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The Story of a Blind Wolf

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THE STORY OF A BLIND WOLF

By

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF MASTER OF FINE ARTS

IMAGING ARTS/COMPUTER ANIMATION

SCHOOL OF FILM AND
ANIMATION

COLLEGE OF IMAGING ARTS AND SCIENCES

ROCHESTER INSTITUTE OF TECHNOLOGY

ROCHESTER, NEW YORK

MAY 2018

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Abstract

The Story of a Blind Wolf; is a 3D animated graduate thesis film, whose length is five minutes forty seconds. It was screened in the School of Animation at Rochester Institute of Technology. The film is in a realistic style and made by CG (computer graphics).

The story takes place in a small puppet theater. While a piper is playing a flute for his audience, a wolf interrupted his performance. The wolf asks the piper to help him escape the hunt. The piper has sympathy for the wolf, so he helps him, lies to the hunter, and saved the wolf. They became friends, dancing and celebrating in the forest. While celebrating, the wolf sees through the tree behind the piper a dangerous snake that is going to hurt the piper. The piper doesn't notice the snake behind him. So, when the wolf attacks the snake to save the piper's life, the piper thinks the wolf is going to hurt him after he saved his life. The piper misunderstands the wolf and runs away. Then he met the hunter, in the hunter's abetted, the piper using hoe beat the wolf to die.

In this film, I want to propose that when confronting things, we are easily interfered by the outside world and give up the ability of thinking independently, which gives rise to unnecessary misunderstandings among people and eventually leads to tragedies.

Introduction

When I was young, I loved to read fables very much. Children are fond of reading fables because these stories can bring them in a world of imagination. Reading those stories, children not only pay attention to the plots but bring these plots into their daily life. Each animal plays a role in this world and a good balance between humans and animals is quite

needed in the world. The most important meaning of fables is that each story embodies a philosophy of life. Children may not be able to fully understand the philosophy of life, but each character in the story can bring them into a wonderful world. When kids grow up, they will feel fortunate to recall these stories hey read in their childhood.

The advantage of fable is, that its story is simple and interesting, and its main characters can be human and personified animals. I tried to create a relatively short fable story whose language is incisive and concise, and structure is simple with strong expressiveness.

I set the background of my graduation film at puppet theater to create a fantastic and bizarre puppetry world. This setting is conducive to leading audience easily into the story and at the same time interpret the fable world easier. Besides, drawn animation has some limitations to the setting of puppet theater, therefore, I manage to accomplish my thesis film by using 3D technique. Honestly, it's a great challenge for me to make 3D animation in realistic style, because using CG to blur the boundaries between reality and illusion is a very time-consuming and cumbersome project. However, I still want to use 3D technique to create a fantastic and vivid narrative scene. What's more, the three-year study at the Rochester Institute of Technology helped me master 3D technique better which makes me become more confident to complete the film well.

On the other side, I am very lucky to have thesis committee members, with two thesis chairs, who have been every helpful to me. At first, I want to express my sincere thanks to my second thesis chair—Mari Blanchard, a very intelligent and experienced

artist of filmmaking. She gives me great help throughout the filmmaking process and offers me a lot of valuable ideas to the development of my story.

Mark Reisch with rich 3D artistic background of filmmaking also helps me to deal with all the problems relevant to 3D techniques. With his help, my render time has been remarkably improved.

Charles Bandla, my first thesis chair, inspires me a lot and gives me a lot of effective suggestions to make the significance of my story more profound and keep my film in the right direction. I also want to express heartfelt gratitude to Charles whose flexible and great ideas give me lot of encouragement to finish my thesis film.

Pre-production

Inspiration

My thesis film is inspired by my own experience. Just as I mentioned before I am addicted to reading the *Aesop's Fables* in my childhood. Although those stories are short, they illustrate moral maxims in a satirical way, which brings great inspirations for people to know more about this world. China has fable stories as well. The difference between Chinese and western fables is that Chinses fables usually are presented through opera. Inspired by that, I want to use traditional Chinese shadow puppet to show concept design's visual look. With, I started to write my thesis story and screenplay.

Here is a story talking about my own experience. When I was in middle school, I had a friend, and we were in the same writing class. One day, our teacher gave us a

quite difficult writing assignment. I have done a lot of research and reading to accomplish this assignment. When I just finished my writing, my friend called me to talk about that assignment. I said I had just finished it, then she told me she didn't that assignment because she hanged out with her "boyfriend". So, she wanted to borrow my writing assignment to get some inspiration and it would be easier for her writing. And she affirmed that she just read my writing for reference and wouldn't copy it. I trust her very much, so I lent my writing to her. A couple of days later, my writing teacher contacted my parents, and told them that I had plagiarized my classmate's assignment. Then I understood what happened. It's my friend who had copied my writing and informed teacher that I had copied her writing. Although the truth has been brought into daylight, I still feel exceptionally depressed. After this thing our friendship was broken up and I never talked to her again.

So, when I was writing my screenplay, I wanted to show my real feeling at that time. The idea I want to express is that we should be cautious to help the people. We need to think about what kind of person they are before helping them. Then I created a story about a right-minded hunter who saved an innocent person from an evil wolf. And the wolf used piper's mercy to deceive him. The further meaning of this story is that be a kind person but do not easily trust a person without knowing their background. Bad people will not be touched by your kindness. And it also warns people not to be merciful to evil.

Initially, I showed this story in thesis preparation class two semesters ago. All my classmates didn't really pay attention to my story, or they thought this story was uninteresting…… Because of this, I had begun to struggle to make the story more twisted

and interesting, and to bring more complicate feeling and deeper meaning into the story. Cathleen Ashworth is my thesis preparation teacher. She was very kind and gave me a lot of help in my thesis proposal. She questioned me why I want to shoot this story. Do I want to tell people not to help others?

I am very lucky to have my thesis committee member. After meeting with my thesis chairs and committee members, I got more inspiration to make my story more interesting. I wanted the wolf to be more humanoid. Then I exchanged the position of the human and the wolf. Also, at the same time, I tried to balance the concept of hunter. I found the hunter who plays a role of punisher does not make sense. In this way, a new story which is more attractive and with more twists and turns come out.

Story

Before the pre-production, I had been struggling with creating story. The original story was quite different with the one I presented now. Before the production, I wanted to make a two-dimensional experimental film displayed with 3D technique. In the previous version of my concept, the wolf was evil and crafty. The piper was a very innocent person through the whole film. But after I talked to Charles, my first thesis chair, I decided to change my old concept and add a twist to my story by the following concerns:

• According to people's comments, the original story is prone to mislead readers to think what I want to express in the story is to call people not to help others.

• The choosing of character: what role did farmer paly in this story? My thesis committee questioned that why farmer has authority to be the punisher to help the reader kill the evil wolf.

