Study on the Construction Design of the Virtual Experiment Model based on Maya Natural Scene

Zhuo-Jing

Wenzhou Vocational & Technical College, Wenzhou. 325035

zhuojing@qq.com

I. CURRENT SITUATION

Three-dimensional animation modeling is made by the two-dimensional script in a three-dimensional software, giving people a visually stereoscopic sense. Same as the stuffs in movies and on TV, visual principle is at the core. Meanwhile, it is already verified in the medical field that "persistence of vision", which means that a picture or an object will stay for 1/24 minutes after the human eye sees it, is a feature we possess. By virtue of this, it is possible to create a smooth series of visual changes if we play a second picture before the first one is gone. Therefore, 24 frames are shot and displayed in one second in movies, and 25 (PAL system) (cartoons in the central TV station abides by PAL system) or 30 (NSTC system) images are shot and displayed on TV in a second. If less than 24 images are displayed in one second, there will be pauses. So, animation modeling is able to meet animators' demand of creation.

II. FOUNDATION OF ANIMATION MODELING

Basic animation modeling theories are basic knowledge of great importance, involving the authenticity and credibility of an animation. Facing the same ideas, excellent animation modeling theories help you to make more delicate and more credible scenes. There must be the concept of volume in the movement of an object, namely, the room it occupies in the space. An object can be made into a surrealistic one or one with pure carton style. Furthermore, it can be made into various models with different styles and accuracy according to different shots, which will be covered later. The most fundamental question waiting for us is how to make an object more real.

(1) In animation modeling, virtual objects are made into the real art, achieving the transformation from real existence to virtual appearance with the help of three-dimensional software. Animation models with high imagination and expressivity are made according to the features of people's understanding of reality.

(2) Animation modeling is different from animation design (original painting). Original painting design is the basis of animation movies, where the roles, actions and facial expressions in each shot are equivalent to the actors in movies. The difference between the two is that, in animation modeling, the designer doesn't shoot an actor's body movements to the film directly; instead, he creates each character with a pen and endows them with life, personality and emotions.

(3) Models in cartoons are also commonly called "the fine models", referring to the models which are finally decided in the process and are used in later processes, including animation and rendering, without the need of any alterations. First of all, it is necessary to complete a simple model in accordance with the script, which is later refined by directors and producers to achieve the anticipated effect.

(4) Tools needed in animation modeling are: computers, mice, keyboard, hand-painting boards, etc. The method is that: the designer creates a model according to his own understanding of the original painting in the script in combination with his knowledge of three-dimensional modeling software, making the general shape, followed by some refinements, where efforts are made for the details and close-up parts. Subsequently, a picture is made in photoshop through the hand-painting board for primary embodiment, and is later revised for the ideal effect.

In conclusion: "animation modeling is not pure modeling". A leaf, grass, a hawk and a brook all have their different features.

III. ANIMATION MODELING AND ITS CHARACTERISTICS

Art is commonly visual. Any kind of art focuses on the shaping of artistic images, with corresponding modeling features and means. Animation, as an art form, is based on artistic modeling. It has the common features of art as well as its own characteristics and unique artistic language.

Animation art, like all art forms, comes from life, and the creation of animation images is inspired by life. The shapes we see in everyday life are shapes formed by natural forces and human strength. Materials from life can only become animation images after processing.

In general, animation modeling is a process of accumulation. The two points discussed above are the problems most easily ignored by beginners. We have to make more observations of life, think more and summarize more, so that we can improve ourselves more quickly.

Original painting is an important part in animation, whose major task is to design the key actions in cartoons according to the plot and the director's intention.

