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Digital Social Imagery in *Silhouette*

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DIGITAL SOCIAL IMAGERY IN SILHOUETTE

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Fine Arts
Digital Production Arts

by
Ashley Triplett
December 2009

Accepted by:
Dr. Timothy A. Davis, Committee Chair
David Donar
Tony Penna
ABSTRACT

Society places an extreme emphasis on outward appearance and beauty that is often unattainable. The short film, *Silhouette*, reminds audiences of the dangers that can result from society’s infatuation with physical perfection, and the film’s production is the focus of this thesis. The goal of the film is to effectively communicate the impact of society on an individual’s self-worth and self-image and to illustrate the consequences that result when trying to attain physical perfection. An integral part of this project is an examination of how women have been portrayed in art historically as compared to present day. To visualize the narrative direction of the film, works of art and films are observed in creating storyboards and determining the style of the film. Using computer animation as the main tool in producing the film allows for a wide range of direction and visual freedom and is the most efficient and appropriate method for achieving the artistic vision of the piece. Some problems arise, however, when the computer becomes a hindrance to the visualization of organic material and its piece-by-piece destruction. Methods involving compositing and normal map techniques are used to confront these issues and deliver a provocative computer animation exploring modern-day issues.
DEDICATION

My thesis is dedicated to my loving parents for always encouraging me to follow my dreams and for giving me support throughout my period in graduate school. This thesis would not have happened without your help and love.
ACKNOWLEDGMENTS

I would like to thank Dr. Tim Davis, my thesis advisor, for his direction, assistance, and guidance on my thesis and throughout my graduate career. Dr. Davis’s recommendations and suggestions have been invaluable to the project.

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CHAPTER ONE

INTRODUCTION

Self-esteem and self-perception are inherently linked. The former focuses on satisfaction with self, while the latter is the mental image of self. Self-esteem has long been regarded as a vital indicator of psychological well-being, especially in Western cultures, and studies have shown that women’s self-esteem tends to be much lower than men’s [CLAY05]. This phenomenon is most likely due to our society’s tendency to place emphasis on appearance as a measure of evaluation by self and others [CLAY05]. This trend is especially detrimental to adolescent girls in society when they begin to develop a belief that their worth depends upon outward appearance alone and not on their abilities [MELT03].

The media is apt to promote this idea that physical beauty is highly valued by society because most women seen in films and magazines live up to society’s standards of perfection. Aided by the emergence and evolution of technology, we are exposed to an overwhelming number of commercials and images every day, which tend to impact our culture much more than schools [MELT03]. More often than not, the slim yet curvaceous body image of women is most often used to sell the products featured in advertisements directed at all types of audiences. With the help of today’s technology, the women on these covers may not be real at all, but instead a result of airbrushing, compositing, and plastic surgery. The group that seems to be most affected by this ideal beauty is adolescent girls because they are at a point in their lives where they begin to develop views about themselves and society’s ideas [CLAY05]. A recent study has
shown that as girls mature, they begin to compare themselves to images of women they see in the media and experience a decline in body satisfaction [CLAY05]. Such images suggest that success comes only to those women who are extremely thin but have curves in all the right places, which is perhaps the most unrealistic body type to achieve. However, our culture also stresses that if a woman wants this body badly enough, she can obtain it, but not without constant dieting, exercise, and most likely plastic surgery [DURH08]. With such an impossible measure of female beauty, some girls and women can be driven to detest their own bodies and become obsessed with changing them. A number of women become so consumed with their body image that they develop eating disorders as a way to gain more control over their bodies and their lives. This fixation on thinness and beauty has encouraged the emergence of pro-anorexia Internet sites to help anorexics develop ways to continue their eating disorders [GRAY05].

The media, however, cannot be considered the only source of society’s concept of beauty. Ancient cultures used observation of outward appearance to determine a female’s reproductive capacity and ability to protect and raise children. Men would decide the degree of attractiveness of the opposite sex by looking at physical indications of age, body shape, and skin complexion [GOEH99]. The importance of physical beauty, therefore, is ingrained in a person’s nature, but the belief that physical traits are deemed more desirable than others is cultural [GOEH99]. Different cultures appear to appreciate different qualities of female beauty, which are determined by that culture’s environmental origins. For instance, cultures that seem to prefer more plump women are usually ones that experience famine more often than those who rarely encounter such situations.
because larger women are most likely seen as well fed and healthy rather than malnourished. In a wealthy country like America, a higher population of women can afford to put forth the time and money to appear in good physical shape with little indication of old age. Society’s appreciation of beauty seems to change then as the culture evolves, and the media simply relays images of the desired appearance to the population. Women have a choice whether or not to pursue the current ideal, and some women decide to go to the extreme as they become fueled by their inability to escape the many images of perfection they encounter each day.

*Silhouette* was initiated as a reaction to the increasing cultural emphasis on appearance alone, and as a way to increase awareness of the detrimental effects this obsession has on society’s female population. Further, this project attempts to encourage appreciation for three-dimensional animation as an art form by using it to convey a message. Chapter 2 gives a history of Western culture’s depiction of beauty and discusses the art and film references that inspired the project. Chapter 3 describes the process involved in producing the film and problems that were encountered along the way. Chapter 4 presents the results of the production process and addresses the project’s limitations. Finally, Chapter 5 provides a conclusion and suggests ideas that might be helpful for future works.
CHAPTER TWO
BACKGROUND AND INFLUENCES

2.1 Brief History of the Ideal Female Body

Throughout history the portrayal of the ideal female body type has changed with the current fashion of the times. In the classical Greek period, the female figure was well proportioned and much heavier than the current portrayal. The second half of the nineteenth century saw the emergence of the corset, which was advertised as a way to help with self-control and restraint [BORD88]. Making herself beautiful was actually considered to be one of a woman’s duties. When wearing a corset, women could barely sit or bend, much less breathe, and consequently were unfit to work. This fashion trend coincided with a time when women were pushing for independence and political emancipation, which follows the cultural mentality of the fear of female power [BORD88]. At the same time, the volume of art pieces depicting women as dangerous and evil increased along with the development in medical technology that allowed for tighter control of female sexuality, such as removal of the ovaries and placing leeches on the womb [BORD88].