- Accident creates conflicts.

- Final, abandon the farmer's character, and the hunter will completely replace the farmer to finish the whole performance.

• Analyze the position of each character. In the hunter's point of view, the wolf is vicious, so he is the messenger of righteousness to hunt the wolf. The wolf, as a prey, is in a passive state, therefore, in his eyes, the hunter is an unjust existence. At the beginning of the story, the piper is very innocent and kind and there's no clear distinction between evil and justice, that's why he helped the wolf to escape from hunting. But when the hunter told him that the wolf was very vicious, the hunter's awareness is imposed to the hunter. While the piper misunderstood the wolf, he chose to listen to the hunter's advice and gave up thinking about whether there is other possibility about the truth and run away.

Description of the Story of a Blind Wolf

In a small puppet theater, a puppet piper is hanged with wires, and wires send him from backstage to the stage. When he stands on the stage, he is confused a little bit, but when he sees the flute in his hand, he suddenly understands what he is going to do. He gets ready for the performance. While curtains open with music, the piper is very excited to his performance. Shaking head with drumbeats, he plays the flute with sweet and bright tone. Attracted by the beautiful sound, a bird stands by the piper and stays on the piper's shoulder.

Suddenly, a noise disturbs this peaceful sense. The bird is shocked and flies away. A wolf jumps out from bush, and quickly run in front of the piper. At first, the piper feels afraid, but he finds the wolf looks at him pitifully and says " A hunter is going to kill me, please hide me! Hurry up, please! If I could live, I will repay you in the future." The piper feels sympathy for the wolf, because the wolf looks harmless and is very miserable, just like a whimpering puppy. So, he hides the wolf behind a big stone. Piper has an idea that he can seat on the stone behind which the wolf is hiding. He plays merrily, waiting for the hunter's coming. After a while, a hunter walks past the piper with a scatter gun and asks about the wolf. The man lies to the hunter and says that the wolf has ran in the opposite direction. After the hunter leaves, the piper calls the wolf to come out and tells him that the hunter leaves and he is safe now. The wolf says: "Thank you sir. You have saved my life". Piper and the wolf, holding each other's hands, dance in the forest, to celebrate with this sudden friendship. They clap hands and laugh at how they are just survived from hunting.

While the wolf a peep through a tree behind the piper, he horribly finds there is a big and dangerous snake that is reaching the piper. This snake is very smart and crafty. The piper doesn't notice the snake's existence. The wolf points to the snake and wants to warn the piper, but the piper still think that the wolf is joking! So, he doesn't pay attention to what wolf told. The snake moves slowly behind the piper and shows his poison tooth to bite him. In a moment of desperation, the wolf jumps on a rock with his teeth snapping and growling to menace and attack the snake. But unfortunately, because the piper is so close to the snake, the wolf's claws also scratch the piper's face.

Piper is afraid, and starts to run, leaving the wolf in the forest lonely. Then the piper meets the hunter, he met before. The piper tells this story to the hunter. The piper wonders why the snake tries to attack him after he saved his life. The hunter listens to piper's story and feels angry with the wolf. But he also is disappointed with the piper because he lied to him. The hunter advises the piper to find the wolf again and he is going to help him to teach the wolf. Later, they find the wolf has been trapped by a trap which is set by the hunter. The trap is so tight that even if the wolf does his best to struggle, he still can't get out from it.

The hunter picks up a very sturdy wood stick on the ground. and throws it to the piper. He signals the piper to move forward and beat the wolf. At first, the piper feels very confused and entangled. But with the hunter's pressure and encouragement, he finally wields the stick severely to smash down onto the wolf's face. At this time, the lights in the theatre begin to dim. The piper uses stick to beat the wolf to die. The curtains pull down, as the shadow continue to beat the wolf.

In the backstage, the piper feels empty into his heart…. Then he just realizes the weapon is still in his hand. He throws that wood stick away in a fluster. Then the wire pulls the piper out of stage. He looks sad with fear and confusion. He questions himself what is the point everything begins to move in the wrong direction?

Character Concept Design

My initial idea is to make a 3D experimental film. The visual look is like 2-dimentional paper puppets with their shadows being part of the animation. The main style I want to present is traditional Chinese shadow puppet play.

But the disadvantage of shadow puppet play is that it is two dimensional, which limits the ability to make animation in 3D greatly. To achieve the acting purpose, I changed Chinses shadow puppet play into European puppet show.

Chinese shadow play

The initial idea of puppet is derived from *Pinocchio*, an old Disney 2D movie. By sheer coincidence, I borrowed the DVD from my friend. Then I was deeply attracted by this old story. The fairy tale shows that the little puppet treats the world honestly, simply and innocently. *Pinocchio* is also a fable story. But unlike most western fable stories, it does not talk about the beautiful princess or aristocrat who lives in a big castle happily. Pinocchio's adventures, like living with ordinary people in Italy, makes the fable story with more profound implications. I have got a lot of inspiration for my concept from this movie, because I also want to show real life phenomenon in my film. I let the piper to be a smaller character like Pinocchio. He is an innocent person with warm heart

to help other people. But on the other side, he also is a quite stupid character and changes his mind easily because of the hunter's instigation.


Pinocchio 1940   *wood figure*

In my initial concept design for the piper, I want to give him a quite bright and cute preforming suite with a flute and a red hat. Thinking of the innocent girl in Chinese fairy tale— *Little Red Riding Hood*, I give the piper a red hat as well. I try to stress the piper. When audience see him at first sight, they will get that he is a kind and funny and is a kind of "good people". But in the middle of the story, he follows the hunter's point of view and starts to lose himself. At last, he stupidly kills the wolf which has truly helped him. In this story, no one is evil except the snake. I give every main character a positive image but grant them with different personality and position, which leads to the tragic result of the story. On the other side, to develop the concept, I spent a specific time on doing the research about European puppet. I collected a lot of materials for reference. Then I decided to simplify the character and enhance the wood feeling of characters, so as to make the audience identify the background of the story in the first place.