IV. HOW ANIMATION MODELING CAME INTO BEING

Animation is a unique art form, which came into being as a necessary result of the development of human civilization. Through the image records of human beings, human beings' desire in their sub-consciousness to show the movements of objects and the process of time has been revealed by the frescoes in Altamira Cave in the mountainous area in north Spain in the Stone Age. In these frescoes with many animals, a vivid wild boar attracts our attention. There are four legs behind its body, whose location makes all the wild boars in the picture look dynamic. This is not an occasional phenomenon. We always discover running horses with eight legs, flying swallows with six wings or dancing persons with four legs and four arms, etc. in ancient relieves and paintings on rocks or in frescoes, where there is an attempt to reflect their movements through each continuous stages in people's or animals' movements in static images. These images are the primitive phenomena and forms of animation, where actions occur in different moments are drawn together, showing people's understanding of "movement" and exploration of expression. We can see that human beings at that time had had ideas to show scenes of action except for the vivid record of living scenes, and had tried to show the movements through images so as to show the relations between movement velocity and life. It is the result of people's wisdom and invention to express the movement of things and thinking of imagination. It is people's mental process of the motive of creation in order to satisfy their mental need and their wish to create beauty after they had the consciousness of beauty. It is also the reflection of people's mental and social needs.

V. SCENE MODELING'S EMBODIMENT OF ANIMATION EFFECTS

Model processing in animation refers to the changes of animation objects. Changes here have a wide connotation, which can refer both to realism and deformation, or to the changes of color. Obviously, in a certain degree of changes, the more time it takes, the more refined the model is; the less time it takes, the rougher the model is. It embodies the authenticity of images in animation.

ZBrush broadens the scale of drawing, which allows you to add to the depth, texture, light and complicated and precise render effects of the works based on pixels, achieving the combination of 2D and 3D, blurring the boundary between polygons and pixels, making you surprised and excited for its variety. ZBrush is a new type of CG software, whose excellent Z-ball way of modeling can not only make excellent static frames but also participate in the creation of many special film effects and games (ZB has participated in the Lord of Rings III, Half-life II which the public are familiar with). It can cooperate with other softwares like max, maya and xsi to make amazing detailed effects. CG software will become the direction of future development due to ZB's irresistible charm. Specific carving effect is shown in Fig.1.
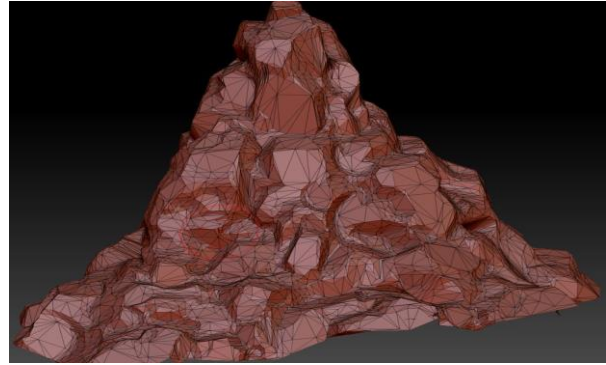

Fig. 3.2 Fine model of ZBrush carving

The picture cannot be directly used after it is carved. It is necessary to reduce the faces, export the file in obj format, and then import it into maya. Menu of face deduction in ZBrush is shown in Fig.2.
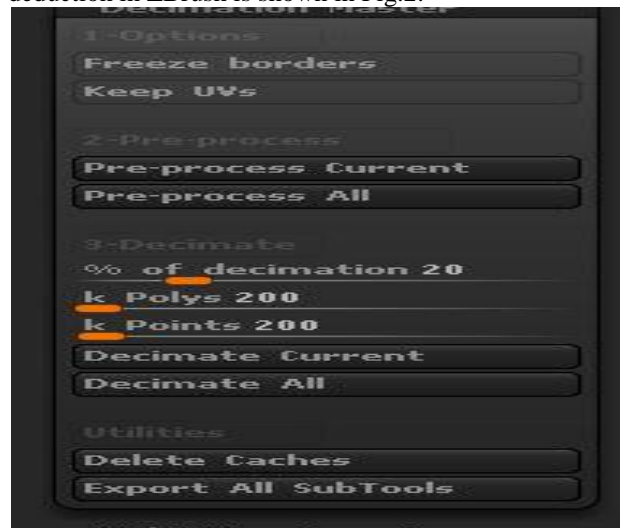

