Rear Window Redux: Learning From the Architecture in Hitchcock's Film Using 3D Modeling and Animation.

Matthew Knox
Kansas State University
mknox@ksu.edu

1 Introduction

In the Fall of 2006 upper level architecture students at Kansas State University used Alfred Hitchcock's film, *Rear Window*, to analyze the films' unique architectural sensibility through 3D modeling and animation and then apply that knowledge in their work. This paper will document that experience.

2 Learning Objectives

Computer graphics have expanded the visualization tools far beyond two-dimensional views and cardboard models for the architecture student. New technologies and techniques, often borrowed from the film industry, offer rich methods to the design process and communication of the student's project.

The sixteen-week studio was designed to reinforce key architectural concepts such as space, light and meaning through analysis of architecture and the related art of cinema. In addition, the project required students to carefully consider how events take place within architectural space and how space reinforces or alters that event. Lastly, the project required expansion and refinement of the student's facility to use 3D modeling, shading, lighting, rendering, shot composition, staging, editing and compositing.

3 Copy and Paste

For centuries artists have learned the techniques[1] and theory of painting by copying the great masters. In order to learn how to paint, artists often copy exceptional works—even down to the smallest brush stroke—to develop fundamental understandings of how the work came to be. Later, the artist aggregates this knowledge to establish his or her unique artistic identity.

In university architectural programs, the study of existing buildings is an essential tradition in the educational process. For centuries the education of an architect was not considered complete until the student had taken a grand tour through Europe to study the great buildings of Western Architecture. Such an extended study tour was essential to Le Corbusier (1887-1965), considered one of the great architects of the twentieth century. At the age of twenty, Le Corbusier, encouraged by his teacher, embarked to Italy to visit and study paintings, sculpture and architecture. His meticulous sketchbooks show an inquisitive mind carefully analyzing and recording to expand his knowledge—understanding that would later manifest itself in his buildings. One passage illuminates the impact of Filippo Brunelleschi's dome in Florence: "The Duomo at six in the evening is a fairyland of color, the quintessence of yellows of every quality and value, of ivory white, black patinas, all this on an ultramarine of extraordinary intensity…"[2] This idea continues today with architectural students taking numerous study tours throughout their education.

With so much to be gained by emulating a master as an educational tool, the students were asked to look at Alfred Hitchcock's 1954 film, *Rear Window*. The objective being to learn how the architecture of the set and the masterful filmmaking could be useful in their efforts to design and communicate using 3D modeling and animation.

4 Rear Window Ethics

Hitchcock's *Rear Window* has long been a favorite film of architects and a topic of discussion in many architecture school seminars. The setting for the film is the rear courtyard of several apartment buildings in New York City's Greenwich Village. A magazine photographer (Jeffries), played by Jimmy Stewart, has broken his leg on a dangerous assignment and is stuck in his apartment. With nothing to do all day he takes an interest in the lives of the other tenets seen through his rear window. A scream in a sleepless night makes him suspect a murder has taken place. His girlfriend, played by Grace Kelly, is one of several characters who find his suspicions implausible. Regardless, he slowly gathers evidence to convince the naysayers and in the end his suspicions are found true and the film concludes in a suspenseful confrontation.

Still image from *Rear Window* copy by Adriana Molina.

Architects seem innately drawn to the film because the architecture is a clear character in the narrative. It is evident that the architecture has been carefully considered to reinforce the narrative of the film—the characters' actions are seamlessly intertwined with the space. For example, one of the main distractions of Jeffries is the dancer, Ms. Torso, directly across from him. This small flat sits as if an elevated stage on a second story. Three openings face the courtyard; a small window in the bathroom at head height obscures her nakedness in the shower; a large square window exposes fully the main space of the flat where she practices her dance and lastly, a doorway to the balcony. The large window acts as a frame exposing her erotic mobility in contrast to Jeffries stasis—the door becomes an

anthropomorphic symbol of her wholeness in comparison to the murder victim's dismembered state. The symbolism of the character, her actions are shaped by the architecture—an orchestrated whole moving the story forward. We could go on as there are many discursive illustrations of this concept in the film too numerous to cover here.[3]

Original set still image by Jay Hoelle.

