

DECO GROTESQUE: A MERGING OF ARTISTIC STYLES

A Thesis

by

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ABSTRACT

Working as an artist in the film or gaming industries requires finding solutions to unique challenges particular to the project or game one is helping to develop. In addition, many animated films and games are stylized; the goal is not to achieve realism but to make a world that conforms to an unusual set of artistic and physical rules. This work is an experiment in combining two styles, Art Deco and the Grotesque, to create digital 3D sculptures of wildlife overcome by fungi. I first established a taxonomy of shapes based on formal commonalities between Art Deco motifs and fungi. Next, I created sketches combining these elements with animal forms. Finally, I modeled, textured, and lit digital sculptures and produced a series of still renders.

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NOMENCLATURE

3D	Three-dimensional
CG	Computer-generated
Maya	Modeling and Animation Software Package by Autodesk
VFX	Visual Effects
Zbrush	Sculpting Software Package by Pixologic

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I. INTRODUCTION

1.1 Aim & Objectives

Working in the realm of CG art allows artists to accomplish something amazing: bringing fictitious creatures and phenomena to life onscreen. With ever-accelerating developments in technology and software, artists are making creations more and more indistinguishable from reality, or conversely, creating richly immersive imaginary worlds. Artists who are experts at observation and who understand human and animal anatomy can leverage these skills to design visually compelling 3D characters including those within the context of contemporary fantasy and science fiction films and games.

In this thesis, I created a series of still images that explore beautiful and grotesque forms by combining aesthetic elements of Art Deco motifs, fungi, and wildlife.

The objectives of this project are as follows:

- To establish a taxonomy of shapes based on formal commonalities between Art Deco motifs and fungi
- To transform animals from representational to abstract forms via metamorphic stylized fungi behavior
- To create works that juxtapose the beauty of Art Deco with the eerie qualities of the grotesque

My work presents the challenge that faces most CG artists: how can I make this fantastic phenomenon or creature believable? How would it look? My specific challenge

is to convincingly render how fungi might affect creatures they don't normally affect, with the additional requirement of creating forms reminiscent of a historical style.

1.2 Rationale

In the film and gaming industry, artistic vision is the driving force behind every project, so artists must develop the pipeline, tools, and technology to match the vision as closely as possible. The sci-fi, horror, and fantasy genres (which often feature grotesque characters) in particular need artists and technicians to make otherworldly creatures and environments tangible. Additionally, animated films and games typically have their own stylized worlds (eschewing realism) where characters and environments operate according to guidelines designed by visual development artists.

II. BACKGROUND AND EXISTING WORK

2.1 Art Deco

The Art Deco movement arose during the years between WWI and WWII, flourishing from the early 1920s to the late 1930s [1]. Many influences and characteristics informed the Art Deco movement; artwork and motifs from Classical Antiquity, Ancient Egypt, African cultures, Asian cultures, and Pre-Columbian cultures were all sources of inspiration for artists. Notable characteristics of Art Deco pieces, such as streamlined forms and metallic materials, came about due to Industrialism and new technologies. According to *Christie's Art Deco*, streamlining is “the elimination of extraneous detail to create aerodynamic forms [2].” Art Deco became a very democratic style that was just as likely to appear in mass-produced, utilitarian items as in luxurious and *avant garde* fine art objects [1].

Art Deco has been described not as a cohesive style, but rather as “a curiously wonderful mixture of several contemporary styles with traditional and popular undercurrents” [1]. Due to the breadth of influences and styles the Art Deco genre covers, it provides an array of references to inspire the design of the stylized fungi.

Within the Art Deco genre, I am researching the treatment of flora and fauna in sculpture, textile patterns, ironwork, and other mediums. Many Art Deco artists found design inspiration in nature [3]. My work specifically references this “fascination with stylized naturalistic decoration” of Art Deco (Figure 1) and streamlines organic forms by translating them into geometric patterns [1].



Figure 1. Example of stylized naturalistic decoration in an Art Deco work. Shuho, *Ornamental Box with Plum Design (detail)*, 1930s. [34]

2.2 The Grotesque

2.2.A History

The grotesque is an elusive genre to define, invoking a range of meanings and artistic styles ever since its namesake, the *grottesche* ornamentation of the Domus Aurea¹ ruins, was found in Rome toward the end of the 15th century [4]. In *The Grotesque in Western Art and Culture*, Frances Connelly demonstrates an interesting perspective on the grotesque, describing it as a verb, rather than a noun [4]. Thus, a grotesque image is one “in flux,” that transgresses the viewer’s culturally informed expectations of what is “known, proper, and normal” in Western society [4]. Geoffrey Harpham corroborates this interpretation of the grotesque in his book *On the Grotesque* by stating, “The grotesque is a structure, the structure of estrangement. The familiar and

¹ Imperial residence ‘Golden House’ built by the Roman Emperor Nero between AD 64–68. [44]

commonplace must be suddenly subverted or undermined by the uncanny or alien [5].” Harpham characterizes ambiguity as a reflexive reaction to the grotesque “through fusion of forms or realms we know to be separate [5].” Connelly’s and Harpham’s definitions of the grotesque encapsulate what I aim to achieve with my own work; that is, to show bodies fluctuating in the ambiguity between life and death, ignorance and awareness, recognizability and abstraction.

2.2.B Trauma & The Body

The grotesque retains close ties with the body, often playing with the human form to create monstrous or carnivalesque characters [4]. Connelly elaborates on the grotesque relationship to the body; it is simultaneously repulsive and attractive, a sort of magnetic spectacle that we can’t look away from despite our disgust [4]. My objective is to create a sense of the peculiar phenomenon of animals engulfed by fungi, to engross a viewer by depicting something not seen often, and to disarm a viewer's reactions to the beauty of the fungi as realization of decay sets in. My aim through these artworks is to inspire an array of reactions, which may include appreciation for beauty, sadness, confusion, or disgust.

Giuseppe Arcimboldo

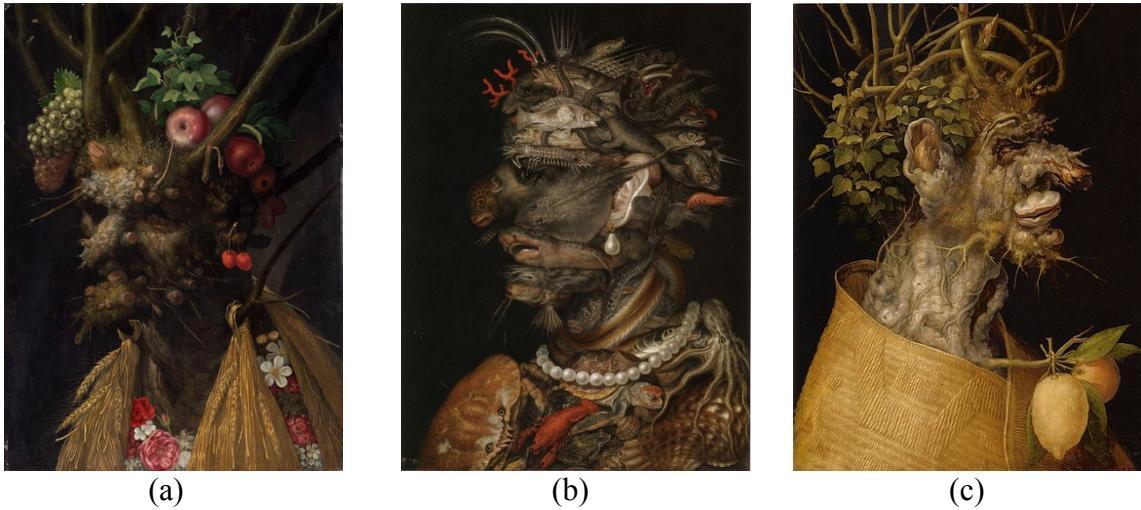


Figure 2. Paintings by Giuseppe Arcimboldo from the 16th Century. (a) *Four Seasons in One Head*, 1590, National Gallery of Art. (b) *Water*, 1566, Kunsthistorisches Museum. (c) *Winter*, 1563, Kunsthistorisches Museum.

