Filmic Architecture
On Motion Perspective in an Architectural Synthesis

by

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Bachelor of Engineering in Architecture
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Submitted to the Department of Architecture
in Partial Fulfillment of Requirements for the Degree of
Master of Architecture

at
Massachusetts Institute of Technology

February 2004

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Abstract
This thesis is an inquiry into the potential of film as an extended perspective defined by the sequential juxtaposition of images. Based on the notion that linear perspective in Renaissance architecture was used as a formal tool for the poetic imagination, it is assumed that motion perspective used as a design tool would have a formative influence on the architectural design process and thence, on the final product, architectural space and the sequence of spaces. The project uses film theory as the conceptual framework from which to gain a better understanding of the fourth dimension (time) in the creation of architecture. Cinematic camera movements, which already have a syntax or patterned language are modified for defining specific geometries in the creation of built space.

The program consists of a housing block and community center in East Boston, offering a variety of spatial types for experimentation. In the primary analysis, the site is observed through a series of camera sequences. In the design process these camera movements are used to generate a spatial geometry based on the relationship between camera and filmed space. For instance, the housing has a layered spatial configuration corresponding to the tracking shot used in the site analysis. Computer generated motion graphics (4-D motion perspective) are used in each step of conceptual design. A dialectic of observation and form-generation with camera sequences are repeated throughout the building using the syntax of other movie-based sequences.

The thesis demonstrates the potential of cinematographic sequencing in architectural design, moving beyond the three-dimensional scenography of traditional perspective.

Thesis Supervisor: Takehiko Nagakura, PhD
Title: Associate Professor of Design and Computation
Contents

Introduction
   Perspective
   Media
   Motion Perspective on Film Media

Methodology
   Filmic Fantasies
   Filmic Geometry
   Filmic Synthesis

PART I Filmic Fantasies
   Jungle Steps
   Forest of Light

PART II Filmic Analysis
   Case Study of Architecture in Filmic Media
   Analysis of Moving Camera
   Analysis of Filmed Space
   Prototyped Camera Movement in Filmed Space

PART III Filmic Synthesis I
   Site
   Program
   Site Analysis
   Site Planning
   Project Refinement

Final Cuts

Project Documents

Conclusion
From the Final Cuts
Scene in the roof garden
00:02:26

Filmic Architecture: On Motion Perspective in an Architectural Synthesis
Introduction

Methodology

PART I Filmic Fantasies
PART II Filmic Analysis
PART III Filmic Synthesis

Final Cuts

Project Documents
Animation is a tool that allows for the transforming of ideas into sensitive material, providing the imagination and fantasy with the capacity of visualization. This synthetic moving image dominates the architectural representation market due to the contemporary technology of digital perspective. Moreover, it is expected that this current trend would cause the formative influence on the manner of architectural design concept and process. With this expectation, it is the intention of this thesis to investigate the potential of the sequential digital images of architecture that is called *motion perspective* in this thesis. In order to correspond to the initial question of *how motion perspective operates an architectural design process*, a series of research on representation of architecture, film media, and design project is executed.

**Perspective**

Initially, perspective was intended to become an instrument of reduction and predicative visualization, based on a precise correspondence between image and reality. In another aspect, the linear perspective of Renaissance could become a formal tool for the poetic imagination, molding a way of thinking space. Our modern conception of architectural space comes from the framed, orthogonal, telescopic vision of perspectival space. The pictorial space of perspective differs from the late Gothic concept of space by its openness, not only as a window but outwards the horizon line, and by its fixing of distance and center of the position and gaze of the viewer in relation to the vanishing point in the line\(^1\).

![Perspective Method](image)

*fig. 1 perspective method
Andrea Pozzo*
Media

The shift from perspective to motion perspective accompanied the change of media, which is deeply related with perception and form. In Chinese painting, the standpoint of the observer is movable without restriction. Each portion of the composition is drawn with its own viewpoint perpendicular to it at some distance. This media form was more useful in representing Asian architecture, which consists of clustered buildings and fences harmonized with nature. A moving viewpoint seems well suited for a medium of long or folded paper in which the composed images of architecture passes before the observer section by section as it is unrolled\textsuperscript{2}.

Motion Perspective on Film Media

Since film was invented, architects have been interested in its potentiality as an explanatory tool of architecture. It makes it possible to simulate movement, which is difficult in traditional medium but essential when representing experience of architecture. Noting the reciprocal mechanism between architecture and its representation in these antecedents, this thesis assumes that, beyond an explanatory tool, motion perspective could function as a design generative tool. If there is a certain way of communication between architectural design and filmic representation process, it is the purpose of this project to illuminate that manner.

