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## In praise of orthographic projections

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# In Praise of Orthographic Projections: Cinematic Plans, History and Application

## Abstract

### *Purpose / audience:*

This article presents a pedagogical insight for architectural and design educators that teach emerging cinematic and film-making practices. Due to its interdisciplinary nature and its practice-based methodology, this essay presents the research, pedagogy, and practice for educators in the field of architecture and spatial design as well as other creative disciplines such as film, animation and digital media.

### *Methodology / approach:*

The argument is substantiated by empirical observations and qualitative analysis of student filmmaking projects, firsthand experiments in a design studio environment. Direct observations made from experiments in a design studio environment in which more than fifty students were trained and numerous internationally awarded architectural films and animations were produced.

### *Findings:*

The research outcomes illustrate how orthographic projections, traditionally used as means of architectural representation, can operate as highly useful instruments in the process of designing narrative pieces of digital media, animation, and film about architectural projects. It demonstrates that using orthographic drawings such as plans, sections and axonometry in the production of architectural films and animations have numerous advantages, and storyboarding is a beneficial method only if it is utilized *after* or in *parallel* with cinematic two-dimensional projections such as plans or sections.

### *Implications for practice, society, or research:*

The essay puts forward a pragmatic multidisciplinary pedagogical approach that borrows traditional means of representation from one discipline for use in another. The pedagogical approach has the potential to have implications on the discourse, practice, and pedagogy of the emerging common ground between architecture, spatial design principles, digital media and filmmaking.

### *Originality / Value:*

This research challenges the prioritized position of storyboarding among architectural educators teaching animated means of representation and argues that, despite its utility for specific tasks, storyboarding cannot replace other architectural means of spatial representation. The essay argues for the significance of the traditional orthographic drawing techniques such as plans and sections in the process of designing film and animations and posits that sections and plans can be the best practical modes of visualization to produce architectural digital narrative media such as film, animation and narrative VR experiences.

## Introduction

Soon after the introduction of cinema as a new, animate medium of visualising space, the moving image became the subject of sustained interest by architects, architectural educators, and theorists. In recent years, leading schools of architecture established subjects on filmmaking and digital narrative media. Post-graduate degrees focusing on time-based media were devised and teaching film and animation in parallel with other narrative digital practices such as virtual reality gained a place in the curriculum of several architecture schools around the globe and ‘film and architecture’ began its existence as an ‘established field’ within the discipline of architecture (Penz 2013: ix) (Schöning, Löffler, and Azevedo 2009: 7).

The trend of teaching film to architecture students is observable in many architecture schools including filmmaking studios such as Unit 3 and Diploma Unit 16 at the Architecture Association (AA), the Cinematic Commons studios at the University of Leeds and CineArch at Queen's University Belfast. There are even architecture schools that offered postgraduate programs in filmmaking and digital media such as the Cinematic and Videogame Architecture at the University College London (UCL) and the Masters of Architecture and the Moving Image previously taught at the University of Cambridge.

Amongst the diverse tools and techniques that filmmakers have devised to design their shots, scenes and films, storyboarding is one of the most popular techniques adopted and commonly celebrated by architectural educators in filmmaking design studios (Durham 2022; Türeli 2021; Wahid and Atmodiwirjo 2018; Cairns 2012; Layden 2011; Aroztegui and Solovyova 2011; Davids 1999). Architecture students are prevalently encouraged to ‘go beyond sections and plans’ and the representational conventions of the discipline have been sidelined by the enthusiasm driven by three-dimensional images of storyboards (Durham 2022). This venerated and accessible technique of storyboarding is borrowed from cinema and deemed ‘essential’ for the production of architectural animations (Anandan, Yoon and Uddin, 2006: 200).

The popularisation of storyboards and, at the same time, the apparent deviation from orthographic drawings like plans and sections are not limited to the exercises of filmmaking within the framework of architectural education. This phenomenon is best understood by looking at the contemporary discourse within the discipline of architecture. During the past two decades, the historical prioritization of orthographic drawings, particularly plans, as a design tool has been contested by theorists. For instance, architect and educator Michael Young contends that privileging a category of drawings that requires ‘training’ to be ‘properly interpreted’ undermines the establishment of a lingua franca that architects can share with other realms of knowledge (Young 2022: 5). Drawing upon the theories of the philosopher Jacques Ranciere, he posits that ‘disciplinary conventions’ constitute certain values, evaluation frameworks and ‘problematic assumptions’ (Young 2022: 5). In his view, orthographic thinking forces architects ‘to see the world in a particular way, to understand the value of their labour in specific ways, to construct arguments through the qualities and attributes of these representations, and to address specific audiences’ (Young 2022: 5). Despite the advantages of a unique vantagepoint, advancements in the digital means of representation initiated questions about the primacy of the plan. Theorist and educator Brian Edwards recognises the ‘hybridization of rendering styles’ as the main cause of the ‘relative decline of the plan’ (Edwards 2008: 68). It appears that the ‘utopic virtuality of 3D rendered’ images inflicted a challenge on the idea that the plan can function as a design generator (Banou 2017: 21). Architectural educators such as Sophia Banou and Mario Carpo argue that the emphasis upon moving and static ‘digital perspectives’ and the ‘language of simulation’ sidetracks architects from the ‘conventional tradition of orthographic drawings’ (Banou 2017: 20) (Carpo 2011: 9).

