Ancient Chinese Tombs: Western Han Dynasty Chapter

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Ancient Chinese Tombs
Western Han Dynasty Chapter

Yaling Zhang

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School of Design
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Title

Ancient Chinese Tombs
- Western Han Dynasty Chapter

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Abstract

Keywords

3D Modeling
3D Visual Design
3D Environmental Design
Tombs of the Western Han Dynasty
Chinese History
Systematic Learning

Content

The study of history is one way of preserving human culture\[^1\][^2]. In China, a country with thousands of years long history, a vast number of historical events have been recorded in different literary works, including history books, fictions, biographies, and so on. However, we still need evidence to support or verify those literatures. One physical evidence are antiques excavated from tombs of different dynasties\[^3\]. The ancient tomb mirrors a micro society of a certain dynasty\[^4\]. This project presented in this study is a 3D environmental design, comprised of four 3D scenes in high quality rendering to show the architecture and interior environment of an ancient tomb. Due to the long history of China (more than 3000 years\[^5\]), it is impossible to cover all dynasties here. Hence in this study, the author focuses on the Western Han dynasty (206 BC - 9 AD)\[^6\] because it was one of the peaks of the development of Chinese culture, and the royal mausoleums from Han spread all over the city of Taiyuan where rich cultural relics were perfectly excavated.

\[^1\] Why do we need to study history. https://www.zhihu.com/question/20349518
\[^2\] The significance of archeology. http://anthropology.msu.edu/anp203h-fs13/2013/12/08/why-is-archeology-important/
\[^3\] The reason why we need to unearth the ancient tombs. https://www.zhihu.com/question/22074228
\[^4\] Ancient tombs. https://baike.baidu.com/item/古墓
\[^6\] Western Han dynasty (206 BC - 9 AD). https://en.wikipedia.org/wiki/Han_dynasty
Abstract
Content Continued

This 3D design reproduced the ancient tomb’s architecture using softwares such as, Maya, Zbrush and Substance Painter. The author created 3 important rooms including the chariot room, the front room and the main room. In each room, specific lighting, different decoration and beautiful burial objects were created and carefully added to restore an incredibly lifelike 3D ancient tomb.

This 3D design can easily attract people’s attention and help audience understand this ancient cultural relics that were extensively destroyed by now.
Introduction

Problem Statement
Target Audience
Deliverables
Problem Statement

1. **Over 3000 years of Chinese history has produced a huge amount of records of culture, arts, economics and technology.**
   Ancient Chinese historians traditionally recorded history in books and paintings. Books witness significant historical events and paintings present society and people’s everyday lives. However, more alternative approaches should be used to fully understand ancient history in China. One the one hand, it is hard to learn and remember the knowledge via reading. On the other hand, historical documents may not necessary truly reflect what happened in history. For example, it was quite common that older historical documents were altered by the new dynasty due to political reasons. In this case, **archaeologists need other proofs to find out the true story.** Those proofs include, but are not limited to, antiques, wall paintings and preserved ancient buildings. Specifically, antiques are usually excavated from tombs or underground palaces and are authentic proofs.

2. These tombs might have belonged to ancient royal families or common families. **A tomb belonging to a royal family has higher historical values to archaeologists** because the exquisite artifacts excavated from royal tombs always represent a higher arts and crafts level as well as higher economic status. Especially, the architecture and material of a tomb demonstrate the owner’s lifestyle and the culture during that period of time. In other words, the ancient tomb mirrors a micro society of a certain dynasty\(^{(1)}\).

3. To protect the culture relics from the grave raiders, only a small group of people have access to real ancient tombs, mainly archaeologists and grave raiders. For most people who are interested in history, they can only learn from books, TV programs or museums. In this project, the author reproduced history in an intuitive way through 3D visual design.

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\(^{(1)}\) Ancient tombs. [https://baike.baidu.com/item/古墓葬](https://baike.baidu.com/item/古墓葬)
Problem Statement
Content Continued

4. The author built a 3D scene of an ancient tomb from the Western Han dynasty and then rendered posters for each room of the tomb, introducing the ancient tomb in a systematic way. The 3D design will allow the audience to learn the tomb’s architecture and distinguish different burial stuffs. This work provides a fantastic experience for them to get into a lifelike ancient tomb through the 3D environmental design.
Target Audience

My target audience is people who are interested in learning Chinese history and culture, and students who need to learn the world history or the Chinese history. Both museums and education institutions will benefit from this project.

The expected target audience will be from 15 or older[1].

Persona

Name: James
Age: 45 years old

His story:
• He is a faculty member at Rochester Institute of Technology (RIT) International Education Office

• He is very interested in learning Chinese history

• He thinks that it is not easy to learn the long Chinese history or to understand features of it.

Deliverables

The final deliverables of this project include four high-quality printed posters, a slideshow demo and four kinds of postcards. The posters have detailed captions to introduce the features of the tomb explicitly. During the MFA thesis show, people showed great interest in this work and gave high praise to this beautiful art design.

[1] Here I made it a reference that Chinese students usually start to learn the world history at 15 years old (the third year of junior high school), and start to learn the Chinese history at 12 years old (the first year of junior high school).
Review of Literature

Survey of literature
**Survey of Literature**

| **History books** | **A Short History of China:**  
From Ancient Dynasties to Economic Powerhouse  
by Gordon Kerr[^1]  
This book gives a comprehensive introduction to the sprawling history of China. A fascinating introduction to over 3,000 years of Chinese history, this book states the stories of the tyrants, femmes, despots, artists, philosophers and warriors, who have shaped this absorbing and complex nation. It tells the amazing technological progresses that Chinese scientists and inventors made several hundreds of years before comparable discoveries happened in Europe. It also explores the Chinese view of the world and investigates the societies, philosophies and aspirations that molded it and, in so doing, created the Chinese history. Finally, the book discusses the remarkable changes of the last few decades and the emergence of China as an industrial and economic superpower in the 21st-century. |
| **Chinese Walled Cities 221 BC- AD 1644**  
by Stephen Turnbull[^2]  
In this book, Turnbull conveys that in China, a city without a wall would be as unimaginable as a house without a roof. Even the smallest village would have some form of defensive wall, while the Great Wall of China was built as a barrier along the most vulnerable border of the country. Yet the best examples of walled communities were China’s walled cities whose defensive architecture outperformed anything along the Great Wall. This book tells the evolution of the walled city from the 3,000-year old rammed-earth walls in Shang dynasty to the huge stone fortifications of the Ming dynasty. Stephen Turnbull, as a military historian, reveals the defensive structures from major ancient Chinese cities. He also discusses how they protected the entire communities, including castle dwellers, color artwork reconstructions, archive photographs and maps. |

Tomb Research of Tang Dynasty in Guanzhong District
by Yi Cheng[1]

This book gives a relatively comprehensive introduction of Guanzhong District in Tang dynasty. In Guanzhong District, notably, Chang’an was the capital of Tang Dynasty and in the long history of Tang Dynasty from the year of 618 AD to 907 AD. Nineteen emperors and a lot of nobilities were buried in the Guanzhong District. According to this book, more than 3000 Tang tombs have been excavated so far. These tombs have high burial levels, beautiful murals, and various culture relics. This book makes a comprehensive analysis of this region.

Changping Shahe
by Beijing Cultural Relics Research Institute[2]

From January to April in 2010, researchers from the Beijing Cultural Relics Research Institute excavated some tombs at Shahe, Changping in China. Five Han tombs, 3 Western Jin tombs, 9 Tang Dynasty tombs, 4 Yuan Dynasty tombs, 22 Ming Dynasty tombs, and 69 Qing Dynasty tombs were found and documented in the book. Most of the Ming and Qing tombs were well preserved, while the tombs from Han Dynasty, Western Jin Dynasty, Tang and Yuan Dynasty had been severely damaged. Those unearthed tombs had a lot of significant artifact combinations, which provided important references for the Institute to investigate the ancient town of Shahe.


