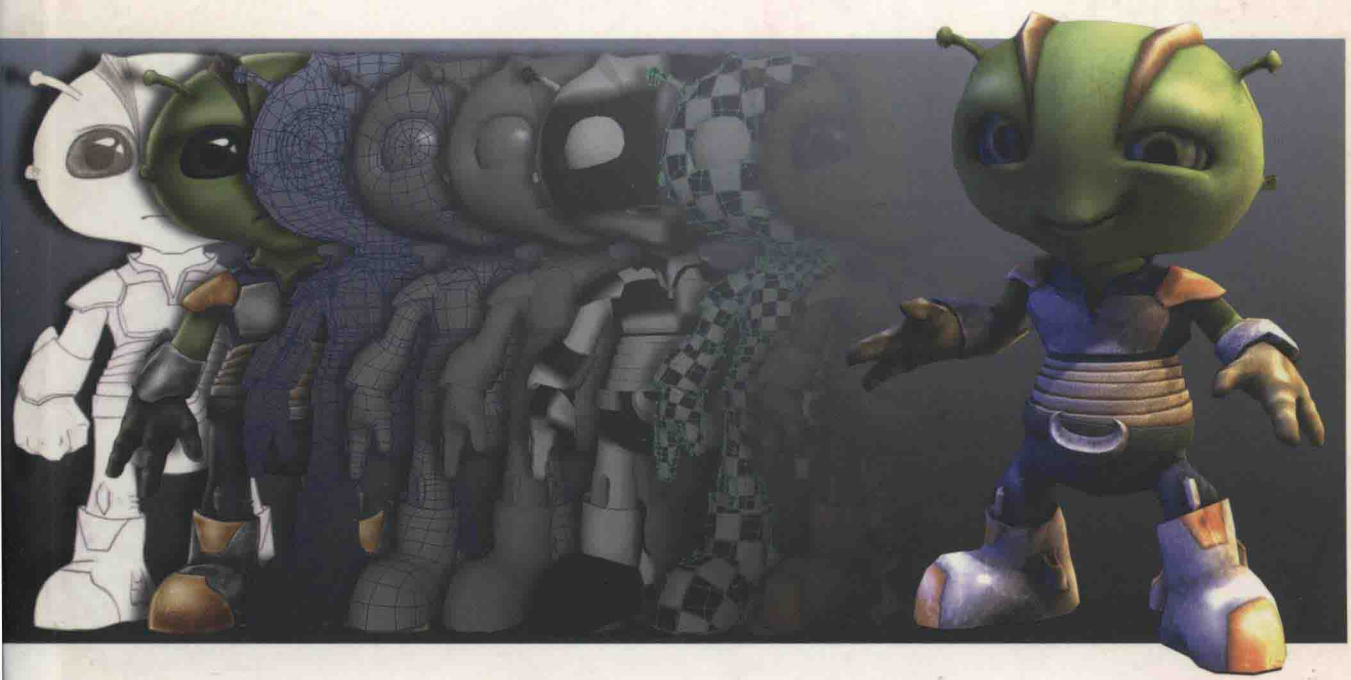
Getting Started in 3D with Maya



Create a Project from Start to Finish

Model, Texture, Rig, Animate, and Render in Maya

Adam Watkins

Focal Press

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As always, to my beautiful and exciting Kirsten, Anaya, and Isaiah.

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Books are always a team effort. Of especial help with this one was the tireless work of my tech editor, former student, colleague, and friend Jake Green. His contribution toward maintaining the consistency and the tone of the book was invaluable. His work is inspiring and his progress over the years has been tremendous.

Kelly Michel and the VISIBLE team at the Los Alamos National Laboratory – where this book was incubated – also provided tremendous help. It was good fun working with that team and there are great things ahead.