The ease in which moving images can be produced seems to play a role in the challenges posed to the prime disciplinary position of the plan as well. Some studies suggest that architects' reliance on the plan belongs to an era ‘prior to computerized animations’ in which the digital moving image did not exist to bestow ‘architectural objects with life’ (Al-Saati, Botta, and Woodbury 2011:3)

(Ng, Schnabel, and Kvan, Thomas 2006: 598). In a widespread theoretical framework in which three-dimensional digital images have the upper hand, it is predictable that a so-called dry and flat orthographic drawing will not be the preferred mode of visualisation in the process of designing a film.

This essay challenges the assumption about the usefulness of storyboarding to produce moving image narratives in the context of architectural education. The article argues that floor plans and sections are not only highly practical modes of representation but can also function as effective design and pedagogical tools for architectural educators who deal with the production of moving images and time-based narrative media. Building upon empirical observations of filmmaking projects and firsthand experiments in a design studio environment, along with the help of a brief analysis of the plan, this article presents how orthographic projections can operate as highly useful instruments in the process of designing films and animations about architecture. In addition, the essay discloses the ways in which the use of plans, sections and other forms of orthographic drawings facilitate the experience of teaching filmmaking techniques and the whole process of film design in a broader sense.

### **The Plan in Cinema and Filmmaking**

As it is often claimed, architects do not create buildings, they make representations and instructions for the construction of buildings. The relationship between architectural design and the final built work is always a mediated one, with architects translating their ideas into different types of images, maps, drawings, sections, and, perhaps the most significant architectural orthographic projection, the plan. According to classical definitions, a plan is an orthogonal projection made by a horizontal cut through an object, building, or space, typically directed downward and parallel to the ground. Other types of ‘overhead’ views such as reflected ceiling plans, figure-ground plans, construction plans, and roof

plans are categorically considered a species of plan and do not occupy a less crucial place in the history of architecture (Zell 2008: 54).

The use of plans, however, is not limited to the discipline of architecture. Among filmmakers, there is an inherent tendency toward diagramming a scene and its actions through floor plan-like drawings. Like architects, filmmakers draw ‘cinematic plans’ (also known as over-head scene views in the film industry). There are various methods of drawing a cinematic plan for discrete aspects of filmmaking such as camera staging, scene blocking (or *mise-en-scene*) and the movement of characters. As with architecture, the cinematic plans function, as the Swiss architect Le Corbusier termed it, as a ‘generator’; showcasing how spaces look, the manner in which the camera and actors move and the interactions between human bodies and filming sets (Le Corbusier [1923] 1986: 180). While architectural plans unveil the form of a space that will be occupied by people and their activities, cinematic plans reflect the space from the top view, as architectural plans do, but are meant to indicate the actions of the camera and actors in the space as well.

There are several examples of filmmakers who draw cinematic plans. For example, the meticulous cinematic plans and sketches drawn by Alfred Hitchcock are well-documented in varied sources (Jacobs 2007: 12-27). Amongst contemporary filmmakers, the acclaimed Mexican filmmaker Carlos Reygadas considers floorplans as an inseparable part of his visually complex cinema. His hand drawings and sketches elucidate his strategy of designing camera movements through scrupulously detailed cinematic plans (Reygadas 2016: 20-35).