\textsuperscript{1} Bek, Lisa. “Toward the Paradise on Earth”. She notices that the axial vistas of Renaissance architecture were derived from Renaissance perspective composition. The insistent vistas through buildings and landscapes usually were identical to lines of human movement such as avenues, colonnades, and enfilades of doors, and that the scenery to either side of these optical channels was treated as, ideally symmetrical.

\textsuperscript{2} Woodward, David/ Harley, J. B. ed., Cartography in the Traditional East and Southeast Asian Societies. This technique has its origin in cartography method and the restricted length of paper production in old Asian society.
Methodology

Methodologically, a series of procedural stages is meant to guide the whole process of the thesis toward an expected answer of the initial question. This thesis will be tested in order to illuminate the reciprocal mechanism of architecture and its filmic representation as a design tool. The methodology proposed here involves an experiment of filmic design process with 3 main stages: experiment, research, and design.

Part 1 – Filmic Fantasies
The first phase is to grasp the geometry of filmic space. It will be an experiment of film as a concept generator, executing unique process of digital film. In filmic space, the definition of space and movement can be different from the one of architecture in paper media.

Part 2 – Filmic Geometry
This project uses film theories as a conceptual frame to gain a systemized understanding in the creation of architecture in motion perspective. The second stage is a film analysis to define filmic geometry, which will be adopted as a design tool in the following design process. Cinematic devices, which already have patterned language, will be modified for defining specific geometries in film. It will be a main concern to investigate how architecture is described by moving cameras.

fig 3.a  film setting of Rear Window
fig 3.b Rear Window, Alfred Hitchcock

Filmic Architecture: On Motion Perspective in an Architectural Synthesis
Part 3 – Filmic Synthesis
The last process is an architectural project, called filmic synthesis, in which computer generated motion perspective will be used in each design step. The filmic geometry will be further developed for a specific site and an architectural program. A housing block including community facilities in East Boston will be designed for testing this methodology. This program is chosen as a vehicle for this study as it offers a variety of spatial types for experimentation.

East Boston

Digital Filmic Apparatus
The digital film making process will use the following computer programs.

Digital Motion Perspective Generator: Autodesk Viz 4.0

Digital Film Editing Program: Adobe Premiere v6.5

Methodology
Introduction
Methodology

PART I  Filmic Fantasies
   Forest of Light [3.1]
   Jungle Steps [3.2]

PART II  Filmic Analysis

PART III  Filmic Synthesis
   Final Cuts

Project Documents
Filmic Fantasies

Perspective Fantasies

Giambattista Piranesi (1720 - 1778) explored the boundaries of a traditional world that was already shifting toward an infinite and homogeneous extension. He developed new ways of fragmenting other linearity of perspective representation that might reveal a depth of human experience now being lost in the systematized rendering of surfaces identified with scientific vision. At issue was the true temporality of vision, embedded in synthetic perception.

fig. 5 drawing of Giambattista Piranesi

Filmic Architecture: On Motion Perspective in an Architectural Synthesis
**Filmic Fantasies**

As an initial filmic experiment, two motion pictures are produced. They reflect the inherent geometric character of film space, in which perceptions are liberated from the limitation of gravity and questioned. These experimental films provide the 4 dimensional Pynesian space in film media, taking advantage of the Autodesk Viz 4.0 for motionally realistic films. In addition to this, the idea for part III is expected to be generated.

1. **Forest of Light**
2. **Jungle Steps**

_Cube 2: Hypercube, Andrzej Sekula_
[3.1.a]  
Filmic Experiment I

Forest of Light  
Duration: 2 minutes  
Screen Ratio: 1.7

Film Sequence of *Forest of Light*

In this short computer generated world, light sources offer the directional sense of gravity. However, once the camera starts moving choreographically, the sense of up and down disappears and space is re-defined every time the camera rotates.

*Filmic Architecture: On Motion Perspective in an Architectural Synthesis*
choreographic movement of camera in 3D model
Jungle Steps
Duration: 2 minutes 10 second
Screen Ratio: 1

This movie was originally inspired and adopted by M.C. Escher's Relativity.

Filmic Architecture: On Motion Perspective in an Architectural Synthesis
choreographic movement of camera in 3D model

PART I: Filmic Fantasies
Jungle Steps. 3D Model

Filmic Architecture: On Motion Perspective in an Architectural Synthesis
Introduction

Methodology

PART I Filmic Fantasies

PART II Filmic Analysis
   Represented Architecture in Film Media [4.1]
   Analysis of Moving Camera [4.2]
   Analysis of Film [4.3]
   Prototyped Camera Movement in Filmed Space [4.4]

PART III Filmic Synthesis

Final Cuts

Project Documents
Filmic Analysis

The next step of Filmic Analysis is to achieve a systematic pattern language of filmic form. The following step, Filmic Synthesis will be fully aided by the result of this research part. In order to gain the patterned knowledge of filmic expression, selected films are researched and summarized.

