Lesson 3

Lesson 3: Principles of Process

The previous lesson discussed some basic tools and elements of 3D Studio MAX. Creating worlds that exist only in your imagination is dependent on your mastery of those tools and your ability to create within the structured process of this book's workshop. Showing you the step-by-step process of how to create `TheEnd.avi` is important, but without an understanding of the principles behind the process you won't be able to achieve your own vision in the work you produce.

The process that moves your ideas out of your imagination and into final rendered imagery is the focus of this lesson.

Previsualization

Previsualization is the process of getting what you see in your imagination out into some preliminary form. The result of previs can take several different forms: doodles, sketches, story writing, storyboards, preproduction paintings, and so forth.

When you've been given a scene to create, your mind will buzz with ideas—visions of what you want to make. You'll want it to be a masterpiece. Your producer then tells you the deadline and your heart sinks, reality sets in, and true creativity starts to appear.

True creativity is creation within some structural constraint, whether self imposed or as the result of the time and budget limitations of a CGI production. When these constraints are present, your individual creative process becomes the savior of your brilliant vision. This individual process must include some form of quick and dirty preliminary visualization. Without a way to quickly visualize the end vision you want to achieve, you will flail and then fail as an artist.

The first step in creating any scene is to have some preliminary visualization to guide you. This brings up an obvious question: "Do I have to be able to draw to be a CGI artist?"

Drawing and Computer Generated Imagery

This question and its answer are very controversial. The answer varies based on the background, training, and bias of the individual art director or animator answering the question. I have met and worked with many really good CGI artists. I like working with the ones who can draw.

So, in answer to the question: "Do I have to be able to draw to be a CGI artist?" From where I sit as an Art Director, the short, medium, and long answer to that question is: "Yes!"

The act of drawing trains an artist to be aware of proportion, positive and negative space, surface development, value contrast, and so on. Draw you must, but at what level?

You will need to develop your drawing skills to a level that will support creating your vision. This might mean that you keep a sketchbook (I recommend it) full of indecipherable diagrams that only you understand. It doesn't have to be great; you just have to understand what the drawing means.

Visual Shorthand

The reality is that if you can't draw, someone who can will be feeding you imagery to create. In many studios there will be people who are CGI artists that also have traditional drawing abilities. Depending on the size and focus of the studio, even if you can draw it might be only for your own process of creation. There are storyboard artists who specialize in preproduction visualization. They are excellent at producing concept sketches and preproduction art to guide you as you create your shots.

In Figure 3.1 you can see the entire page—from my sketchbook—that I used to previsualize `TheEnd.avi`. This visual shorthand is not that impressive. What's important is that I understand what I was trying to achieve. For me this was enough to create what you've seen in `TheEnd.avi`.

Figure 3.1
This is the sketch for `TheEnd.avi`. Sketches such as this are visual shorthand for your creative process.

In Figure 3.2 you see a different level of drawing. This is a sketch produced as a guide to create the CG image seen next to it. Even though it seems to be a more complex level of sketch, the same principles are in effect. The idea is to know what level you need to capture the preliminary vision and translate it into the computer.

Figure 3.2
Good previsualization of a CGI environment saves time and enhances your creative process. Use your sketches to guide you as you create your scene in MAX. Image from Intergalactic Bounty Hunter, c.1999, Creative Capers Entertainment, Inc.

Tip - The ability to previsualize design and animation ideas via diagrams, scribbles, clay sculpture, marker renderings, and so forth is absolutely essential. Without some previsualization, CGI artists wander in search of a place to start. This creates a common language that unites you as the artist with your art director, producer, and client. For this reason alone, these important people want to work with CGI artists who can produce some form of previsualization, usually in the form of sketches. To improve your sketching skills, get a sketchbook and draw every day.

You have your project; you've done some doodles and sketches—you're ready to go! Before you start using MAX to create your shot, there is one most important factor to consider: the story.

Telling the Story

The story reveals the motivations, feelings, and actions of the characters in the scenes you will animate. Before any final art creation happens, you must understand the fantasy world you are about to reveal visually. Many CGI artists have also become fantastic storytellers in their own right and understand the fundamental importance of the story to the visual creation process.

