



AUTODESK
Official Press

Dariush
Derakhshani



Autodesk®

3ds Max® 2016

ESSENTIALS

 **SYBEX**
A Wiley Brand

Table of Contents

[Title Page](#)

[Copyright](#)

[Acknowledgments](#)

[Writing on the HP Elitebook](#)

[About the Authors](#)

[Introduction](#)

[Who Should Read This Book](#)

[What Is Covered in This Book](#)

[The Essentials Series](#)

[Chapter 1: The 3ds Max Interface](#)

[Navigating the Workspace](#)

[Transforming Objects Using Gizmos](#)

[Graphite Modeling Tools Set](#)

[Command Panel](#)

[Time Slider and Track Bar](#)

[File Management](#)

[Chapter 2: Your First 3ds Max Project](#)

[Setting Up a Project Workflow](#)

[The Secret to Accurate Modeling: Reference Material!](#)

[Building a Simple Model](#)

[Creating Details Using Splines](#)

[Lathing, Extruding, and Beveling to Create 3D from 2D](#)

[Bringing It All Together](#)

Chapter 3: Modeling in 3ds Max: Architectural Model Part I

Setting Up the Scene

Building the Room

Adding Special Details to the Room

Chapter 4: Modeling in 3ds Max: Architectural Model Part II

Modeling the Couch

Modeling the Lounge Chair

Bringing It All Together

Chapter 5: Introduction to Animation

Animating the Ball

Reading Animation Curves

Refining the Animation

Chapter 6: Animation Principles

Anticipation and Momentum in Knife Throwing

Chapter 7: Character Modeling Part I

Setting Up the Scene

Blocking Out the Alien Model

Chapter 8: Character Modeling Part II

Creating the Alien Head

Building the Alien Hand

Building the Foot

Completing the Alien

Chapter 9: Introduction to Materials

Navigating the Slate Material Editor

Identifying the Standard Material

Identifying the mental ray Material

Identifying Shaders

[Building Materials for the Couch](#)

[Building Materials for the Lounge Chair](#)

[Building Materials for the Window](#)

[Chapter 10: Textures and UV Workflow: The Alien](#)

[Defining UVs on the Alien's Body](#)

[Unwrapping UVs on the Alien's Body](#)

[Building and Applying Material to the Alien](#)

[Chapter 11: Character Studio: Rigging](#)

[Character Studio Workflow](#)

[Associating a Biped with the Alien Model](#)

[Skinning the Alien Model](#)

[Chapter 12: Character Studio: Animation](#)

[Animating the Alien](#)

[Freeform Animation](#)

[Modifying Animation in the Dope Sheet](#)

[Chapter 13: Introduction to Lighting: Interior Lighting](#)

[Recognizing 3ds Max Lights](#)

[Lighting a Still Life](#)

[Atmospherics and Effects](#)

[The Light Lister](#)

[Chapter 14: 3ds Max Rendering](#)

[Navigating the Render Setup Dialog](#)

[Rendering a Scene](#)

[Working with Cameras](#)

[Raytraced Reflections and Refractions](#)

[Rendering the Interior and Furniture](#)

[Chapter 15: mental ray](#)

[Navigating the mental ray Renderer](#)

[Navigating the Final Gather Parameters](#)
[Navigating mental ray Materials](#)
[Using Photometric Lights with mental ray.](#)
[Using the Daylight System](#)
[Appendix: Autodesk 3ds Max Certification](#)
[End User License Agreement](#)

List of Illustrations

Chapter 1: The 3ds Max Interface

[Figure 1.1 The 3ds Max interface elements](#)

[Figure 1.2 Viewport label menus showing the General Viewport, Point-of-View, and Shading Viewport menus](#)

[Figure 1.3 The ViewCube navigation tool](#)

[Figure 1.4 Breakdown of the three mouse buttons](#)

[Figure 1.5 Quad menus](#)

[Figure 1.6 Viewport rendering options with the default Nitrous driver modes](#)

[Figure 1.7 Viewport navigation controls are handy, but the key/mouse combinations are much faster to use for navigation in viewports.](#)

[Figure 1.8 Gizmos for the transform tools](#)

[Figure 1.9 The Modeling tab found in the ribbon](#)

[Figure 1.10 The Minimum/Maximum toggle for the Graphite Modeling Tools set](#)

[Figure 1.11 The modifier stack in the Modify panel](#)