Fig.2 Face deduction in ZBrush

Re-import it into maya after the faces are deducted, and the effect is shown in Fig.3.
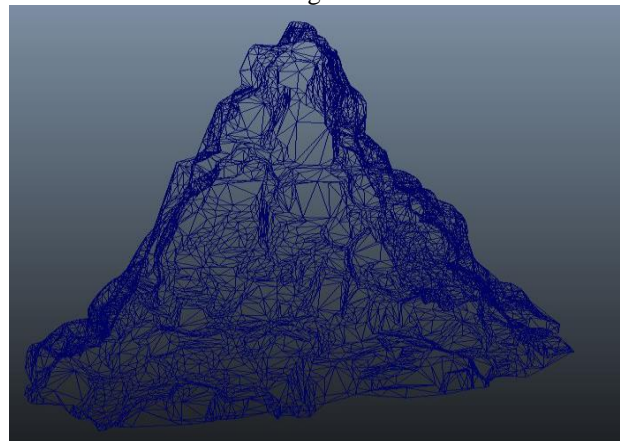

Fig.3 Wireframe after the importation in maya

This is its wireframe, and the effect is shown in Fig.4.
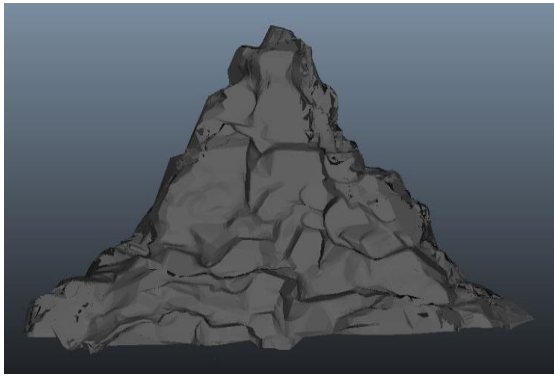
Fig.4 Activity diagram

This is only part of a scene, and other procedures are the same. After all these procedures are done, combine them into the form initially set. The effect of all the wireframes is shown in Fig.5. All models are shown in Fig.6.
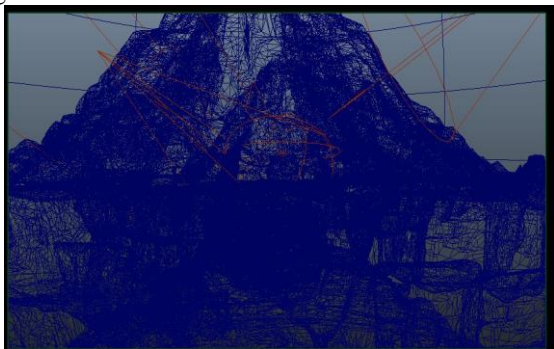

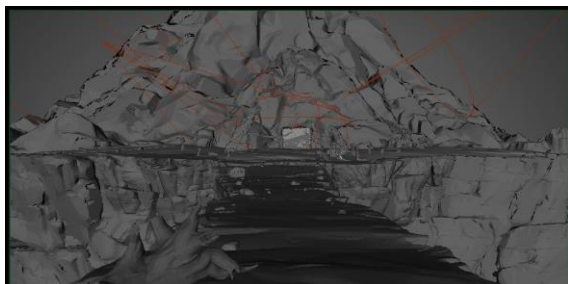Fig.5 All wireframes of the model

Fig.6 Activity diagram of all models

Then, it is necessary to analyze the material. The natural scene which I make is a mountain body, so the majority of the materials is mountain stone. Here it is necessary to explain what is a material ball.

VI. MATERIAL CREATION IN THE LATER STAGE OF MAYA NATURAL SCENE MODELING

Differences between material and texture:

First of all, we need to know about material. Material refers to the most basic material of a certain surface, like wood, plastic, metal or glass, etc.

Texture is attached to material, like rusty steel plate, dusty table, marble with green texture, red fabric and frosted glass, etc. Texture should be rich in visual feelings and the embodiment of texture.

