect of technology in costume design development and digital creation, as well as issues regarding tangible and digital materiality.

My study followed typical data-driven research by first analysing the data and then contextualizing the data information in relation to theoretical considerations. I chose to connect the theory of somaesthetics (Shusterman 1998, 2008), the concept of sensory and haptic perception (Shusterman 2008; Marks 2000, 2002) in my discussion as these theories relate to the costume designers' somatic consciousness and embodied feelings that guided their design development. I also employed selected theories of embodiment in studies of costume design and animation, where my analysis shows that costume design is an important part of animation acting and performance. I further drew theories on materiality (Ingold 2013; Harris 2005, 2013) to better explore the relationship between tangible and digital materials in the context of digital character costume design.

FINDINGS

My research demonstrated that costume designers are vital collaborators in computer-animated film production pipelines where many artistic and creative departments work simultaneously. Costume designers collaborate by suggesting ideas for character's body forms, costume materials, colours, construction and fit, which all contribute to better storytelling. The final result of costume design was achieved through a collaborative effort working alongside the director, producers, production designer, art director, and scriptwriters. Costume designers must respond to constant changes in the film's script and rework the designs multiple times, which I propose is one of the characteristics of digital character costume design. On the other hand, the continuous scriptwriting enables the costume designers to be part in the script development phase. This allows the writers and animators to respond to costume-related ideas quicker which positively affects the films' production time and budget. Costume designers' involvement is also part of the collaborative process when animators study real garments on a physical person in movement. When animators themselves wear garments, it allows them to understand the different kind of feelings that costume materials transmit, which I proposed as being closely connected to the somaesthetic and embodied practice. I argue that this embodied garment examination can be implemented in the animation production process into phases where characters' different personalities are built and action in scenes developed. The input of a costume designer in these phases is equally important for helping the animator embody the character via the design of the costume which produces more believable acting.

The development of technology affected digital character costumes design in several ways. One example is related to the ways in which costumes support the narrative in depicting time through texture and design style. In the production of *Shrek* and its sequel, large volumes of cloth and how

the cloth moves independently outside the digital body were problematic to animate. For example, due to issues with cloth collision, important elements of 14th century fashions such as long hanging sleeves or floor length dresses and capes were not possible to create for the characters. Another example of the technology development is related to costume's overall design. In the animated world, all surfaces are digital, and costumes are built directly onto characters digital bodies. However, the process of digitally creating the shape and design of a costume, such as the form of a neckline, sleeves, and hemlines, is time-consuming to accomplish via animation software. For this reason, if the narrative required a costume change in a film, any alterations on costume structures were minor, and it was not uncommon for one digital costume model to be re-used in different scenes. The appearance of a "new" costume was achieved by retaining the same structure of the costume model, but changing the colours, prints, and materials. On the other hand, the software development enhanced the reproduction of real material textures, colours, light, and shine, producing visible differences between costumes when the costume changes were made by re-using the costume models. These specific costume models were used within a film and across films, such as the *Shrek* franchise. I argue that re-using the specific costume models to create a costume change establishes a specific distinguishable look for the characters and their silhouettes, which is an important factor for animated character definition.

The creation of digital costume requires tangible material references to understand how the different aspects of physical dimensions can be reproduced authentically in the digital world. My study showed that tangible material experimentation was part of both the costume design development and the phase when animators digitally build the costumes. Touching and examining tangible materials was the reason for being able to accurately reproduce elements of realistic cloth behaviour, such as textures and the ways cloth falls on a body and reacts to human movement. In addition, examining physical garment patterns was part of costume design. Copying information from the patterns proved useful to digitally build costumes for characters with realistic and exaggerated body proportions. To point out, understanding how two-dimensional patterns transform into a three-dimensional digital garment requires the expert professional knowledge of a costume designer.

Exploring materials through touch informs the costume designers and animators regarding the feeling of the texture, such as how rough or smooth they are. The designers' and animators' personal experiences through touching and feeling the material samples during the design development and costume's digital creation is a somaesthetic practice. The somaesthetic exploration guides the designers and animators in their work processes and enhance the costumes to appear as digitally realistic. Digitally realistic costumes involve truthful cloth behaviour, reproducing real-world textures, which connects with the characters personality, film's story, and action in scenes. These altogether are vital for improving the audience's experience of watching computer-animated films. Digital costumes are powerful in transferring multisensorial experiences and enables audience immersion in the world of a film.

CONCLUSION

My doctoral research demonstrated that costumes are strong visual support in creating and crafting a character's fictional history, identity, and place in a film. Costume designer's contribution enhance the characters formation of identity and connection to cultural contexts, the film's locations and

time periods via specific materials, costume structures, and colours. These decisive details allow the audience to “read” and recognize the character. When the animated character appears in a scene, the spectator sees character’s costume as the primary visual element, and I argue that this renders the costume an essential part of animated character representation. The digital character and costume create an indistinguishable connection between one another where the costume model forms the design and structure of a costume. These altogether create the character’s form and silhouette, at the same time making the design of costume highly important.

Software developed through the course of time which is visible in the depiction of material characteristics that improved gradually from film to film. The more recent computer animations benefit from advanced computer software and are technologically capable of creating digitally realistic costumes. These includes believable material surfaces, three-dimensional textures, and realistic cloth behaviour. Creating these aspects of realism successfully in digital costumes is two-fold: it is an experience for the makers, the designers and animators, and their creation is an experience for the audience. As the largest contribution of my thesis remains the fact that it gives voice to the costume designers which has enabled me to illuminate the key characteristics of digital character costume design in computer-animated films. I have shown the production stages where a costume designer is a vital collaborator. My thesis has proved that both *costume design* and *costume designer* are equally important in computer-animated filmmaking.