[Figure 1.12 Choosing Set Project Folder](#)

Chapter 2: Your First 3ds Max Project

[Figure 2.1 The clock to be modeled](#)

[Figure 2.2 Position, Length, and Width type-in boxes in the Plane Keyboard Entry rollout](#)

[Figure 2.3 Shading viewport label menu](#)

[Figure 2.4 The image planes with the clock images applied](#)

[Figure 2.5 Converting the cylinder to an editable poly.](#)

[Figure 2.6 Select the back polygon of the cylinder; it is shaded red when selected.](#)

[Figure 2.7 Using the Swift Loop tool, place a loop as shown.](#)

[Figure 2.8 Edges are scaled to match the image plane.](#)

[Figure 2.9 Bevel Settings will bring up the caddy for parameter input.](#)

[Figure 2.10 Clock body progress](#)

[Figure 2.11 Select the edge shown in this image.](#)

[Figure 2.12 Move the edges back.](#)

[Figure 2.13 Select and loop the edge to prepare for chamfer.](#)

[Figure 2.14 The chamfer performed on a looped edge](#)

[Figure 2.15 Select these three edges.](#)

[Figure 2.16 Chamfer result for the clock body's edge and lip](#)

[Figure 2.17 Select the edge.](#)

[Figure 2.18 The edge loop is selected \(left image\), and then the edge is chamfered \(right image\).](#)

[Figure 2.19 The clock handle](#)

[Figure 2.20 The intended path for the clock handle](#)

[Figure 2.21 From the three sub-objects of the Line command, select Vertex.](#)

[Figure 2.22 Use the quad menu to modify the vertex type.](#)

[Figure 2.23 The line for the handle with all but the first and last vertices adjusted](#)

[Figure 2.24 Rendering enabled on the clock handle line, set to Radial](#)

[Figure 2.25 On the Selection Region flyout, choose the Fence Selection Region.](#)

[Figure 2.26 Use the Fence Selection Region to draw a selection around the desired vertices.](#)

[Figure 2.27 The finished handle](#)

[Figure 2.28 The bell's profile line with the vertices numbered according to their creation order](#)

[Figure 2.29 Choose the Lathe modifier from the Modifier List.](#)

[Figure 2.30 The bell with the lathe center in the correct place](#)

[Figure 2.31 The image of the bell showing the three pieces to be created](#)

[Figure 2.32 The parameters for the three objects to be created](#)

[Figure 2.33 In the Group menu, choose Group and name the group](#)

[Figure 2.34 Text shape parameters](#)

[Figure 2.35 Bevel Values rollout showing all of the shape parameters for the numeral 12](#)

[Figure 2.36 Parameters rollout for the Bevel modifier](#)

[Figure 2.37 Bevel modifier applied to the number](#)

[Figure 2.38 Use Refine to add two vertices to the right and left sides of the rectangle.](#)

[Figure 2.39 The clock hands positioned at 3 o'clock](#)

[Figure 2.40 Merge is found in the Application menu under Import.](#)

[Figure 2.41 The clock so far](#)

Chapter 3: Modeling in 3ds Max: Architectural Model Part I

[Figure 3.1 Accessing the Units Setup options](#)

[Figure 3.2 From the US Standard drop-down menu, choose Feet w/Decimal Inches.](#)

[Figure 3.3 Images of the room to be created](#)

[Figure 3.4 The AutoCAD DWG/DXF Import Options dialog box](#)

[Figure 3.5 An AutoCAD drawing showing walls, doors, and a window](#)

[Figure 3.6 The Grid and Snap Settings dialog box](#)

[Figure 3.7 The Parameters rollout for the Wall object](#)

[Figure 3.8 The finished walls shown in the Perspective viewport](#)

[Figure 3.9 Wall parameters](#)

[Figure 3.10 The Door object parameters](#)

[Figure 3.11 Use the Select and Link tool to create an opening in the wall for the door. This is necessary only if autolinking doesn't work.](#)

[Figure 3.12 The sliding door in the wall](#)

[Figure 3.13 The window is centered on the wall.](#)

[Figure 3.14 Walls with doors and a window](#)

[Figure 3.15 For a difficult selection, you can use the Scene Explorer panel.](#)

[Figure 3.16 From the Modifier List drop-down menu, choose Extrude.](#)

[Figure 3.17 The Clone Options dialog box](#)