Finally, in this, my tenth book, I give a special shout-out to my high school English teacher – Ms. Eva Torres back at Edinburg North High School. Her excitement for literature and writing has been highly inspiring, and I often find myself looking back on her instructions and ideas as I tidy up what I have planned to write. I graduated a long time ago – it's amazing how important that high school teacher can be. Many thanks Ms. Torres – can I get some extra credit for this....?

Introduction

3D. It's everywhere. From stereoscopic movies to online logos to billboards along the side of the road, chances are, even today you've seen 3D content. In recent years, 3D has gone from a specialty (and sometimes gimmicky) afterthought to a staple of the creative industry. The products you use were visualized in 3D before being manufactured, the streets you drive down are likely flanked by buildings that were previsualized in 3D before being built, and often the street itself (if it's recent) was created in some 3D software before construction was begun. And of course, all of this is in addition to the ubiquitous presence of 3D in most every form of entertainment and in every form of digital entertainment.

Like many new forms of digital art, at the beginning, the technology was instantly available to everyone, but the on-ramp was steep and often difficult to ascend. The area was flooded with hobbyists who could get their hands on the software, but continually produced uninspired work. This happened in the professional world as well – for all the never-ending genius of Pixar and the nice work of early Dreamworks, there emerged as competition, some really poorly conceived and even more poorly executed feature films that really besmirched the hallowed artwork of 3D animation.

Now, after many years, viewers have become more discerning in what they consider "good" 3D and 3D animation. Reviewers for games are no longer dazzled by the fact that games are 3D, but they start making real commentary on the artistry and efficacy of modeling, style, and animation choices. Movie reviews have become incredibly discerning, and substandard technique in modeling and animation is quickly caught and called out. Animation consumers have come of age.

Benefits and Drawbacks of Tool Sophistication

This is good and bad for animators or aspiring animators. It's great because as the consumer's eye for animation has grown in sophistication, the tools that allow for the production have grown increasingly robust. This means that there are many very powerful toolsets that have allowed for further power, faster, and at a lower skill set. From the early days of having to use the command line to create a cube, the current click and drag to get full cloth dynamics and fluid integration into a project is a huge leap forward. However, the bad news is that viewers of 3D are simply less impressed with another bit of dazzling technology – they demand a compelling story and a deft touch in handling the visuals of any project (game, TV, film, web, etc.). The days of blindly dazzling effects are over – consumers are just too savvy.

What this means is that the most successful 3D projects will come from people who have done a lot of work beyond the technical – people who have studied light, composition, form, and movement (just to get started). Often times, this comes from formal training (college, university, art school, etc.), but not always. There are clearly folks who are able to intuitively produce products that show these skills, and others who gain these skills in the old fashioned way – through reading and immense amounts of sweat equity to grow the skills themselves.

Having said this, no matter what the art and composition skills of the artist are, without knowledge of how to use the tool – the skills will never have a chance to be put on display. So in addition to traditional skills, the competitive 3D artist of today also must understand the tools – and how to use the tools to convey their knowledge of story or art. This book is designed to assist in getting into dynamic, complex, and very powerful tools faster, so that great artwork can find a visual voice and great work can be produced.

Who's It For?

With the goal of this book being a facilitator to help the reader gain a new instrument in your tool chest, it's worth while pointing out that there are multiple situations in which this book can be effective:

Hobbyist

So you've loved the 3D work that has evolved in recent years. It seems like magic, and more importantly, it looks like fun. The 3D hobbyist market has become increasingly sophisticated in recent years. There was a time that a bit of Bryce and some simple Poser satisfied the weekend 3D warrior. But those days are past for the most part. Today's hobbyists – like today's consumers – know that there is much to partake of in the 3D world and want to get into the craft deeper more quickly. If this is you, this book has many sections that will get you up to speed (well beyond a dabbler) in a hurry.

Because each chapter starts with some background information, it will help those of you without a technical background in 3D graphics to get a chance to understand what the core ideas are before diving into the tutorials. However, since the book is full of tutorials, you will very quickly be "doing it" – creating 3D, and producing work that will be fun to show off and fulfilling to create.