5 Films Offering to Architecture

Film has long been an interest to architects due to the similarity of concepts such as light, movement, space, sound and its ability to immerse the audience in a virtual architectural experience. In the same way, architecture is often thought simply as light and space in subtle or dramatic play. Louis Kahn, architect of the Salk Institute, eloquently illustrated this idea:

Space has tonality, and I imagine myself composing a space lofty, vaulted, or under a dome, attributing to it a sound character alternating with the tones of space, narrow and high with graduating silver, light to darkness.[4]

Likewise, the cinematographer's art is one of light—the film becomes an essay on the behavior of light in space built upon the masters of painting such as the chiaroscuro of the Baroque Caravaggio found in his *Doubting Thomas* of 1602.[5] Observant architects can only learn from the focused exposition of light in space and time and their conveyance of mood, atmosphere and meaning found in film. The Stuart Samuels film, *Visions of Light: The Art of Cinematography*, is an excellent resource.

Both film and architecture are arts of construction, each assembling sequences of image or space into a whole. While film constructs space and narrative as an aggregation of meaningful images of representative space, architecture constructs by the sequential experience by movement through space and its attendant views. Inherent to each is the necessity of memory ordering over time the monadic or uninflected images into a comprehensible totality.

In fact, this is one of the earliest film theories—the pioneering filmmaker, Sergei Eisenstein's, idea of montage. Through editing or cutting, individual images can be put into relationships that form new narrative meanings. Or according to David Mamet, "You always want to tell the story in cuts. Which is to say, through a juxtaposition of images that are basically uninflected."[6] Eisenstein himself was not unaware of the architectural connection to film as he once described cinematic montage with the experience and arrangement of the Greek Acropolis.[7]

The architect Le Corbusier also employed the cinematic juxtaposition of images in architecture as the changing views obtained by movement through space over time—commonly referred to as the architectural promenade. He designed several buildings with this concept such as the Villa Savoye outside Paris centered on a ramp connecting the floors, the experience of which becomes almost filmic as it unfolds in time and space.

6 Looking Through the Window

There are many other connections between film and architecture but we will only look at one more, the frame. It is many times found true that architectural students who have a background in photography often show advanced skill in the composition of space and form particularly when the computer is introduced and the frame of the 3D camera becomes a large part of the work in both design and communication. As well, cinematography and its inherent dependence on the frame and perspective provide knowledge useable by the student.

Jahni Pallasmaa, an architect who has written extensively on the connections between film and architecture, said that the cinematographer in many ways knows more about perception and the laws of optics than the architect.[8] Thus the frame becomes an anatomical theater for the student to fully understand the role of perspective and light in our perception and representation of space and form. The compositional relationship between objects (staging) in space and time is clearly framed and thus useful to the student's quest to see how people engaged in an event will occupy or use the space/building.

Photo of set model from Jeffries' window. Photo by author.

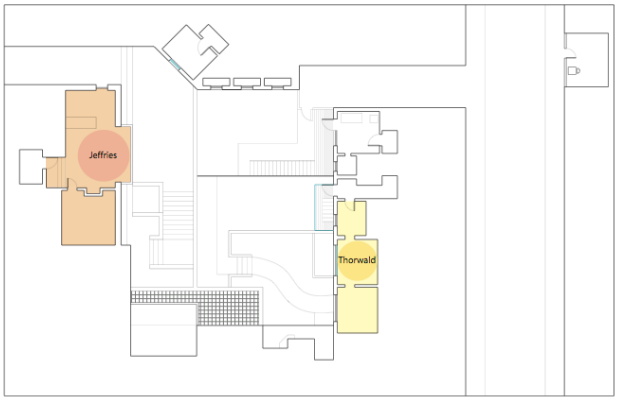
As a pedagogical device, the frame introduces focus and clarity to an otherwise open condition. This has been manifest in many ways historically prior to film such as the window, the canvas of a painting and the Claude Glass—an Eighteenth-century device with several-colored lens that was used to compose an idealized view of the landscape providing real time access to views similar to landscape paintings by Claude Lorrain (1600-82). Each separates a set from the multiple. At times the set apart is monadic. At other times the frame does not deny the existence of other sets beyond the frame. The frame becomes a powerful device enabling the student to consider how we see space and objects in isolation and in relationship to others inside or outside of the frame.