[Figure 3.18 The baseboard molding](#)

[Figure 3.19 Deleting the Extrude modifier in the modifier stack](#)

[Figure 3.20 In the modifier stack, select Spline mode.](#)

[Figure 3.21 To offset the spline, change the Outline amount to -0'6.0".](#)

[Figure 3.22 Profile of the baseboard molding](#)

[Figure 3.23 Picking the baseboard shape in the Sweep modifier](#)

[Figure 3.24 The baseboard molding is going through the door opening.](#)

[Figure 3.25 Use Refine to add the new vertices on either side of the door; then delete the segment.](#)

[Figure 3.26 The baseboard with proper gaps at the doors](#)

[Figure 3.27 The finished room with crown molding](#)

Chapter 4: Modeling in 3ds Max: Architectural Model Part II

[Figure 4.1 Couch with measurements](#)

[Figure 4.2 The Clone Options dialog box](#)

[Figure 4.3 The first few pieces to start the couch \(left\); the blocked-out couch \(right\).](#)

[Figure 4.4 Armrest object with NURMS applied](#)

[Figure 4.5 Use the Swift Loop tool to add edge loops to the box.](#)

[Figure 4.6 Decorative piping runs along the seams of the couch.](#)

[Figure 4.7 Select the highlighted edges.](#)

[Figure 4.8 Set the extrusion type to Local Normal.](#)

[Figure 4.9 The finished couch armrest](#)

[Figure 4.11 Use Extrude to create the wing on the chaise.](#)

[Figure 4.10 Add a new loop to the chaise box.](#)

[Figure 4.12 Use the Swift Loop tool to add an edge loop on the chaise cushion box.](#)

[Figure 4.13 The couch feet with measurements](#)

[Figure 4.14 The Taper parameters](#)

[Figure 4.15 The final couch](#)

[Figure 4.16 The chair for the spline-modeling exercise](#)

[Figure 4.17 The lounge chair with measurements](#)

[Figure 4.18 Mapped image planes in viewports](#)

[Figure 4.19 Create vertex points by following the numbers.](#)

[Figure 4.20 Fillet the vertex to create a smooth curve.](#)

[Figure 4.21 The completed spline for the side of the lounge](#)

[Figure 4.22 Shift+Move to clone the lounge chair spline.](#)

[Figure 4.23 Attach both sides of the chair frame.](#)

[Figure 4.24 Use Connect to create a segment between the two separate splines.](#)

[Figure 4.25 The finished lounge frame with spline rendering enabled](#)

[Figure 4.26 The arc frames are attached and connected at the base and top.](#)

[Figure 4.27 Arrange the vertices on the box so they follow the lounge chair frame.](#)

[Figure 4.28 Turning up NURMS iterations and using Swift Loop to smooth out the model](#)

[Figure 4.29 Create straps using splines and the Rendering rollout.](#)

[Figure 4.30 The lounge base](#)

[Figure 4.31 Create a box the size of the base leg in the image plane.](#)

[Figure 4.32 Move the vertices so they line up with the image plane.](#)

[Figure 4.33 Use Extrude to begin creating the foot.](#)

[Figure 4.34 Add edge loops using Swift Loop in designated areas.](#)

[Figure 4.35 The final base shown with frame and cushion](#)

[Figure 4.36 The Merge dialog box](#)

Chapter 5: Introduction to Animation

[Figure 5.1 The time slider is used to change your position in time, counted in frames.](#)

[Figure 5.2 The Auto Key button records your animations.](#)

[Figure 5.3 Press the Shift key and drag the keyframe to copy it to frame 20.](#)

[Figure 5.4 The Curve Editor shows the animation curves of the ball.](#)

[Figure 5.5 Selecting Out Of Range Types](#)

[Figure 5.6 Choosing to loop your animation](#)

[Figure 5.7 The Curve Editor now shows the looped animation curve.](#)

[Figure 5.8 The object quickly accelerates to an ease-in stop.](#)

[Figure 5.9 The object eases out to acceleration and suddenly stops at its fastest velocity.](#)

[Figure 5.10 Ease-out and ease-in](#)

[Figure 5.11 Step interpolation makes the object “jump” suddenly from one value to the next.](#)

[Figure 5.12 The Curve Editor](#)

[Figure 5.13 The keyframe handle](#)

[Figure 5.14 Click the Open Mini Curve Editor button.](#)