the Concept of Piper

On the image of the wolf, I designed assorted versions. The first version looks quite ferocious, which accords with the general belief of wolf's evil nature. In the original concept design, wolf's head is triangle-shaped, and its size is same with the piper. After finishing the first sketches, I had a meeting with my thesis chair Charles; and showed the initial concept design and rough animatic. Charles suggested me to change the concept of wolf by making it more humanoid and cute. The origin of this story and the personality of the character, I decided to accept Charles's suggestion. Compared with the piper, the wolf's personality is smarter and more watchful.
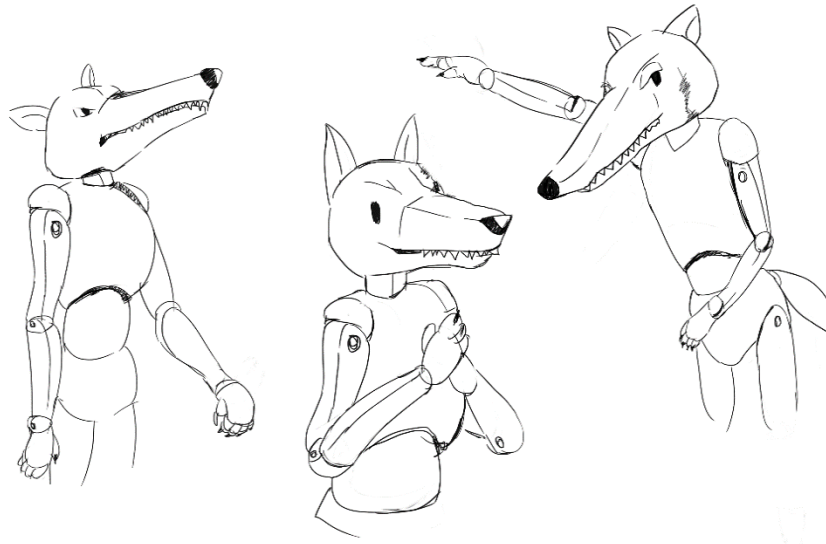
the Concept of woof

The hunter's image actually has been in my mind for a long time while I am writing this story. I came up with the thought to make the hunter with a feeling of justice. He is significantly taller than others. The hunter has a shotgun, to show the authority of power in this story. Hunter's face is more angular to interpret his tough and stubborn image, and to show that he is a practitioner of justice. The hunter stands for invisible violence, that is common in really life. These so-called defenders of justice are merely order-holders who gradually enslave people and let them to give up thinking about the truth gradually.

Symbolism and Metaphors

In the process of making my thesis film, I have learned how to symbolize my characters and environment. I set my story in a certain environment. My teacher Chales

Bandla suggested me to use stage props flexibly and think about the meaning of the ropes controlling the puppet. Before he talked to me, the background just is a flattened image, but after that, I started to think about the style of those props and environment-and how to apply symbolism and metaphors in my story reasonably to make the core of the story more simple and clear. This is not only about the design of props but about the use of color palette on each character.

Firstly, it's the usage of props. As everyone knows, puppets are usually controlled by ropes or threads, and the same as puppets, we are also controlled by invisible ropes in the real world. In this fast-paced and competitive society, people are easily to go with the stream and lose themselves in their busy life. Puppet's ropes precisely allude to the realistic society. In order to express this allusion clearer, I add the parts that puppets are controlled by machine in the background in preproduction. But, this doubles my workloads invisibly. In the process of making puppets and ropes, I confronted with many unknown new things, leaving me with a lot of valuable experience related to 3D animation.

Then it turns to the design of props used at the stage. The puppet is 3D whose image is round and full in a way that looks attractive. At first, the design of props used both in the background and by the characters are in similar style. But because the whole story merely performs at the narrow stage in puppet theater, too complex background and props are likely to lead to a strong visual sense of concentration, which will steal characters' thunder. Therefore, I tried to simplify background and props by replacing the original design style with symbolic styles. Then, my first solution was to project planar graphs on the screen to take the place of background props. The advantage is that the

whole production progress is relatively simple and time-saving and the visual effect is more harmonious with stage. The shortcomings are obvious as well, including the lack of layers of graphics and the rigid conversion of scenes. Combined with the first two options, I found a new plan which works better in practical production. In the plan, the props used by the main characters is different from the props decorating the whole environment, so as to simplify the complexity of props decorating the whole environment. But these props are placed in a more hierarchical sense, at the same time using the parallel movement of props to convert scenes makes the narrative story more interesting.

Final design of wood

Final design of Piper

*Final design of hunter*

Production

After finishing animatic parts, I found there are many questions and uncertainties, but this is an inevitable and important step in filmmaking. However, after knowing that these uncertainties may hinder my production process, I all the more wanted to try to make the film as early as possible to identify whether my plan is feasible. Simultaneously, I also needed to make strict time schedule to ensure the process of filmmaking in all aspects. The completion of this film is a great challenge to me as I do not do well in many aspects. Although I have animated several short films, the professional knowledge learned in RIT mainly focuses on story telling，animation and modeling. The filmmaking process includes modeling, rigging, texturing and lighting the scenes, and more challenges will be talked in the following contents.

Modeling

1. **Environment Modeling**

As to modeling, my principle is to strictly abide by concept design and restore puppet theater and props to the highest degree of truth. I hope that when audience watch this film, scenes and props can bring them into a real puppet show and they can understand the world view displayed in this film. In other words, I do want that this film can completely abandon the false feeling of CG. But to achieve this effect, I have to refer to the real photo while modeling and make it consistent with my reference as far as possible so as to ensure that detailed features in the model can be showed in every angle. What's more, in the part of texturing, the accuracy of every texture shall be enhanced to

make sure that every image will not be distorted due to insufficient pixels when the camera is in close shot.
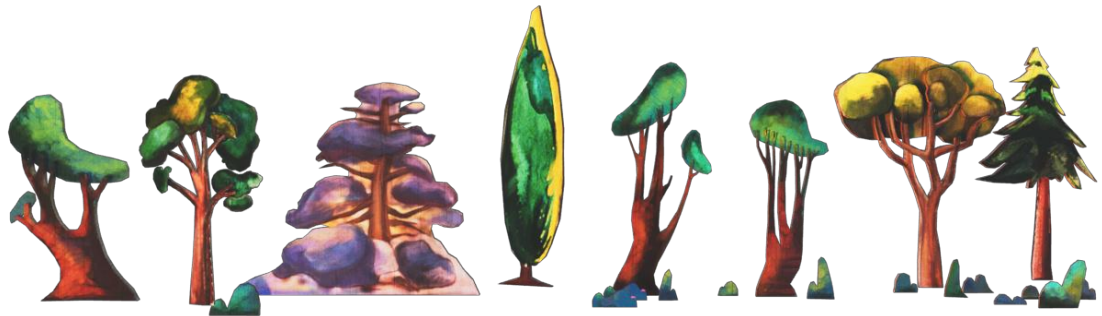
Environment and Props

While constructing scenes and props, I tried to imagine what they look like in camera shot to ensure the coordination between scenes and props. As to this film, the real making process is very suffering. The workload of modeling is very huge as the film has both stage scenes and background scenes (gears used to control puppets). At the same

time, I need to spend as much time as possible on character modeling and animation, therefore, I briefly summarizes my strategy in the following points:

- Before modeling, find enough references in real life to draw up the scenes roughly by combing matte painting, so as to generally grasp the direction of production and effectively avoid the waste of time and rework.