**Survey of Literature**

Content Continued

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**The Mask of Dead**

By Peking University Press\(^1\)

This book describes how ancient people in China think about the life after death from the religious and ritual perspectives. Specifically, the ancient tombs presented the concepts directly as tomb is not only a place to store the deceased body, but also a collection of cultural heritage artifacts, such as different architecture style, paintings and sculptures in different period of Chinese history. This book gives a comprehensive introduction of the archaeology and art history of the tombs from Han dynasty to Song dynasty.

---

**Design Area**

**The Films of Pixar Animation Studio**

by James Clarke\(^2\)

This is a one-stop handbook to the studio’s work. It discusses each film of Pixar Animation Studio in great detail. Pixar Animation Studios reminds audience that animation is one of the major forms of art. Each Pixar feature film is investigated in terms of the major art form and different creative choices made by the films’ producers, directors, animators and writers from the start of a bright idea to its final production. The book also makes connections between the studio’s appealing and wider realm of animation history, the epic movie, and the folktales.

---


**Survey of Literature**

Content Continued

**Infographics: The Power of Visual Storytelling**
by Jason Lankow, Josh Ritchie, Ross Crooks\(^1\)

This book introduces how to communicate message and idea in an engaging and concise way. The authors claim that visual content, for example, info-graphics and data visualization can accomplish this. With DIY functionality, this book tells readers how to build and tell stories from their data, and how to visually communicate and share their message with audience for maximum impact.

**Emotional Design: Why We Love (or Hate) Everyday Things**
by Donald A. Norman, Don Norman\(^2\)

In this book, Donald indicates that research on emotion and cognition has shown that attractive things can get more attention. An example of emotional design that articulates the profound influence of the feelings is that people would love to spend thousands of dollars on luxury bags and watches. It is quite normal that emotion has an impact on the everyday objects in our life. The authors provide a large number of examples and the most up-to-date scientific insights to indicate a bold investigation of the objects in our everyday world. Emotional Design will appeal to designers, manufacturers, managers, psychologists, and general readers who are attached to attractive things.


Process

**Design Ideation**
- Concepts
- Content Organization
- Early Sketches
- Personal Style
- Assets List
- Caption for Posters
- Personal Style

**Methodological Design**
- Modeling
- Materials and Texturing
- Lighting and Rendering
- Final Render and Image Compositing
- Demonstration
Design Ideation

1. Concepts

This thesis project is a piece of 3D environmental design, comprised of four 3D scenes in high quality to show the architecture and interior environment of an ancient tomb. It is named as “Ancient Chinese Tombs - the Western Han Chapter”. This project is designed for people who are interested in Chinese history and culture. The 3D design work will help the audience understand the culture and arts of Western Han Dynasty in a systematic way. This 3D design includes the tomb’s architecture, internal lighting environment, ancient decoration and many burial stuffs, such as the bronze palace lanterns, pottery figurines, jade coffins and carriages. Different dynasties have their own characteristics. For example, people in the Western Zhou dynasty preferred to put bronze wares into tombs; people in the Western Han dynasty loved to place jade into their tombs; as for Tang dynasty, people liked to put tri-colored glazed potteries into tombs (underground palaces). In this thesis project, the author focuses on the Western Han dynasty.

In this project, the author built all the assets (on pages 21-22), adjusted the shadings, materials, lighting components and also managed the after effects. Pursuing a high visual quality, this project will be lifelike and aesthetic to raise audiences' interest of learning history.

2. Content Organization

1. Researched the famous dynasties with different and typical burial customs.

2. Picked out the Western Han dynasty which has great otherness to the others.

3. Analyzed their tombs’ location, circumstances, structure, and funeral objects.

4. Searching for literature on museums, books, and website articles.

5. Read relevant books on 3D Visual Design, and Environmental Design.
3. Early Sketches

Mind Map

Figure 1: Mind Map
3. Early Sketches

Sketches of the ancient tomb

Figure 2: Early sketches of the tomb rooms: Part 1
3. Early Sketches

Figure 3: Early sketches of the tomb rooms: Part 2
4. Assets List

Constructions

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chariot room</td>
<td>Room for carriages, potteries, and some weapons</td>
</tr>
<tr>
<td>Front room</td>
<td>A huge room for ceremony, people always put bronze wares into it</td>
</tr>
<tr>
<td>Main room</td>
<td>The room for putting the main coffin, always along with a good amount of jade and gold burial objects</td>
</tr>
<tr>
<td>Sub-drain</td>
<td>Cross over the front room, paved path and chariot room</td>
</tr>
</tbody>
</table>

Wall Details

<table>
<thead>
<tr>
<th>Position</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chariot room’s wall</td>
<td>Decorated with scratches and chisel marks</td>
</tr>
<tr>
<td>Front room’s wall</td>
<td>Decorated with chisel marks, and bricks</td>
</tr>
<tr>
<td>Main room’s wall</td>
<td>Decorated with rusted murals, chisel marks and bricks</td>
</tr>
</tbody>
</table>
### Funeral Objects

<table>
<thead>
<tr>
<th>Assets</th>
<th>Type</th>
<th>Detail</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coffin</strong></td>
<td>Jade Coffin</td>
<td>Made of jade, Applied lacquer partially</td>
<td>1</td>
</tr>
<tr>
<td><strong>Lacquer</strong></td>
<td>Folding screen</td>
<td>Sculpted with patterns, gold lacquer</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Weapon rack</td>
<td>Sculpted with lucky clouds, gold lacquer</td>
<td>2</td>
</tr>
<tr>
<td><strong>Potteries</strong></td>
<td>Clay pot</td>
<td>2 unique styles</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Clay jars</td>
<td>3 unique styles</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Pottery bowls</td>
<td>2 different styles</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Pottery carriages</td>
<td>1 style</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Earthenwares</td>
<td>Kneel down</td>
<td>5</td>
</tr>
<tr>
<td><strong>Bronze wares</strong></td>
<td>Weapons</td>
<td>2 unique style of swards</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Bows</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Arrows</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Dagger-Axe</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Tripod cauldrons</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Copper basin</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><strong>Utensils</strong></td>
<td>Maid shaped</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Branch lantern</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Wall lantern</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Small walk lantern</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Bronze music instruments</td>
<td>BianZhong</td>
<td>1 group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BianQing</td>
<td>1 group</td>
</tr>
<tr>
<td><strong>Jade</strong></td>
<td>Jade rings</td>
<td>Jade material, simple shape</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Jade pendant</td>
<td>Base of Chinese dragon</td>
<td>2</td>
</tr>
<tr>
<td><strong>Rock</strong></td>
<td>Rock stand</td>
<td>Some rock tables to put on burial objects</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Rock pillars</td>
<td>Sculpted with dragon and other patterns</td>
<td>12</td>
</tr>
</tbody>
</table>
During ancient times in China, the rules and concepts of construction of a grave demonstrated the material and spiritual civilization (e.g. religion and beliefs) of that era\(^1\). In the mid to late era of the Han dynasty (156BC–9AD), there was an evolution in people’s perceptions toward connecting one’s soul to heaven, which resulted in the transformation from the “vertical tomb” (a totally enclosed tomb) to the “horizontal tomb” (a set of new designed tombs with doors that can be opened, such as the “brick tomb” and the “stone tomb”)\(^2\). As a substitute for the outer coffin (an element of the “vertical tomb”), the chamber of the “horizontal tomb” had almost the same internal constructions as a real house. For example, some of the emperors and nobilities prepared spectacular underground palaces (tombs) and put all their belongings in them when they were close to their death, so they could bring them to another world (heaven).