It is important to note that story and previsualization development are usually concurrent activities—both feeding and supporting the creative process of the other.

The Back-Story

The *back-story* is a history of what came before the scene you are creating. It is used to develop the rules and logic of the world you're revealing to the audience. It establishes the environment and physical nature of the world and its inhabitants, revealing their relationships and interactions. The audience might never see a lot of the back-story, but it exists in everything they see on the screen. Sometimes we call the back-story, the inspirational art, storyboards, and preproduction art: the Bible. It's the book that contains the entire world we are trying to create.

Storyboards

***Storyboards* are a series of drawings that show the lighting, action, movement, sound, and effects intended for a specific scene. These boards become the basis for creation of the scene and guide you in your work.**

In addition to telling the story, storyboards also give the CGI artist direction on animation, special effects, camera movement, actor placement, and so forth. In Figure 3.3 you can see some examples of a storyboard created for a video game based on the adventures of the Boy-King Tut. The style is graphic and simple and gets the story across.

Figure 3.3
Storyboards should be simple graphic images that tell the story while communicating the atmosphere and emotion of a scene.

Tip - When you create storyboards, it might help to think of them as comic books, revealing the action, atmosphere, and drama of the story in the simplest way possible. Using the graphic imagery of comic books as inspiration will go a long way toward refining your storyboard abilities.

In Figure 3.4 you can see a comparison of some storyboards and their final CG images done for a video to promote an animated TV series. This is a more formal storyboard and is typical of the boards created for such a project. The animation director of the project, David Molina, created these boards to guide the work of five different artists, including me. The imagery from the final video is a very close match for the storyboard. Without these boards, the project would not have been completed successfully.

The power of storytelling is in the words used to evoke imagery in the mind of the reader. Storyboards are a bridge between the writer and the visual artist. The end goal is to give visual form to the feeling the writer is trying to create with words. Choosing the right words to reveal the soul of a story is at the core of a writer's creative process. Choosing the right imagery to bring those words to life is the core task of an Art Director. This is the development of visual language.

Figure 3.4
Telling the story is a critical part of the process. Don't begin any CG animation production until you have a solid story and complete storyboard to guide you as you create your images in MAX.

Animatic/Leica Reel

An important part of the previsualization process is to create an Animatic, also known as a Leica Reel, for the individual shots and scenes of a production. The animatic is created by first scanning in the images of the storyboard. Then, a composition tool such as Adobe Premiere is used to put the scanned images in order, timing each image to approximate the timing desired for the production shot. By adding temporary sound and dialog tracks to the images the directors and producers can see an entire production in rough form, allowing them to make inexpensive adjustments to point of view, scene length, and so on.

The coolest thing about an animatic is that it lives through the entire production process, constantly being updated with preproduction and production imagery and sound as it becomes available. For example, an animatic seen in the middle of a production might have storyboard stills mixed in with rough wireframe animation and finished rendered shots. This creates an indispensable tool for development and enables the directors and producers to see the progress of an entire production from beginning to end.

Visual Language: The Art of Art Direction

What writers do with words, artists do with images. While previsualization is happening, the artists responsible for creating the overall visual language of a production are hard at work. The artists charged with this task are the art directors.

In addition to being excellent artists in their own right, art directors must be able to draw on and organize visual inspiration for the production from a variety of natural and man-made sources—nature, music, novels, other artists, architecture, the classic productions of stage and screen, and so on. They must have the capacity to create the overall visual framework of a production without denying the individual artists their free expression within the framework.

Finally, they must have the absolute ability to articulate the visual language to all the production team. The art director uses preproduction art and animation tests, among other tools, to develop and communicate the visual

language required by the production.

This creates a bridge of communication among the members of a production crew. Think about three science fiction movies: *Alien*, *Blade Runner*, and *Star Wars*. Now think about their unique visual language, the color and lighting of the shots, the atmosphere and emotion created by the visual imagery. Each one of these movies created a visual language and set a standard by which all other films in the genre are judged.

