Life Drawing and 3D Figure Modeling with MAYA

Contact
Gregory P. Garvey
Yale University Digital Media
Center for the Arts
149 York Street
New Haven, Connecticut 06520
USA
+1.203.582.8389
gregory.garvey@yale.edu

This paper discusses development and organization of a workshop on modeling the human figure using Maya 3.0. Held at the Yale University Digital Media Center for the Arts, the workshop covers drawing from life, scanning, importing, setup of reference image planes, and introductory modeling. Topics include: discussion of Nicolaïdes' drawing exercises; an overview of selected examples of figurative art from ancient through contemporary periods; planning appropriate poses; drawing from life; scanning the drawings, file importing, and setup of image planes; using NURB primitives such as circles, cylinders, spheres; lofting and stitching; basic transformations (move, scale, rotate); simple component editing using pick-masking; using Artisan (Sculpt NURBS Surfaces Tool); adding a basic skeleton and skinning; painting weights; simple texturing and using Paint Effects (hair); lighting (key, fill, rim); rendering to image files; and printing. This presentation reviews sample tutorials and student work, and concludes with a discussion of the aesthetic outcomes.

Motivation

Development of computer graphics has been driven in part by the pursuit of photo-realistic rendering. Many computer graphic artists seek to create images of human beings that are indistinguishable from reality. In contrast to this impulse is a very long history of image making in many different cultures that represents the human form in both a believable and recognizable way. Yet the means of representation (the individual gestural mark made with the paint brush or pencil by the artist) is a celebrated part of the aesthetic. With photo-realistic computer graphics, the means of representation is meant to disappear and not be visible. In the western tradition, the figurative works of Titian, Rembrandt, Degas, Cassatt, Picasso, or Alice Neel would lose their meaning and vitality if the gestural line of drawing was removed.

This paper and workshop pose a series of questions:. Can the "natural way to draw" be preserved in the process of modeling the human figure? Can the photo-realistic impulse be set aside in favor of exploring personal expression and the nature of the medium, to reveal a different truth of representation? Are there alternatives to the dominant modes of representation such as photo-realism, pumped-up superheroes, international anime culture or Disneyesque stylization? How can exploration of alternative approaches be best encouraged and developed? Can 3D modeling provide a pathway to discovery and revelation of aesthetic truths and personal meanings that is similar to the pathways explored in the worldwide history of drawing and painting? Do technical demands, the 3D computer graphics modeling process, and ultimately the marketplace make such concerns obsolete and irrelevant?

More than a millennium ago, using language informed by Taoism and Buddhism, the painter Ching Hao (900-960) wrote: "Resemblance reproduces the formal aspects of things but neglects their spirit. Truth shows the spirit and the essence in its perfection."[1] In his book "The Natural Way to Draw,"[2] Kimon Nicolaïdes aims for something quite similar: "You should draw, not what the thing looks like, not even what it is, but what it is doing." He developed a series of drawing exercises in which the artist focuses alternately upon contour, gesture, weight, modeling, memory, analysis of contrasting curved and straight lines, predominating shapes, and their design within the frame. Through such exercises, Nicolaïdes strives for a deeper understanding and empathy with the subject as the artist learns how to represent it.

For Nicolaïdes, learning to draw is an ongoing process of discovery. Fundamentally it is learning how to observe with not only the eyes but all the senses. It is interesting to note that his approach lays the groundwork for literally breaking out of the frame into multi-media and even installation and performance. A contour drawing made without looking at the paper is about touching the edges of form, of pushing and pulling edges that move forward and backward in space. A gesture drawing is learning how to empathize, identify, and participate with what the model is doing, feeling, and thinking. For Nicolaïdes, this is more than action or attitude: "Gesture describes the compound of all forces acting in and against, and utilized by, the model."

Weight and mass drawings seek to feel the effect of the forces and discover the core motivation of a form. This is similar to some modern dance technique where performers focus on the midpoint of their bodies as the locus of energy from which to initiate movement. Drawings from memory emphasize using one's own muscles to remember the movement of the model. Drawing at right angles requires the artist to draw the model from an imagined perspective 90 degrees to the observed viewpoint. This is a skill that directors and animators use in determining camera angle and placement. In fact, a good animator feels and empathizes with the subject in order to understand how the character acts, moves, and behaves.