With bump nods, details of the objects in a distance which cannot be clearly seen can be solved in this way. for instance, I made part of my graduate design in this way. The material nod is shown in Fig.7, diagram of bump material nods, and Fig.8.
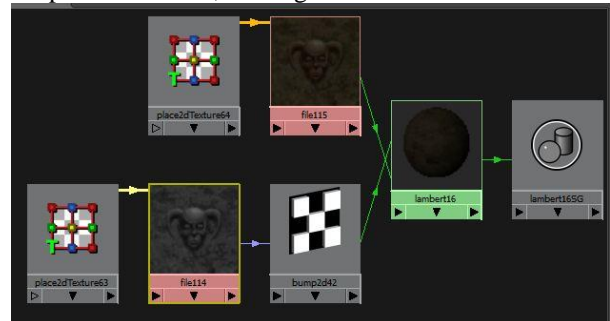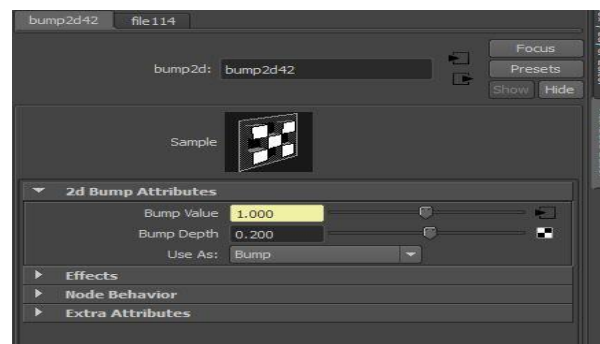

Fig.7 Diagram of bump material nods

Fig.8 Diagram of bump nod qualities

Expected effects can be achieved if BumpDepth, a quality of bump nods can be adjusted a bit larger. It is necessary to test more and render more pictures for reference. It is impossible to achieve the ideal effect by one attempt, and only in this way can we achieve the effects we want.

VII. PROBLEMS IN MAYA NATURAL SCENE MODELING PROCESS AND SOLUTIONS

In the early stage, there are some problems of modeling. It is difficult to achieve the anticipated effect and in the refinement of the simple model, there are problems of whether ZBrush carving software is proficiently used, how the whole shape is controlled in the carving process, and how the details are dealt with, how the material is understood, what is the process of making seamless map in Photoshop, as well as how to control the light effect in rendering, how to show the style one wants.

These problems are all temporary, which has a lot to do with experience. It is common to encounter some problems in daily work and once they occur, we have to deal with it. So it is with the process I mentioned above. I solved basically all these problems with the guidance of the seniors in our company and with the knowledge I found online.

The setting in the early stage wasn't quick satisfying because the videos and pictures I saw in daily life were

not enough. During the creation, I also saw many videos and pictures whose styles were similar to my own, trying to make my work closer to foreign ones. However, I cannot copy their works because I had to have my own ideas. The appreciation and analysis of these videos and pictures helped me a lot in terms of the setting in early stage.

In the refinement of modeling, I couldn't do it proficiently due to my poor understanding of ZBrush. However, after I found many teaching videos online about this and learned and practiced a lot in my work, I also solved these problems. I personally believe that repetition is the best way to learn. Since I make scenes in my company, so it is unavoidable for me to make some stones, flowers, grass and trees, etc. Making stones repetitively helps me to master a good control over stone shapes. I even made one stone repetitively for a month.

VIII. CONCLUSION

Technical features of a cartoon refer to the technical means which are used to restore natural shapes creatively with each procedure and each photographic technique. The specific method is to draw different instant actions of a series of movements through the decomposition of movements and shapes of things. Then, it is necessary to draw the pictures one by one, code the pictures in order, calculate the time, go through the process of shooting the pictures one by one and so on. Early animation, as a technical means, enables simple lines and graphs to move on the screen so as to amuse the audience. Later, this method is borrowed to promote products, make advertisements and make special effects in videos on science education and promotion of agricultural technology.

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