[Figure 5.15 The effect of the new tangent type](#)

[Figure 5.16 Use the Select and Squash tool to squash the ball on impact.](#)

[Figure 5.17 The final curves](#)

[Figure 5.18 Enter a value of 100.](#)

[Figure 5.19 The X Position track of the ball does not look right.](#)

[Figure 5.20 The X Position curve for the ball's movement now has no ease-out or ease-in.](#)

[Figure 5.21 The ball will not rotate properly, because the pivot is at the bottom.](#)

[Figure 5.22 Align Sub-Object Selection dialog box](#)

[Figure 5.23 The Gizmo track's Y-axis rotation is selected in the Controller window and Linear tangents are set.](#)

Chapter 6: Animation Principles

[Figure 6.1 Move the knife to the target at frame 30.](#)

[Figure 6.2 Move the knife up slightly at frame 15.](#)

[Figure 6.3 Change the frame range in the Time Configuration dialog box.](#)

[Figure 6.4 The initial curves for the knife](#)

[Figure 6.5 Finished curves with the position of the knife starting at frame 10](#)

[Figure 6.6 Turning on Trajectories for the knife](#)

[Figure 6.7 The curve shows the trajectory for the knife's motion.](#)

[Figure 6.8 The Curve Editor graph for the rotation on the knife](#)

[Figure 6.9 Adjust the curve for the knife's arc through the air.](#)

[Figure 6.10 Match your curve to this one.](#)

[Figure 6.11 Add a key to the beginning to create anticipation for the knife throw.](#)

[Figure 6.12 To create believable anticipation for the knife throw, set your curve to resemble this one.](#)

[Figure 6.13 Your animation should end like this.](#)

[Figure 6.14 Link the knife to the target \(left\), and then rotate the target in the X-axis \(right\).](#)

[Figure 6.15 The target animation curve](#)

Chapter 7: Character Modeling Part I

[Figure 7.1 The Clone Options dialog box](#)

[Figure 7.2 Mapped image planes in viewports](#)

[Figure 7.3 Box parameters](#)

[Figure 7.4 Box position from the front and side views](#)

[Figure 7.5 Move the vertices to match the alien's image in the Left viewport.](#)

[Figure 7.6 Move the vertices to match the alien's image in the Front viewport.](#)

[Figure 7.7 Select and move the vertices toward the center of the model.](#)

[Figure 7.8 Use Swift Loop to place an edge on the model.](#)

[Figure 7.9 The Symmetry modifier creates a full torso.](#)

[Figure 7.10 The alien model with the Symmetry modifier and Use NURMS applied](#)

[Figure 7.11 Select the polygon in the armhole location.](#)

[Figure 7.12 Position the arm polygons to match the image plane.](#)

[Figure 7.13 Rotate the polygon 65 degrees.](#)

[Figure 7.14 Bevel settings for completing the arm to the wrist](#)

Figure 7.15 Problems with the model are more evident with Use NURMS active.

Figure 7.16 Use Swift Loop to add edges to fix problems with the model.

Figure 7.17 Select the polygon at the bottom of the alien model to begin blocking out the leg.

Figure 7.18 Use the Shift+Move Extrude method to extrude the thigh and use Scale to change the width of thigh.

Figure 7.19 The left side image shows the leg from the Front viewport, and the right side image shows the leg from the Left viewport.

Figure 7.20 Front view of the completed leg_(left image); left view of the completed leg_(right image).

Figure 7.21 The completed model shown from the Left and Front viewports

Figure 7.22 Areas to be refined on the model

Figure 7.23 The knee vertices moved to add more detail

Figure 7.24 With vertices added, the groin area is more refined.

Figure 7.25 Groin area with Use NURMS active

Figure 7.26 The left image shows the zoomed-out area; the right image shows the zoomed-in area where you need to select the vertex.

Figure 7.27 Move the three selected vertices closer to the center of the model.

Figure 7.28 The completed backside of the alien

Figure 7.29 The left image shows the elbow with the loops added; the right image shows the changes with

Use NURMS turned on.

Figure 7.30 The final alien body; the left image is the front, and the right image is the back.

Figure 7.31 Select the edges around the neck hole.

Figure 7.32 Use the Shift+Move Extrude method to create two more sets of polygons for the alien's neck.

Figure 7.33 Using Swift Loop, add a new edge to the top of the arm and neck to help round out the neck.