Master and Apprentice - There is no substitute for learning from the work of others. Ask yourself the question: "Who are my artistic heroes?" Learning from the masters requires analytical research and a deliberate desire to copy and emulate their work. In times past, an apprentice painter would spend countless hours copying the works of the masters, learning the secrets of their techniques by endlessly doing what they did.

To learn the secrets of the masters, you must study the results of the efforts. A library of their work consisting of their books, magazine articles, movies, and so on creates an awareness of visual language and opens up the possibility of experimenting with your own personal visual style. Create a library of your artistic heroes and fill your office walls with their work. Become a virtual apprentice.

When you begin a project, spend a few hours of research and look for the visual language that embodies the soul of your scene. Draw on the natural and imaginary world around you and remember visual language is about atmosphere, color, lighting, stylistic details, and giving form to feeling.

Production Structure

After the story is set, the storyboards are done, and the art direction style is established, it's time to start production. Production is the process of turning all the preliminary development, story, and art direction into real, usable visual assets. Understanding a production's basic organization creates the framework for your creativity.

The owners of the studio I work in, Creative Capers Entertainment, come from a feature film animation and production background. Consequently, our production process is similar to the process used in feature films. An entire movie usually has three acts comprised of 15–25 sequences per act with 10–50 scenes in each sequence. Those scenes might be further divided into hundreds of individual shots.

`TheEnd.avi` is an eight-second *shot*, which would be referred to in the organizational structure of an entire production like this: Act 3 - Seq-20, SC- 45, SHOT 101- The End. This organizational convention and variations of it are the standard in most studios. Without this, it would be impossible to stay organized and keep track of all that has to be done.

Shot Elements

The shot `TheEnd.avi` is divided into these basic elements: camera, animation, set elements, atmospherics, lighting, and special effects.

- **Camera—This shot uses one stationary target camera**
- **Animation—Elements are the water, the sewer water from the pipes, fire, fog, fireflies, and the Bug**
- **Set Elements—Elements are the background sky, the moon, the background pyramid, the middle-ground buildings, the middle-ground pylons and lantern, and the foreground pylon**
- **Atmospherics—These include the water and fog**

- **Lighting—The elements used are the omni lights using volumetric effects**

- **Special effects—These include the fire, water and the glow effects used on the fire, the fireflies, and the bug**

All these shot elements combine to create the whole shot. If you were to try to do all this in one big file, it would take forever to create the balance among all the elements and the rendering of each individual frame would take too long. To remedy this, you can split the scene into individual layers.

Layer Division and Structure

All the elements of an individual shot are grouped by where they sit in the depth planes or *layers* of the image. There are three depth-plane layers used to organize the elements in `TheEnd.avi`: foreground, middle ground, and background.

The sky, moon, and pyramid are part of the background layer. The buildings, fire, water, fog, and fireflies belong to the middle ground. The bug and his group of pylons are in the foreground. With minor variations, the elements of CGI scenes produced today will be divided in a similar fashion. These depth planes are divided further into individual images. When those images are combined, the result is a complete scene such as the one in our workshop.

`TheEnd.avi` was created from eight individually rendered sets of still images and one sound layer. Most of those eight sets of images are comprised of 240 individual frames. Using discrete layers such as this creates two notable advantages.

- **As an artist, the layer structure gives you the freedom to isolate and modify individual elements of a scene without impacting the animation or lighting of the surrounding elements.**

- **In the production process, the layer structure allows cooperative team workflow and reduces the risk of producing mistakes in the final imagery. This means that if something is wrong with an image, individual layers can be revised and rerendered in a fraction of the time it would take to do the same with nonlayered imagery.**

Use the Asset Manager to find and view the contents of the `Final Layer` folder on the companion CD. This will show you the 10 layers that you will be creating to make `TheEnd.avi`.

Now that you have some understanding of how you are going to organize the structure of the shot, I'd like you to try your hand at a storyboard.

MAX Workshop: Storyboards

In this workshop you'll use the storyboard template found in Appendix A of this book to create your own storyboard for `TheEnd.avi`. This is going to be a bit of a cheat because the imagery is already created, but do it anyway and have some fun. If you need some help, refer to Figure 3.5, which will show you a sample storyboard. You'll also need some pencils, markers, scissors, glue, and access to a copier to complete this workshop.