Student

I've been teaching 3D for a long time (almost 15 years now), and I have seen a lot of students come through my programs, classes, and curricula. I know how students learn 3D and how some of the concepts come quicker than

others. I also know that different students learn in different ways. Some learn aurally – they listen to a lecture and they grasp the idea and are off the races. Some learn visually – they watch the demo and seeing is learning. Still others find that careful listening and visual learning is a good start, but that some text helps cement the concepts – and a tutorial helps move the "I saw it done" into the "I just did it, and now I understand it."

This book is heavily tutorial based. It's chock full of step by step pages of "do this and then do that." For students who are using this as a textbook, or as a supplement to in-class instruction, be sure to take a moment and ask yourself "why?" Why is the author having me do this now? What's the goal behind this collection of steps? And most importantly: How can I use this technique in my own work? Do this and the book will be much more than just a collection of steps – and become a platform to creating your own projects.

Teacher

Hopefully you're out of a college or university program in which you did extensive 3D training and you're looking for a book to allow you to learn/teach a new technology to supplement your current skills. If this is your situation, this book should move quite quickly for you, and you might be able to skip past most of the theoretical discussions at the beginnings of each chapter as you learn to translate your current vocabulary into Maya-speak. But, if you're not (and this is the case at most middle schools, junior high schools, high schools, and even some colleges and universities), this book will be of great help. The "Whys" of 3D are covered in every chapter. It's critical – especially when attempting to teach this stuff – that the core ideas and principles are understood. 3D is deep and goes way beyond hitting the right tools at the right time. The questions that come up in class – and the dark alleyways of the software that students wander down – demand an understanding of what's really happening behind the GUI.

For you, the descriptions of the technology at the beginning of every chapter and tutorial will be critical. Be sure to read those parts carefully and take a careful look at how those ideas are being illustrated through the course of the tutorials. The tutorials all have a pedagogical goal that goes beyond just following the tutorial recipe. Grasp that goal and it will speed your mastery of the tool and allow you a firm footing upon which to lift your students.

Book Organization

The book has nine chapters. These chapters are split up into the basic steps of 3D creation: Modeling, UV Layout, Texturing, Lighting and Rendering, Rigging and Skinning, and finally Animation. Each of these chapters will begin with

some discussion of the core ideas of that corner of the 3D creation world. Some of it is theoretical, and much of it is metaphorical. The idea is to make sure that the concepts are introduced before getting mired in Maya's implementation of those ideas. After the Introduction, there will be several tutorials designed to illustrate how the concepts work.

These tutorials will be the bulk and meat of the book. Detailed instructions will be given on how Maya works and how to work with Maya's power and around Maya's eccentricities to create great products.

Appendices

Occasionally, there will be a technique that is a precursor to a collection of tools within Maya which may get in the way of a smooth flow of ideas in the text – or simply be out of the scope of the tutorials. In these cases, appendices have been created for some quick reference. You may already know these ideas from past Photoshop work or work in some other 3D package – but they are there in case you need them for reference.

Homework and Challenges

The real goal of this book should not be a successful completion of the tutorials. It is true that these tutorials can be an important tool in learning Maya; but they are the means to an end. The end is (or should be) creating your own projects. If all you can do after finishing the tutorials is do the tutorials again – the book has failed. Making the "great leap" into your own production is the real aim here.

To achieve that goal, each tutorial has a few short challenges. If this book is being used as a textbook, they could be great homework assignments – but if you're self-teaching and using this book to get up to speed with Maya – consider these challenges from me to you. They will help you determine if you have really grasped the ideas presented in the chapter or if the chapter should be reworked. If you are able to successfully complete the challenges – it's likely you've mastered the concepts presented and you're ready to move on.

Of course, you can skip these all together – but I've found that students who tackle these are more likely to be able to retain the ideas of the chapter when they have applied them to these mini-problems as they go along.