**2). Plenty of burial objects**

Historians found that most of the well-preserved tombs in the Han dynasty had lots of valuable cultural relics. That is because the tomb constructions in any given historical period are influenced by social consciousness at the time. People in the Han dynasty held the belief that they would be reborn in another world after death, but this new world was the same as the previous world before death\(^3\)\(^4\). That is why all their belongings, sometimes even mostly treasure, were put into the tomb after their deaths. Over 10,000 cultural relics in the Han dynasty have been excavated, including gold wares, silver wares, bronze wares, iron wares, jade objects, stone implements, potteries, lacquer wares, and silk fabrics, and so on. However, precious cultural relics triggered many tomb robberies. Therefore, there is a saying in

\[1\] The culture of mausoleums. [http://huanglingwenhua.baike.com/article-86260.html](http://huanglingwenhua.baike.com/article-86260.html)

\[2\] Burial etiquette of the Western Han Dynasty.
[https://zhidao.baidu.com/question/262313151723403365.html](https://zhidao.baidu.com/question/262313151723403365.html)

\[3\] Honoring the dead as the living.
[http://guoxue.ifeng.com/a/20160323/48148408_0.shtml](http://guoxue.ifeng.com/a/20160323/48148408_0.shtml)

\[4\] The Han tombs. [https://baike.baidu.com/item/汉墓](https://baike.baidu.com/item/汉墓)
3). Bronze wares
As the representative of Late Bronze Age, the bronze ware of Han dynasty plays an important role in Chinese bronze history. According to the excavated culture relics, historians found many bronze household utensils, such as tripod cauldrons, jars, wine vases and bronze mirrors. The most famous bronze item of Han dynasty is the Palace Lantern. It is a gorgeous and ingenious piece of art work cast into different shapes and glazed with gold. The body of the lantern is empty, and after the lantern is lit, its smoke directly flows into the empty body through a certain path (maid’s arm or the goose’s beak) so as to keep the indoor air clean. The lamp holder can store water, dissolving soot from the smoke. Besides, the parts connecting to the lamp holder are removable and can be easily cleaned.

4). Chinese earthenware
During the Han dynasty, Chinese earthenware reached new heights of complexity and sophistication. Earthenware in the Han dynasty are usually 50-60cm tall. Some of them were modeled in great detail with clay first, and after being burned into earthenware, the color was applied directly. The rest of them were only molded as a naked body, and were then adorned with the Han’s delicate silk clothes. In the tomb of emperors and nobilities, there are lots of human earthenware, including armed soldiers, maids, musicians and many domestic animal earthenware, such as horse, cow, sheep and pig, all made in the same mold.

[1] Nine-tenths of the tombs in the Han dynasty are emptied (robbed).

http://blog.sina.com.cn/s/blog_5fca0f830100ky8i.html


http://www.todayonhistory.com/lishi/201603/32156.html

6. Personal Style

Figure 4: Personal style, former artworks
Methodological Design

The Western Han dynasty had ruled China for almost 200 years in Chinese history. After 157 BC, the Western Han dynasty reached its peak in economic exuberance, and since then, the stuff buried with the deceased in the tombs had become more and more sumptuous.

1. Modeling

The tomb structure
Since this project would be presented in the form of educational posters for viewers who are interested in Chinese tomb history, I did extensive research to restore the ancient tombs as precisely as I can. Specifically, I read the Journal of “Haihunhou Tomb”[1], the article of “Jiulongshan Han tombs”[2], “Mancheng Han tombs”[3] and compared the tomb differences between different periods in the Western Han dynasty. I also searched tomb-related pictures in Pinterest, Google, and electronic books to learn the features of the buried stuff in the Western Han dynasty, mainly the material, shape and environment lighting. After acquiring all the information, I restored the general layout of the ancient tombs in the 3D software: Maya (Figs.5-6).

Figure 5: The layout of the tomb from perspective view

1. Modeling

Content Continued

Figure 6: The layout of the tomb from top view and side view

As shown in Fig. 7, the rooms colored in red were modeled in my project, which include the main room, front room and chariot room.

Figure 7: The rooms being created in my current project were indicated in red
1. Modeling

Content Continued

I started to create each room of the ancient Western Han tomb from the entrance to the chariot room, the front room and then the main room (Fig. 8).

Figure 8: The layout of rooms from the entrance to the main room

The Chariot Room

People in Western Han Dynasty usually chose chariot as a means of transportation. As a result, it played an important role in the buried stuff of the tomb. In this project, I restored the chariot of Western Han dynasty with some daily supplies such as potteries, lacquers and weapons (Figs. 9-12).

Figure 9: Burial objects in the chariot room
1. Modeling

Figure 10: Potteries in the chariot room, created in Maya, wire frame render

Figure 11: Potteries in the chariot room, default material render in Maya

Figure 12: Weapons and carriages in the chariot room, created in Maya
Most of the object models in the chariot room were constructed in Maya. The horses were sculpted in Zbrush. One big challenge in the process of sculpting a horse in Zbrush was how to make the horse muscles look reasonable. I searched for pictures of both real horses and statues of horses from all over the world, then carefully extracted features of the muscles from them and accomplished the sculpting (Figs. 13 -14).

Figure 13: Pottery horses imported from Zbrush to Maya

Figure 14: Carriages in the chariot room, wire frame render in Maya
The Front Room

During Western Han dynasty, the front room of tombs was usually huge because it was used for ceremony. People would put ancient musical instruments, such as BianZhong (An ancient Chinese musical instrument consisting of a set of bronze bells, played melodically)\(^1\) and BianQing (An ancient Chinese percussion instrument consisting of a set of L-shaped flat stone chimes known as qing, played melodically)\(^2\), sacrificial supplies such as bronze tripod, and sacrificial altar along with many bronze-wares in the front room. Those objects were created in Maya as shown in Figs. 15-17.

---

1. Modeling

Content Continued

---

1. Modeling

The Front Room

Figure 16: Ancient musical instrument - BianQing

Figure 17: Sacrificial supplies
Ancient nobilities love pillars with complicated patterns, such as clouds, ancient dragon and specific ancient totems. In this work, I chose clouds pattern to sculpt on the pillars as shown in Fig. 18.

I used two methods to create the patterns of the pillars. The first method was using Zbrush to combine hand sculpting and alpha channel to achieve a stone carving effect. The result was not as good as expected because complicated patterns needed to be divided and subdivided so many times in Zbrush that it extremely increased the computation time. Consequently I chose another software called Substance Painter to redo the sculpting. It was faster because it did not require so many subdivisions, and what I did was painting on the channel of normal map.

In this project, there are several pottery figurines in the front room. The technology of making pottery figurines in Western Han dynasty was mature and it was common to find different types of figurines with different shapes in the tombs during that period of time. In my project, I modeled an ordinary female pottery figurine kneeling on the ground, and bowing slightly (Fig. 19).

Figure 18: Pillar patterns with clouds and ancient totem

Figure 19: Female pottery figurine, sculpted in Zbrush
1. Modeling

The Front Room

With different camera angles of the front room, we are able to notice the specific positions of each object in this room (Fig. 20).

Figure 20: The views of the front room from different camera angles
The Main Room

The last part of the ancient tomb is the main room. This room restores the bedroom of the tomb master before his or her death. The audience will see the famous bronze palace lantern, the luxurious jade coffin, and the exquisite lacquer, such as folding screens and weapon racks in this scene.

The bronze palace lantern indicated in Fig. 21 was very famous in the Western Han dynasty. As a gorgeous and ingenious piece of art work, it was casted into a maid shape and glided with gold. Since it has a hollow body, when the lantern is lighted up, the smoke flows into its body through the maid's arm and it will be dissolved in the water that the lamp holder stores. As a result, it will keep the indoor air fresh. In addition, the connection between the lamp holder and body is removable so it can be easily cleaned.

The bronze palace lanterns were created in Zbrush with Zsphere and a big challenge was re-topology. When using the Zremesher tool, the original posture of the lantern in Fig.22 would change to a symmetrical form, which is due to the way how Zremesher works. Hence I used another tool, the "projection shell", to convert the high detailed model to a lower mesh.