Giuseppe Arcimboldo was an Italian artist active during the 16th century who is famous for his (often colorful) “composite” figure paintings [6]. Many of these composite images are optical illusions that make sense compositionally upright and upside down [6]. Arcimboldo visualized the compositions of his paintings (mostly likely drawing on his nature studies for reference) [6], and he often chose the compositional elements to communicate literary, allegorical, or witty meanings [6].

In *The Arcimboldo Effect*, Massimo Cacciari wonderfully describes the grotesque of Arcimboldo’s paintings as “not at all consist[ing] in the representation of the extraordinary and unheard-of as such, but in the representation of what is extraordinary and ‘miraculous’ in ordinary things [7].” For example, the bizarreness of the painting *Water* (Figure 2b) lies in its gestalt, not the depictions of marine life recognizable to

viewers (fish, lobsters, etc.). The simultaneous interpretations of Arcimboldo's paintings are a grotesque feature [5]. Harpham, in reference to *Water*, observes, "the image appears to have an impossible split reference, and multiple forms inhabit a single image", which prompts the viewer to question the relationship between the discordant concepts of fish and portraiture [5]. The CG pirate crew from the film *Pirates of the Caribbean: Dead Man's Chest* is a contemporary grotesque intersection between humanity and sea creatures [8].

Some experts regard Arcimboldo as a predecessor of the Surrealist movement; it was in the early 20th century that his work was "rediscovered" by artists and art historians [6]. Ever since the success and notoriety of the Surrealist movement of the 20th century, the fascination with unique combinations of forms and figurative pastiches continues to appear in contemporary art (ex 'Pop Surrealism', the work of Freya Jobbins, etc.). In the following discussions of contemporary grotesque artwork, the influence of Arcimboldo's oeuvre is apparent.

Grotesque Masks

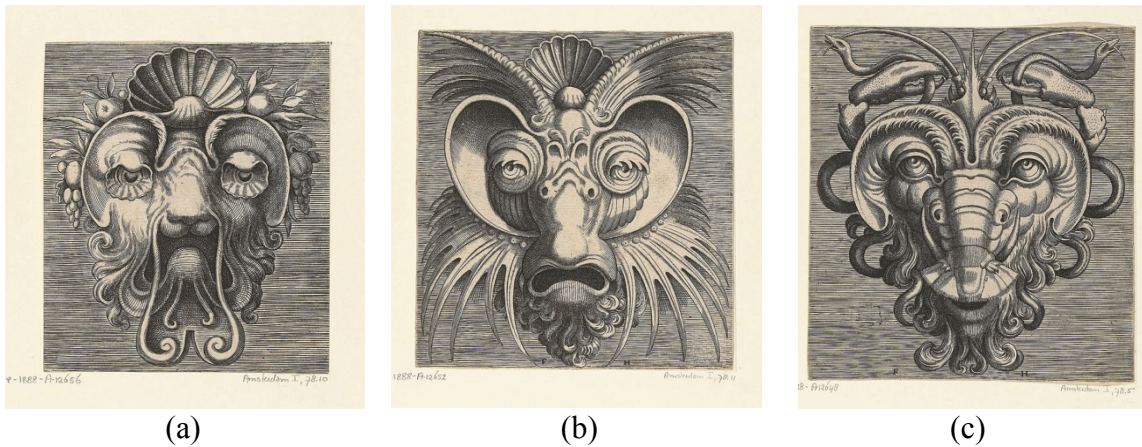


Figure 3. Frans Huys, after Cornelis Floris (II) *Masker met twee kreeftescharen die slangen vasthouden*, 1600 – 1650. [27]

The Grotesque Style spread to other parts of Europe from its origin in Italy. Frans Huys, a Flemish draftsman, created a set of prints published in Antwerp in 1555 depicting masks that follow the grotesque tradition of combining forms [9]. Huys based the designs of these masks on the works of another Flemish artist, Cornelis Floris [9]. Floris, like other Flemish printmakers, visited Rome [10]; he has been credited with bringing the grotesque style to the Netherlands [9].

The elaborate mask designs are symmetrical, following the layout of the human face. They have ornate, finely rendered embellishments, such as the curling tendril-like locks of hair and sea motifs (shells), apparent in Figures 3a & b, fins in Figure 3b, and lobster claws and tails in Figure 3c. These are attributes of Floris' unique style, influenced by Italian grotesque decorations, invertebrates and marine life, the latter perhaps alluding to the port city of Antwerp [10]. More so than Arcimboldo's

composites, these mask designs blend human and animal features, blurring the boundaries between the two. One feature present in all three designs is the shapes framing the eyes that resemble the human ear, which is known as the Auricular style that was “popular in northern Europe in the late 16th and early 17th centuries, and transitional from Mannerism to the baroque [10].”

Qualities of these masks appear in the work of contemporary artists discussed below, from human/sea creature hybrids to the attentive craftsmanship of decoration, proving that the fascination with the grotesque endures.

2.3 Existing Work

The following reviews contain observations about the work of contemporary artists and explain how their work influences my own. Their work displays particular facets and themes of the grotesque that my work will employ, such as corporal transformation, parasitism, and the decorative.

2.3.A Rebecca Stevenson



Figure 4. Rebecca Stevenson's wax and resin sculpture *Buttercup* (2006), exemplifying the grotesque trademarks of ambiguity and strange combinations of forms. [28]

Rebecca Stevenson is a contemporary artist who works in wax and resin. Her sculptures are resplendent and “baroque”: animal, human, and skeletal figures feature an abundance of colorful roses, fruits, or frilled, petal-like shapes growing out of them, sometimes superficially, but usually overflowing out of their body cavities [11]. These sumptuous and colorful masses of fruits and flowers recall some of the works of Arcimboldo (Figure 2a); like Arcimboldo's works and other contemporary grotesques, viewers can recognize the individual elements (fruits and flowers) that distort the overall figure. The aesthetic beauty of these elements makes these images less violent or

gruesome looking, while invoking our wonder and curiosity. The decorative is able to suppress the fear or horror of dismemberment/disfigurement.

The medium of wax lends a particular organic and delicate quality to the work. Some figures appear to be alive, frozen in artless gestures and unaware of the organisms feasting upon them; others are dismembered heads or torsos, well undergoing decomposition, and a few are skeletal remains, no longer fleshy or nutritive, but still anchorages for other organisms. From multiple angles, many figures become unrecognizable by the amount of flora consuming and covering them, thus exemplifying grotesque trademarks of ambiguity and strange combinations of forms (Figure 4).

Stevenson's work explores the themes of decomposition and new life, and inhabits a grotesque intersection between macabre and beautiful. A goal of mine is to make 3D models that possess the ambiguity of forms and beautiful parasitism/decomposition that Stevenson's work so successfully embodies.

2.3.B Jess Riva Cooper



Figure 5. Select sculptures from the *Viral Series* (2013) by Jess Riva Cooper. [29]

Jess Riva Cooper is a contemporary ceramic artist. She has created three *Viral* series, in which she covers ceramic portrait busts with decals and ceramic “organisms” (Figure 5). These organisms punctuate eyes, spill out of mouths, and poke out of nostrils; they wind around their hosts’ necks and amass atop their heads like ghastrly, writhing crowns. Cooper has cited parasitism and invasive species as themes in her art [12]. Much like Stevenson’s work, we see an additive process frozen in time and the beginning chaos that unfolds when ornamentation proliferates out of control. It is also similar to Stevenson’s work in that the decorative is able to quell some of the disgust of the decay implied by the worm-like insects.

In my own work, I pay similar attention to the details of the decorative aspect of the parasitic fungi and push the abstraction of recognizable forms to a bizarre, unrecognizable end.