This analysis includes 4 major steps.

1. case study of represented architecture
2. definition of camera
3. analysis of film
4. patterning
Form Generating camera
Ca_01 - Ca_04: Main Camera (generated through the site analysis)
Ca_06 - Ca_11: Sub Camera (generated in the middle of synthesis)

Camera Types
Pa, Ti, TrD, TrP, CrD, CrP

Spatial Types
Stair, Layered(h/v), Linear, Tall, Broad, Bent

Spatial Program
required for the design project
Housing + Community Facilities

Sequence Description
(form the left) the initial form generator, camera types used for analysis and synthesis, spatial types and spatial program.
Each sequence has this diagram

Inserting
camera, space and program in the design process

Inserting sub cameras
When sub cameras are generated in the process, this will indicate the insertion of new cameras and location

PART II: Filmic Analysis
Represented Architecture in Motion Picture

Case study of Architectural Representation
Villa Savoye by Tim Benton, Open University, UK, 1975

Tim Benton in Open University, UK, produced several video clips, in which the buildings of Le Corbusier were taped for TV programs. In the initial step of filmic analysis, the comparative study of Le Corbusier's Villa Savoye and its representation by Tim Benton provides an opportunity to understand the manner of representing architecture in motion picture. This examination is mainly based on the relationship between the spatial configuration of the building and camera movement.

The video analysis accompanies the space study such as architectural promenade, which is the conspicuous formal character of this building. The re-interpretation of Le Corbusier's intention by this filmed building is useful to gain the formal knowledge of filmic expression.
Villa Savoye in Film Media

Case Scene #1

The sequence from the living room to the bedroom was taken with a series of pan shots, and tracking shots.

Case Scene #2

The sequence of Architectural Promenade, which connects the ground to the roof garden, was taken with a series of tracking shots (on a vehicle), hand held tracking, and tilt shots.
Moving images in film media should be analyzed with the understanding of camera working. For this reason, the adjusted camera movement from the film terminology is attempted.

In filmic terminology, camera movements are defined by moving methods. They are Change of Focus, Zoom, Stop Motion, Pan, Swish pan, Tilt, tracking, Dollying, trucking, and Movement on crane.

In this thesis, the component of moving camera is dissected to systematically analyze motion images with relation to camera moving track and target location.

Dissection of Camera Movement

The cameras consist of 4 basic elements

1. Camera
2. Camera view direction
3. Camera moving direction
4. Camera target

With those 4 components, camera movements are categorized by the following 6 movements.
This thesis will use and refine mainly four camera movements for filmic analysis and synthesis, regarding architectural representation.

1. **pan**: the camera moves laterally on its vertical axis to explore a setting.
2. **tilt**: the camera revolves vertically on its tripod head, causing an effect similar to that of the pan.
3. **tracking**: the camera is mounted on a support that moves along a rail.
4. **crane**: the camera is mounted on the end of a movable arm and can move vertically, horizontally or at an angle. 

The adjustment of camera movement definition in this thesis will be based on the relationship between camera shooting direction and target.

### Camera Movements Types

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B-1</th>
<th>Group B-2</th>
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<td><strong>Plan-Positional movement</strong></td>
<td><strong>Section-Positional movement</strong></td>
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<td><strong>CrtP</strong>:</td>
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<tr>
<td><strong>Tilt</strong>:</td>
<td><strong>TrB</strong>:</td>
<td><strong>Crb</strong>:</td>
</tr>
<tr>
<td><strong>Crane</strong>:</td>
<td><strong>Crm</strong>:</td>
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<td><strong>Tilt</strong></td>
<td><strong>Tracking</strong></td>
<td><strong>Crane</strong></td>
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<td><strong>Positional</strong></td>
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<td><strong>On</strong></td>
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<td></td>
</tr>
</tbody>
</table>

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3 This category was adopted from *Film: Space, time, Light and Sound* by Lincoln F. Jones, Holt, Rinehart and Winston.
[4.3] Analysis of film

A motion picture is made up of a series of shots. Each shot requires placing the camera in the best position, in which dramatic visualization of the story can be heightened. There are the patterned grammars of camera movement and cinematography. Based on this filmic language, the purpose of this section is to find the formal syntax of representing spaces, which structure human relations in film. Namely, this analysis will re-defined camera movement in terms of spatial configuration and systemize architectural representation method by motion pictures.