Figure 21: bronze palace lantern, sculpted in Zbrush

Figure 22: bronze palace lantern, put back to Maya
**1. Modeling**

The Main Room

Most of the ancient nobles in Western Han dynasty chose jade to make their coffins because they believed that jade coffins would embalm their bodies. As shown in Fig. 23, the jade coffin was modeled in Maya and sculpted in Substance painter (Fig. 40).

![Figure 23: Jade coffin on the rock stairs before sculpting](image)
1. Modeling

The Main Room

Figure 24: Folding screens and weapon rack, basic models

Viewing the main room from different camera angles in Fig. 25.

Figure 25: Different camera angle render, default material render
2. Materials and Texturing

Materials and textures were done in Substance Painter, which was a new software to me. With Substance Painter, I was able to create more realistic textures efficiently. In addition, instead of sculpting the bump details with a high poly mesh in Zbrush, I could simply sculpt them on the normal map channel in Substance Painter. I started to paint texture maps from the chariot room, and finished with the main room.

The Chariot Room

In this project, most of the objects in the chariot room are made of clay. Some pictures of different types of potteries are shown in Figs. 26-28.

Figure 26: Pottery jar and pottery vat
2. Materials and Texturing
The Chariot Room

Figure 27: Horse statue, made of clay

Figure 28: Carriage, made of wood, bronze and gold. Lacquer applied
2. Materials and Texturing

The Chariot Room

Figure 29: Iron weapons in the chariot room

Images rendering with environmental lighting (Figs. 30-32).

Figure 30: Left corner of the chariot room
2. Materials and Texturing

The Chariot Room

Figure 31: The chariot

Figure 32: Panoramic view of the chariot room
2. Materials and Texturing

The Front Room

Objects in the front room were carefully refined. I have done a lot of sculpting to the pottery figurine, the musical instrument, the bronze tripods, the pillars, and the rock walls. Some examples can be found in Figs. 33-37.

Figure 33: The pottery figurine with paint

Figure 34: The bronze musical instrument, Bianzhong

Figure 35: The bronze tripods
2. Materials and Texturing

The Front Room

Figure 36: Pillars with specific patterns

Figure 37: The high-angle shot of the front room

The Main Room

The objects in the main room were also well sculpted in Substance Painter. Details can be found in Figs. 38-40.

Figure 38: Weapon rack, made of wood, painted with lacquer
2. Materials and Texturing

The Main Room

Figure 39: Bronze palace lantern, maid shaped, gold plated

Figure 40: Jade coffin with all the patterns sculpted in Substance Painter
2. Materials and Texturing

The Main Room

I rendered the entire scene with the environment lighting in Figs. 41-43.

Figure 41: Top view of the Main room

Figure 42: Front view of the Main room

Figure 43: Corners of the Main room
After accomplishing the textures, I started to set up the lighting for the scenes. In order to pursue a mysterious atmosphere, the lighting environment in my design was very dim. However, I provided a main light with high intensity to highlight the object that I wanted to emphasize. In addition, to make the lighting of each object look reasonable, I used “light-link” to set each target light individually.

---

**The Chariot Room Lighting**

1). Camera angle testing
I tested different camera angles to render the chariot room explicitly. Finally, I chose a lower angle in the left corner because it made the carriages look spectacular, and kept such details as the horse statues, potteries, weapons, and chisel marks on the ground. (Fig.44)
2). Light links

In order to help the audience focus on the carriage, the main light was placed on top of the chariot. In addition, I gave each of the other object groups a light source so that they do not look too dark or bright. To make the scene look more lifelike, the light settings cannot be even or flat because the light in nature will decay. Consequently, I adjusted the brightness of the scene manually. For example, as the light decays in Maya, the potteries and horse statues close to the camera would be too dark to see details, so I added a couple of spotlights to make them more visible (Figs. 45-46).

Figure 45: The “light centric light linking”

Figure 46: The “object centric light linking”
3. Lighting and Rendering

3). Final rendering in Maya

The final rendering of the Chariot room in Maya is shown in Fig. 47. The next step was compositing in Photoshop.
1). Camera angle testing
The objects that I intend to highlight in this room are on the right side, such as the ancient musical instruments and the pottery figurine.
I decided to place my camera in the left corner (as shown in Fig. 48). Then I adjusted the height of the light source to make the room look more solemn. In addition, the high intensity lights were focused on the musical instruments and the pottery figurine to make them stand out.

Figure 48: Camera angle testing from high angle shot vs. lower angle shot
3. Lighting and Rendering

The Front Room

2). Light linking

Figure 49: The “light centric light linking”

Figure 50: The “object centric light linking”

Figure 51: Light linking applied vs. light linking was not applied
3. Lighting and Rendering

The Front Room

3). Final rendering in Maya

The final rendering of the front room in Maya is shown in Fig. 52. The next step was compositing in Photoshop, such as adding light effects, adjusting color saturation and adding captions.

Figure 52: Final rendering with a volume fog
3. Lighting and Rendering

The Main Room

1). Camera angle testing
Given the objects in this scene are symmetrical, I decided to place the camera in the center. After several different camera angle tests, I chose a lower angle instead of a top angle so audience will have a sense of the appearance of bronze palace lantern and feel the solemn coffin (Fig. 53).

Figure 53: Camera angle testing from high-angle shot vs low-angle shot
2). Light linking
The illuminating in the main room is more complicated than the front room because there are two objects to highlight, including the jade coffin and the bronze palace lantern. Since there is a long distance between the coffin and lanterns, I need to give them different lighting links and make these lights affect each other in a reasonable way (Figs. 54-55).

Figure 54: The “light centric light linking”

Figure 55: The “object centric light linking”
3. Lighting and Rendering

The Main Room

The image after rendering is shown in Fig. 56. The next step was compositing in Photoshop.

Figure 56: Final rendering in Maya with a volume fog
4. Final Render and Image Compositing

Four posters with explicit details and captions (Figs. 57-60).

**Tomb structure**

![Tomb structure diagram](image)

**Constructions of tomb changes**

During ancient times in China, the rules and customs of construction of a grave indicated the material and spiritual civilization (e.g., religion and beliefs) during that era. In the mid to late era of the Han Dynasty (140-220 AD), there was an evolution in thinking toward connecting one's soul to heaven, which resulted in the transformation from the “vertical tomb” (a kind of totally enclosed tomb) to the “horizontal tomb.” A set of new-designed tombs with doors that can be opened, for example, the “brick tomb” and the “stone tomb.” As a substitute for the altar ofOffering, the chamber of the “horizontal tomb” had almost the same internal constructions as a real house. For example, some of the emperors and nobility proposed spectacular underground palaces (tomb) and put all their belongings in them when they were close to their death, so they could bring them to another world forever.

Figure 57: “The changes of tomb structure” with caption
4. Final Render and Image Compositing

The Chariot Room

Figure 58: "The Chariot Room" with caption

Chariot Room: Plenty of burial objects

Historians found that most of the well-preserved tombs in the Han Dynasty had lots of valuable cultural relics. That is because the tomb constructions in any given historical period are influenced by social consciousness at the time. People in the Han Dynasty held the belief that they would be reborn in another world after death, but this new world was the same as the previous world before death. That’s why all their belongings, sometimes even more treasure, were put into the tomb after their deaths. The number of excavated cultural relics in the Han Dynasty are over 10,000, including gold wares, silver wares, bronze wares, jade objects, stone utensils, pottery, lacquer wares, and silk fabrics, etc. However, precious cultural relics triggered many tomb robberies. Therefore, there is a saying in the archaeology study of China, "Nine-tenths of the tombs in the Han Dynasty are emptied Indeed!"
Chinese earthenware (Front Room)

During the Han Dynasty, Chinese earthenware reached new heights of complexity and sophistication. Earthenware in the Han Dynasty are usually 50-60cm high. Some of them were modeled in great detail with clay first, and then applied the color directly after burning into earthenware. The rest of them were only molded as a naked body, and were then adorned with the Han’s delicate silk clothes.

In the tomb of emperors and nobilities, there are lots of human earthenware, such as armed soldiers, maid, musicians and many domestic animal earthenware, such as horse, cow, sheep and pig, all made in the same mold.