2.3.C *Ishibashi Yui*

Ishibashi Yui is a contemporary sculptor whose clay figures overtaken by branch-like structures evoke a poetic surrealism.

Dream of 10 Billion Years is a sculpture of a pale female figure slumped atop a chair with spindly legs that echo the thin limbs of the figure. The figure's entire face and neck are buried under roots that shoot upwards into a thicket of verdant branches. The figure's posture is one of resignation, at peace with its unification and eventual destruction by nature. The motif of the pale, thin figure reappears in *Sleep*, suspended in a liquid filled tank. Aquatic plants obscure the face, and the body shows no sign of movement or life.

In contrast, the pale figure of *Then, it returns slowly* openly suffers because of the twigs and branches growing out of or on top of it. The torsion of the figure, with its head tilted upward and mouth open as if uttering in pain, invokes a horrified response unlike the other works where the figures are listless and their faces are covered.

These sculptures differ from the previous works of art in that they suggest a story due to the figures interacting with props or their environments. But these narrative elements are open to interpretation – the juxtaposition of the graceful figures with the uncontrollable plants is grotesque. There is implied destruction, pain, and death, but the sculptures themselves are very smooth, tidy, and pristine (similar to Riva Cooper's

works). Perhaps the overpowering growth of nature is not a menace, but a respite. I see this quality in my own work – the destruction of the animals is not messy or revolting because putridity is decoupled from death by the use of clean, pattern-like fungi.

2.3.D Pirates of the Caribbean: Dead Man's Chest

Nowadays, grotesque characters entertain audiences in the popular mediums of film and video games; the desire to animate strange and unsettling creatures has compelled teams of artists and technicians to develop software and pipelines to accomplish this goal.

A stunning example of CG grotesque is the crew of half human, half sea creature pirates in *Pirates of the Caribbean: Dead Man's Chest* (2006) fabricated by a team of artists lead by Visual Effects Supervisors John Knoll & Roger Guyett and Visual Effects Art Director Aaron McBride at VFX Company ILM (Industrial Light & Magic). Each of the pirates is unique; some of them look like anthropomorphous sea creatures while others look more like carnivalesque humans with marine life fused to them. These pirate characters are composites, albeit less compartmentalized than the subjects in Arcimboldo's paintings (Figure 2b); nevertheless, the overall perception of them is that they are grotesque, fantastic and monstrous, yet the individual elements that distort their forms (marine animals, seashells, barnacles, etc.) are recognizable to us. Like many of Arcimboldo's composite figures, the pirates have exaggerated, gnarled features such as bulbous noses, prominent chins, and wide mouths (Figure 2a).

Studying the process of ILM's creation of the pirate crew can provide a template for a CG pipeline to make grotesque creatures. A lot of thought and detail went into

making these characters, starting with the concept art; Hal Hickle, ILM Animation Supervisor, explains that the designs “suggest a history to the characters that you might only glimpse a bit here and there on the third or fourth watching on the DVD [13].”

According to an interview with ILM by Pixologic, the makers of digital sculpting software Zbrush, the pirates and various sea creatures were modeled in Maya, and then they were imported into Zbrush. There, the models were made into ZTools and subdivided to give them enough resolution to be sculpted with fine details. The detailed ZTool displacement maps were then “applied on top of the base meshes and instanced [14].”

Zbrush has become a crucial component of the production pipeline for many studios (including Naughty Dog, which is discussed next). While I didn’t use Zbrush for the exact same purpose as ILM did, I was aware of the many advantageous qualities the software has when it comes to visualizing and creating 3D meshes. It was an easy decision to include it in my own pipeline, which I will discuss later.

2.3.E The Last of Us

Similar to the digital sculptures produced for this thesis, the zombie characters of *The Last of Us* (2013) are a design experiment in the theme of destruction by fungal decay. *The Last of Us* is a video game made by Naughty Dog for PlayStation 3.

Like the sea creature pirate crew from *Pirates of the Caribbean*, the zombies are a fusion of human and natural organisms, but unlike the pirate crew, these zombies have more ambiguous forms. The average viewer is likely unfamiliar with the actual parasitic fungi that inspired the design of the zombies, and so the strangeness of them is more

startling as there's no point of reference. The fungi disfigure the zombies, but unlike in the works of the three sculptors previously discussed or even the pirate crew, there are neither decorative objects nor clear boundaries of form to offset the viewer's disturbance at the disfigurement. It is an example of the grotesque flourishing in the realm of horror, invoking in us the fear of the very real threat of disease, the eventual decay of the body, and loss of humanity by the scrambled visages.

In contrast, the aim of this thesis is to create sculptures that are not outright horrific or gory, but imply something more sinister than what they seem to at first glance. Using art deco motifs is a way to soften the grotesque theme of the works.

Director Bruce Straley expounds on the inspiration for the design of the zombies: "We wanted that contrast between the elegance and the delicacy versus the pure anguish, pain, and disgust of being controlled by a parasite [15]." His remark encapsulates the tension I sought to capture in the sculptures produced for this thesis. Though I chose not to make my sculptures as viscerally horrific as *The Last of Us* zombies, I do see the fungi in my work having similar asymmetrical placement.

III. METHODOLOGY

3.1 Taxonomy of Shapes

A taxonomy is a method of classifying and grouping objects and phenomena. This particular taxonomy is based on similarities of form or *shape language*. Shape language is the way forms relate to one another, often achieved by repetition or by employing a selection of design principles consistently for the purpose of creating a sense of unity in a work of art. Since I will be forging connections between two disparate subject areas that are not usually combined (fungi and Art Deco motifs) it will, therefore, be useful to establish my own taxonomy as a way to show my thought process and how my taxonomy will figure into the design phase. To demonstrate shape language commonalities between Art Deco motifs and fungi, I selected images that highlight the three categories that emerged in this taxonomy of shapes: The Layered Scale, The Modified Fan, and The Sunburst.

3.1.A Layered Scales

The layered scale is a simple shape resembling a fish scale that, when placed in overlapping rows, creates a pattern that can be seen in many Art Deco era pieces (Figure 8). While it is difficult to pinpoint a single explanation for the pattern's ubiquity in Art Deco, its strong two-dimensional geometric form as well as its resemblance to specific Japanese and Chinese patterns (two of the many international influences on European Deco artists), are possible reasons that made it attractive to artists of the time [1].

A selection of sconces designed by Albert Cheuret during the 1920s (Figure 6), in particular, echo the simple bell-like silhouette of *Coprinus comatus*, as well as

incorporate layered pieces of alabaster that resemble the layered gills of *Coprinus comatus* (Figure 9). The layered scale pattern often embellished other Art Deco pieces, such as metal works including railings and mailboxes. The pointed scales of Figure 7 and Figure 8 are similar in shape to the gills of *Coprinus comatus*, and it was this shape that served as the basis of my stylized gill design for the digital sculpture.