- Determine the major content to model firstly and then make up the details slowly. For example, the full-length shot of title and little theater is to help audience to understand the environment of the whole story and tell them some background information, but some subtle details are hard to capture in the first place in a 12-second long shot, therefore, in the actual modeling process, I first blocked a general form of theater and combined it with the movement of the lens to determine how further the details of models can approach.

- Randomize models in different sizes and angles. This story happens at the stage, so the depth of fields is limited. In order not to make the screen too flat, it's crucial to use the same prop for many times.
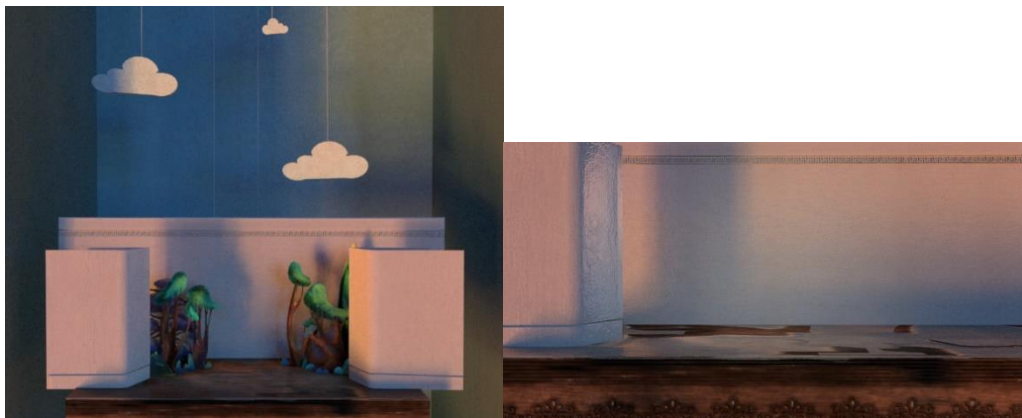
Basic stage setting

The visual effects of a movie are directly affected by the quality of a model, therefore, even if the workload of modeling is huge, I still need to ensure the quality of modeling.

2. Character Modeling

As for me, the modeling of characters is a more experienced part than the rest. The key point in character modeling is storytelling. The following steps are necessary to implement it:

- Concept design comes first. Generally speaking, a good concept design is the prerequisite of a good-looking models, because it may affect the model in a direct way to obtain an ideal effect.

- Block the general shape of the character. At the initial stage of modeling, I did not care too much about the details for it's easy to add details after all the general shapes have been fixed.

- Match concept as close as possible. I used Zbrush to sculpt character. I carved each parts of the body, like head, body, hands and feet separately, which allows me to concentrate on one part over a period of time and makes the production more productive. Compared to Maya, Zbrush is a 3D software focusing more on engraving. Zbrush's advantage in modeling is that it can be extremely efficient in blocking the shape of model,

and it' very workable. Compared to Maya in which everything starts with cube, Zbrush is very efficient.

- Attention shall be paid to topology in the process of modeling. The difference between character modeling and environment modeling lies in that after modeling, the environment is still while the character is movable, which refers to the rigging parts that I will discuss in the following parts. As character needs rigging, so it's stricter in topology. Neat edge flow and fewer face numbers are needed. Bad mesh in the character's model will cause a lot of problems in rigging parts. So, in order to prevent unnecessary waste of time and rework, we need to do mesh cleaning in the modeling procedure.

- Work on several characters in the same time. Generally speaking, a complete story needs at least one character. My story has three characters. While modeling, I need to take into account the different personalities and features of different characters. Developing character has always been a relatively time-consuming step in modeling, so my mind shall be kept in a refreshing state all the time.

Rigging

In my opinion, character rigging is the most complicated part in the whole pipeline. In my film, there are three characters to be fully rigged with entire body and facial expressions. Although I have confronted with many problems in the process of rigging, I feel very lucky for I have Mark Reisch in my thesis committee who gives me a lot of help to solve my rigging problems. Thanks to Atia, a very experienced rigger, I learned a lot with her as well.

In my opinion, it is a test of logical analysis in the process of rigging character which includes four aspects: creating joints and skeletons, building controllers, binding geometry, and facial rigging. Before making this film, I only learn some rudimental courses about how to rig and do not have the ability to solve all problems. But now, I have a more profound understanding of rigging pipeline. Next, I will make a brief account of each part:

Building skeletons for each character is the first step of rigging. Frankly speaking, this step is a very simple but important step in the process of rigging, because it determines how your character moves. Therefore, while building skeletons by using joints, I need to refer to real skeletons, so that the character animation will be more realistic. Also, one point that needs special attention is the orientation of the joints and it requires special inspection, for the wrong orientation will lead to the wrong movement direction of the joints.

After building skeletons, it comes to a crucial step—binding geometry. This step is very important because the bind skin quality directly affects the accuracy of each character's posing, just as bones control the corresponding muscles in human body. I need to paint skin weight to ensure that the right joint controls the geometry under its control. Therefore, while modeling character, I also need to consider the movement of the character and add enough edge loops at the turning point of joints. On the other hand, I need to carefully check whether there are geometry error surfaces, triangles and other issues, because the painted weight is attached on the vertex of geometry. Big changes are not allowed in the model after the completion of painting the skin weight.

Making controllers is a relatively complex part. Any carelessness will lead to mistakes and rework. So, in the actual production process, it's a great challenge for a manufacturer's patience, cautiousness and all-round thinking. The essence of building controller is to understand the principle of parent and constrain parent. When parent is applied to an object, other object can control the object unilaterally and the object itself may lose the ability to move independently. On the contrary, when constrain parent is used in an object, the object can move on its own, and be controlled at the same time. Another point that needs to be mentioned is that parent may give rise to the change of the object's pivot but constrain parent will not. Based on the above conditions, I use constrain parent more in the process of rigging my character. In addition, the parameter of attribute editor shall be zeroed carefully. If you ignore this, it will not only lead to many problems in animation but also in lighting and texturing.