In the twentieth century, criteria that labeled someone as beautiful tended to almost always be based on outward appearance. Cosmetics became more popular with the average woman in the 20th century, as opposed to the 19th century when they were viewed as a signal of prostitution [WOOD09]. Women began to use cosmetics not just for the benefit of men, but also as a way to boost self-esteem [WOOD09]. In the 1920s,
films became extremely popular along with a fascination with celebrities, a resource the advertising industry used in full force. If they could show beautiful models and celebrities using their products, the qualities of that person would be connected to that product. Many young women also began to reject the hourglass figure and make their figures more boyish in hopes that they would attain the independent lifestyle enjoyed by men. Yet even though they believed they were attaining freedom, they were actually confining themselves even more to a particular body image and encouraging obsession with their appearance. During World War II, clothing production was restricted, and the most common look for women was practical and masculine. After World War II ended, women were encouraged to sacrifice their newly acquired wardrobe and jobs and return to their previous roles as mothers and wives. During this era, the voluptuous Marilyn Monroe body type became the most fashionable as women began to see more curvaceous, blonde celebrities in films [WOOD09]. An added emphasis on flawless self-presentation and conformity emerged, and interestingly enough, the 1950s witnessed the development of the Barbie doll and *Playboy* magazine. The appeal of the voluptuous figure lasted until the late 1960s when women’s rights movements developed in full force along with a rebellion against ideas that imposed beauty standards. Ironically, beauty seemed more important than ever during this time since it became an indication of status along with wealth and class.

The voluptuous ideal faded in the 1960s when the famous model Twiggy helped elevate models to superstar status, and the thin, boyish figure became popular once again. This time around, cosmetic surgery, such as the removal of the back teeth and lower ribs,
became very popular in the modeling industry, enabling models to achieve Twiggy’s “naturally” thin look [WOOD09]. In the 1980s, success and beauty were so intrinsically linked that salaries were higher for women deemed more attractive than others [WOOD09]. An obsession with fitness also manifested itself, which could be mainly attributed to the booming economy as women had more money to spend on health and appearance. Since that time, the obsession with slenderness has grown as women remain attracted to the independence and success suggested by the boyish body. Unfortunately, women are spending so much more time attempting to reach that ideal that they neglect their inner development and achievements in society. In turn they are encouraging society to accept them based only on their appearance and not for who they really are. Furthermore, they are supporting an exclusive ideal that only accepts Caucasian women with a very specific body type in an era when diversity is becoming more important than ever before.

2.2 Beauty in Today’s Society

In society today, the age at which girls become involved with fashion that encourages them to care about their appearance is getting progressively younger. Growing up, girls are exposed to a variety of influences including Barbie, who has pursued a variety of careers while promoting the slogan, “Be who you wanna be.” Her perfectly shaped body, however, has remained unchanged, which could be interpreted by some girls to mean that career success can only come with physical perfection [DURH08]. Disney animated films directed toward younger children also send mixed
messages. The female protagonists from films such as *The Little Mermaid, Aladdin,* and *Pocahontas* exhibit traits such as independence and determination and are ethnically diverse; however, their bodies unnecessarily mimic airbrushed centerfolds and their clothes barely cover them. Some girls might gather from these films that to be desirable and successful, one should be thin and consent to display her body. Disney must be credited, however, for its recent series *That’s So Raven,* which features a female protagonist with an average body who is independent and goal-oriented. Her likeable character has a greater effect on the success of the show than her body type. *Ugly Betty* is another show highlighting a curvier-than-average female protagonist who has a successful career in the fashion industry. The show helps give younger viewers hope that in the future, acceptance will be based not on body image, but on personality. Such programs, however, are scarce in the entertainment industry, and the Barbie look remains the most powerful. Girls are very young when they are exposed to films and toys that portray this look, and consequently, some might begin to unconsciously develop dissatisfaction with their bodies.

Studies have shown that 80% of women are unhappy with their physical appearance, and this dissatisfaction can gradually lead to eating disorders such as anorexia and bulimia. According to the National Eating Disorders Association’s website, anorexia is defined as “self-starvation and excessive weight loss,” while bulimia is defined as “a cycle of bingeing and compensatory behaviors such as self-induced vomiting designed to undo or compensate for the effects of binge eating” [NATI09]. In the United States, approximately 10 million women and 1 million men suffer from these
life-threatening eating disorders, and because they are frowned upon in our society, many cases have probably not been reported [NATI09]. These numbers give evidence to a huge problem in our society, but we continue to approve of and emulate that small population of people who have attained the presumed ideal form of beauty. The average American model is 5’11” tall and weighs 117 pounds, which is thinner than 98% of American women who average 5’4” tall and 140 pounds [NATI09]. Although only a small percentage of women actually have this ideal body type, culture deems it to be the example of perfection because humans are ingrained with an attraction to beauty, to which society exposes its citizens from a very early age.

Fortunately an increasing number of people are becoming aware of this problem, and society has withstood an emergence of protest against America’s obsession with the ideal appearance. In 2004, Dove began the Campaign for Real Beauty, which is committed to encouraging societal change and instigating discussions of beauty in hopes of expanding our definition of it [DOVE09]. They use real women, not models, of every shape and size for their commercials, billboards, website, and other forms of media to promote non-conforming figures. The campaign has recently placed an emphasis on younger girls and their encounters with numerous unrealistic ads in the hope they can provide them with a reality check and boost their self-esteem.

Plenty of websites are also available that are aimed at eating disorder education and providing mentoring services, such as those belonging to the National Eating Disorder Association and The Alliance for Eating Disorders Awareness [NATI09] [ALLI05]. Many videos featured on the Internet and in television commercials
containing gruesome images of women suffering from eating disorders force people to see the effect media images are having on today’s women.