Figure 6. Sounce created by Albert Cheuret from 1925. [36]



Figure 7. Buchman & Kahn, architects, *Mailbox: The International Telephone and Telegraph Building (detail)*, 1928, New York, NY. [43]

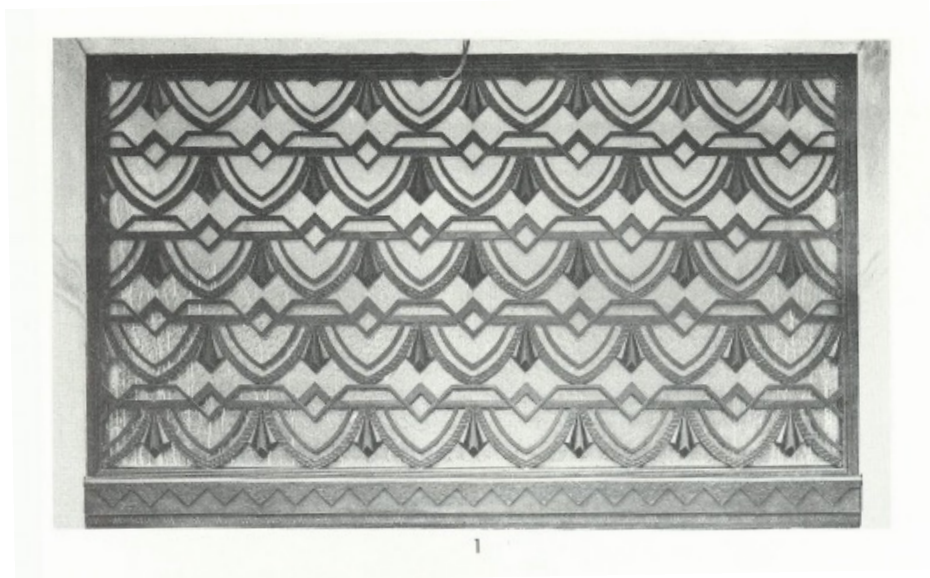


Figure 8. Example of the layered scale motif in an Art Deco fanlight by Ets. Schwartz-Hautmont from the 1920's. [37]



Figure 9. Close up of a *Coprinus comatus* mushroom melting. Drahrub, *Coprinus comatus*, 2011. [16]

3.1.B Fan

The Fan is another popular Art Deco motif (Figures 11, 12 & 13). It appears in many of the iron gates and metal works by the iconic Art Deco artist Edgar Brandt, whose style affected many of the metal works produced during the era [17]. The Fan motif originated from ancient designs of “stylized Egyptian lotus and lily blossoms [17].” Archaeological discoveries in Egypt, like King Tutankhamen’s tomb, from the 19th century through the 1920’s ignited French designers’ captivation with Egyptian art (“Egyptomania”), and in turn inspired some of their designs [17]. Brandt, who made jewelry in addition to ironwork, would have been familiar with the Egyptian influence [17]. He was able to adapt the lotus motif to his iron working practice by distilling it to its most striking, sinuous features [17].

The Fan can be likened to a scallop shell, with its delicate curved edges and lines. Its analogue in the fungi world is the elegant *Schizophyllum commune* (Figure 10). By observing the manifestations of the Fan Motif in Art Deco works, I was able to model a stylized symmetrical lobed version of the *Schizophyllum commune* mushroom that would work cohesively with the *animalier* digital model in the Study 3 piece (Figure 33).



Figure 10. Steve Axford, *Schizophyllum commune*, Booyong, 2010. [30]



Figure 11. Example of the fan motif in Art Deco ironwork. Edgar Brandt, *Les Bouquets Grille and Torchères*, 1925. [38]



Figure 12. Example of the fan motif on an Art Deco era building. Mark Lemmon, architect, *Tower Petroleum Building (detail)*, 1931. [18]



Figure 13. Example of the fan motif inside an Art Deco era building. George W. Kelham, architect, *Bronze Transom Grille of the Shell Building (detail)*, 1929-30. [19]

3.1.C Sunburst

The third category in the shape taxonomy is the Sunburst. Essentially, it is a semi-circle with lines radiating from it (Figures 14, 15 & 16). The sunburst motif became internationally popular during the Art Deco era for a variety of reasons: sunbathing was promoted as a healthy activity during a time when people were migrating from polluted cities to spacious suburbs; the motif was versatile enough to appear on mass-produced personal items and domestic products; and finally, its representation of dawn was “a metaphor for the future [1].”

When comparing the Art Deco examples of the Sunburst to the shapes of *Mycena sect. longisetae*, we can construe the cap and pin-like hairs of *Mycena sect. longisetae* to comprise a unique version of the motif (Figure 17). In my design of the Art Deco-stylized *Mycena sect. longisetae* mushroom, I decided to make the hairs radiate in a pattern with alternating long and short “rays” that gradually taper towards the center.

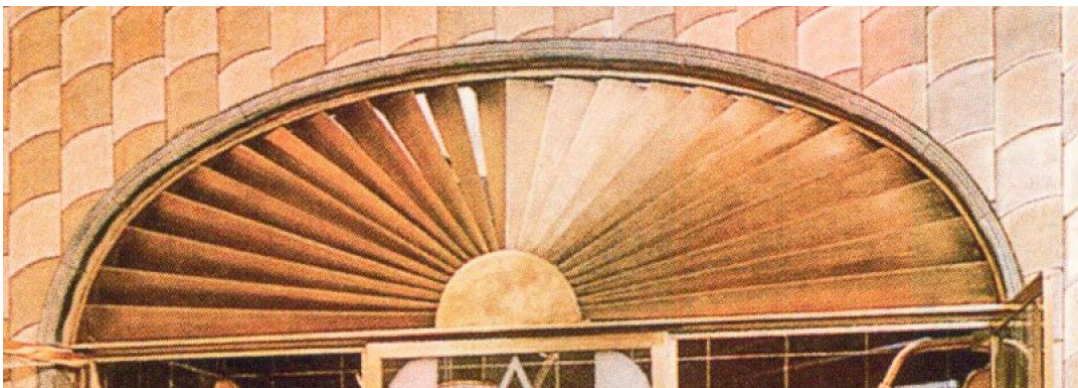


Figure 14. Example of the sunburst motif inside an Art Deco era building. Sloan & Robertson, architects, *The Executive Suite Bathroom of the Chanin Building (detail)*, 1929. [39]



Figure 15. Example of the sunburst motif in Art Deco furniture. Clement Rousseau, *Chair of ebony, ivory, and sharkskin*, 1921. [40]



Figure 16. Example of the sunburst motif in an Art Deco era building. George J. Dietel & John J. Wade, Sullivan Jones, architects, *Stained Glass Window in Buffalo City Hall*, 1929-31. [20]



Figure 17. The fungus *Mycena sect. longisetae* (2012)
photographed by Steve Axford. [21]

3.2 Analysis of Art Deco *Animalier* Sculptures



Figure 18. Maurice Prost, *Panthère Noire en Marche*, 1927. [41]

Before the mid 19th century, jurists of the Paris Salons would not accept sculptures solely depicting animals (*animalier*) because they spurned the principle of humanity's sovereignty over animals [22]. It was not until Louis Phillippe commissioned Antoin Louis-Bayre to create large-scale animal statues for public spaces around Paris that the bias against *animalier* began to abate [22]. Sculptors of *animalier* themes enjoyed newfound acceptance and success in the following decades [22]. At the turn of the century, artists started to adopt more expressive (as opposed to realistic) approaches to sculpting animals, imbuing them with selfhood [22]. Art Deco *animalier* sculptors, building upon Cubist and Futurist influences of the 1910's, sought to “streamline and stylize shapes and surfaces [22].”

3.2.A Form

A typical feature of many of the Art Deco *animalier* sculptures is the contour line. It is ubiquitous in the panther sculpture by Maurice Prost, most noticeably in the head and legs (Figure 18). The contour lines delineate abrupt plane changes in the form, which diminish naturalism by adding dimensionality that in reality is much less pronounced. Additionally, the lines add visual interest, rhythm, and guide the eye around the form.

Another key feature of the *animalier* sculptures is the graceful shapes that denote the animals' physiques. To give the animals a sleek appearance, sculptors eliminated anatomical details, for example: paws lacking individual toes and noses without nostrils.

Art Deco *animalier* sculptors used the streamlining technique, among others, to cultivate bodies of work with trademark styles. Jan and Joël Martel, twin brothers and Art Deco sculptors, became known for their innovative use of new "machine age" materials and their Cubist-influenced structural sculptures of animals and humans with demarcated geometric forms and patterns (Figure 19) [22]. François Pompon, a celebrated Art Deco *animalier* sculptor, evinced the distinguishing features of the animals he sculpted, posing them with liveliness and polishing them "to capture the light" (Figure 20) [22]. These artists' attention to smooth glinting surfaces, select detail, and bold lines gave the works their aerodynamic "streamlined" quality.