In the process of adjusting animation, if the character holds something or is hand in hand with others, their hands shall constrain or be constrained by others. A properly rigged character has two set of controllers: IK controller and FK controller respectively. IK controller can be constrained with other controllers or characters, but FK can't. Moreover, I also need to tell something about the concept of IK and FK. FK is the abbreviation of forward kinematics. We can refer to the movement of Barbies. It moves when the movement of one joint drives that of another, for example, rotating the shoulder will bring the movement of the whole arm. IK is the abbreviation of inverse kinetics, which can refer to the movement of marionettes whose facet joints drives the movement of other joints, for example, if you pull the hand joints of a marionette, the arm and

shoulder move as well. There is no need to compare the practicability of IK and FK, because human's movement are driven by both FK and IK. Therefore, during the process of animating, animator can choose to use IK or FK according to their needs.
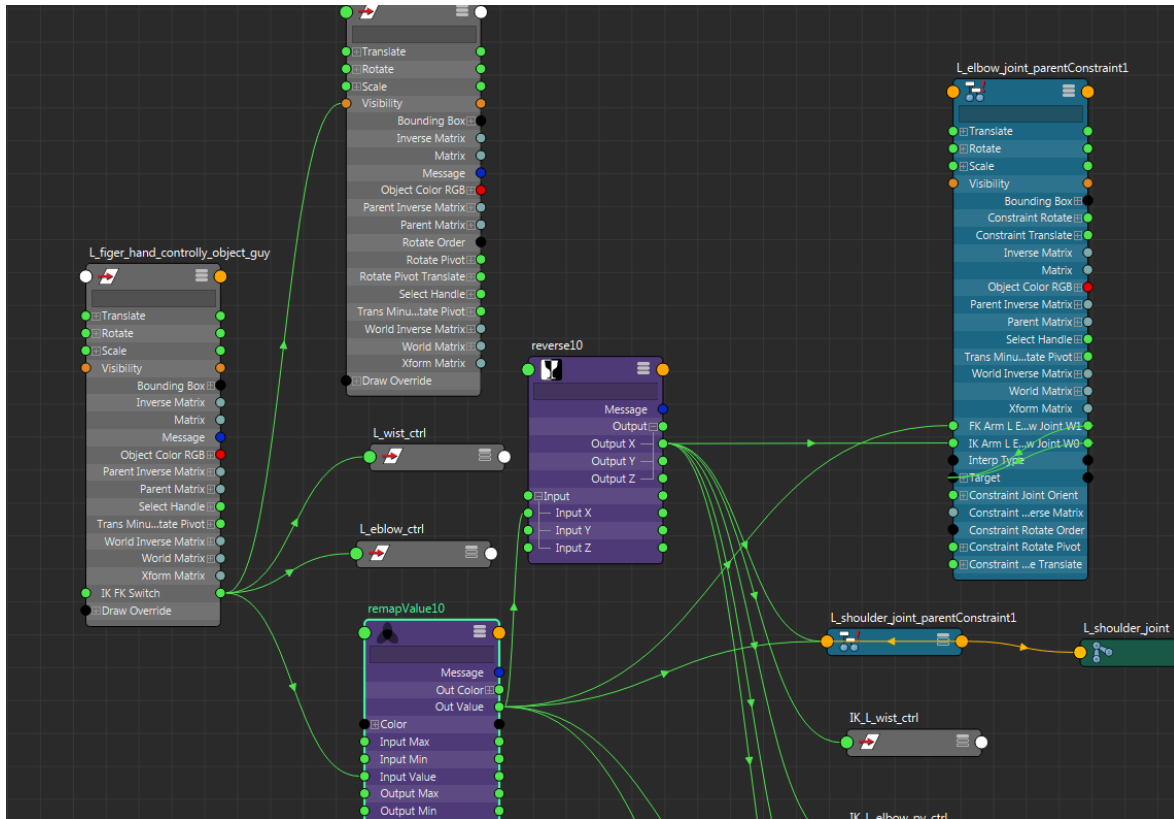
The graph of IK FK switch

Facial rigging consumes me a lot of time as well. After doing some basic tests, I thought that blend shape can't meet my requirement of character's facial expressions. So, I decided to build facial joints to control character's face by combing with blend shape, which has maximized the controllability of my rig.

What I have talked about above are the parts that are very important or are prone to arise problems in the process of rigging. But that is not the whole parts to make property rigging whose complete pipeline is comparatively complex.

The first step is to build skeletons, based on which to bind geometry and paint skin weight. Then, I need to make controllers to control every section of skeleton joints, during which period I need to copy two groups of the skeletons of the spines, arms, fingers, legs and feet to make FK and IK controllers. After finishing making all the controllers, I need to make an extra IK and FK switch. Then it comes to facial rig. In the end, we can use blend shape to polish final rig. To master the rigging techniques well needs a thorough understanding of the meaning of every step and more practice and mistakes. In the process of rigging for production, you'll have a more profound understanding about it.

Animation

I reserved the longest time for this part, because it seems to me that animation can be developed and polished all the time. There's no upper limit to superior animation, but inferior animation can be recognized at a glance. Therefore, I tried to compress the time in the pre-preparation period to leave enough time to think about animation. During this time, my thesis chair MJ, an experienced animator with unique view of animation, had given me a great help. In fact, my status was very easy and relax in the animating period. In weekly meeting, MJ's critiques always brought me a lot of inspiration, so I

knew exactly where I was going and could imagine the desired effect in my brain when I modified keyframe or posing. It is worth mentioning that MJ suggested that I can block out the shots and then go back to refine shot by shot. I benefited a lot from this suggestion because in this way I can find out the irrationality of each shot in a more intuitive way and it also helps me to see where the specific changes need to be made. More importantly, MJ helped me to find out the correct position of camera. In the semester before making this film, I did not block every shot in filmmaking in the animation workshop. When I composed each shot together to see the general effect, I found there exist several meaningless shots that not only waste time but also affect the film's narrative rhythm in the film. So now I am very happy that MJ helps me to find how to correctly arrange the location of camera to improve the effectiveness of animating.

On the other hand, the greatest challenge for me in animation is acting parts in fact. It's well-known that to make a good animation, every animator shall not only ensure the smoothness of animation but also make every character perform vividly. However, this is what I lack most. Normally when blocking character, I often use camera to shoot myself as a reference to animation. But due to the exaggeration of acting in reference, the animated effect is plain and lack of rationality sometimes. Fortunately, MJ has a very keen perspective on acting for animation, and she can accurately point out my wrong movement every time and guide me to go in the right direction. And she also teaches me how to rationalize the exaggerate character. Generally speaking, this is a relatively happy process. The only pity is that the overall production time is limited and there is not enough time to sublimate animation to a better level.

Materials, Texturing and Lighting

Frankly, lighting and texturing is the most interesting part for me in this film. This part affects the visual effects of the movie greatly. I used Arnold to render my film, so the shader must be Arnold's shade. Why did I use Arnold not Mentalray? Because Arnold rendering is a physics-based rendering engine, and unlike the traditional CG animation scanline render engine, its rendering is based on real photos and physical lighting. In order to guarantee the result of rendering and to save rendering time, even though I didn't know much about Arnold at first, I also made my determination to learn and practice using the render engine. Thankfully, because I used to learn something about Mentalray and Vray, it didn't take me too much time to get familiar with Arnold renderer.