Figure 3.5
Use this storyboard template to guide you through this workshop.

The descriptive steps you want an animator to follow must include atmosphere and lighting notes, animation path arrows, special effects and sound effects direction, animation notes, voice over narration, and storyline.

Even though the shot you'll create in this workshop doesn't have sound yet, the storyboard is an appropriate place to begin specifying the basic possibilities—water, wind, theme music, and so on.

Follow these steps to complete a four-page storyboard for this shot:

1. **Make a copy of the storyboard template, and with MAX open use View File to play `TheEnd.avi`.**

2. **While the Avi is playing, sketch in the basics of the scene on the template you copied. Draw the buildings, the fireflies, and so on. A rough sketch is fine. Draw the bug in the foreground in the location above the pylon where it starts its animation. You'll draw its path later.**

   Pay particular attention to the relative light and dark spaces of the composition, and try to duplicate them.

3. **When you have finished, make four photocopies of your sketch. The bug in the foreground is the only element that changes drastically in this scene, so you can use the basic drawing you've created and add the bug element as you go.**

4. **Using the Boxes at the top of the page title your pages as follows: `Act 3 - Seq-20, SC- 45, SHOT 101- The End`. Add the appropriate page number in the box provided.**

5. **Using the blank lines below the image box on the four pages, write a short story that might seem to fit the imagery of the shot. Something like "and so Marco the Firefly, who once lived his life without light and love, learned the true secret of the light he had carried inside his heart for all these years!"**

6. **After the story is written, take one page at a time and describe one of the effects needed for the shot. Be very descriptive and specific. Use the boxes provided to write your instruction to the artist. For visual effects such as the fire or fog, use the VisualFX box. For the sound design, use the SoundFX box. For the action and animation of the scene, use the Action box. Because these effects are consistent throughout the shot, you can use all four pages to make the notes needed.**

7. **Take a blank piece of paper and draw three bugs: the bug as it appears halfway through its flight to the screen; the bug when it is hovering and winking in the foreground of the shot; and the bug we see just as it flies off the screen. Use the playback controls of the media player to scrub through the `.avi` file to see those still frames.**

8. **When you are finished, cut these bugs out. Paste the midflight bug on page two, which should look something like Figure 3.6.**

9. **Paste the winking bug on page three and write "bug winks" in the special animation instruction box.**

10. **On page four, paste the bug flying off the screen. This completes the storyboard for this shot.**

Figure 3.6
Storyboard page two begins to show the bug's path of action.

Figure 3.7 shows a review chart of the production steps discussed in this lesson. Take some time to review the list—it's the generic production process you will follow as a CGI artist. Of course, there will be variations and major differences in technique and tool application based on the unique requirements of every production studio. However, the basic principles of previsualization, story and storyboard development, production structure, shot elements, and layering will always apply.

Figure 3.7
Storyboard page four completes the bug's path of action.

Wrapup

You now know the shot you are going to create in this book's workshop, how the shot fits into the overall structure of a larger production, and how the use of layers will be employed to create the final imagery for `TheEnd`.

Before moving into Lesson 4, I want to tell you about one of the fundamental cognitive shifts you'll need to make to be a successful CGI artist.

Sight and Perception

Seeing is the physiological process of light entering into the eye, stimulating the cells on the retina and transmitting the resultant information to the visual cortex of your brain. Your brain processes that information and a wonderful thing happens—you experience the phenomenon known as seeing.

Perception is the mental process you go through to decide what those images mean. The eye tells you what is out there; your perception determines the meaning and the reality of what you are seeing.

Chrome-Plated Reality

When I was a student studying Industrial Design, we were given an assignment to use magic markers or colored pencils to illustrate a chrome hubcap. If you know any industrial designers, you will know that we are taught how to *render* many different materials to illustrate our designs quickly for evaluation of form, material, and so on. A chrome hubcap is the best place to learn how to really see how form affects the size and shape of the reflections of the environment in the surface of the object. This *rapid-vis* exercise (short for Rapid Visualization) was an in-class assignment and we were given 20 minutes to complete it.