Figure 59: “The Chinese earthenware (Front Room)” with caption
Bronzewares in Main Room

As the representative of Late Bronze Age, the bronze ware of Han Dynasty plays an important role in Chinese bronze history. According to the excavated cultural heritage, historians found many household bronze utensils such as tripod cauldrons, jars, wine-vases, bronze mirrors, etc.

The most famous bronze item of Han Dynasty is the palace lantern. It is a gorgeous and ingenious piece of art work, which was cast into different shapes and then gilded with gold. The body of the lantern is empty, and after the lantern is lit, its smoke directly flows into the empty body through a certain path (maid’s arm or the goose’s beak) so as to keep the indoor air clean. The lamp holder can store water, dispersing smoke from the smoke. Besides, the parts that connected to the lamp holder are removable, which can be easily cleaned.

Figure 60: "The bronzewares in Main Room)" with caption
5. Demonstration

I rendered out several images with different camera angles for demonstration purposes. To demonstrate my art work, I printed out four posters (Figs. 57-60) and many postcards for the audience (Fig. 63). Meanwhile, I displayed several high-resolution images on computers in a rolling demo (Fig. 61).

Slideshow

Figure 61: “The ancient Chinese Tombs - Western Han chapter”, slideshow
5. Demonstration
Content Continued

**Posters and Postcards**

Figure 62: “The ancient Chinese Tombs - Western Han chapter”, posters

Figure 63: “The ancient Chinese Tombs - Western Han chapter”, postcards
Summary and Conclusion

Evaluation

Conclusion
Evaluation

Evaluation is significant to my thesis project. Feedbacks from both my advisors and audiences were collected including face-to-face meetings and hard-copy surveys from the MFA thesis show. The final design was carefully revised according to those feedbacks.

Face to face meetings

Suggestions
I had weekly meetings with my advisors during the whole process of this project. Their main suggestions are as follows:

1. Too many high subdivision polygons were placed in the scene. This may cause the overloading of Maya.

2. Camera angles were kind of flat and should be more dynamic.

3. The lights in the scenes were kind of even and more contrast will enhance the focal point.

Refinements
Based to the feedback from the meetings, I have revised my thesis in the following areas:

1. As my advisor suggested, I made some low subdivision polygons and then applied normal maps or displacement maps to them. It saved a lot of RAM and computation time in Maya.

2. Different camera angles were tested as shown in Fig. 53, and the best one was chosen according to the feedback from my advisors and audience. The best results are shown in Fig. 60.

3. I also relinked the objects in the scenes to make them look more lifelike. This was done by adjusting intensity as shown in Figs. 45-46. Meanwhile, I manually increased the contrast in Photoshop (Fig. 58).
Thesis show survey

Evaluation Form

An evaluation form was created for the thesis show. It included 3 sections as shown in Fig. 64:

1. The models
2. The visual style
3. Does it help?

![Evaluation Form](image)

Figure 64: Evaluation form
Feedback from the surveys showed that the modeling and visual style were excellent and successful. The audience spoke highly of the posters and said the visual design helped them to understand and remember the history of the tombs. Some samples of positive feedback include:

“You did a great job to restore the ancient tomb, the textures look fantastic!”

“Very nice way to preserve and educate about history”.

“Absolutely beautiful. Incredible view of history we would not otherwise be able to appreciate”.

In the meantime, some improvement suggestions from the viewers are as follows:

“Maybe you could print the work out by 3D printer in the future, that will assist viewers to learn better”.

“I think you could add something on the wall instead of leaving it dark”.

“360-degree view may help”.

Overall, the feedback from viewers were informative and constructive. The feedback showed that the design was attractive, fantastic and educational. The viewers not only learned the history of the Chinese tombs, but also developed a sense that 3D visual design would give audience an intuitive feeling for some ancient cultural relics that might have been extensively destroyed by now. Both museums and educational game design companies will benefit from this project.
Conclusion

This 3D environmental design project restored the ancient Chinese tombs that had been destroyed, robbed or not yet excavated. The audience would be able to learn Chinese tomb history intuitively and explicitly. This 3D design project reproduced and vividly presented many aspects of the ancient tomb, including architecture, internal lighting environment, ancient style of decoration and many specific burial objects. It provides an authentic experience for audience to learn Chinese culture through this lifelike 3D ancient tomb.

This project has shown a great success during the thesis show. People showed great interest in this work and gave high praise to this gorgeous art design. However, there are still some opportunities to improve the current design. The future work includes the following aspects:

1. Continuing to refine the current prototypes based on the feedback gathered from viewers.

2. Continuing to create the other rooms in the ancient tomb.

3. Making a 360-degree panoramic image of each room to fully engage viewers.

4. Applying virtual reality technology to this design as an educational end, and popularizing it to museums and schools.

5. Developing more ancient tombs from different dynasties, and then building a series of historical teaching project.

During the process of this thesis project, the author had an explicit plan at the beginning and learned to utilize time wisely. This 3D design work enhanced the author's skills in many ways, such as model polygon with high details, layout UVs, apply textures in Substance Painters, and re-topology in Zbrush. In addition, the author's ability on managing design details and visual emotions has significantly improved.
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Original Thesis Proposal

See next page
3D Environmental Design:
Ancient Chinese Tombs
Western Han Dynasty Chapter

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Thesis Proposal for The Master of Fine Arts
Visual Communication Design
School of Design
College of Imaging Arts and Science
Rochester Institute of Technology

Fall 2017

Chief Advisor: Daniel Deluna
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Thesis Proposal for Master of Fine Arts

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Title
3D Environmental Design:
Ancient Chinese Tombs - Western Han Dynasty

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Abstract

Keywords

3D Visual Design  
3D Environmental Design  
Tomb features of Western Han Dynasty  
Experience the environment  
History knowledge  
Visualize the knowledge  
Systematic learning

Content

To research history can help people preserve humanity’s culture more completely. For China, a country which has a very long history, we have a vast number of historical events, which were recorded by official historians. However, we still need objective evidence to support and verify the documents. Antiques from different dynasties are material evidence about the past.

In China, most of the antiques are obtained by excavating tombs. These tombs might have belonged to ancient royal families, or common families. For archaeology, a discovery of a royal family tomb would have a higher value than a common one. This is because, those artifacts from the royal family tombs were always more exquisite, they can reflect the highest production level, trends, and economic status at that time. In addition, the tombs’ structure and material would represent the construction industry and builders’ lifestyle habits. That is, the ancient tomb is a micro society of a certain dynasty.

My thesis project will be a piece of 3D environmental design, comprised of several 3D scenes in high quality rendering to show the main environment of an ancient tomb. Due to the long history (which is more than 3000 years,) I’d like to focus on the Western Han Dynasty (206BC - 24AD). The reason why I choose this period is because it is a peak of Chinese cultural development, and the royal mausoleums spread all over the city of Taiyuan, where rich cultural relics still remain. In my project, I will pick one typical tomb, build and simulate the whole construction, including every part like the paved path leading to the tomb, the main tomb room, 2 side rooms called “ear room”. I would like to build a fancy scene, and render many
Abstract
Content Continued

high-quality posters. Each of them will have caption so that people can learn the tomb’s features in a systematic way. This will also make audiences involved in the environment in a more engaging way than that just reading books.

My target audience could be teenagers and people who are interested in learning about different culture. For teenagers, study knowledge through a 3D visual project would attract their interest easily. The 3D visual effects would also help them to focus on what they need to learn quickly because it is strong and attractive. The caption content corresponds to the visual parts helping them to enhance the memories of what they’ve learned as well.