Websites and online videos aimed at combating eating disorders unfortunately must compete with the pro-anorexia websites that give advice to girls concerning issues such as dieting techniques, the best ways to vomit, and which laxatives to try. These sites began to attract attention from the public and were subsequently shut down, which forced many groups to become private or advertise their intentions as being directed toward support and recovery. An encouraging trend is that these sites are known and rejected by society; however, a substantial media focus remains on body image and the ideal type. Beauty is still connected with success and status, and some women and men become so fixated on this notion that they ultimately kill themselves while trying to achieve perfection. Raising awareness of this issue for the mental and physical health of the American society is important, and because film is an avenue used by the media to fuel the obsession, it can also be used to enlighten people of the obsession’s dangerous consequences.

2.3 Thematic Influences

Throughout the years, film has become a valid form of art and a source of critical discussion as evidenced by its acceptance in academia and by philosophers. Filmmakers are able to communicate their ideas to audiences and encourage them to re-evaluate their outlook on certain issues. One director that has been influential to the development of this project is Krzysztof Kieslowski. Kieslowski was born in Warsaw and received his
directing degree from the State Higher School of Film, Television and Theater in Lodz in 1970 [NAWO04]. In school he began to cultivate his interest in documentary filmmaking and became affiliated with the Documentary Film Studio in Warsaw after graduation. Kieslowski’s early documentaries focused on the everyday lives of Polish citizens, but they soon resulted in conflict with the government because they were seen as anti-authoritarian.

Kieslowski quickly turned to fiction after one of his documentaries, Workers 1971, was heavily censored and footage from another, Station, was used as evidence in a criminal case. Fiction also allowed him more artistic freedom and, ironically, became a way for him to portray everyday life freely and more truthfully without having to worry about censorship. In 1973 he completed his first narrative film, The Underground Passage, which was a made-for-television film shot in documentary style about people’s failure at finding understanding. His television feature, Personnel (1975), earned him first place at the Mannheim International Film Festival, and, also shot like a documentary, deals with the loss of hopeful youth and the complicated choices everyone must make in life. Kieslowski continued to make extremely realistic films that ultimately dealt with moral anxiety and difficult questions. Among his many other awards, Kieslowski was nominated for an Academy Award for Best Director in 1994 for Three Colors: Red, which deals with a woman’s struggle to find purpose in life after losing her family.

Throughout his life, Kieslowski constantly pushed the boundaries of narrative and documentary film and influenced others to follow suit. Stanislaw Zawislinski, author of
Kieslowski – No End, summed up Kieslowski’s subject matter and themes with the following list:

Man clashing with society, with power, with the System, with his environment, with his family and with himself. Man entangled in contradictions, dependencies and conflicts. Man constantly forced to make choices in a world of established values and bearing responsibility for those choices. Man encroached upon by politics and man beyond politics. Man facing the inevitable and eternal effort towards freedom, equality and justice, eternally seeking love, joy and understanding... [NAWO04].

With all of his films, Kieslowski ultimately challenges his audience to ask themselves “How should one live?” He retired after completing his Three Colors trilogy in 1994 and died only two years after. His ultimate goal in filmmaking was to give people a sense of unity with others in a world where many things divide us. In an interview he once said, “Film is often just business... But if film aspires to be part of culture, it should do the things great literature, music and art do: elevate the spirit, help us understand ourselves and the world around us and give people the feeling they are not alone” [KIEF02].

Kieslowski’s opinion of film’s purpose and his view of humanity are inspirations for this project and future projects to bring people together and give them a sense of comfort and hope.

Like full-length films, short films also have the capacity to induce critical thinking and impact society. One short film that influenced the direction for Silhouette was Doll Face (2005), directed and produced by Andrew Huang [HUAN05]. This computer-animated film emphasizes everyone’s goal to conform to an unreachable level of perfection. The set for this film is minimal, having only a few objects, but the texturing, modeling, and lighting are more complex (Figures 2-1 and 2-2). The character in the film is believable because her body and facial movements are realistic and emotive.
Doll Face was featured in SIGGRAPH’s electronic theater in 2006 and boasts upwards of 3 million hits on youtube.com. Huang’s inspirations for filmmaking include Jan Svankmajer and Norman McLaren, and his goals are similar to those of Kieslowski’s in that he wants his films to force audiences to develop new perspectives. In one interview he stated,

“I think as long as I produce something that inspires someone else or makes them see differently, I'll be happy. Art is about sharing, so if I can share something with someone that gets us both pumped, then that means a lot to me” [HUAN06].

Huang, like Kieslowski, understands the characteristics that help film transcend commercial entertainment to a form of art and expression.

Figure 2-1 and 2-2: Scenes from Doll Face (2005) by Andrew Huang

Another short film that deals with a similar theme is Masks (1998) by Piotr Karwas [KARW98]. Winner of SIGGRAPH'S’s Electronic Theater Jury Award in 1999, Masks features a human-like figure who tries different masks in search of identity (Figures 2-3 and 2-4). As this figure has no facial features, Karwas successfully uses only body movement to express subtle emotion and pain. Unlike Doll Face, the set for
this film is elaborate and the lighting is dark and foreboding. The message, however, is not lost and the frustration and helplessness the character feels transfers directly to the audience. While both films address the destruction and frustration that results when a character is dissatisfied with self-image, the films do not portray the extent to which self-image can be distorted.