Film list:

The Battleship Potemkin by Sergei Eisenstein, 1925
Citizen Kane by Orson Welles, 1941
Rope, by Alfred Hitchcock, 1948
La Dolce Vita by Federico Fellini, 1960
Vertigo by Alfred Hitchcock, 1958
Psycho by Alfred Hitchcock, 1970
Le Corbusier’s Villa Savoye by Tim Benton, 1975
Rear Window, by Alfred Hitchcock, 1975
Playtime by Jacques Tati, 1973
Manhattan by Woody Allen, 1978
Le Corbusier: Maison La Roche by Tim Benton, 1980
The Shining by Stanley Kubrick, 1980
Nostalgia by Andrei Tarkovsky, 1983
Someone to Watch Over Me by Ridley Scott, 1988
Seven by David Fincher, 1997
Case #1
*Manhattan* by Woody Allen, 1978

<table>
<thead>
<tr>
<th>Analysis of Space and Camera</th>
<th>Spatial Summary</th>
<th>Camera Movement</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontally Layered Space</td>
<td>Horizontally Layered Space</td>
<td>TrP</td>
<td>A scene in museum</td>
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</tbody>
</table>

Related shots in other movies

*La Dolce Vita* / *Nostalgia* / *Seven*
Case #2
*Manhattan* by Woody Allen, 1978

<table>
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<th>Note</th>
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</thead>
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<tr>
<td>Bent Space</td>
<td>Pan</td>
<td>A scene in the corridor of a school</td>
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</table>

analysis of a scene in *Manhattan*

**Related shots in other movies**

*La Dolce Vita / Someone to Watch Over Me*
Case #3
Someone to Watch Over Me by Ridley Scott, 1988

sequence in Someone to Watch Over Me

<table>
<thead>
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<th>Analysis of space and camera</th>
<th>Spatial Type</th>
<th>Camera Movement</th>
<th>Note</th>
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<td>TrP</td>
<td>A scene in the Guggenheim museum</td>
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</table>

analysis of a scene in Someone to Watch Over Me

Related shots in other movies

Vertigo / Seven
Prototyped Camera Movements in Filmed Space

With a series of film investigation, a category is made by primary spaces and positions of moving camera. It is concluded that specific spaces can generate suitable camera movements to depict them in motion pictures. This result can offer basic rules, which can be used for setting up initial spaces and related camera movements in using animation as a design tool.

Prototyped Relationship Between Spatial Types and Camera

<table>
<thead>
<tr>
<th>space category</th>
<th>camera</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear space</td>
<td>TrD</td>
<td>Citizen Kane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nostalgia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Someone to Watch Over Me</td>
</tr>
<tr>
<td>Layered space (Horizontally / Vertically)</td>
<td>TrP / CrP</td>
<td>Citizen Kane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manhattan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rope</td>
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<td></td>
<td></td>
<td>Rear Window</td>
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<td>Nostalgia</td>
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<td></td>
<td>Someone to Watch Over Me</td>
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<td></td>
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<td>Seven</td>
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Filmic Architecture: On Motion Perspective in an Architectural Synthesis
<table>
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<tr>
<th>space category</th>
<th>camera</th>
<th>example</th>
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<tbody>
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<td>Stair</td>
<td>Ti +/-</td>
<td>Vertigo, La Dolce Vita, Battleship Potemkin, Psycho</td>
</tr>
<tr>
<td></td>
<td>CrD</td>
<td></td>
</tr>
<tr>
<td>Bent space</td>
<td>Pa</td>
<td>Someone to Watch Over Me, Manhattan, Vertigo, Nostalgia</td>
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<td>Broad Space</td>
<td>CrP</td>
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</tr>
<tr>
<td></td>
<td>TrD</td>
<td></td>
</tr>
<tr>
<td>Tall Space</td>
<td>Ti +</td>
<td>Someone to Watch over Me, Seven, Psycho</td>
</tr>
</tbody>
</table>

**PART II: Filmic Analysis**
montage of analyzed film scenes

Filmic Architecture: On Motion Perspective in an Architectural Synthesis
Introduction

Methodology

PART I Filmic Fantasies

PART II Filmic Analysis

PART III Filmic Synthesis

Site [5.1]
Program [5.2]
Site Analysis [5.3]
Site Planning [5.4]
Project Refinement [5.5]

Final Cuts

Project Documents
For the test of the methodology, the site should satisfy the following conditions:
1. Conspicuous landmark/scenery should be included
2. Various activities should happen around site

The chosen site, a block in East Boston has a long history of diverse ethnic resettlement and activities. Artist communities have been formed around this area, and residential districts are mixed with these diversities. Also, this area is oriented toward the downtown of Boston, taking it as a vista. In a filmic design process, this situation and location will aid the creation of various spaces implying events in their settings.