For the thesis show I propose to exhibit 4 posters in high rendering quality. In those posters, I’d like to show the detail or each tomb room along with instructions. Overall, I’d like to show the structure of the tomb, a variety of assets like the exquisite burial objects, including delicate or broken potteries, Bronze wares, jades, and many visual element to make the scene more immersive and fantastic. The goal of this project is to help more people get to know the ancient Chinese tombs’ history and culture.
Problem Statement

1. **Long history produces huge amount of records which are difficult to learn and remember in China.** China has a long history with more than 3000 years of records. Ancient Chinese officers usually utilized two methods to record the social environment, culture, and economic levels at their time: books write about significant historical events, and paintings describe people's lives. It is not easy to learn and remember the knowledge just via reading. So, I propose to find ways that can help to organize the information of what we need to learn. Documents need to be verified. Tombs contain historical evidence. For historians, they need this data to restore the real and complete history. Records might have been changed by the next dynasty because of political reasons, stories might come from people's conjectures, etc. In these cases, we need other proof to support or even overturn the records. Such are the different styles of antiques, the wall paintings, the delicate ancient architectures, etc. Graves, or the underground palaces, are the most likely locations to excavate those proofs.

2. **Documents need to be verified. Tombs contain historical evidence.** For historians, they need this data to restore the real and complete history. Records might have been changed by the next dynasty because of political reasons, stories might come from people's conjectures, etc. In these cases, we need other proof to support or even overturn the records. Such are the different styles of antiques, the wall paintings, the delicate ancient architectures, etc. Graves, or the underground palaces, are the most likely locations to excavate those proofs.

3. **To protect the culture relics from the grave raiders, only a small group of people can get access to real ancient tombs.** The most significant problem here is that only a small group of people can get access to the real ancient tombs: archaeologists and grave raiders. For most people, we only go to read books, watch TV programs, or visit the museums to get the relevant information. Therefore, I propose to build a 3D scene to reproduce a real ancient tomb, people will able to experience the tomb (underground palace), and learn the relevant culture in a systematic way.

4. **Therefore, a systematic and specific visual method is necessary for learning history.** That is what my thesis project proposes to do. I will build a scene of a tomb from the Western Han Dynasty in Maya, and then render posters for each room, which can talk about the ancient tombs in a systematic way. In this 3D design, audiences would have the chance to observe and get familiar with the tomb's structure, and learn to distinguish handicrafts' features; they can get the information in a clear way via the captions for the posters, and
they can also connect the visual elements with the text to enhance their memories. They would feel like that they are experiencing a real ancient tomb through the 3D scene. I hope after the thesis show, the knowledge they’ve learned of the tombs would be more impressive and long lasting.
Review of Literature

**History**

**A Short History of China: From Ancient Dynasties to Economic Powerhouse**
by Gordon Kerr

From the beginnings of Chinese prehistory right through to internet censorship, a comprehensive introduction to the sprawling history of this enormous country. An absorbing introduction to more than 4,000 years of Chinese history, this book tells the stories of the tyrants, despots, femmes fatales, artists, warriors, and philosophers who have shaped this fascinating and complex nation. It describes the amazing technological advances that China's scientists and inventors made many hundreds of years before similar discoveries in Europe. It also investigates the Chinese view of the world and examines the movements, aspirations, and philosophies that molded it and, in so doing, created the Chinese nation. Finally, the book examines the dramatic changes of the last few decades and the emergence of China as an economic and industrial 21st-century superpower.

**Chinese Walled Cities 221 BC- AD 1644**
by Stephen Turnbull

It has been said in China that a city without a wall would be as inconceivable as a house without a roof. Even the smallest village invariably had some form of defensive wall, while the Great Wall of China was an attempt to build a barrier along the most vulnerable border of the entire country. Yet the finest examples of walled communities were China's walled cities, whose defensive architecture surpassed anything along the Great Wall. This book traces the evolution of the walled city from the 3,000 year old remains of the beaten earth walls of the Shang dynasty to the huge stone fortifications of the Ming dynasty. Stephen Turnbull, expert military historian, reveals the defensive structures from all the major ancient Chinese cities, and discusses how they protected entire communities, and not just castle dwellers, with color artwork reconstructions, maps and archive photographs.
Review of Literature

History

**Tomb Research of Tang Dynasty in Guanzhong District**

*by Weishen Wang*

As we know, Chang'an is the capital of Tang Dynasty. In the long history of 618 AD years to 907 AD years, there are as much as 19 emperors and lots of nobilities were buried here in the Guanzhong District. So far, we have excavated more than 3000 Tang tombs. These tombs have high burial level, excellent murals, and a variety of culture relics. This book tries to make a relatively comprehensive analysis of this region.

**ChangPing ShaHe**

*by Beijing Cultural Relics Research Institute*

During the January to April, 2014, the Beijing Cultural Relics Research Institute excavated the tombs at Shahe, Changping. They found 5 Han tombs, 3 Western Jin tombs, 9 Tang Dynasty tombs, 4 Yuan Dynasty tombs, 22 Ming Dynasty tombs, and 69 Qing Dynasty tombs. The Han Dynasty, Western Jin Dynasty, Tang, Yuan Dynasty tombs had been severely damaged, while most of the Ming and Qing Dynasty tombs were well preserved. Those tombs unearthed a number of important artifacts combinations, which will be a very important data for the Institute to research the ancient Shahe town.

**The mask of Dead**

*By Peking University Press*

We can see how the ancient people assume the life after death according to the books, the religion and ritual. However, the tombs can present the concepts more directly. Burial place is not only a space to put the deceased body, but also can be a collection of architecture, painting, sculpture, and artifacts at that time. This book combines the archaeology and art history to describe and analyze the materials of tombs from Han Dynasty to Song Dynasty.
### Review of Literature

#### 3D Visual Design

**The Films of Pixar Animation Studio**  
*by James Clarke*

A one-stop handbook to the studio’s work, discussing each film in great detail. A major icon of cinema and pop culture more widely, Pixar Animation Studios has played a vital part in reminding audiences of animation’s capacity as a major artform. Hugely popular, and recognized as a real force in the imaginative lives of its audience, Pixar’s movies have attained critical mass. Each Pixar feature film is explored here in terms of creative choices made by the films’ producers, writers, directors, and animators, from the first bright idea through to final realization. The book also makes connections between the studio’s aesthetic and the wider realm of animation history, the blockbuster movie, and the enduring examples of folk tales.

#### Game Theory for Applied Economists

*by Robert Gibbons*

This book introduces one of the most powerful tools of modern economics to a wide audience: those who will later construct or consume game-theoretic models. Robert Gibbons addresses scholars in applied fields within economics who want a serious and thorough discussion of game theory but who may have found other works overly abstract. Gibbons emphasizes the economic applications of the theory at least as much as the pure theory itself; formal arguments about abstract games play a minor role. The applications illustrate the process of model building of translating an informal description of a multi-person decision situation into a formal game-theoretic problem to be analyzed.

#### Infographics: The Power of Visual Storytelling

*by Jason Lankow, Josh Ritchie, Ross Crooks*

In today’s fast-paced environment, you must communicate your message in a concise and engaging way that sets it apart from the noise. Visual content—such as infographics and data visualization—can accomplish this. With DIY functionality, Infographics: The Power of Visual Storytelling will teach you how to find stories in your data, and how to visually communicate and share them with your audience for maximum impact.
Review of Literature

**Emotional Design**

*Emotional Design: Why We Love (or Hate) Everyday Things*

*by Donald A. Norman, Don Norman*

New research on emotion and cognition has shown that attractive things really do work better, as Donald Norman amply demonstrates in this fascinating book, which has garnered acclaim everywhere from Scientific American to The New Yorker. Emotional Design articulates the profound influence of the feelings that objects evoke, from our willingness to spend thousands of dollars on Gucci bags and Rolex watches, to the impact of emotion on the everyday objects of tomorrow. Norman draws on a wealth of examples and the latest scientific insights to present a bold exploration of the objects in our everyday world. Emotional Design will appeal not only to designers and manufacturers but also to managers, psychologists, and general readers who love to think about their stuff.
**Design Ideation**

**Concepts**

My thesis project will be a piece of 3D environmental design, comprised of several 3D scenes in high quality rendering to show the main environment of an ancient tomb. It is named as “Ancient Chinese Tombs - the Western Han Chapter”. This project is designed for the people who are interested in learning history and different culture. In my project, people could learn the Western Han’s cultural features in a systematic way. The features including the tomb’s architectural structure, artifacts’ special shape and pattern, and the unique color methods of that time. Different dynasties would have their own characteristics. For example, people in the Western Zhou Dynasty preferred to put the bronze wares into tombs; people in the Western Han Dynasty utilized lots of jade; as for the Tang Dynasty, people liked to put the tri-colored glazed potteries into tombs (underground palaces). Due to the variety of dynasties we have in the past 3000 years, I might design a series of 3D scenes to talk about different ancient tombs in the future. For now, in my current thesis project, I will focus on the western Han Dynasty first.