![Figures 2-3 and 2-4: Scenes from Masks (1998) by Piotr Karwas](image)

### 2.4 Artistic Influences

Directors not only influenced the theme of *Silhouette*, they also influenced the film’s art direction. One director that greatly impacted the style was Henry Selick. After graduating from CalArts, where he met his friend Tim Burton, Selick was hired by Disney and worked on films like *Pete’s Dragon* (1977) and *The Fox and the Hound* (1981). However, Selick quickly felt stifled and left Disney to work on his own projects. In 1986 he started his own production company called Selick Projects, and wrote, directed, and produced his film, *Slow Bob in the Lower Dimensions*, which combined live action, stop-motion, and cut-out animation. The film won first place at the Ottawa Animation Festival and second place at the Chicago Animation Festival.
Burton, who had recently finished *Batman* and *Beetlejuice*, was finally given the green light by Disney to produce the idea he developed in the 1980s involving Jack Skellington’s takeover of Christmas. Burton saw Selick’s film and decided he wanted Selick to direct *The Nightmare Before Christmas* (Figure 2-5). This film would be Selick’s biggest challenge in the stop-motion style, but Disney allowed Selick a great deal of freedom. He quickly started Skellington Productions and was given fifteen million dollars to produce the film. Burton also continued to be an active contributor on the look and feel of each character. After the film was completed in 1993, it earned $51 million at the box office. Since then audiences have come to appreciate its dark elements and complex themes as well as its technological advancements.

![Image](image.png)

**Figure 2-5:** Scene from *The Nightmare Before Christmas* (1993) by Skellington Productions Inc.

Selick’s next project would be another film that combined not only stop-motion with computer-generated elements but also integrated cel animation and paintings. *James and the Giant Peach* was completed in 1996, and although it did not achieve the same success at the box office as *Nightmare*, it contained first-rate technological and artistic
effects that confirmed Selick as an extremely competent and gifted filmmaker. After
*James*, Selick changed the name of his studio once again to Twitching Images, and
commenced to produce *Monkeybone* (2001), a mixture of live-action and animated
elements. The film was extremely innovative for its time because of the live-action and
animation interaction; however, it did not fare well at the box office.

Selick’s most recent project, *Coraline* (2009), was well received in theaters, and it
was not only completely shot in stop-motion but also contained some 3D sequences
(Figure 2-6). The story is based on Neil Gaiman’s novel of the same name, and Selick
embraces its dry humor and dark nature to help audiences consider animation as more
than just a way to present kid-friendly, light-hearted stories.

![Coraline Image](image)

**Figure 2-6:** Scene from *Coraline* (2009) by Focus Features

Selick, with all of his films, has pushed the boundaries of animation that
encourages artistic appreciation and critical review. He gravitates toward stop-motion in
particular because of its extreme detail and its tangible nature. In one interview about
*Monkeybone*, he states, “Stop-motion has a great textural quality that CG doesn’t quite
achieve. The wrinkles there are real and by it being handmade…it’s a performance. An actual performance with incredible charm” [EVAN02]. The feel of stop-motion is unique, and CG artists would be hard-pressed to replicate it; however, it greatly influenced the style and feel of Silhouette seen through the texturing, lighting, and movement of the character.

An artist whose works influenced the style and design of the character outside the mirror is Swiss sculptor Giacometti. Son of the Postimpressionist painter Giovanni Giacometti and godson of Cuno Amiet, a Fauvist painter, Giacometti followed in their artistic footsteps. He began art classes in secondary school and went on to study at the Académie de la Grande-Chaumière in Paris in 1922. There he developed his artistic style, which is similar to Cubist sculpture, as he strove to convey the search for a reality in what a person sees when he looks at another person. This theme concerning the way a person perceives reality also helped shape the theme of distorted self-perception in Silhouette. Giacometti’s most famous works came about in the late 1940s, which featured unrealistic, skeleton-like figures. The artist attempted to draw, paint, and sculpt his figures and portraits in order to give the viewer the same impact as when he/she sees a living person. Giacometti’s figures appear massless and weightless so that when seen from any viewpoint, they look as though they are situated in distance and space. Two of his works that were used in the look development of the character in Silhouette were Woman of Venice II and City Square (Figures 2-7 and 2-8).
Figure 2-7: Woman of Venice II (1956), painted bronze sculpture, Metropolitan Museum of Art

Figure 2-8: City Square (1948), bronze, Museum of Modern Art

Woman of Venice II is part of a series of fifteen figures, which focuses on the continuity of life and fertility. The artist was inspired by the protruding pelvises and
exaggerated profiles of prehistoric models, and he manages to place emphasis on and
give power to the pelvic area of his figures by the space between their arms and waists.
Ironically, this figure, which represents femininity, is one of the inspirations of the
character in Silhouette, whose main goal is to rid herself of any voluptuous, womanly
qualities. The textures of his figures were also evaluated for the figure in Silhouette
because of their worked and reworked quality. Giacometti would spend about five
months on one figure and would constantly revise it, being careful to keep the original
clay.

Peter Paul Rubens, an artist who lived many centuries before Giacometti and
differed greatly in style, influenced the design of the mirror figure. Rubens is recognized
today as one of the leading painters in Western art history because he successfully
merged traditional Flemish painting with the creative freedom of Italian Renaissance
painting. He is widely known for the way he depicts figures in his paintings as
voluptuous and fleshy. His painting, titled The Three Graces, was most inspirational for
the design of the main character of Silhouette (Figure 2-9). The painting features the
ancient Greek goddesses for beauty, grace, and artistic inspiration, all nude and
embracing each other in a circle. The figures are extremely detailed, round, and soft, and
the shapes of their bodies were used as templates for the construction of Silhouette’s main
character. Although they are part of a static work, Rubens painted them in a way that if
they came to life, they would move with delicate and graceful motion, which was also the
inspiration for the main character’s body movement. It is interesting to note as well that
the figures in The Three Graces represent femininity and beauty, and if painted today,
would be considered overweight and undesirable: a depiction of plainness rather than beauty.