Another exercise emphasizes using memory and imagination by consciously relating the direct sensory experience of viewing a model to past experience. This free-association could involve any one of the senses. Like Proust's Madeleine, our conscious life is made up of not only the present, but a flood of memories, thoughts, and sensations that reflect our own unique lives and color our current experience. Drawing becomes a dance between objective observation and subjective, even subconscious reactions and recalled experience, mediated by the marks left on the paper. For Nicolaïdes, "drawing depends on seeing. Seeing depends on knowing. Knowing comes from a constant effort to encompass reality with all of your senses, all that is you."

Recent computer graphic techniques for modeling, rendering, and animation have captured the likeness of the human figure with ever-increasing photo-realism. The digital version of Kevin Bacon in the movie "Hollow Man" or the virtual James Brown created for the Experience Music Project proclaim that we may now be unable to perceive the difference between the "real" and the "virtual." Yet all too often what appears realistic today, within a year or so appears as yesterday's artifice. At the same time, character design for games such as Tomb Raider are often

highly stylized. This is influenced in part by storage requirements and display constraints, which require fast polygonal rendering. The international comic book and anime culture also plays an important role in this stylization and simplification of 3D characters.

Successful stylization, even with surreal distortions and exaggerations, requires a command of anatomy, proportion, and form, and a sense of color and design. Creating convincing characters with believable movement requires much more than anatomical correctness. Whether designing a photo-realistic virtual actor or a highly stylized action character for gaming, animators, artists, and designers need to start with observing the human form from multiple perspectives and in motion. A mastery of drawing and understanding of anatomy and proportion lay the groundwork for making believable corrections, enhancements, or distortions to polygonal meshes created from 3D scanning. Even with cartoon-like characters or highly stylized comic book action figures, 3D artists need to quickly realize ideas through 2D sketches that can be used as references in 3D modeling. To bring a polygonal model to life requires reaching beyond the surface and somehow investing the character with a personality, a sense of a lived life. As Nicolaïdes wrote: "To what the eye can see the artist adds feeling and thought. He can, if he wishes, relate for us the adventures of his soul in the midst of life."

How appropriate is such a sentiment to the task of 3D scanning, modeling, motion tracking, rendering, and compositing as used in a typical commercial production? What amount of individual expression contained in a drawing will survive the steps of digitizing, modeling, curve rebuilding, reparameterization, and all the rest throughout the production pipeline? Since the final outcome is the result of many hands, individuality must be suppressed. Characters are created by committee and often shaped directly by market forces and audience feedback. Yet some of the best commercial examples do communicate some of the values to which Nicolaïdes refers, although they may well be subordinated to plotline and qualities dictated by appeal to a mass audience. Nicolaïdes himself considered his drawing exercises as learning tools intended not for exhibition but rather as a by-product of the required mental and physical activity. But these exercises give us a glimpse of a larger and more meaningful experience.

The Natural Way to Draw is really a guide to learning how to observe with all of one's faculties, senses, and intelligence. It is essential training for anyone involved in the arts of visualization, from traditional painting to 3D computer graphics. It is preparation and a foundation that applies to many other disciplines. Mastery of life drawing is but one part of a larger pursuit that contributes to formation of a cultivated, self-aware aesthetic sensibility.

Other questions remain unanswered: Can sophisticated 3D computer graphics ever be more than photo-realistic razzle-dazzle that leaves behind the individual gestural mark and personal vision? Are these merely byproducts of working with pencil, pen, brush, paper, and canvas in an aesthetic whose time has come and gone? Or is there still territory to be discovered and explored by using 3D computer graphics with a unique and individual vision? A provisional answer: Yes. As in traditional sculpture, there are multiple techniques for modeling the human form. An artist can use NURBS, polygons or subdivision modeling. Approaches include modeling the figure from a series of spheres or cylinders, slicing these geometries into patches, rebuilding surfaces, and stitching together reparameterized surfaces. From such techniques might a more individual exploration take place, one that would make the work of an artist as instantly recognizable as that of Francis Bacon, Peter Paul Rubens, or Alice Neel?