Figure 7.34 The adjusted shape of the neck

Figure 7.35 Adjust the vertices to match the neck of the alien in the image plane.

Figure 7.36 Move up the vertices on the outside of the arm to round out the top of the arm.

Figure 7.37 Final neck and arm

Chapter 8: Character Modeling Part II

Figure 8.1 Align the box with the alien head.

Figure 8.2 Move the edges so they surround the eye.

Figure 8.3 By selecting the corners and scaling them inward, you make the head more spherical.

Figure 8.4 In Vertex mode, edit the alien's nose to match the image plane.

Figure 8.5 Select edges to begin shaping the eye (left image). Move the edge toward the inside of the eye socket (right image).

Figure 8.6 Move the new edges to create a small ridge around the eye socket.

Figure 8.7 Select the edges on the head that were once the corners of the original box.

Figure 8.8 From the Front viewport, in Vertex mode, move the vertices so they match the alien's jaw line in the image plane (right). Repeat from the Left viewport (left).

Figure 8.9 The refined head

Figure 8.10 The hand image plane positioned at the end of the wrist

Figure 8.11 The parameters for the box that will create the hand

Figure 8.12 Rearrange the vertices to match the palm in the image plane.

Figure 8.13 Select the three polygons to prepare for beveling the fingers.

Figure 8.14 Rearrange the thumb vertices to follow the thumb in the image plane.

Figure 8.15 The hand from the Top viewport

Figure 8.16 Select Local from the Reference Coordinate System drop-down menu.

Figure 8.17 The final alien hand

Figure 8.18 Select and scale the vertices together to form the heel; then select the second row from the top and move it down below the heel.

Figure 8.19 Edit the middle and top rows of vertices to further refine the foot.

Figure 8.20 Edit the line of vertices at the base of the toes.

Figure 8.21 Toes extruded using Bevel

Figure 8.22 The finished foot with the ankle

Figure 8.23 Hand and lower arm showing the borders meeting and the edges

Figure 8.24 The top of the wrist has an extra edge.

Figure 8.25 Use the Cut tool to create new edges on the top of the hand.

Figure 8.26 Select the four vertices on the top front of the foot (left). Use Weld to combine the edges (right).

Figure 8.27 Use Cut to create an edge from the bottom of the lower leg to the bottom of the knee.

Figure 8.28 Select vertices on the outer edge of the leg, and move them so the leg is more rounded.

Figure 8.29 Attach the foot to the leg using Target Weld.

Figure 8.30 Use the Cut tool to add new edges.

Figure 8.31 Select the old edges, and use the Remove tool to properly delete them.

Figure 8.32 Use GeoPoly to rearrange the polygon into a circular shape.

Figure 8.33 Select the three vertices at the top of the neck (left). Use the Merge tool to combine the vertices (right).

Figure 8.34 The merged vertices on the front of the neck

Figure 8.35 Move the vertices at the neck to eliminate the twisting.

Figure 8.36 The completed alien model

Chapter 9: Introduction to Materials

Figure 9.1 The Slate Material Editor

[Figure 9.2 The Standard material type shown in the Slate Material Editor](#)

[Figure 9.3 Shader types shown on rendered spheres](#)

[Figure 9.4 Material in the Material Editor and on the couch in the viewport](#)

[Figure 9.5 The render of the couch with a Standard material applied](#)

[Figure 9.6 The Shortcut button used to add an image or bitmap to your material](#)

[Figure 9.7 To add an image to your material, choose Bitmap in the Material/Map Browser > Maps > Standard rollout.](#)

[Figure 9.8 The couch with the fabric image applied](#)

[Figure 9.9 The Alignment section for the UVW Map modifier parameters](#)

[Figure 9.10 The final results of the couch mapping](#)

[Figure 9.11 Apply the Dark Red Wood material by clicking and dragging from the node's output socket to the couch foot.](#)

[Figure 9.12 The couch fabric showing the subtle surface bumpiness](#)

[Figure 9.13 The couch fabric without the bump map \(left\) and with the bump map \(right\).](#)

[Figure 9.14 The lounge chair](#)

[Figure 9.15 The Leather texture is applied to the chair cushion.](#)

[Figure 9.16 The Chrome material applied to the lounge chair frame](#)

[Figure 9.17 Final reflections on the chair frame](#)

[Figure 9.18 The final materials applied to the lounge chair](#)