As to the build-in Ai shader of Arnold, I have gotten a really good practical experience in using substance painter by cooperating with texturing software. My story has a lot of HD close-up shots that can show the details, which requires me to put enough efforts into model and texture. In fact, when I use Zbrush to sculpt high resolution model which can be exported as bump map, normal map and displacement map. The function of the three maps is to add more details to the smooth surface of these objects that do not have some details by way of planar mapping. The differences between the three maps are:

Specifically, the algorithm used by bump map is fake, because it does not change the surface of the object but only the result of lighting.

Normal map is widely used in games. It also can be called Dot Three Bump Mapping. In short, normal map uses three Chanel to describe normal information in a brand-new way. Furtherly, bump map can display a bump sense while normal map can display accurate light reflection on the basis of showing bump sense.

Displacement map changes the shape of the model according to the slender texture on the object's surface. That's to say, displacement map changes the shape and contour of the object truly, but compared to the above mentioned two maps, its algorithm is more complicated.

Considering carefully and according to the length of rendering time, I decided to use normal map to present the details of the characters and scenes. Although with respect to normal map, displacement map can provide more details, it spends a lot of rendering time. As my film lasts near five minutes, using displacement map may influence my schedule, what's more, due to its complex algorithm, it also very easy to make mistakes in the process of rendering. Weighing these pros and cons, I selected to use normal map. And I am very confident that the application of texturing techniques can make up the missing details. My decision is proved to be correct in the end.

The main characters in my movie are puppets, while most of the background is also in wooden structure. This requires me to differentiate the texture of main characters and background in texturing step. Therefore, I looked for many photos of real life for reference and found that different types of wood have different roughness and reflection. According to this finding, together with the changes of diffusing, it is easy to create puppets and background. As to substance painter painting texture, one thing to note is

how to accurately apply the exported texture into Arnold. In algorithmic's official website, there is an external rendering setup that describes how to import the texture exported from the substance painter into Arnold and achieve the effect that the substance painter produces in detail. My shaders are done based on the description. It is worth noting that substance painter exports F0 texture, but there is no corresponding option to plug in this texture in Arnold, so where is this texture to be added? In fact, F0 refers to Fresnel Diffraction (for detail, please refer to http://www.visual-barn.com/2017/03/14/f0-converting-substance-fresnel-vray-values/)。 F0 refers to the reflectivity between the object and the camera in vertical surface. In short, the angel between the sight of the camera and this normal area is $0°$. So, on the corresponding default material—aistandard in Arnold, there is a property called Reflectance at Normal which actually is the property of F0. Another point, the selection that alpha is luminance also need to check, or there will have deviation between Arnold shader and the shader presented in substance painter.
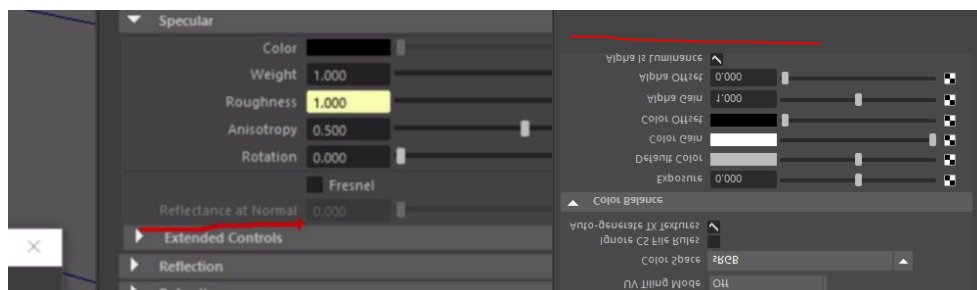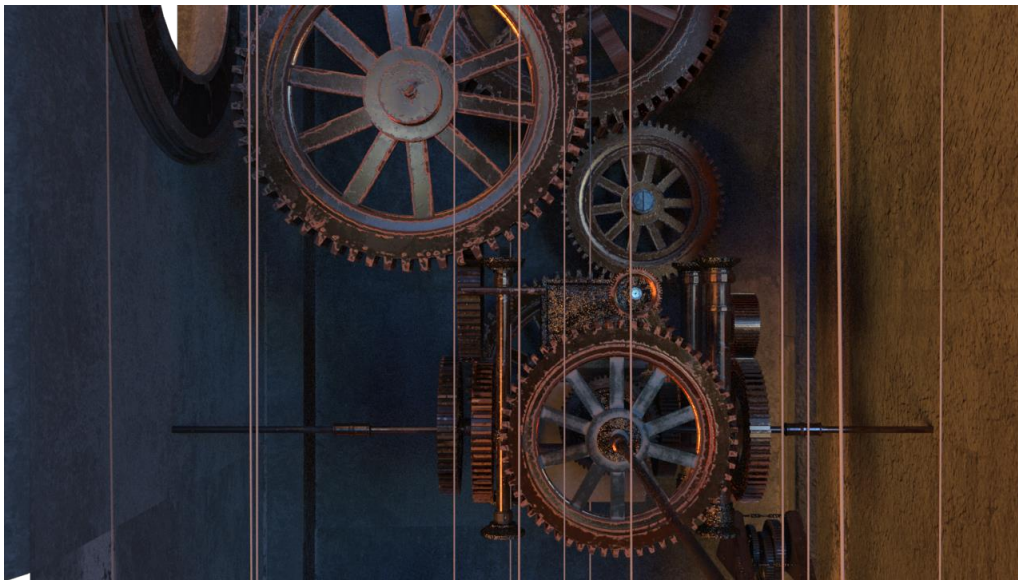