Therefore, as a student, film provides via the frame a wealth of practical information on composition, light, space and movement

along with theoretical knowledge of how framing the view imparts narrative information and meaning. Gilles Deleuze identifies the importance of this concept: "Doors, windows, box office windows, skylights, car windows, mirrors, are all frames in frames. The great directors have particular affinities with particular secondary, tertiary, etc., frames. And it is this dovetailing of frames that the parts of the set or of the closed system are separated, but also converge and are reunited."[9]

More importantly the frame makes apparent depth. Steven Holl, an architect interested in how we perceive space, speaks of this as the architectural synthesis of foreground, middle ground and distant view interacting with materiality and light to be one of complete perception.[10] In the studio, by establishing a frame the primary components of space can be isolated for discussion both as research but also as part of the student's design process.

Of course, in film, unlike photography, the spectators view (i.e. the camera) is set in motion. Time allows the camera to move through space (depth) just as we move within architecture. As the camera moves the relationship of surfaces and objects change in depth because of the change in view.[11] For example, a large box in front of a wall seen head on will occlude a large area of the wall. If the camera moves to the right still focused on the box, areas of the wall surface hidden before are now visible. This more complete perception of depth due to parallax reminds the student to consider the dynamic experience of space as an accumulation of differing depths and viewpoints as seen through the camera and by the spectator within their own architecture.



Plan of original courtyard showing the relationship between Jeffries' apartment on the left and Thorwald (the murderer).

7 Digital Translation

The project was divided into two parts. The first was to understand how Hitchcock used the architecture to support the ideas in *Rear Window* and how the techniques of filmmaking expressed that architecture. The students began with research on the film, multiple viewings and group discussions followed by a reconstruction of the original set. The students archeologically mapped the set first in drawing and then as a cardboard model. Using this information the set was then modeled in 3D using Autodesk® 3D Studio Max. From this work it was clear that the set in the film appears realistic but in fact there were many perspective alterations such as the flatness of many of the apartments used to bring the characters closer to the windows and thus Jeffries surveillance (compare the thin depth of Thorwald's apartment to the more realistic depth of Jeffries' apartment). Using the film as a resource the surfaces of the model were shaded to match the original set.

Each student picked a scene in the film that they would recreate in 3D animation. The careful attention to detail necessary to copying would help the student learn about the architectural space of the set and to see how Hitchcock carefully framed his views with the camera and how the characters actions are staged within the architecture. Event (action) and space are part of the constructed narrative (the meaning) being told. For the student, this concept is explored in architectural history as a primary taxonomy showing how a culture in a specific time and place viewed the world and its impact on architecture. For example the Pantheon in Rome with its omni-directional dome corresponds to the many gods worshiped in Roman culture. For students this concept is understood well in theory but in praxis it is often lost.

Reproduction or copying of a scene required careful observation of light, movement, sound and editing in the existing scene in order to reproduce it in 3D. This became a vital component as the students had minimal practical application of these concepts and necessary in order to improve their work in 3D animation. Who better to learn from than Hitchcock?

Having modeled and set the cameras, students animated characters to replicate the film characters—the purpose being to observe the relationship of the body in space interacting with the architecture. While the idea of the body in space is fundamental to architecture it is often difficult to study within the educational environment since the projects are rarely if ever built. With the introduction of animation however the student can see his or her design being occupied and used.

Students rendered the shots and edited the scene together using the original soundtrack from the scene.

8 Redux

After copying the existing work in a new media the students were each asked to redesign the set for a remake of the film set in 2006. The question put forward was to consider the technological and cultural changes in the last 50 years such as video, cell phones and digital imaging and how they would impact the structure of the story and the architecture of the set. The students were to use the existing characters in the film and the location in Greenwich Village but were to design new buildings (the set) surrounding the courtyard for their remake.

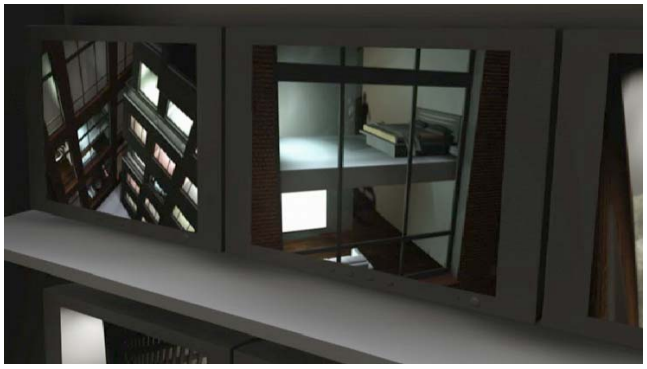
Still image from *Rear Window Redux* by Adriana Molina.