[Figure 9.19 Multi/Sub-Object material and parameters](#)

[Figure 9.20 Adding a Standard material to the Multi/Sub-Object material node](#)

[Figure 9.21 Finished MSOM with five Standard materials added](#)

[Figure 9.22 The Multi/Sub-Object material applied to the window object shows the different colors applied to the different parts of the window.](#)

[Figure 9.23 Drag from the output socket of the Shiny White Plastic material into the input socket of the remaining ID slots of the Multi/Sub-Object material.](#)

[Figure 9.24 The completed window material](#)

Chapter 10: Textures and UV Workflow: The Alien

[Figure 10.1 Uncheck Map Seams in the ConFigure rollout.](#)

[Figure 10.2 Click the Point-to-Point Seams button.](#)

[Figure 10.3 Pick this edge intersection to begin defining the seam \(left\). Choose the next point at the upper shoulder \(middle\).](#)

[Figure 10.4 Select the intersections under the arm.](#)

[Figure 10.5 Select edge intersections around the wrist to complete the forearm/wrist seam.](#)

[Figure 10.6 Add these seams to define the torso area.](#)

[Figure 10.7 Cut a new seam around the hand, starting as shown in the left image. Cut a seam around the fingers, as shown in the middle image.](#)

finishing at the opposite side of the wrist, as shown in the right image.

Figure 10.8 Using the Point-to-Point Seams tool to cut the seams for the left and right legs

Figure 10.9 Cut a seam around the foot.

Figure 10.10 Cut seams for the head. The right image shows seams on the back of the head; the left image shows the seam that runs around the base of the nose.

Figure 10.11 Cut the seams for the nose.

Figure 10.12 A low-contrast checker pattern is added to the alien model.

Figure 10.13 The arm's polygons are selected.

Figure 10.14 The Edit UVWs and Pelt Map dialog boxes showing the left arm UVs

Figure 10.15 In the Pelt Map dialog box, use Start Pelt to unfold the UVs of the alien's arm.

Figure 10.16 Use the Start Relax button to relax the UVs.

Figure 10.17 Both arms are pelted and relaxed.

Figure 10.18 The alien's backside with its UVs pelted and relaxed, showing the checker pattern evenly laid out

Figure 10.19 Click the Select by Element UV Toggle button.

Figure 10.20 Select an element in the Edit UVWs dialog box, and it will appear as selected on the model.

Figure 10.21 The Arrange Elements rollout

[Figure 10.22 UVs placed within the UV space](#)

[Figure 10.23 The UV layout image](#)

[Figure 10.24 Use the Save Image button to create the UV layout image.](#)

[Figure 10.25 The final map for the alien](#)

[Figure 10.26 The alien with the material applied](#)

[Figure 10.27 The Bump map was created in Photoshop by desaturating the original color map to create light and dark areas that conform to the original color texture.](#)

[Figure 10.28 Alien rendered with the bump map](#)

[Figure 10.29 The specular map for the alien](#)

[Figure 10.30 The final render of the alien with the specular map applied](#)

Chapter 11: Character Studio: Rigging

[Figure 11.1 A bipedal character in the reference position](#)

[Figure 11.2 Skeleton, Male, Female, and Classic bipeds \(from left to right\).](#)

[Figure 11.3 Create a biped with the same shoulder height as the alien model's.](#)

[Figure 11.4 Enter Figure mode in the Biped rollout.](#)

[Figure 11.5 Change the biped from the Structure rollout.](#)

[Figure 11.6 Match the positions of the biped's pelvis and the alien's pelvis.](#)

[Figure 11.7 Set the reference coordinate system to Local.](#)

[Figure 11.8 Scale the pelvis to fit.](#)

[Figure 11.9 Match the biped's leg, foot, and toes with the alien's.](#)

[Figure 11.10 Create the collection to paste the left leg hierarchy.](#)

[Figure 11.11 Copy the posture. The selected objects will appear in red in the preview.](#)

[Figure 11.12 Scale the spine links up to place the clavicles in position.](#)

[Figure 11.13 Arm positioned within the 3D mesh](#)

[Figure 11.14 Match the biped's fingers to the model's fingers.](#)

[Figure 11.15 Matching the head](#)

[Figure 11.16 Match the ponytail links with the nose.](#)

[Figure 11.17 The problem areas with the skinning](#)