Figure 19. Martel brothers, *Chat Assis*, 1929. [42]



Figure 20. François Pompon, *Ours Blanc*, 1924-25. [23]

3.2.B Texture

A majority of *animalier* sculptures are made of patinated bronze. First, the artist modelled a sculpture until he or she was satisfied with it. Modelling involves appending together masses of a pliable medium, such as clay, wax, plaster, or gypsum, usually onto a wire armature [22]. After completion, the sculpture was fired and then delivered to the foundry for casting in metal by the lost-wax or sand-casting methods [22]. Once cast in bronze, the sculpture's superficial flaws and "surviving mould lines" were removed in a process called chasing [22]. Finally, the sculpture's surface was "brushed or sprayed with a mix of heat-applied chemical oxides to create the desired finish, usually [a] black, brown, or verdigris [patina] [22]." According to Jeffrey Maish, conservator at the J. Paul Getty Museum, patinas not only imparted the bronze sculptures with naturalistic colors, they also sometimes preserved the mark-making and contour detailing on the underlying material [24].

3.3.C Lighting



Figure 21. A photograph of an Art Deco *animalier* sculpture that provided reference for lighting. Kithara Sanka, *Stag*, 1930. [35]

Photographs of the *animalier* sculptures I am referencing (Figure 21), as well as many museum photographs of bronze sculptures have similar lighting set ups and backgrounds. The backgrounds of the photographs tend to have subtle downward gradients, from dark to light, without distinction between foreground and background. The shadows are very light, due to what appear to be soft lighting set-ups. In the article *Light on a dark subject*, journalist James Fenton recommends using a diffuse lighting

scheme that makes shadows “gentle and gradual”, mentioning that this type of set-up requires at least five key lights to be effective [25].

This type of lighting illuminates all parts of the sculpture and lacks the harsh shadows of dramatic, high-contrast lighting set-ups. I chose to recreate the diffuse lighting setup and gradient background in my 3D renders not only to mimic the real-world references, but also to showcase the details and entirety of the digital sculpts in a flattering way.

3.3 Three Studies

Before settling on the components of the studies, I sculpted rough 3D maquettes in Zbrush of various animals and fungi to consider the multitude of ways they could be combined. For example, I embossed a stylized botanical pattern on a marten (Figure 22). I also merged a wolf with coral fungi by morphing the animal’s limbs into the branchlike structures of the fungi (Figure 23). A third maquette displays an oversized shelf fungi growing out of a pronking springbok (Figure 24).

Ultimately, I selected three animals and paired them with the previously discussed fungi and corresponding Art Deco motifs for each study. I made these pairings because I thought they would be adaptable to the Art Deco style and allow for variations on the theme of grotesque affliction of the body. For this project, I narrowed the focus on combinations of animals and fungi which allowed them to retain discrete characteristics rather than fully blending their features.



Figure 22. Early 3D maquette of a marten with an embossed stylized botanical pattern (2015).

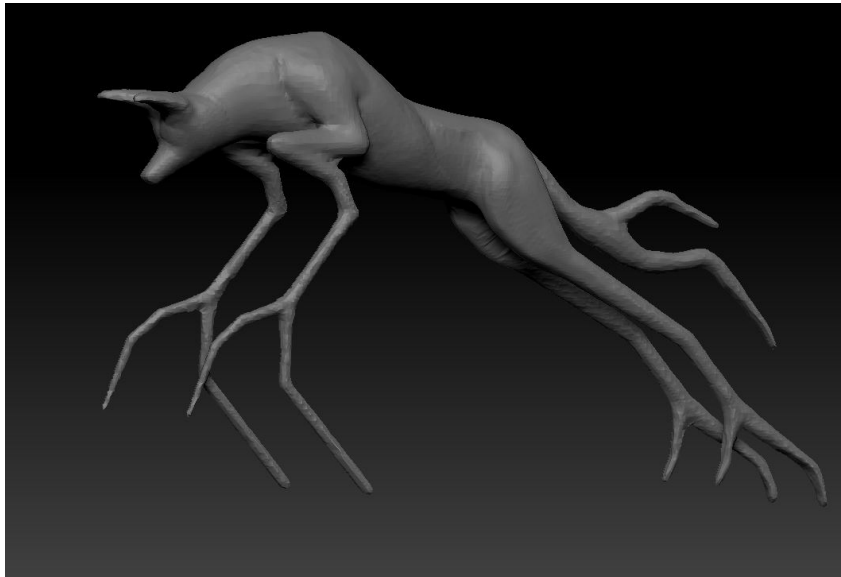


Figure 23. Early 3D maquette of a wolf with coral fungi limbs (2015).



Figure 24. Early 3D maquette of a springbok with oversized shelf fungi growths (2015).

3.3.A Design of Study 1



(a)



(b)



(c)

Figure 25. The components of Study 1: (a) Newfoundland Pine Marten photographed by Bailey Parsons. [31] (b) Steve Axford, *Mycena sect. longisetae*, 2012. [21] (c) Sunburst Motif, George J. Dietel & John J. Wade, Sullivan Jones, architects, *Stained Glass Window in Buffalo City Hall*, 1929-31. [20]



Figure 26. Sketch of Study 1.



Figure 27. 3D Rendering of Art Deco Stylized *Mycena sect. longisetae*.

Study 1 (Figure 26) visualizes how a parasitic fungus would engulf a Newfoundland Pine Marten (Figure 25a). The parasitic fungus is a stylized version of *Mycena sect. longisetae* (Figure 27), further emphasizing the Art Deco Sunburst motif its fungal counterpart already suggests (Figure 25b & c).

3.3.B Design of Study 2



(a)



(b)



(c)

Figure 28. The components of Study 2: (a) Kudu. [33] (b) Drahkrub, *Coprinus comatus*, 2011. [16] (c) Sconce by Albert Cheuret displaying the Layered Scale Motif from 1925. [36]

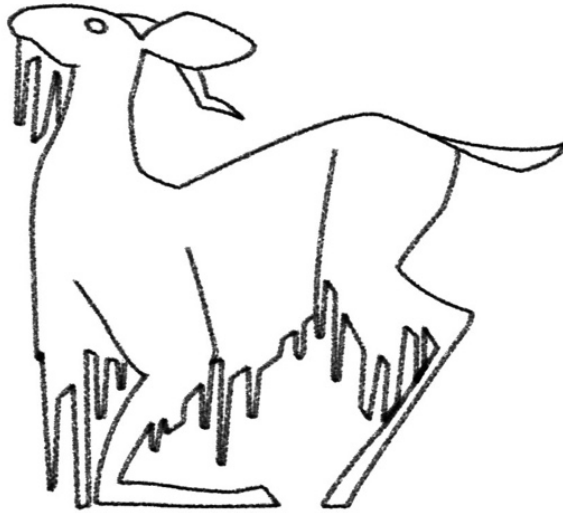


Figure 29. Sketch of Study 2.



Figure 30. 3D Rendering of Art Deco Stylized *Coprinus comatus* scale.

Study 2 (Figure 29) shows a Kudu's body melting in the way that the mushroom *Coprinus comatus* does (Figure 28b). The Kudu's mane is structured like the layered scale motif (Figure 28c), so it resembles the scales of *Coprinus comatus* (Figure 30) and incorporates the same deliquescent behavior.

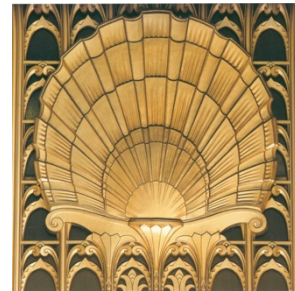
3.3.C Design of Study 3



(a)



(b)



(c)

Figure 31. The components of Study 3: (a) Richard Fisher, *Lesser Sooty Owl at Bonadio's Mabi Wildlife Reserve*, 2008. [32] (b) Steve Axford, *Schizophyllum commune*, *Booyong*, 2010. [30] (c) George W. Kelham, architect, *Bronze Transom Grille of the Shell Building (detail)*, 1929-30. [19]



Figure 32. Sketch of Study 3.