With these questions in mind the workshop was conceived as an update to the traditional life drawing course while being at the same time an introduction to MAYA and 3D modeling. This hands-on approach links the know-how of drawing to that of 3D modeling. In referencing Nicolaïdes' exercises this workshop offers a point of departure for further explorations of the human figure inspired by the legacy of expressionism, cubism, surrealism, and even abstraction. Coupled with the increasing interest in non-photorealistic rendering, 3D computer graphics artists may rediscover the value of the individual gesture and personal mark that informed the artistic vision of previous generations of artists.

From the Paleolithic Venus of Willendorf to the sensational work of Jake and Dinos Chapman, the human figure remains a subject of aesthetic interest and the site of contested narratives. In recent years, the "body" has been exhumed and dissected by extensive theorizing. The purported male gaze has been blind-sided and displaced by competing viewpoints with very different agendas. The territory of human skin and flesh has been colonized as an aesthetic object by artistic visions that were once marginalized.

This workshop, while providing an introduction to using 3D computer graphics to model the human figure, also aims to bring to this process the many different viewpoints and approaches that are found in contemporary artistic practice. It is an introduction to the Maya graphical user interface and to 3D modeling in general. Most students who have enrolled in the workshop had limited experience with 3D modeling. Some from the School of Architecture had experience with AutoCAD. Although the workshop is an introduction to modeling with Maya, the primary motivation and starting point is drawing from life and exploration of the role of the personal mark, gesture, and vision, which has remained a hallmark of artistic expression.

Workshop Outline

Part I

An orientation to the Maya GUI. A step-by-step tutorial demonstrates modeling a simple figure using NURB primitives such as cylinders and spheres in a four-panel view (perspective, front, side, top).

Part II

A survey of figurative work from art history. Posing the model and selection of viewpoints. Arms, legs, and torsos are drawn in profile and frontal views. Sketches are scanned, imported, and set up as reference-image planes.

Part III

Using the drawings displayed on the image planes as references, a series of NURB circles is lofted to create arms, legs, and torso.[3] Basic editing with Move, Scale, Rotate, and pick-masking components. Stitching.

Part IV

Polygonal and subdivision modeling is introduced by two examples of modeling the hands. Additional modeling techniques using component editing (vertices, edges, and faces), extrude, and Artisan (Sculpt NURBs Surfaces Tool) are introduced and used for refinements and for making simplified facial features on a sphere.

Part V

Demonstrations of adding a basic skeleton and skinning followed by a brief demonstration of deformers and painting weights. Basic texturing and the use of Paint Effects (hair), lighting (key, fill, rim) and final rendering to image files. Participants were able to print final renderings.

Gregory Garvey

Gregory Patrick Garvey is currently the visiting fellow in the arts and associate professor at Quinnipiac University and is an associate of the Yale Digital Media Center for the Arts. He has exhibited his digital images and interactive installations in North America and Europe and is a frequent contributor to SIGGRAPH and other conferences and symposia on art, technology, and education. He previously lived in Montréal, where he chaired the Department of Design Art at Concordia University, started the Program in Digital Image and Sound (a double major between computer science and fine arts), and served on the Board of Directors of the Montréal Design Institute. While living in Boston, he taught digital art and design at Mass College of Art, the New England School of Art and Design at Suffolk University, and Northeastern University. From 1982 to 1985, he was a fellow at the Center for Advanced Visual Studies at MIT, where he also received a masters of science in visual studies. He also holds an MFA from the University of Wisconsin-Madison.

Carol Scully–Director, Digital Media Center for the Arts, Yale University

The Digital Media Center for the Arts is a multimedia facility created to explore new areas of education and cross-disciplinary interaction that result when traditional art collides with the computer age. The DMCA encourages and enables discovery and creation in electronic media, investigates how new information technologies fit into established educational systems in the arts, and implements new models of arts education.

The center was conceived and designed by Yale's leaders in art, architecture, drama, history of art, film studies, music, the University Art Gallery, the Center for British Art, the Art and Architecture Library, and Information Technology Services, working closely with the Offices of the President and Provost.

References

1. Keim, Jean A. (1961). *Chinese art: The five dynasties and Northern Sung.* Tudor Publishing Co. New York, NY.
2. Nicolaïdes, Kimon. (1941). *The natural way to draw,* Houghton Mifflin Company, Boston;
3. This workshop is partly inspired by examples from: Harovas, Perry, John Kundert-Gibbs, and Peter Lee, Mastering MAYA Complete2, SYBEX, Alameda, CA, 2000.