This project will focus on 3D visual design, and environmental design. I need to build all the assets (on page 16), adjust the shading, material, lighting components and also do after effects. Pursuing a high visual quality, this project will be more realistic and cool to raise audiences’ interest of learning. I hope it will impress them a lot.

**Content Organization**

1. Research the famous dynasties which have different and typical burial customs.
2. Pick out 1 dynasty which has great otherness to .
3. Analyze their tombs’ location, circumstances, structure, and funeral objects.
4. Look for references from museums, books, and website articles.
5. Reading the relevant books talking about 3D Visual Design, and Environmental Design.
Design Ideation

Sketches (Tomb Structure)
Design Ideation

Sketches
(Tomb Structure)
Design Ideation

Sketches
(Tomb Structure)
## Design Ideation

### Assets List

#### 1. Construction:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paved path</td>
<td>The passage leading to main room, stones to stock the gate, connect with ear rooms</td>
</tr>
<tr>
<td>Front room</td>
<td>A huge room, always put in bronze wares</td>
</tr>
<tr>
<td>Ear room (left)</td>
<td>Room for carriage</td>
</tr>
<tr>
<td>Ear room (right)</td>
<td>Room for potteries, a few bronze wares</td>
</tr>
<tr>
<td>Back room</td>
<td>The room for the main coffin, always along with a good amount of jade</td>
</tr>
<tr>
<td>Sub-drain</td>
<td>Cross over the paved path and the front room</td>
</tr>
</tbody>
</table>

#### 2. Wall Painting(Murals):

<table>
<thead>
<tr>
<th>Position</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of the tomb</td>
<td>Sun, moon, mythical goddess and god(Nuwa and Fuxi), mythical beasts.</td>
</tr>
<tr>
<td>Front wall of the main tomb room</td>
<td>Animals, monsters, four mythical beasts, daily lives, famous history stories.</td>
</tr>
</tbody>
</table>
## Design Ideation

### Assets List

#### 3. Funeral Objects:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Type</th>
<th>Detail</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffin</td>
<td>Wood Coffin</td>
<td>Made of wood, Applied lacquer</td>
<td>1</td>
</tr>
<tr>
<td>Potteries</td>
<td>Tripod cauldrons</td>
<td>An ancient cooking vessel with two loop handles and three legs</td>
<td>One pair</td>
</tr>
<tr>
<td>Clay jars</td>
<td>4 unique styles</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Pottery bowl</td>
<td>2 different styles</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Pottery carriage</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Earthenwares</td>
<td>Kneel down</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Standing</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Bronze wares</td>
<td>Weapons</td>
<td>2 unique style of swards</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Bows</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Arrows</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Crossbow</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Dagger-Axe</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Utensils</td>
<td>Copper pot</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Copper basin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palace lanterns</td>
<td>Maid shaped</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Bird shaped</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Wide goose feet lantern</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Jade</td>
<td>Jade piece</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Jade pendant</td>
<td>Base of Chinese dragon</td>
<td>2</td>
</tr>
</tbody>
</table>

---
1. Constructions of tomb changes

During ancient times in China, the rules and concept of construction of a grave indicated the material civilization and spiritual civilization (e.g. religion and beliefs) during that era. In the mid to late time of the Han Dynasty (9AD–220AD), there had been an evolution in thinking toward connecting soul to heaven, which resulted in the evolution from the “vertical tomb” (a kind of totally enclosed tomb) to the “horizontal tomb”, e.g. the “brick tomb” and the "stone tomb" (a set of new designed tombs with doors that can be opened). As a substitute for the outer coffin (an element of the “vertical tomb”), the chamber of the “horizontal tomb” had almost the same internal constructions as a real house. For example, some of the emperors and nobilities, prepared spectacular underground palaces (tombs) and put all their belongings in them when they were close to death, so they could bring them to another world (heaven).

2. Plenty of burial objects

Historians found that most of the well-preserved tombs in the Han Dynasty had lots of valuable cultural relics. That’s because the tomb constructions in any given historical period are influenced by social consciousness at the time. People in the Han Dynasty held the belief that they would be reborn in another world after death, but this new world was the same as the previous world before death. That’s why all their belongings, sometimes even more treasure, were put into the tomb after their deaths. The number of excavated culture relics in the Han Dynasty is over 10,000, including gold wares, silver wares, bronze wares, iron wares, jade objects, stone implements, potteries, lacquer wares and silk fabrics, etc. However, precious cultural relics triggered many tomb robberies. Therefore, there is a saying in the archaeology study of China, “Nine-tenths of the tombs in the Han Dynasty are emptied (robbed)”. 
As the representative of Late Bronze Age, the bronze ware of Han Dynasty plays an important role in Chinese bronze history. According to the excavated culture heritage, historians found many household bronze utensils such as tripod cauldrons, jars, wine vases, bronze mirrors etc. The most famous bronze item of Han Dynasty is the palace lantern. It is a gorgeous and ingenious piece of art work, which was casted into different shapes and then glided with gold. The body of the lantern is empty, after the lantern is lit, its smoke directly flows into the empty body through the certain path (maid’s arm or the goose’s beak) so as to keep the indoor air clean. The lamp holder can store water, dissolving soot from the smoke. Besides, the parts that connected to the lamp holder are removable, which can be easily cleaned.

During the Han Dynasty, Chinese earthenware reached new heights of complexity and sophistication. Earthenware in the Han Dynasty is usually 50-60 cm high. Some of them were modeled in great detail with clay first, and then applied the color directly after burning into earthenware. The rest of them were only molded as a naked body, and were then adorned with the Han’s delicate silk clothes. In the tomb of emperors and nobilities, there are lots of human earthenware, such as armed soldiers, maids, musicians and many domestic animal earthenware, such as horse, cow, sheep and pig, all made in the same mold.
Design Ideation

Personal Style
Methodological Design

Research relevant art works we already have, then analyze them. We have art works talking about ancient tombs all the time. For example, we have films like the Tomb Raider, the Mummy, The Lost Tomb, etc; and we also have many 3D works like 3D game scene design, 3D concept design. In my thesis project, I will build a 3D scene of Chinese ancient tomb, it is belonging to the Western Han Dynasty. I will print 4 posters along with captions for thesis show.

Gather documents for modeling assets. Before modeling, I need to collect documents, sorting data, and then decide the appearance of my tomb, the assets I need to build, and any other features of the tomb. In addition, I will organize the detail information I need to put on the poster.

Design Assets.

Modeling, material, shading, lighting, rendering. Software utilized for the thesis project will consist of Maya, Mudbox, Photoshop, and Illustrator. I will build the whole scene in Maya, including doing the material, the shading (procedure shading, hand paint shading), and adjust the lightings. Mudbox would be used to engrave the details such as the lines on the stones, the patterns on the jade, etc. I will also use Photoshop and Illustrator to complete the composition and refine the final visual effect.

Get feedback, refine, render, and design the posters.

Print the posters for thesis show.

Target audience. Target audience will be people who are interested in learning different countries' culture. The visual impact of 3D Visual Design projects will engage people to learn easier. The systematic and specific visual method would able to help people enhancing the knowledge they've learned.
Deliverables

Digitally as a 3D modeling scene, and I will print out 4 posters in high quality along with introduction.