Just like in the original movie, the meaning of the narrative would play a role in the design of the set. For instance, in the original the shots showing the view from Jeffries apartment to Thorwald's (the murderer) show a strong vertical line created by the drain pipe attached to the side of the building separating his wife's

bedroom window (the victim) from the living area window where he spends his time. The two characters in conflict have clearly drawn a line between themselves and the architecture supports this reading.

Students combined conventional architectural design process such as sketching, drawing, and cardboard models with computer modeling. Instead of treating the design in the often too normal sense of objects viewed from all directions, the students were asked to think firstly about the role of the camera frame and frames within the frame in their design—just as the film was about viewing others through multiple frames such as the film camera, the rear window and the windows looking into the other apartments.

Studio discussion centered on the act of voyeurism in the current idiom and how electronic technology offers many obvious and unforeseen ways to peep. However, as architecture students, their interest naturally focused on the role of architecture in the narrative—in the end most students focused on ideas of transparency in terms of materials and objects such as glass. The architecture of the different sets often provided veils of large glass planes (windows) and interior screens creating multiple layers revealing and concealing the characters to Jeffries. Technology was important but it was the visual properties of space and perspective offering occlusion or apparent occlusion that most students focused.



Still image from *Rear Window Redux* by Emily Chappelear.

This focus on the window was not unexpected. In teaching design it very often occurs that the media you use in the creative process tends to foster concentration on singular aspects. For example, students designing with cardboard models tend to focus on form and space while a student working in plan focuses on the order of the different spaces and less on the 3D aspects of the building. A student working with the computer using 3D applications will focus on space and form. It followed that by viewing their work through the display screen, the frame of the camera and then through window frames, the window as architectural trope becomes paramount.

When modern technology was introduced it most often followed the window analogy such as digital imaging and video surveillance—instead of a single rear window, Jeffries was given other electronic windows for his observations.

As students developed their design, the location of the camera, its movement and the characters staging began to alter their design. Issues such as lighting began to impact the mood of the scene as well as the how the architecture shaped and directed the light.

Students were asked to create an animated scene using their new sets for the final review.
At the end of the semester the students completed their scenes using Adobe® Premier Pro, Apple® Final Cut Pro and postproduction using Autodesk® Combustion (a compositing program). A premier was held to view the final scenes with faculty and students from the college invited.

9 Conclusions

In the end, the project accomplished several educational objectives. By carefully studying and reproducing a scene from *Rear Window*, the students learned how cinema is strongly influenced by architecture and how the technical aspects of filmmaking can be used to clearly communicate ideas—something extremely important with the increasing role of 3D modeling and animation in the architect's tool set.

The second part of the project allowed the students to directly apply the knowledge and skills from the first part. By copying the master, they were able to channel that knowledge into their own work. The necessary focus on issues such as light, space, frame and the narrative meaning of architecture and cinema contributed to how a student can consider his or her projects as part of a continuing narrative in a fluid assemblage of views moving in depth over time.

The impact of the image is of the first importance in a medium that directs the concentration of the eye so that it cannot stray. In the theater, the eye wanders, while the word commands. In the cinema, the audience is led wherever the director wishes.
—Alfred Hitchcock[12]

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[1] The word technê would be more appropriate here to differentiate from the term technique, which often means simply a mechanical step-by-step way of doing something to the idea of craft as a practical application of art.
[2] Geoffrey H. Baker, *Le Corbusier: The Creative Search*, (New York: Van Nostrand Reinhold, 1996), 69.
[3] See Pallasmaa's book below including the chapter, "The Geometry of Terror" on *Rear Window*.
[4] John Lobell, *Between Silence and Light: Spirit in the Architecture of Louis Kahn*, (Boston: Shambhala Publications, 1979), 32.
[5] Jean-Pierre Geunes, *Film Production Theory* (Albany: State University of New York Press, 2000), 153.
[6] David Mamet, *On Directing Film*, (New York: Penguin Books, 1991), 3.
[7] Anne Friedberg, *The Virtual Window: From Alberti to Microsoft*. (Cambridge: The MIT Press, 2006), 171.
[8] Juhani Pallasmaa, *The Architecture of Image: Existential Space in Cinema*. (Helsinki: Building Information Ltd, 2001), 155.
[9] Gilles Deleuze, *Cinema 1: The Movement-Image*. (Minneapolis: University of Minnesota Press, 1986), 14.
[10] Steven Holl, *Parallax*, (New York: Princeton Architectural Press, 2000), 61.
[11] Ibid, 26.
[12] Pallasma, 149.