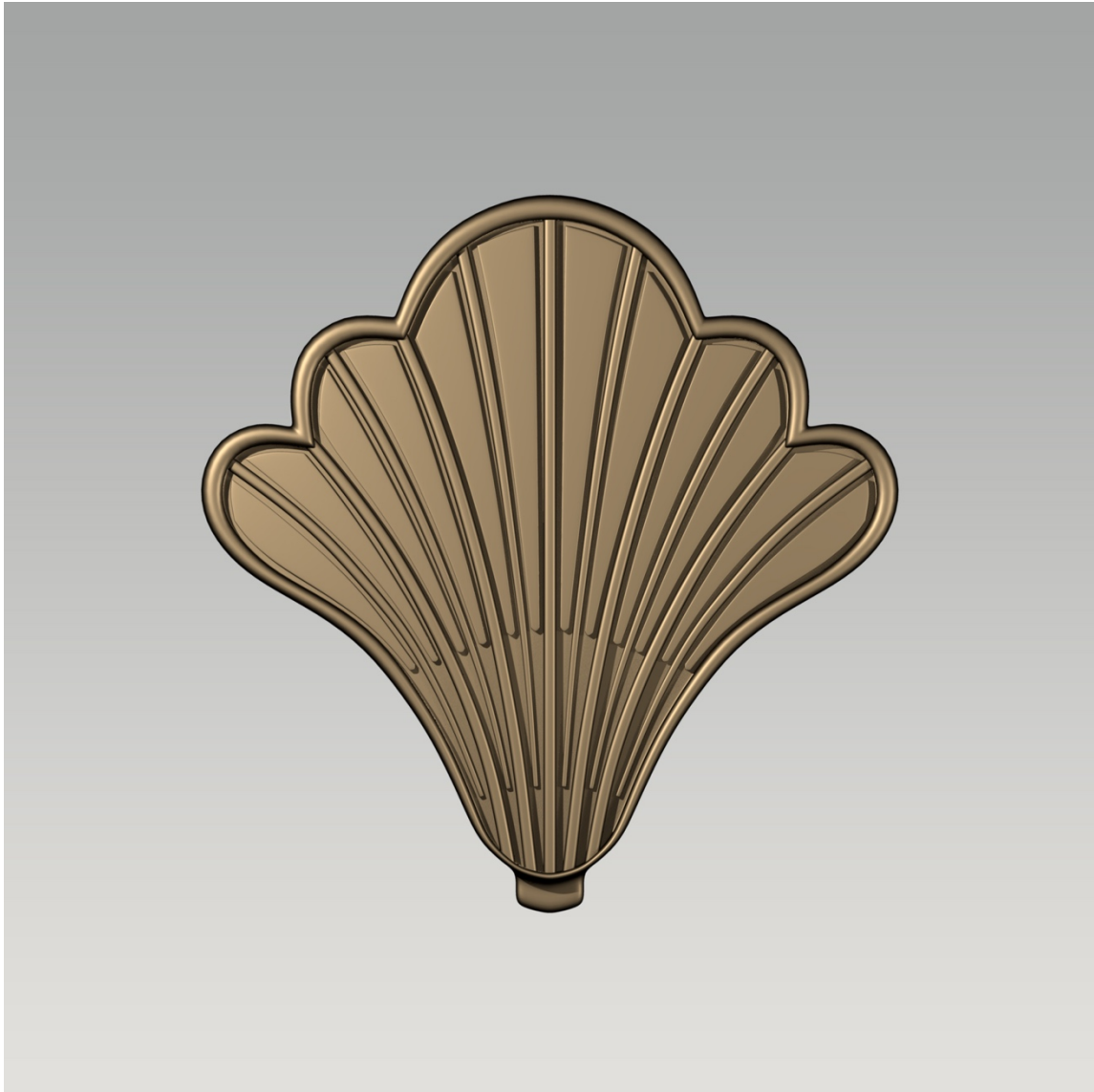


Figure 33. 3D Rendering of Art Deco Stylized *Schizophyllum commune*.

Study 3 (Figure 32) exhibits a stylized version of *Schizophyllum commune*, showcasing its modified fan motif, growing out of a Sooty Owl's body (Figure 31a & c). In this case, the wood-decaying fungus is more localized on its host (Figure 31b).

After settling on the components of each study, I devised a workflow to make the 3D renders, which included sculpting, re-topologizing, rigging, shading, and rendering.

IV. IMPLEMENTATION

4.1 Modeling

4.1.A Sculpting

Using the 3D sculpting software Zbrush, I sculpted the three animals in neutral poses. Zbrush is particularly well suited for sculpting organic forms since it allows the user to focus entirely on the artistic aspect of modeling, with no need to first develop a deformable topology for the mesh. The topology of these sculpts are high-resolution.

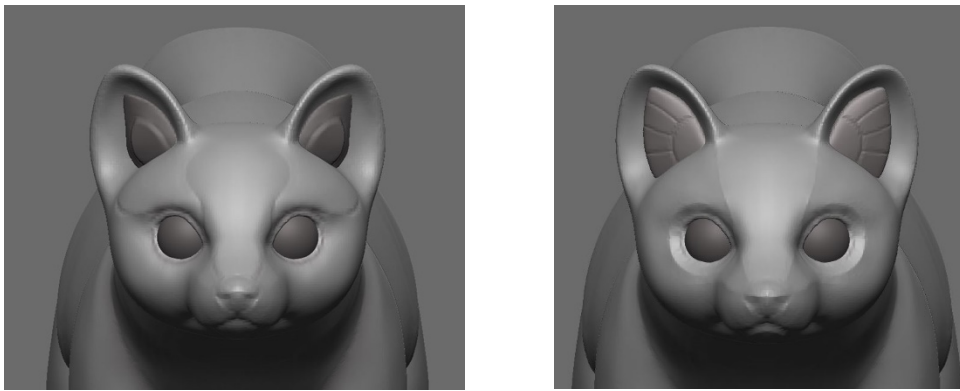


Figure 34. A comparison between an earlier iteration of the Pine Marten model and a later one with more Art Deco features.

During the sculpting phase in Zbrush, I made various iterations of the models, starting with simple models that captured the overall shapes of each animal. Zbrush allowed me to make quick modifications. I experimented to get the features that were most evocative of Art Deco. All three animals were sculpted in the same faceted style as many Art Deco *animalier* sculptures. Details like whiskers, individual feathers, and toes

were eliminated to streamline the forms. Earlier iterations of the models were lacking the faceted look, so I added more plane changes and contour lines to the final models. For example, with the Pine Marten, I added hollows to the eyes and more contour lines around the snout, lower jaw, and forehead (Figure 34), in order to achieve a similar aesthetic to Prost's *Panthère Noire en Marche* (Figure 18).

All three of the mushroom meshes and bases of the sculptures were modeled in Maya. Maya has tools that are ideal for creating symmetrical meshes; one such tool that I used extensively was the Duplicate Special Tool, which allows the user to translate, rotate, and scale copies of a mesh. This was especially useful in creating the “rays” of the *Mycena sect. longisetae*. I also used it to create the various pieces that make up the *Schizophyllum* mushroom.

4.1.B Re-Topologizing

After the models were sculpted, they were re-topologized in Maya. I imported the high-resolution meshes from Zbrush into Maya. Using the Quad Draw Tool in Maya, I drew lower resolution topologies made up of quadrilaterals that were suitable for deformation on top of the Zbrush mesh (Figure 35). Less resolution allows for smoother surfaces, which was important to have in order to make the animals look like streamlined sculptures. When creating topology, it is crucial that the topology of the mesh supports and “flows” with the form, otherwise the mesh will deform strangely after it's been rigged.