I will build one huge tomb with a variety of burial objects for each room. It is available to show the tomb’s structure and contents. The main architecture will be finished in Maya, while the details will be completed in Mudbox.

Many different type of shading will be utilized, such as procedural shading, hand painting textures, bump maps, and displacement maps.

The whole environmental design will be dim, cool and quiet because the tomb is an underground palace. In my opinion, a dusky light will make audience feel tension and help them to concentrate quickly. To obtain the final visual effects as I propose to, I will combine the indirect light and other type of lights.

I will print out 4 posters in high rendering quality. In the poster, I’d like to add the introduction to explain the assets in a systematic way.
Implementation Strategies

**Format**

3D Visual Design
Digitally as a 3D scene in Maya
Printed out 4 posters with a high rendering quality

**Software**

**Photoshop**
Character design
Sketches & thumbnails.
Posters for the educational information.

**Illustrator**
Info graphic Design
Poster Layout

**Maya**
Basic Models, the main huge tombs, the burial objects in each room, the corps, and the traps.
The whole scene, outside environment.
Shading, lighting.
Part of the animation, such as camera movement, light animation.
Part of the after effects, such as particle effects and animation.

**Mudbox**
Paint the details of objects, tomb wall.
Generate the displacement map, bump map, and normal map.
Dissemination

Exhibition
1. It will be displayed in the Rochester Institute of Technology’s Thesis Show Exhibition in Fall 2017.
2. Available at the RIT University Gallery.
3. Upload to the 3D design portal for people to watch.
   For example: Vimeo, Facebook, Pinterest and Behance.
4. Submit the paperwork to RIT Wallace Library to keep on file.

Competition
1. Adobe Design Achievements Awards 2017
2. CG Challenges & NVArt
3. AIGA design Competition
4. Hardcore Modeling Challenge
5. 3D Environment Competition
6. Communication Arts Competitions
Evaluation Plan

1. Advisors' feedback
   During working on the project, I will talk with my advisors to get some feedback of the visual effects, the info design, and the final deliverables.

2. Feedback from my own website
   I’m going to upload the processes of design to my own website so that I can get many feedback and ideas. I will have the chance to fix the work on next step according to those suggestions.

3. Portal 3D Visual Design website
   I will upload the final render images to some portal 3D visual design websites, a questionnaire will be setted also. Viewers will be asked a series of questions to determine if they could really learn anything from the project.

4. A questionnaire in the thesis show
   The same questionnaire will be integrated into the thesis show as well. I will collect viewers’ answer to see if the posters work great or no.
Pragmatic Considerations

Budget might be a little high for this project because of printing fee and traveling payment. A high quality poster with a dimension of 18” x 24” will cost $40 or more. In addition, I might need to pay the museums for the copyright licensing, because part of the antiques in my scene are exhibited by them currently. Good news is that most part of my project will be implemented in student version softwares, which would not cost too much on this.

Besides, during collecting the documentation, some travel fees and tickets fees will be generated. For example, to visit Metropolitan in New York, I need to pay for the transportation and the ticket, which will be as high as $300 or more.

So here is the list of budget:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis Show</td>
<td>$300</td>
</tr>
<tr>
<td>Dissemination</td>
<td>$100</td>
</tr>
<tr>
<td>Transportation fee</td>
<td>$500</td>
</tr>
<tr>
<td>Ticket fee</td>
<td>$150</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1050</strong></td>
</tr>
</tbody>
</table>
Appendices
Content Continued

Evaluation Results

The original evaluation form

3D VISUAL DESIGN
Ancient Chinese Tombs - Western Han Dynasty

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modeling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Material and Texture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lighting Effects</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Visual Style</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</table>

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<tr>
<th></th>
<th>Flat</th>
<th>Dynamic</th>
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</thead>
<tbody>
<tr>
<td>Camera Angle</td>
<td>1</td>
<td>2 3 4 5</td>
</tr>
</tbody>
</table>

What brings you to this booth?

☐ The posters  ☐ the postcards  ☐ just looking around  ☐ Invited by Yailing Zhang

Do you think the visual design help you to remember the information better?

☐ Yes, it helps a lot  ☐ Yes, it helps a little bit  ☐ No, not at all

Other suggestions:
### Evaluation Results

The viewer survey with results

<table>
<thead>
<tr>
<th>3D VISUAL DESIGN</th>
<th>Ancient Chinese Tombs - Western Han Dynasty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>Excellent</td>
</tr>
<tr>
<td>Modeling</td>
<td>1   2   3   4   5</td>
</tr>
<tr>
<td>Material and Texture</td>
<td>1   2   3   4   5</td>
</tr>
<tr>
<td>Lighting Effects</td>
<td>1   2   3   4   5</td>
</tr>
<tr>
<td>Visual Style</td>
<td>1   2   3   4   5</td>
</tr>
<tr>
<td>Flat Camera Angle</td>
<td>1   2   3   4   3</td>
</tr>
<tr>
<td>Dynamic Camera Angle</td>
<td>1   2   3   4   5</td>
</tr>
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</table>

What brings you to this booth?
- [] The posters
- [] the postcards
- [] just looking around
- [] invited by Yiling Zhang

Do you think the visual design help you to remember the information better?
- [x] Yes, it helps a lot
- [ ] Yes, it helps a little bit
- [ ] No, not at all

Other suggestions:

I'd love to see more of your work in the future well done!!
**Evaluation Results**

The viewer survey with results

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<td>Excellent</td>
</tr>
<tr>
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</tr>
<tr>
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<td>1  2  3</td>
</tr>
<tr>
<td>Lighting Effects</td>
<td>1  2  3</td>
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<tr>
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<td>1  2  3</td>
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What brings you to this booth?

- [ ] The posters
- [ ] the postcards
- [ ] just looking around
- [ ] invited by Yaling Zhang

Do you think the visual design help you to remember the information better?

- [x] Yes, it helps a lot
- [ ] Yes, it helps a little bit
- [ ] No, not at all

Other suggestions:

`Very Good Work!`

---

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What brings you to this booth?

- [ ] The posters
- [ ] the postcards
- [ ] just looking around
- [ ] invited by Yaling Zhang

Do you think the visual design help you to remember the information better?

- [x] Yes, it helps a lot
- [ ] Yes, it helps a little bit
- [ ] No, not at all

Other suggestions:

`If you could print the 3D model, that would assist viewers understand the many details behind it better.`
### Evaluation Results

**Content Continued**

<table>
<thead>
<tr>
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<tbody>
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**What brings you to this booth?**
- [ ] The posters
- [ ] The postcard
- [ ] Just looking around
- [ ] Invited by Yaling Zhang

**Do you think the visual design helps you to remember the information better?**
- [x] Yes, it helps a lot
- [ ] Yes, it helps a little bit
- [ ] No, not at all

**Other suggestions:**

"Absolutely beautiful. Incredible view of history. We would not otherwise be able to appreciate."
Evaluation Results

The viewer survey with results

<table>
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<tr>
<td>3</td>
<td>✓</td>
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Modeling
Material and Texture
Lighting Effects
Visual Style

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<tr>
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<th>Dynamic</th>
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<tr>
<td>1</td>
<td>4</td>
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Camera Angle

What brings you to this booth?
- The posters
- The postcards
- Just looking around
- Invited by Ying Zhang

Do you think the visual design help you to remember the information better?
- Yes, it helps a lot
- Yes, it helps a little bit
- No, not at all

Other suggestions:

"The design view may help."
### Evaluation Results

The viewer survey with results

<table>
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What brings you to this booth?
- [x] Poster
- [ ] The postcards
- [ ] Just looking around
- [ ] Invited by Yaling Zhang

Do you think the visual design helps you to remember the information better?
- [x] Yes, it helps a lot
- [ ] Yes, it helps a little bit
- [ ] No, not at all

Other suggestions:
I thought you can add something on the wall. Not only we show environment.