[Figure 11.18 The alien with the Edit Envelopes button active](#)

[Figure 11.19 Select the bone vertex and move it to make the envelope smaller.](#)

[Figure 11.20 Make the inside and outside envelopes smaller by selecting and moving the points.](#)

[Figure 11.21 The Bip001Spine2 bone after the envelope has been edited.](#)

[Figure 11.22 In the Biped rollout, click at the bottom to reveal the Modes and Display rollout.](#)

[Figure 11.23 The rendered alien during a walk cycle](#)

Chapter 12: Character Studio: Animation

[Figure 12.1 Alien model with the jump sequence added](#)

[Figure 12.2 Selecting the head of the biped reveals all of that object's animation keys in the track bar.](#)

[Figure 12.3 Delete the keys on either side of frame 50.](#)

[Figure 12.4 Rotate the head to the left and up.](#)

[Figure 12.5 Shift and drag to copy the key.](#)

[Figure 12.6 Rotate the biped's arm, hand, and fingers to assume a pointing posture.](#)

[Figure 12.7 Use the Body Vertical button to position the biped for a jump.](#)

[Figure 12.8 Manually place the footsteps in the Top viewport.](#)

[Figure 12.9 Zoom to the footstep keys.](#)

[Figure 12.10 The dots indicate when contact begins and ends. You can drag a dot to change the duration of contact.](#)

[Figure 12.11 Create a key gap to get your biped airborne.](#)

[Figure 12.12 Prepare your biped to jump.](#)

[Figure 12.13 Position your biped in mid-jump.](#)

Chapter 13: Introduction to Lighting: Interior Lighting

[Figure 13.1 A target spotlight](#)

[Figure 13.2 The Spotlight Parameters rollout](#)

[Figure 13.3 The falloff of a spotlight](#)

[Figure 13.4 A target direct light](#)

[Figure 13.5 A target spot \(left\) and a target direct \(right\).](#)

[Figure 13.6 Free spot \(left\) and free direct \(right\) lights](#)

[Figure 13.7 An omni light is a single-point-source light.](#)

[Figure 13.8 Omni light \(left\) and directional light \(right\).](#)

[Figure 13.9 A three-point lighting schematic](#)

[Figure 13.10 Choose Standard from the Lights drop-down menu.](#)

[Figure 13.11 The spotlight's position in the room](#)

[Figure 13.12 The Shading viewport label menu](#)

[Figure 13.13 The Still Life Camera viewport set to Realistic, with the new Hotspot/Beam and Falloff/Field settings \(left image\). The rendered scene is shown in the image on the right.](#)

[Figure 13.14 It looks good, but the scene shadows are too soft.](#)

[Figure 13.15 The render showing more defined shadows](#)

[Figure 13.16 Interior room with key light and fill light](#)

[Figure 13.17 Shadows with Density set to 0.8](#)

[Figure 13.18 Check the Use and Show boxes for Far Attenuation.](#)

[Figure 13.19 Far Attenuation set on the fill light as viewed from the Top viewport with all the scene objects hidden](#)

[Figure 13.20 A still life rendered with Far Attenuation](#)

[Figure 13.21 The Shadow Map Size setting affects the shadow detail.](#)

[Figure 13.22 The image on the left shows the shadow maps, which do not show transparencies. The image on the right shows raytraced shadows and how they react to transparencies.](#)

[Figure 13.23 The light's position shown in all the viewports](#)

[Figure 13.24 Interior room with the direct light in place as the sun](#)

[Figure 13.25 Ooh! Volume light!](#)

[Figure 13.26 The Environment and Effects dialog box displays the Volume Light parameters.](#)

[Figure 13.27 The final results of the volume light in the interior room](#)

[Figure 13.28 The Light Lister dialog box](#)

Chapter 14: 3ds Max Rendering

[Figure 14.1 The Render Output File dialog box defines how the render saves to disk.](#)

[Figure 14.2 The Rendered Frame window](#)

[Figure 14.3 The Rendering processing dialog shows you everything you want to know about your current render.](#)

[Figure 14.4 Renderer drop-down menus enable you to easily choose between different renderers.](#)

[Figure 14.5 QuickTime compression settings affect the quality of the rendered QuickTime video file.](#)

[Figure 14.6 A camera as seen in the Perspective viewport](#)

[Figure 14.7 Target/Free camera stock lenses make it easy to pick the right lens for a scene.](#)