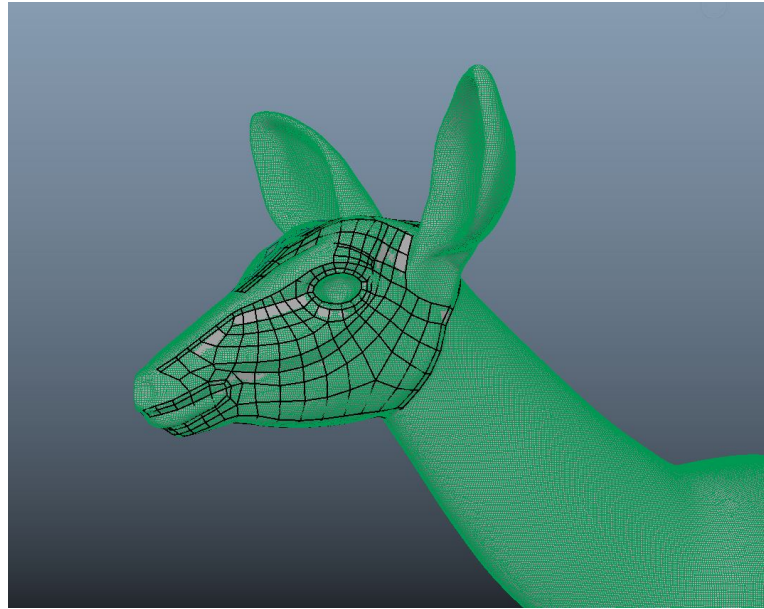


Figure 35. A screenshot of the re-topologizing process using the Quad Draw tool in Autodesk Maya.

4.1.C Posing

The posing of the animals was accomplished using the TransPose Master in Zbrush. The TransPose Master creates a single mesh that is a combination of all the subtools, such as the eyes, horns, or other pieces that were separate from the animal meshes. I was able to use the Transpose Tool to then move the limbs of the animals. I used the sculpting brushes to refine the poses and fix the areas of the models that became pinched or distorted from rotating and moving the limbs. Finally, I transferred the meshes back to Maya to make further detailed refinements.

4.2 Texturing

I decided to use Mental Ray, rendering software made by NVIDIA, to texture and render the final images.

Mental Ray comes with a series of material shaders, including Mia Material X, a “physically accurate, energy conserving, high dynamic range shader [26].” I used a Mia Material X shader that has customizable parameters, like Reflectivity and Fresnel Reflection, to create the bronze texture.

4.3 Rigging

I chose to rig most of the mushrooms so that I could manipulate their shape, size, and placement easily with deformations instead of manipulating the meshes directly. The simplest rig was the one for the *Mycena sect. longisetae* cap; all it needed was a single joint and a scale constraint so that I could move it around on the Pine Marten mesh and could manipulate the size, too.

The *Schizophyllum* rig was also quite simple, but I did add two bend deformers: one to slightly bend the sides of the mushroom towards the center, and a second to drag the top of the mushroom forwards or backwards. The deformations gave the mushrooms a graceful curve that made their layered placement on the owl look naturalistic; without them, the mushrooms would have been rigid and awkward-looking .

The *Mycena sect. longisetae* rig was the most complicated. I decided to rig it with both IK (inverse kinematic) and FK (forward kinematic) controls, in order to have the most control over the poses. I first used the FK controls to bend the mushroom, which ensured that the position of the cap of the mushroom followed the angle of

rotation of the joint on the stalk below. Next, I used the IK controls to refine the pose of the mushroom. I decided to make the IK rig stretchy, so that I could manipulate the height of the mushrooms.

Once the rigged mushrooms were completed, I was able to reference the rig files multiple times in the final scenes with the animal models. I placed, scaled, and manipulated these referenced mushroom files to create the final looks. Without the rigs, it would have been tedious to model the pose for every single mushroom, especially without the option of making quick, reversible changes that controls allow.

4.4 Lighting

For the lighting, my goal was to recreate the soft diffuse lighting used in reference photographs of Art Deco bronze sculptures. I ended up using multiple lights to achieve this effect. I used one high intensity spotlight as the key light to shed light on focal points of the digital models. I used various less intense spot and area lights to softly illuminate the rest of the models. Finally, I added rim lights to highlight parts of the models' silhouettes. Additionally, these rim lights provided illumination to the bases of the models.

To create the shadows in the precise locations that I wanted, I used separate shadow passes to isolate the shadows cast by the bases and animal models. Using these isolated shadows, I was able to composite them into the final image so that they appeared to “float” on the background in the same way as the shadows do in my primary reference image (Figure 21).

4.5 Rendering

To create the final images, I rendered multiple passes that were then transferred to Adobe Photoshop. I was able to add the gradient background and insert the separately rendered shadows.



Figure 36. Final render of Study 1: Pine Marten, Sunburst Motif, and *Mycena sect. longisetae*.

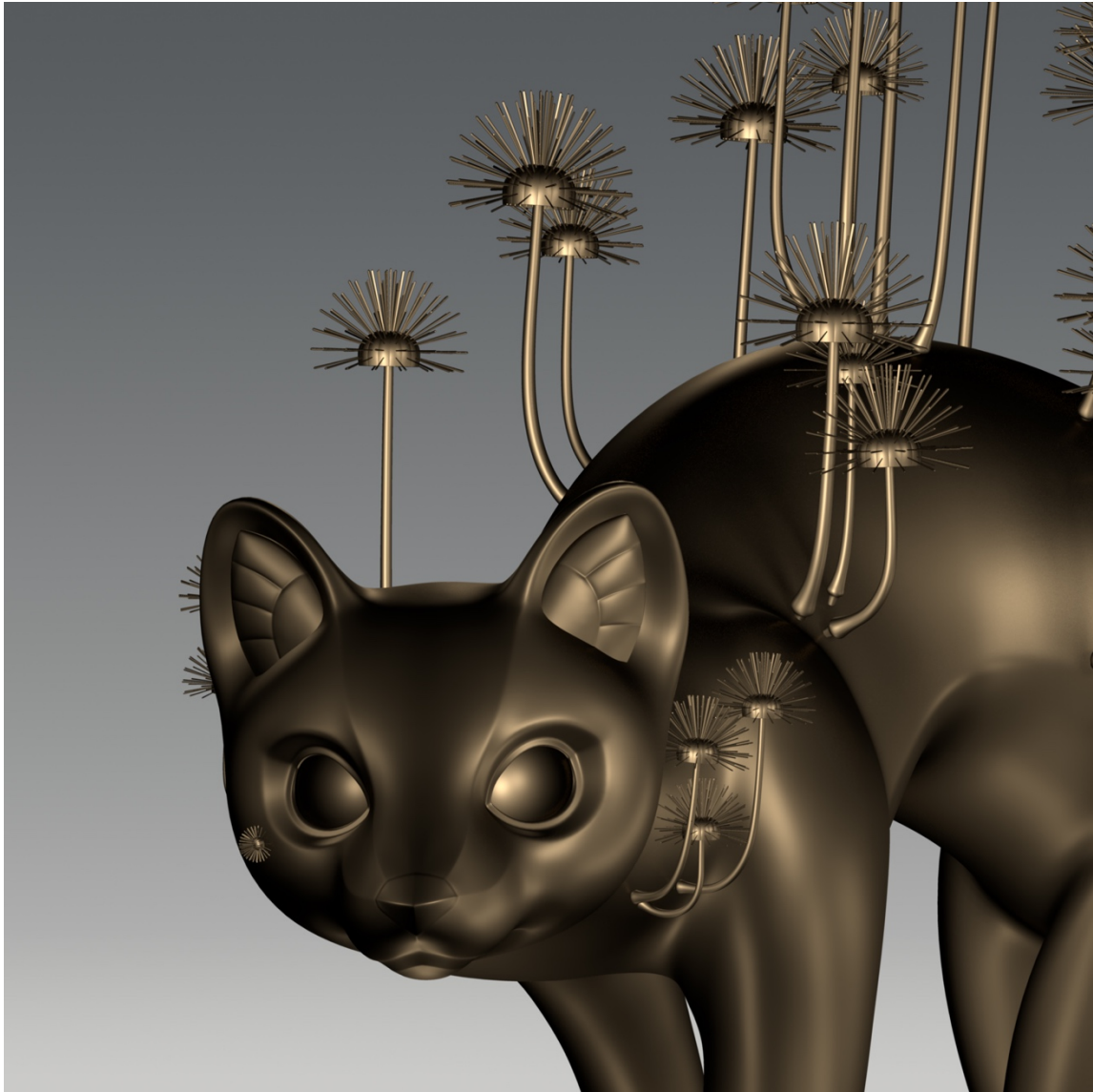


Figure 37. Close up of Pine Marten Study.