![Figure 2-9: The Three Graces (1636-38), oil on canvas, Prado Museum](image)

Another inspiration for the design of the mirror figure in *Silhouette* was a famous early depiction of the female form known as the Venus of Willendorf, discovered in 1908 by archaeologist Josef Szombathy near the town of Willendorf in Austria (Figure 2-10). Studies of the figure’s material indicate she was created around 24,000-22,000 BCE, and was the first known female nude in the history of art. The name Venus has become the popular term for Paleolithic statues of women; however, this term is ironic due to the fact that the depiction of the goddess Venus in Western art is one of modesty despite her erotic nature. During the Classical and Renaissance periods, any portrayal of the Greek goddess of sex, love, and beauty shows her attempting to cover her breasts and pubic area, which implies the suppression of female sexuality and encouragement of civilized
restraint [WITC03]. The Venus of Willendorf, on the other hand, does not cover her very curvaceous body, which might signify pride in her femaleness and an unrestrained sexuality. Labeling her with the name Venus could persuade art critics to contrast her with the reserved Classical depiction of the goddess and subsequently associate her with uncivilized culture [WITC03]. She therefore might become a symbol of unattractiveness, which stems from patriarchal society’s fear and suppression of female sexuality. The mirror figure in Silhouette was designed with the Venus of Willendorf in mind not only because of the statue’s voluptuous form, but also because of its seemingly blatant female power. The mirror figure’s dissatisfaction with her body and eventual destruction can link to society’s rejection of the Venus of Willendorf’s ancient form of beauty.

![Image of Venus of Willendorf](image)

**Figure 2-10:** *Venus of Willendorf* (c. 24,000-22,000 BCE), limestone, Naturhistorisches Museum

The performance of the mirror figure was one of the most important and difficult aspects of *Silhouette*. The figure has no face and uses only body movement to express
emotion and pain. A commercial produced in Sweden was used as a guide as to how the figure should move as she examines and criticizes her body and also as a guide for the film’s narrative layout. The commercial advertises help for people with eating disorders and features an average-sized teenage girl staring at herself in a mirror. Throughout the ad, the perspective alternates between medium to close-up shots of the girl’s face and the areas of her body that she believes are unattractive. She becomes increasingly distressed as she feels each place, and as the music swells, the camera pulls back to reveal the true, anorexic version of the same girl staring at her average-sized figure in the mirror (Figure 2-11).

![Scene from Anorexia Bulimic Contact commercial (2007), Sweden](image)

**Figure 2-11:** Scene from Anorexia Bulimic Contact commercial (2007), Sweden

The movement of the mirror figure is based on the actress’s performance in this commercial; however, the producers of the commercial had the luxury of facial expression. As the animated mirror figure does not have a face, emotion is expressed
through movement such as deep sighs, nervous shaking, and hesitation. The climax of *Silhouette* is also very similar to this commercial’s climax; however, *Silhouette* pushes the boundaries further by showing the mirror figure actually cutting away the pieces of her body that make her upset. The reveal at the end of *Silhouette* not only shows a real and mangled character similar to the anorexic girl in the commercial, but also implies that she returns to cutting and remains unsatisfied.

Although the theme and idea for *Silhouette* is not completely original, it takes the idea to the extreme and adds a creative and new dimension. Many references and inspirations from both the traditional and the contemporary art worlds were used for the construction of the narrative, style, and mood of the film. Hopefully the decision to use computer animation and digital technology to creatively and artistically address a pressing societal issue will support the notion of animation as a valid form of art.
CHAPTER 3
IMPLEMENTATION

When creating and producing an animated film, every element, no matter how small, must have a specific purpose since each requires time in the production schedule, and money in the industry, to be created and implemented. If the detail does not add anything to the theme or story, no time or money should be wasted in its creation. Every aspect of the set and characters in Silhouette, therefore, was intentionally created and strategically placed in the film.

3.1 Environment Design

The lack of a specific setting helps to pull the audience’s focus to the central character and her struggle. Minimalist and dark, the scene contains only a full-length mirror, a small table covered with a cloth, and three tools placed on top of the table. The environment is lit with a single down-turned spotlight so that the viewer has no idea how large the room is as it fades into darkness. The floor is black with large panels resembling a stage, which communicates the idea of a theatrical performance. This mood is fitting given that the figure in the mirror is depicted as feeling that she is on display and therefore vulnerable to viewer criticism, despite the fact that she herself is most critical of her appearance.

The shape and texture of each object in the scene were carefully chosen and created. The final design for the mirror balanced several factors. First, it had to be large
enough to encompass the mirror figure’s movements, but not so large as to be distracting. Second, the mirror’s geometry is complementary to the figure’s curvy shape, with a simple wood texture that does not detract in any way from the character’s texture. The side table is textured with the same wood material and has a similar geometric shape as the mirror to imply that the two pieces are part of a set. The table’s main function is to support the clay modeling tools; therefore, it is placed off to the side so as not to interfere with the figure’s performance. The cloth on top of the table is meant to mimic a cloth used by sculptors to protect furniture from clay and dust. The muted blue color of the cloth was chosen so that it would not detract from the attention placed on the two figures in the film.

![Figures 3-1 and 3-2: Initial mirror and table design](image)
The three tools resting on the cloth were based on pictures and figures of professional sculpture implements. Ultimately, only the first tool used by the figure was actually based on a real sculptor’s tool since the design of each tool needed to progress in exaggerated intensity and danger. This tool is known in the art world as a scraper and is used for chopping and moving large pieces of clay (Figure 3-5). The mirror figure uses this tool initially because it does not seem too threatening, placing her focus on larger parts of her body, such as her thigh and stomach.
The second is designed to be sharper and more menacing as the figure gradually loses hesitation and becomes more comfortable with her cutting. The tool is similar to a butcher’s knife but smaller so that she can reach smaller areas on her body while inflicting deeper cuts (Figure 3-7). It is also easier to handle since she needs only one hand to use the knife, thus facilitating her process of self-mutilation.
Finally, the third tool is modeled after a hunter’s skiving knife and appears to be the most threatening of the three (Figure 3-9). The audience never sees the figure use the tool, but her action of reaching for it in the last shot implies her persistent and growing desperation to change her appearance.
The challenge of digitally simulating a mirror in the film was solved by the use of render layers and compositing. Render layers in Maya help to decompose complex scenes into smaller pieces that can be rendered in multiple passes and pieced together using a compositing program. When a render layer is organized, Maya renders a separate image for each layer of the objects assigned to the layers. This concept is extremely useful when specific objects and elements in a scene need to be changed and re-rendered,
rather than re-rendering an entire scene. Render layers can also be set up as render passes for the elements and their lighting and textures, such as beauty, shadow, specular, etc.