Need to check on Fresnel
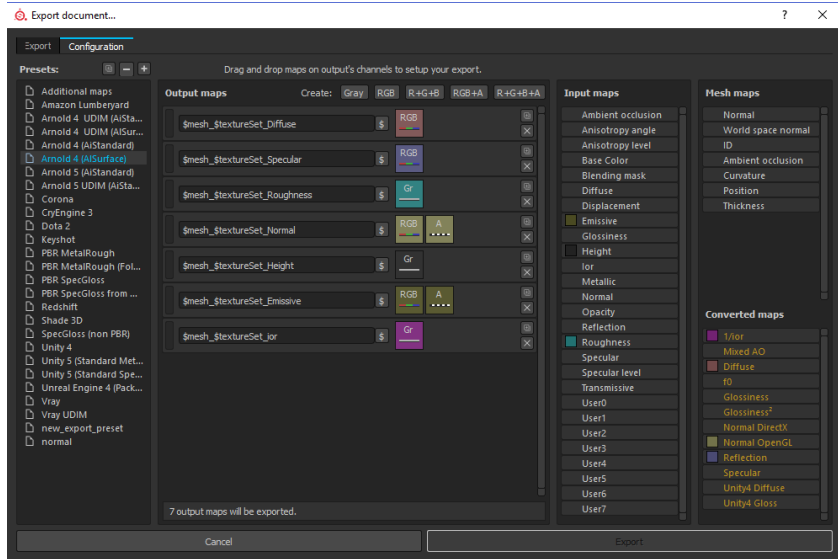
Export setting in Substance Painter
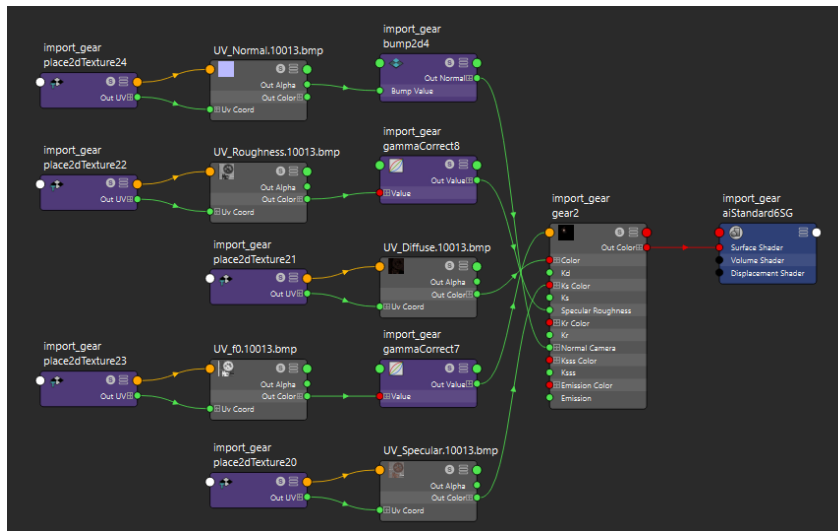
The right way to plug_in texture from Substance Painter into Maya
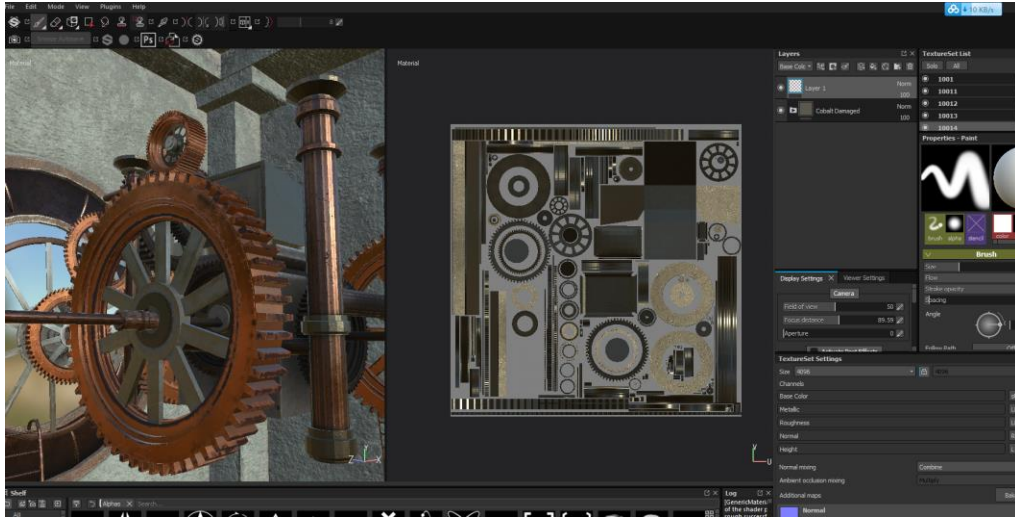
The same object in Substance painter and Arnold

On lighting scene, my experience is to try to make each lamp has a special meaning to exist, pay attention to set off the atmosphere and lit very senses rather than the number of lights.

To maintain the consistency of the color and brightness of each shot, I used a sky dome light to act as ambient light and to make the lighting have a sense of depth, I used

a Hdri picture plugged into sky dorm light to simulate the ambient light in real world. Since in my story there are stage and background two scenes whose atmosphere are quite different. At the stage, I hope to create a happy and lively atmosphere, while at the backstage, an atmosphere of depression and loneliness are what I want. Therefore, when choosing Hdri, I used a picture similar to an abandoned factory to create a relatively cool tone. In addition, a warm spot light is added to act as stage spotlight and another rim light for character's facial expression was used to track the character all the time. But one thing you need to be aware of that when two characters stands close, two spotlights will cause exposure too high, so at that time, camera shots are needed to modify the light to be gentler. It is worth mentioning that if there is too much noise in the lighted sense, you need to increase the number of light "sample".

Dynamic and Visual Effects

Dynamic and Visual Effects

The visual effect of this film specifically refers to the puppet's ropes. Since my film is close to realistic style, many of my classmates and friends suggested me drawing 2D ropes by hands. I was not satisfied with this solution personally, so I determined to use Maya to make ropes. After searching tutorial videos on YouTube, I found that Ncloth in Maya's Dynamic can help me to get what I expect. A few tests prove that Ncloth's simulation is very close to reality, but many problems exist as well, like Ncloth's simulation goes wrong if the ropes cannot touch each other and you have to avoid the

intertwining of ropes. In the production process, I had been following the following two tutorial videos:

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

https://www.youtube.com/watch?v=MToQzhIQpQ8

What a pity that Ncloth's simulation is very time-consuming. Due to the limited time, I didn't do much tests on that and solely determined the length and number of ropes based on my feeling and the stability of ropes.

Rendering

To be frank, due to the occurrence of many unexpected difficulties, rendering process becomes the most painful parts to me. At first, I reserved 50 days to render film. In the two-year study in RIT, I used to use render farm many times, so I know the render farm well, and in my opinion, the whole film can be rendered out within 25~30 days. What I don't think of is that the ropes on my puppets made through dynamic simulation gave rise to some small errors in operation. Although that do not affect the senses, render farm often skipped my request due to these small errors. Thanks for thesis member, Mark and my thesis chair MJ, they had given me a lot of help. When they learned that I can't complete my render task due to render farm, they communicated with the manager of render farm to help me get why my render task is always skipped. After communicating with the manager of render farm, I found the render farm didn't fully support the Arnold

render engine at that time, which has made all undergraduates who use the same renderer with me use school's PC to batch render arbitrarily, which had made render farm work more slowly. Many people know that school's render farm shall be rendered by unoccupied machines. Unfortunately, almost all of the machines in the 3D lab were completely occupied by students to batch render at the same time. It was almost impossible for me to render out my film in render farm timely at that time. So, in order to finish my film on time, I only slept four hours a day to sit in HD lab waiting for render. The machines in HD lab are Mac. Using Arnold batch render may leave Arnold's water mark. Fortunately, I found that if I use render sequence to replace the traditional way of batch render, it would not render out with water mark. It took me one third time to solve the problems in render farm, so I was really worried that I would not be able to finish the film on time. But after solving the water mark problems, I fortunately found that the rendering speed of Mac is much faster than that of PC machine in 3D lab. And since the 3D lab was almost entirely occupied by undergraduate students, I changed the battlefield to a HD lab. At last, my grateful thanks are due to my thesis chair MJ and my team member Mark Reisch for they have given me a lot of supports and care. Simultaneously, I also feel that I am very lucky to complete my film on time while meeting so many unexpected accidents.