Figure 38. Final render of Study 3: Sooty Owl, Fan Motif, and *Schizophyllum commune*.

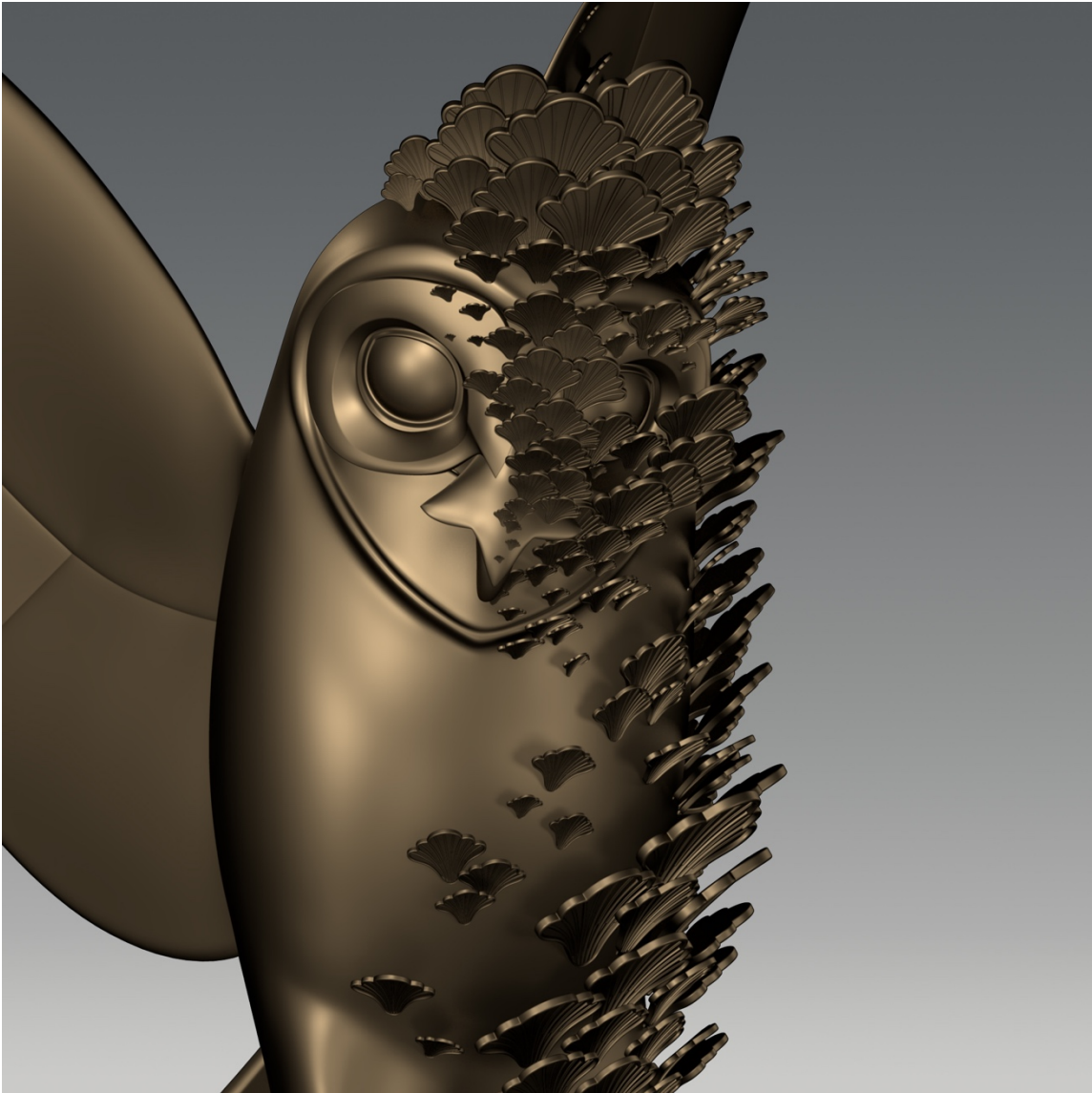


Figure 39. Close up of Sooty Owl Study.



Figure 40. Work in progress render of Study 2.



Figure 41. Close up of Kudu Study.

V. CONCLUSION

5.1 Results

The aim of this thesis was to create three digital sculptures with an overall Art Deco aesthetic and a grotesque twist. It was necessary to develop a taxonomy of shapes identifying similarities between Art Deco Motifs and fungi. This taxonomy guided my designs of the 3D mushroom models and assured the results would have an Art Deco sensibility. Conducting a visual analysis of Art Deco *animalier* sculptures enabled me to distinguish the design properties that are unique to the style and to identify the diffuse lighting set up that would be most befitting of the bronze models.

I sculpted and re-topologized the animal models, striving to adhere to the Art Deco *animalier* style by streamlining the animals and using contour lines to differentiate plane changes. I sculpted and rigged stylized geometric versions of three species of fungi and placed them on the animal models to evoke an ambiguous reaction in viewers, which is what grotesque works of art tend to do. I used digital lighting and background setups similar to those used in photographs of existing Art Deco bronze sculptures; these gave the three studies a sense of unity and contextualized them with their references.

Success can be determined by how many qualities of Art Deco the 3D renders (Figures 36 – 41) embody and by the reactions viewers have to them. Improvements could be made at every step of implementation, such as: more graceful or dynamic posing of the animals, developing a more realistic and customized bronze shader, more attentive lighting, and more sophisticated post-production enhancements to the final images.

5.2 Future Work

There are many possibilities for future directions of this research. Stop motion animation is a potential avenue for exploration. The models of the animals and fungi would be 3D printed, lit in a physical studio, and photographed for each frame of the animation. This outcome would require funding to print the 3D models, as well as collaboration with a lighting artist and photographer.

This project could develop more fully in the CG realm as well. In order to dramatize the animals' psychological and physical reactions to the fungi, they could be animated to show a range of expressions and movements. This would require producing robust body and facial rigs with intuitive controls that animators can use to create convincing performances. The outcome of this approach would be three time-based works that show the continuous evolutions of the forms with movement and audio.

Implementing a procedural approach to modeling the fungi is a potential area of research. It can be laborious and time-consuming to create many mushroom models and modify them one-by-one. Instead, user-friendly tools could be made in a software package like Houdini to allow users to create art direct-able clusters of mushrooms, with parameters such as the number of mushrooms per cluster, the height of the mushrooms, the angle at which the stalks of the mushrooms bend, and so forth. An L-System based tool could be created to model clusters of *Schizophyllum commune* fungi, with parameters that allow the user to determine how many lobes the fungi would have, as well as growth patterns.

Another dimension of sophistication could be added through exploration of how the fungi would affect the interior of the animals' bodies: How would the fungi destroy the inner organs and muscles? Would the skeletons be left behind? These detailed, gory visuals of decomposition would widen the chasm between beautiful and revolting, foregrounding the works' grotesque nature.

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