[Figure 14.8 The camera shown in the Top, Front, Left, and Camera001 viewports](#)

[Figure 14.9 Move the camera in the Top viewport.](#)

[Figure 14.10 A far clipping plane cuts off the distant extents of a scene \(left\). A near clipping plane cuts off the extents directly in front of a camera \(right\).](#)

[Figure 14.11 The Safe Frames tab in the Viewport Configuration dialog box](#)

[Figure 14.12 Safe Frames shown in the Camera001 viewport](#)

[Figure 14.13 The Raytrace material with reflections set to the maximum](#)

[Figure 14.14 More accurate reflections are added to the coffee table legs.](#)

[Figure 14.15 The reflection map with falloff](#)

[Figure 14.16 The Extended Parameters rollout for the Raytrace material](#)

[Figure 14.17 The SuperSampling rollout](#)

[Figure 14.18 The wineglass with the default SuperSampling \(left image\), and with modified SuperSampling \(right image\).](#)

[Figure 14.19 A much more pronounced refraction is rendered with an IOR of 8.0.](#)

[Figure 14.20 Use the Raytrace map on the Refraction parameter to create refraction in the wineglass.](#)

[Figure 14.21 The Advanced Transparency section in the Extended Parameters rollout](#)

[Figure 14.22 Frame the material using the Zoom To Results feature in the Slate Material Editor.](#)

[Figure 14.23 Plug the Raytrace map into the Reflection input socket of the Light Wood for Chess material.](#)

[Figure 14.24 The Time Output section setup for a range from 0 to 60](#)

Chapter 15: mental ray

[Figure 15.1 Choose NVIDIA mental ray from the Renderer drop-down menu.](#)

[Figure 15.2 The Renderer tab shows the Sampling Quality rollout.](#)

[Figure 15.3 A Quality setting of 0.01 renders a noisy image.](#)

[Figure 15.4 A Quality setting of 20.0 renders a smooth image.](#)

[Figure 15.5 The Final Gathering \(FG\) rollout in the Global Illumination tab of the Render Setup dialog box](#)

[Figure 15.6 The Draft setting produces a test render of the spheres \(left\). The High setting produces a better-quality render of the spheres \(right\).](#)

[Figure 15.7 More diffuse bounces mean more bounced light.](#)

[Figure 15.8 The Rendered Frame window now shows several mental ray controls.](#)

[Figure 15.9 The file rendered with mental ray.](#)

[Figure 15.10 Create a new view.](#)

[Figure 15.11 Select Arch & Design Glass \(Solid Geometry\) from the template drop-down menu.](#)

[Figure 15.12 Refraction color changed to white to achieve clear glass](#)

[Figure 15.13 The message warns you about assigning a material with a duplicate name to an object.](#)

[Figure 15.14 The new Chrome material applied to the chair frame and side table](#)

[Figure 15.15 Floor with the Arch & Design material applied](#)

[Figure 15.16 The Hardwood Floors material showing the change in the reflections](#)

[Figure 15.17 The final render of the mental ray materials](#)

[Figure 15.18 Select Yes in the Photometric Light Creation dialog box.](#)

[Figure 15.19 The Distribution \(Photometric Web\) rollout](#)

[Figure 15.20 Exposure Control and mr Photographic Exposure Control rollouts in the Environment and Effects dialog box](#)

[Figure 15.21 The room so far](#)

[Figure 15.22 Intensity/Color/Attenuation rollout showing the changed parameters](#)

[Figure 15.23 The room render with color and intensity changes](#)

[Figure 15.24 This mini panel gives you access to Final Gather controls to adjust your render easily.](#)

[Figure 15.25 The final mental ray render of the room's interior lighting](#)

[Figure 15.26 The Daylight System Creation warning](#)

[Figure 15.27 Move the Daylight System light so it will shine through the window.](#)

[Figure 15.28 This scene is too dark.](#)

[Figure 15.29 Move the mr Sky Portal to the window in the wall in the Top viewport.](#)

[Figure 15.30 The final render](#)

List of Tables

Chapter 1: The 3ds Max Interface

[Table 1.1 The 3ds Max interface elements](#)

[Table 1.2 Viewport shortcuts](#)

[Table 1.3 Command panel functions](#)

Appendix: Autodesk 3ds Max Certification

[Table A.1 3ds Max 2016 exam objectives](#)