Composing

After rendering, there is not much time left. I mainly use After Effects to compose. In this period, I spent more time on color correction and defocus to make the scenes look more harmonious and have sense of depth. After composing with sound effect and music, I simply made a title and rolling subtitles at the end.

Sound and Music

I am lucky to work with my composer, Quinn Huang, a passionate and brilliant girl. We met at composer meeting. When I played my 3D animation, she found me and we chimed in easily. After completing the animation of the film, I sent my animation to her. After that we just met once and most of the time we communicated through skype. Since Quinn is very experienced in writing music and making sound effects and we communicated happily, the final sound track is very close to my ideal effect. I am very grateful to meet Quinn, such a good composer.

Screening and Critiques

The final version of my film was screened in May 2017. After screening, I got a lot of feedbacks from audience some of which are relevant to animation and critiques, and most of which is to answer question about the look development and techniques. But one of the most impressive feedbacks is from the Dean. There is a problem stemmed from render farm with the simulation of the ropes on the last shot. Although I already

made some changes at that time, it was too late to re-ender it. This problem attracted the Dean's attention. Then he asked me about the significance of the existence of the rope. At that time, I told him my original thought that I did not think much about the meaning of the ropes when making this film and I just wanted to express that the main characters are marionettes and the story happens in a puppet theater. With the feedback from audience, I tapped the potential of the story and got great inspiration for my future story creation

Thank you

At last, I would like to say that I am very grateful to be able to study at SOFA of RIT. Over the past three years, I have learned a lot of knowledge, and more importantly, my ability to study and deal with problems independently is enhanced greatly. I have learned some professional knowledge about 3D animation film, 2D animation film, live action, experimental film and stop motion, but above that I have a more in-depth understanding of the pipeline of animation filmmaking. I am very lucky to meet so many talented professors at RIT who have helped me to improve my ability and professional technology greatly.

Even though I am going to graduate from RIT now, I am not confused at all because I have more specific goals that I will use the knowledge learned in RIT to work harder, and to improve my abilities by doing more practice, so as to prepare for my future life.

Untitled

3D Animation Graduate Thesis Production Proposal By Jasmine Li

MFA Thesis Proposal School of Film and Animation Rochester Institute of Technology, Rochester, New York March 2016

Approved for submission by

_____ Charles Bandla, Thesis Chair

Logline:

A man saves a wolf's live. The wolf shows returns the favor by teaching the man a valuable lesson.

Treatment/Story

A human is reading a book under the tree. The book is a traditional bamboo scroll, that he holds in two hands. A wolf slowly sneaks up on the man. The man is afraid, and jumps up, but the wolf looks at him pitifully, and says " the hunter is going to kill me, please hurry up, hide me in your scroll bag! If I could live, I will repay you in the future." The man turns his head and looks at the empty bag on the ground.

He feels sympathy for the wolf, because the wolf looks harmless and is very miserable. The wolf looks like a whimpering puppy. So he lets the wolf hide in his of bamboo slip bag. But the wolf does not fit into the bag, because he is too big, his fluffy tail sticks out. The man has an idea, to use the bamboo scroll and wrap the wolf tightly, so he will fit in the bag. After he finishes stuffing the wolf into the scroll bag, a hunter walks past the man, and ask about the wolf. The hunter has a bow and arrow. The man lies to the hunter, and says he the wolf ran in the opposite direction.

After the hunter leaves, the wolf says:" Thank you sir. You saved my life. Please let me out!" When the Wolf is out of the bag he said: " I survived the hunter, but now I am starving to death, why don't you be my food, and save me again?" The wolf jumps on a rock, his teeth snapping and growling and menacing the man who saved his life.

The man is afraid, and starts to run, the wolf chases him over hills and valleys. They meet a farmer. The man tells this story to the farmer. The Wolf argues that the man wrapped him too tight, and almost killed him. The farmer listens to both sides of the story. The farmer has trouble believing that the wolf fit in the bag and wants the wolf to prove this. The man wraps the wolf again and stuffs him into the bag. The farmer picks

up a rope and ties the bag very tight, and using hoe beat the wolf to die. The curtain comes down, as the shadows continue to beat the wolf.

Vision

This will be a 3D experimental film. I will use 3D and 2D techniques to make the animation look like a traditional Chinese shadow puppet play. There will be a puppet theater, with a curtain and occasionally the puppet master will be revealed. The visual look will be like 2-dimentional paper puppets with the shadows they make being part of the animation. The main style I want to present the China traditional Shadow Puppet Play.

The shadow puppet play, also called "shadow play", is a drama form in which the player holds the human figures that are engraved on animal leather with colored paintings, and reflected on the curtain through the light, singing and dancing controlled by the player with the silk string, gongs and drums music, playing a series of stories. It is widely spread in most regions in China, except Tibet and Xinjiang, with different styles of shadow puppet play in different places. However, the characters shaping and performance skills are all quite exquisite, with play themes including the Chinese ancient magic, myths, religions, monarchs, legal cases, wars, as well as talented scholars and pretty ladies, the secular life.

Rationale

I grew up in China and always loved to see Shadow Plays, they were even on television.

I want to challenge my 3-D animation skills, by creating 3-D that looks like 2-D.

	Cost	In Kind	
Pre Production			
Art supplies	500	Yes	
Photoshop	400	Yes	
Production			
Wacom Tablet	400	Yes	
Computer	3000	Yes	
Maya	3500	Yes	
Google Drive	0	Yes	
External Drive	60	Yes	
Music	500	No	500
Post Production			
Render Farm	300	Yes	
Pro-Tool	700	Yes	
Sound FX	100	Yes	
Sound Mix	100	No	200
Nuke	500	Yes	
Blueray Disc	20	No	10
Festival Fees	200	No	200
Total			111

Pre)

Storyboard

Concept Design (Character,

Production

D modeling(character, background

Texture

Rigging

D

3

Animation

Lighting

Music Compose

Post Production

Rendering

Composting

Titles and

Sound FX

Sound Mix

Final Output

Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May