> **Why?**
>
> More important than knowing what to do next is knowing why to do it next. Throughout all the tutorials, I will be taking time to talk through the "whys" of that step. Although you could just skip over that narrative and continue onto the next step, take some time to look that over. These parts of the text will help to explain the method to the madness of the tutorials and help to ensure that you are getting the most out of the tutorials.

Tips and Tricks

In addition to the Why? sections of the text, there will be other sections that help you to make more effective use of Maya's workflow. Sometimes these sections will include hints as to workflow, other times they will remind you of keyboard shortcuts. In all cases, they aren't critical to the tutorial, but can certainly help you work smarter.

Warnings and Pitfalls

Maya is powerful, but it can be a little like weeding your garden with a backhoe; it can simply have too much power. Similarly, it is such a complex tool that it can have *too many* options for some of the simpler tasks. The Warnings and Pitfalls sections will give you the heads up on problems that are often encountered by new Maya users. These are born of many years of teaching Maya and hopefully will save you from many hours of frustration.

Other Conventions

When text is to be entered into a text field in Maya, it will appear like `this` (in Courier) in the book.

Maya has several different **modes** that allow the user to do different things. Of some considerable confusion, this means that certain pull-down menus are only available at certain times. We will talk more of this, but the mode will always be listed before a bar (|). So, "Polygons|Mesh > Combine" means to look for the Combine command in the Mesh pull-down menu, which is only available in Polygons Mode. Much more on these various modes later – but don't be looking for a "Polygons" pull-down menu (it doesn't exist).

Some of Maya's tools (that are available with pull-down menus) have options associated with the tool. This is indicated with a little square after the tool name in the pull-down menu (Fig. 0.1). If we need to access the options in the course of a tutorial, I'll indicate this with (Options). So, "Polygons|Mesh > Combine (Options)" means to be sure and move the mouse out to the options square in the pull-down menu so we can change some of the settings on the tool before the tool is finalized.

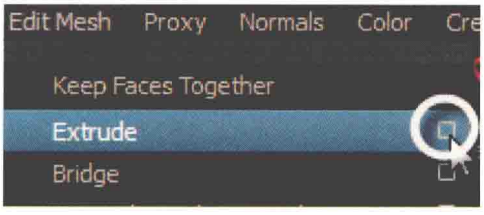

FIG 0.1 Options are available for some tools and will be represented with a square.

What You'll Need

Maya will really run on any relatively recent machine; although there are certainly better machines than others. For more information on specific recommendations, be sure to read Chapter 2 to see what to spend your money on if you don't have a big machine.

One note here though: Regardless of which platform you are running on, make sure you have a good three-button mouse (or a two button mouse with a scroll wheel that will act as the third button). I'm a Mac fan (also a PC fan), but Apple's long-time insistence on a single button mouse was silly. I'm still not a fan of Apples Magic Mouse either – yes, I know it has a bazillion buttons and the whole mouse is a multi-touch sensor and yes I love it when using things like Final Cut Pro, but for Maya, I have a blasphemous three-button Microsoft mouse connected to my Mac. You PC users out there are probably already in a good place with your mouse. Make sure that all three buttons work.

Other than a recent Mac or PC and this book, obviously you'll also need Maya. The tutorials covered in this book were made using Maya 2012; however most of the techniques have been around a long time and could be done with earlier versions of Maya as well. If you don't have Maya yet, be sure to go grab it at http://usa.autodesk.com/maya/. There is a free trial available and if you are a student there are particularly generous options (as in free); just enter "Education Community" in the search field at Autodesk's site.

Conclusion

So there it is – or here we go. Make sure you've got a computer, Maya, and this book and the beginning of the 3D journey with Maya is afoot. Now that we know the conventions of the text, let's look at how animation works and how we can think of Maya fitting into all the areas of this workflow. Please be sure to visit the book's web site, www.GettingStartedin3D.com.

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