For *Silhouette* render layers were used not only as a way to speed up render time but also as a way to imitate the behavior of a mirror. The environment was divided into three layers: one for the figure and environment inside the mirror, one that would create a mask for the mirror’s shape, and one for the figure and environment outside the mirror. The layers for the elements inside and outside the mirror were identical, except the inside layer was reversed so that it looked as though it were being seen through a mirror. Additionally, the inside layer contained the figure seen in the mirror, while the outside layer contained the figure seen outside the mirror. To simulate the actual glass used in a mirror, the panel in the mirror was rendered only in the outside layer and was given an almost transparent texture. After all layers were rendered separately as .iff files, they were brought into Shake and pieced together. Mask layers from each shot acted as the foreground inputs of IMult nodes, with the inside layers from each shot representing the nodes’ background inputs. This schema eliminated everything outside the mirror’s frame in the inside layer shot. Output from the IMult nodes became the background inputs for IAdd nodes, with the outside layers as the foreground inputs. A mask situated inside the mirror’s frame was created by this process and replaced with the inside layer to create the final image.
The main character of the film, the figure in the mirror, is the most important performer, and consequently her animation mandated the most consideration and time. Her actions and emotions drive the plot and mood of the piece; therefore, an important part of the film was to effectively communicate her thoughts. Animation of characters cannot be initiated until a rig is created to guide their movements. A rig, or skeleton, is most commonly made up of bones and joints similar to a real skeleton and is assigned to a model so that the model’s geometry can be animated. Animators typically use two methods to rotate joints or chain of joints in a Maya skeleton: forward kinematics (FK) and inverse kinematics (IK). FK requires the animator to rotate each joint by hand beginning with the highest joint in the chain and ending with the last child joint. This method is easier to set up but more time-consuming to animate, as each joint must be addressed by hand. In IK, the motion in the joint chain is transmitted backwards, moving
from the most extreme joint to the beginning of the chain. Two tools that must be used in an IK setup are IK handles and IK solvers. IK handles are vectors that run from the start joint to the end joint where the end effector is located. When rigging an arm, for example, the IK chain should run from the shoulder joint to the wrist joint, which contains the end effector. An IK solver is then added to allow for the animation of each joint in the chain. The IK solver assesses the end effector’s location and calculates how each joint in the chain should move so that the animator need only move the wrist joint. When the end effector’s position moves throughout the scene, the IK solver changes the effector’s translation values to affect the rotational values of the joints.

Four different types of IK solvers exist, each having its own IK handle: the ikRP (Rotate Plane), the ikSC (Single Chain), the ikSpline, and the ikSpring. A very basic skeleton using ikRP and ikSpline solvers was created for the mirror figure. The arms and legs contained ikRP solvers, which calculate only the translation values of the end effector and ignore the rotational values, allowing for more accurate control of the IK chain’s rotation; however, more control results in more elements that require manual updates. Also, because the rotational values are ignored, the IK chain easily flips when the arm or leg is bent certain ways. For the mirror figure, the pole vector was animated separately by use of a locator, which complicated animation and resulted in popping that in some instances required frame-by-frame attention. An ikSpline solver was used for the figure’s spine since it uses a NURBS curve as a guide for the IK chain’s rotation. Most riggers use this setup when animation of a twisty shape, like spines, tentacles, or tails, is necessary as it allows for more control of the shape’s curvature.
To make the IK handles easier to see and animate, iconic representation was used for the control of any body part that contained an IK chain. Iconic representation is a way to facilitate the animation of IK handles by assigning animation to shapes or curves under which the IK handles are parented. Instead of displaying all of the IK controls, which can be confusing, the rigger can create representative controls that the animator can easily understand.

Once all the joints are in place, the geometry is bound to the skeleton using a binding algorithm, which calculates a cylindrical volume around each bone, with all geometry located within that volume affected by that joint. Maya includes two types of binding algorithms: rigid and smooth. Rigid binding uses a Boolean operation such that a CV (or control vertex) can be affected by only one joint. Smooth binding, on the other hand, allows for CVs to be influenced by multiple joints, with all influences totaling 100%. For the mirror figure, a smooth bind was used because it was easier to control and allowed for more organic movement.

One challenge that arises when using a smooth bind is weight painting, or adjusting joint influences to achieve a desired effect. Initially the Smooth Bind settings in Maya can be adjusted so that the influences are nearly suitable by altering initial max influences and dropoff values. The max influences parameter determines how many joints can affect each CV, and the dropoff parameter determines how rapidly the influence of a joint decreases as the distance from the joint increases. Achieving a result as close as possible to the desired deformation using these initial values is important so
that the work involved with weight painting can be decreased. The final values used for
the mirror figure were a max influence of 3 and a dropoff rate of 4.0.