At the end of the 20 minutes, one by one, we put our attempts at chrome up on the wall for critique. The last student came up to show his work. I can still see him in my memory: pinning his drawing to the wall, standing back, obviously proud of his attempt to render chrome. We all sat speechless. His drawing consisted of a circle (right shape for a hubcap). Good enough start. He then had taken a silver pencil and colored in the circle with the pencil; a nice coloring job, very even, no white of the paper showing through, and no discernible scribbles outside the borders.

For this student, chrome was silver. That was his reality and it was what he saw when he looked at chrome. He didn't see the subtle gradation of the core of the sky, the dark mass of the horizon reflection distorted by the contours of the form of the hubcap. He didn't see the hubcap. What he saw was what his mind had been trained to see: silver.

To have your eyes opened and really see the world around you, you must begin to perceive all that you can see in terms of its material, how light falls on its surface, the reflection patterns that are produced by the form of the object, and its relationship to you in the environment.

If you rely on the computer to solve such fundamental visual phenomena, you will never have the ability to free your vision from the limitations of the tool. This will take some practice.

There are CGI artists who have the same deficiency in their ability to really see beyond the superficial and I will forever honor my former classmate by thinking of them as "silver pencil" artists. They rely on the default abilities of the powerful computer tools available to them without really learning to create believable reality.

Suspension of Disbelief

In movies, this ability to create believable reality results in what is called *suspension of disbelief*. When an audience is totally captivated by the filmmaker's magic, they willingly choose to believe what their eyes are taking in—they suspend their disbelief.

To achieve the suspension of disbelief in your audience, you must understand the visual reality of what they will be looking at. Good examples abound. Here's one excruciatingly simple solution to a huge visual problem.

Dennis Muren, VFX Supervisor, *Star Wars Episode 1: The Phantom Menace*, was tasked with 2,000 special effects shots to complete this movie. Dennis has won eight Academy Awards for his work and is the only visual-effects

magician to have his name on Hollywood's Walk of Fame. When some of the shots in the Pod Race scene required a large crowd of people filling the stands, Dennis and his crew used cotton-tipped swabs painted in different "crowd people" colors. Digitally multiplied and combined, they are a convincing example of a simple, elegant solution to a visual problem.

Figure 3.8 shows the fireflies from `TheEnd.avi`. This is an example of creating the core essence of something using a minimum of visual elements.

Figure 3.8
The fireflies are little glowing spheres following spinning elliptical paths.

When you watch `TheEnd.avi`, the fireflies appear to be flocking and moving in random orbits—at least, that is what they appear to be doing to the viewer. The reality is that they are following very simple elliptical paths that have been animated to spin. You can see those paths in the wireframe view in Figure 3.8. This shot won't win an Academy Award for the result. The important thing was to apply the simple principles we have been talking about to create the visual reality of fireflies.

Taking a Step Back

The first step forward in creating such simple solutions is to take a step back. Visually, mentally, step back from the image you are trying to create and ask the question, "What is it I am actually seeing here?"

In the case of *The Phantom Menace* crowd scene, what we are actually seeing is a bunch of fuzzy-colored blobs that, when viewed from a distance, look like people. In the case of the fireflies, what we are actually seeing is a bunch of fuzzy-colored blobs that, when viewed from a distance, look like fireflies.

When looked at this way, the challenge becomes, "How do I create a bunch of fuzzy-colored blobs?" not "How do I create a crowd scene of fireflies?" It's very Zen, and practicing this ability to take a step back is important. Next time you are drying off from a shower, try thinking that you are not drying yourself off, you are making the towel as wet as possible. This is nonlinear paradoxical thinking. It is the antithesis of the "silver pencil" reality.

Choosing Perception

Perception is about choice and in the case of my former classmate, whether or not it was a conscious choice, he chose to create chrome with a silver pencil. In the case of Dennis Muren, you can't argue with eight Academy Awards. When you begin to see the world in terms of how light interacts with form, and learn to perceive and not just see, you have taken the first necessary cognitive steps toward becoming an excellent artist.