Another issue encountered during weight painting involved high polygon count. With a skin surface covering millions of polygons, unwanted wrinkles and cracks in the skin were difficult to eliminate given the high number of CVs. To reduce the polygon count on the mirror figure while keeping the same amount of detail, a low resolution version of the model was created and converted from a polygonal model to a subdivision surface, or subD (Figures 3-12 and 3-13). SubDs are surfaces that combine the smoothness of NURBS with the modeling methods of polygons. An advantage of using subDs rather than polygons for this project was the ability to switch between increasing levels of detail while modeling and animating. With subDs, changes can be made at a low level of a detail and reflected in higher levels of detail, which significantly decreases processing time. By converting the mirror figure to subDs, weights on the low-resolution model were transferred to the high-resolution model making the skin appear smooth and continuous (Figure 3-14). This process helped to greatly decrease the time involved in weight painting and made the task of simulating the skin behavior of an organic model much easier because fewer vertices required consideration.
Another issue encountered with the basic rig was accounting for the figure’s volume. Generally, in computer animation, voluminous characters are more difficult to rig and animate than thin characters because additional factors must be taken into account for larger masses. For example, more joints must be created and strategically placed so that the extra volume will animate correctly, typically requiring jiggle deformers to properly simulate the extra volume’s movement. The mirror figure’s stomach is large,
which created difficulties in assigning the correct joints to influence the CVs that make up the front part of the stomach. The joints in the spine created to influence the stomach CVs were located outside the *dropoff* range; therefore, four child joints were added to two spinal chord joints in the rig: two affecting the top half of the stomach and two affecting the lower half of the stomach (Figures 3-15 and 3-16). Fortunately for *Silhouette*, no secondary deformers were needed because the figure in the mirror was meant to appear clay-like, which does not exhibit secondary movement the way human flesh might; thus, with the added joints, the figure could be animated as desired.

![Figure 3-15 and 3-16: Rig before and after joints were added to spine](image)

### 3.3 Clay Simulation

A clay-like material was chosen for the figure in the mirror to emphasize the figure’s malleability, which supports the film’s theme of the desire to change oneself in
the quest for physical perfection. To understand exactly how clay works and reacts, studies were conducted with sculptor’s clay. Sculpting tools were used to cut and reshape the clay, and a model of the mirror figure was made to determine how light interacted with the shape. One of the significant challenges of the project was using technology to simulate the way an impressionable material like clay acts when it is cut and torn. When a piece of clay is penetrated with a scraper, for example, the area around the cut is affected and deformed, leaving the texture from the cut bumpy and rough.

Taking a more surrealistic approach with the textures did not result in a realistic look for the figure, but became reminiscent of the feel of the clay. Slight indications of cracks in the clay were created with the use of bump and ambient maps. In Maya, bump maps are used to simulate the appearance of surface relief, such as bumps or cracks, without altering the shape of the model to which it is applied. To create the bump texture, a combination of clay images was compiled and a displacement map was produced using CrazyBump, a program that generates various texture maps, such as normal, diffuse, and ambient occlusion maps, from a 2D source photo (Figure 3-17) [CRAZ07]. The image was then brought into Maya and placed on the model using multiple 3D projections. Each projection was baked onto a 2D texture, all of which were blended in Photoshop to give a realistic and uniform look, and the resultant 2D image was then referenced under the bump map setting in the final texture for the model. An ambient occlusion map for the model was also created using 3D projection. Ambient occlusion, or the blocking of indirect light on an object, helps add to a model subtle shadow variations that would otherwise be washed out. For the mirror figure, an ambient occlusion map added more
depth to the shadows from the bump map and helped keep the model from appearing over exposed by the spotlight (Figures 3-18 and 3-19).

**Figure 3-17**: Maps generated by CrazyBump from a source photo

**Figure 3-18**: Final bump map with seam-removing paint strokes for mirror figure
Cluster deformers were used to animate the subtle movement of the area around each cut. These controls were employed to mimic the way clay is prone to move with the cutting motion until enough pressure is applied to create a separation. In Maya, cluster deformers are simply a collection of points, such as CVs and vertices, which can be moved and manipulated with one control. Each time the mirror figure makes a cut on her body, anywhere from four to six clusters assigned to the vertices surrounding the cut were animated to move down and away from the tool so that it would appear as though the clay were being impressed and separated by the tool.

Once the method of how the clay would move around the cut was established, the biggest challenge to the project came with the simulation of the clay pieces cut away from the larger geometry. In Maya, once a piece of geometry becomes a separate entity from a larger piece, the normals of each piece are adjusted. When polygons are rendered,
their normals are adjusted to account for the change in surface curvature. As a result, the pieces that were to be cut away from the model’s body in *Silhouette* could not be present in the shot prior to the cut to preserve the surface of the model.

The method chosen for the simulation involved the use of render layers and multiple models, which were composited and supported by animated rotoshapes. First an outline of the cut was made by moving the vertices to form the shape (Figure 3-20). Afterward, the complete model was duplicated. The faces inside the cut outline of one of the models were then selected and duplicated with the *separate duplicated faces* option set to on. (The history of the model was deleted so that each face could become its own object.) The separated faces and the faces inside the cut outline on the duplicated mirror model were then selected and extruded to give the piece volume and the model was updated to contain a corresponding indentation (Figure 3-21).

![Creating the outline of the cut by moving vertices](image)

**Figure 3-20:** Creating the outline of the cut by moving vertices
Once the elements were created, they were given their own render layers for later compositing: one with the original model, one with the indented model, one with the chunk of clay, and one with the model’s animated arms and tool. A lattice deformer was used to animate the chunk of clay as it curls and bends with the cut and eventually falls to the ground (Figure 3-22). A lattice was chosen for the animation of the pieces because it allowed the most control and provided the most realistic look when coupled with other nonlinear deformers, such as a bend.
After all layers were rendered, they were imported into Shake and pieced back together with the original figure on the bottom, followed by the cut figure, the arms and tool, and topped with the animated piece. A RotoShape node was assigned to the alpha channels of the cut figure and the animated piece layers. The Rotoshape for the cut model outlined the indented area, thus eliminating everything else in the image (Figure 3-23). As the tool moved downward to complete the cut, the points on the mask were animated in Shake to follow the tool and reveal the cut on the model. Likewise, the Rotoshape for the chunk of clay outlined the chunk’s edges and was animated to follow the edge of the tool and gradually reveal the chunk as it was cut away (Figure 3-24). For a final touch, the edges of each mask were given a blur so that they would appear softer and less disjointed. This solution also helped to decrease render time immensely as each render layer contained at most two objects.
Figures 3-23 to 3-26: Steps taken to simulate the cut

After much research and testing, the aforementioned methods were chosen and put in place in hopes of creating a cohesive and meaningful piece of animated art. A workflow incorporating each method was established and applied to each shot so that the construction of the film would be efficient and consistent.
CHAPTER 4
RESULTS

Despite the fact that more sophisticated and streamlined ways could have been applied to achieve the final look of the film, the chosen implementations adequately simulate the character’s self-mutilation and express the main idea of the story. Figure 4-1 depicts the final look of the opening shot. The set consists of very few objects and the minimal lighting directs the audience’s attention to the figure as well as dictates the solemn mood of the piece. The figure’s texture is not completely realistic of sculpting clay, but captures enough information to suggest a clay-like material, as highlighted in Figure 4-2. Figure 4-2 also illustrates the final result of the compositing method used to simulate the figure’s mutilation. After the cut is made, an indentation in the figure’s surface appears, as seen in Figure 4-3. The texture and geometry give the feeling of a deep cut despite the fact that the texture does not realistically represent the behavior of clay when it is cut. Figure 4-4 illustrates the moment when the film shifts from focusing on the figure in the mirror to the full reality of the situation, and the real figure is revealed to the audience, seen in Figure 4-5. To maximize shock, the figure outside the mirror was designed to be asymmetrical and covered with more extreme holes than those seen on the figure in the mirror. Also the color of this figure is a pale green to emphasize her mental and physical sickness. All of the pieces on the floor are only outside the mirror, and the mirror figure has no sign of cuts, which is meant to illustrate the real figure’s inability to perceive her drastic self-mutilation. Finally, Figure 4-6 is the final shot of the
film, which emphasizes the figure’s metaphorical blindness and addiction to her self-destruction.

Figure 4-1: Final look of the opening shot

Figure 4-2: Final texture and result of compositing method
Figure 4-3: Behavior of model and texture when a cut is made

Figure 4-4: Moment when the reality of the situation is introduced
As noted previously, the render time for each shot was minimal due to the liberal use of render layers. Depending upon the shot and the amount of geometry in each layer, the render time for each frame varied from 5 seconds to 5 minutes. To further speed up render times, a batch job scheduler called the Sun Grid Engine (SGE) was used to distribute frames across a group of 100 Linux machines. Once a render job was initiated using Maya’s render directory commands, each frame was farmed out to a separate
computer in the SGE as it became available. The frames, once rendered, could then be retrieved from their specified directory and compiled in Shake.
CHAPTER 5
CONCLUSION

Hopefully, the solutions implemented combined with the art direction were successful in creating an impactful and meaningful animated short communicating the effects of a distorted self-image. The goal of the film is to leave audiences with feelings of concern and discomfort, which may help to raise awareness of this ever-present desire to attain unreachable beauty in our society.

Computer animation was vital in the creation of this film and in bringing to life a model composed of a malleable material. Although stop-motion might have added extra detail and realistic feel, the overall result using computer animation communicates the idea effectively and profoundly. The simple design for the environment not only conveyed an isolated and uncomfortable mood, but also allowed more time for fine-tuning the most important element: the performance of the main character.

Some additional enhancements could be introduced to improve the quality of the piece. For instance, the mirror figure’s animation in most shots is satisfactory, although it could be smoother and more exaggerated in some areas. A better rig could have eliminated popping and unnatural movements, which would have greatly improved the animation. The texture of the mirror figure is also very successful at suggesting a clay-like material, and the color is realistic of dried sculptor’s clay. Improvements, such as jagged areas, could have been made to the texture when pieces are cut from the figure’s body, which would have intensified the figure’s actions. As the film rises in intensity, a
gradual build up of dust and scratches could have been added to the mirror’s surface to show the passage of time and the figure’s increasing desperation. The muted colors of the elements in the film also convey a sense of emptiness and depression, but the lighting is too harsh and blown out in some shots; it needs to be less intense with softer shadows to achieve a richer, smoother look.

The solutions used to combat the challenges of the film produced an effective result, but some were more helpful than others. The use of subD’s was the most efficient solution and was successful in making a geometric model appear organic and alive due to effective weight painting. The process of creating the appearance of pieces being cut away, although sufficient, could have been more streamlined and sophisticated instead of relying on post-production techniques, which do not produce the same result as when integration is performed in the objects’ original environment. Other software packages could be employed, such as Houdini, a 3D animation package that utilizes a node-based workflow and features superior particle and dynamics tools. Its fluid and rigid body dynamics would have been of interest to this project, especially its ability to simulate surface tension and soft body deformations. Using Houdini would have also enhanced the animation of the cut and separated pieces of the body instead of using rotoscoping in Shake. Despite the absence of Houdini employment in the project, the use of Shake to simulate the figure’s destruction as well as simulate a mirror’s behavior generated a convincing product and decreased the amount of time needed to render each shot.

Ultimately the final processes used throughout the project produced an effective and complete short film that not only has the potential to expand audience’s views of
animation as a valid and useful way to communicate provocative ideas, but also the ability to help those struggling with eating disorders. Many local and global organizations could use this film as a way to encourage both women and men in search of physical perfection to reconsider hurting themselves and to initiate satisfaction with their own appearances. With more exposure, it could also help people, especially Americans, reevaluate their own ideas of beauty and deemphasize its importance to a person’s physical appearance.

In conclusion, Silhouette confronts its audience with a profound message that forces them to think about how much society impacts the way they view themselves and others. Depicting a figure physically mutilating herself to achieve an end that is unattainable and revealing the truth that she was already too thin is a disturbing irony to illustrate. Using computer animation as the vehicle for this idea further allows for the film’s violent and uncomfortable nature to be realized. The main character of this film represents a large number of people in our society who are currently dissatisfied with their appearances and those who choose to act on their dissatisfaction to the point of self-destruction. Silhouette is a visual reminder of their struggles and a tool that can hopefully be used to help them overcome the lies fueled by society’s ideas.
REFERENCES


  <http://www.eatingdisorderinfo.org/>.


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