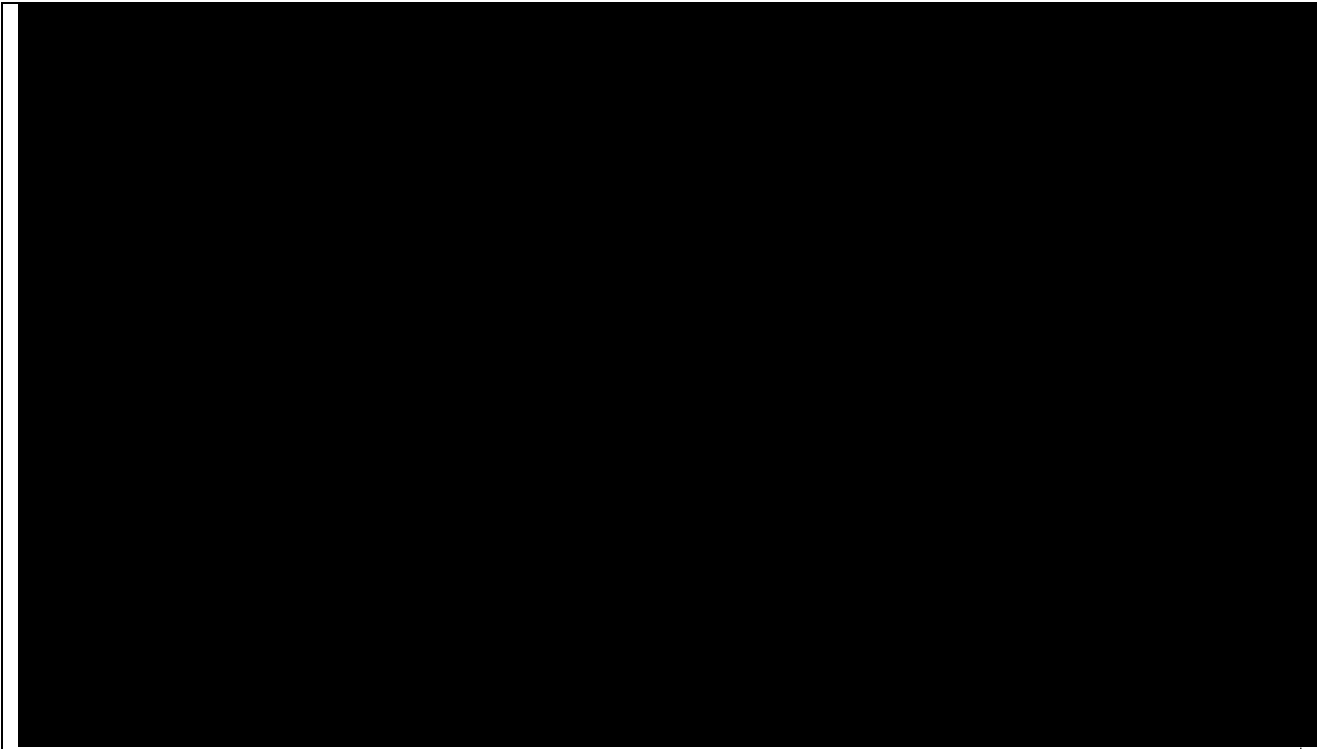


Figure 1: Cinematic plan for Luz (2016) by filmmaker Carlos Reygadas.

In an interview, Reygadas states that his process of filmmaking resembles exactly what an architect does as he draws ‘detailed blueprints’ of every scene (Criterion Collection). He emphasizes that ‘the more you draw the better you can improvise’ (Criterion Collection). In the way the interview is edited it seems that what Reygadas is referring to as ‘blueprints’ is a combination of both plan and storyboard-like drawings. However, the abundant use of diverse types of cinematic plans and sections unveiled in the book *Luz*, a collection of Reygadas’ sketches, illustrates that the drawings, particularly plans, take precedence over storyboards in his filmmaking process.

Werner Herzog called storyboards ‘the instruments of the cowards’ and when asked about storyboards, Bela Tarr bluntly snapped: ‘I hate them, they [storyboards] don’t belong to the language of cinema’ (Weintraub 2016) (Amouzad Khalili 2020: 178). Both Tarr and Herzog have mentioned that cinematic plans were used in the course of designing their *mise-en-scenes*. The contemporary cinematographer Fred Klemen acknowledges that cinematic plans were utilized in designing the convoluted choreography of camera movements and actors in the influential film *The Turin Horse*

(2011) directed by Bela Tarr. He remarks the camera movements were designed using top-view drawings which were ‘like [an] architect’s floor plan, with lines for the movements of the actors and camera’ (Koehler 2011).

The film industry has pre-set software packages and online platforms such as Pixel Liberation Front, allegedly used by filmmaker David Fincher for *The Panic Room* (2002). Programs like Frame Forge 3D Studio and Zebra Development assist filmmakers in digitally drawing cinematic floor plans with a considerable level of precision. These software packages and websites enable filmmakers to see the potential visual result of a specific change in the floor plan and camera staging. Apart from the possibility of modifications in the position and angle of the camera on a virtual set, the applications allow for the adjustment of technical inputs such as the focal length of a camera to generate highly accurate frames that look like the final product of a specific *mise-en-scene*. Nevertheless, for filmmakers, the architectural drawing technique of the plan enables more possibilities than simply designing the architecture of moving images. Cinematic plans perform as analytical and pedagogical tools for filmmakers as well.

A plan view of the “blocking” of a scene which includes a camera, actors, and the space of a scene, is, traditionally, one of the first images filmmaking students become familiar with (Proferes 2008: 12) (Monaco 2009: 81). Top-view drawings help filmmakers to communicate the spatial organisation of a scene in a legible way by depicting spatial relations, directions, proportions and, at the same time, the geometry of spatial elements, and their interaction with actors. Film theorist Steven Katz encourages filmmakers to draw floor plans and suggests that this ‘non-camera view’ assists filmmakers to ‘discover new ways of thinking about how a scene might be staged’. A cinematic plan, in Katz’s view, is the only tool that uniquely enables filmmakers to see a space in which the camera will move and ‘simultaneously see the space the camera will view’ (Katz 204: 1991). Similarly, cinema educator and filmmaker Michael Rabiger advocates the use of ‘floor plan sketches’ to ‘re-create what a whole room or location layout looks like, record how the characters move around and decide how



the camera is placed' (Rabiger 74: 2008). He suggests that a cinematic plan is the only tool that can disclose 'how little of an environment needs to be shown for the audience to create the rest in their imaginations' (Rabiger 74: 2008).

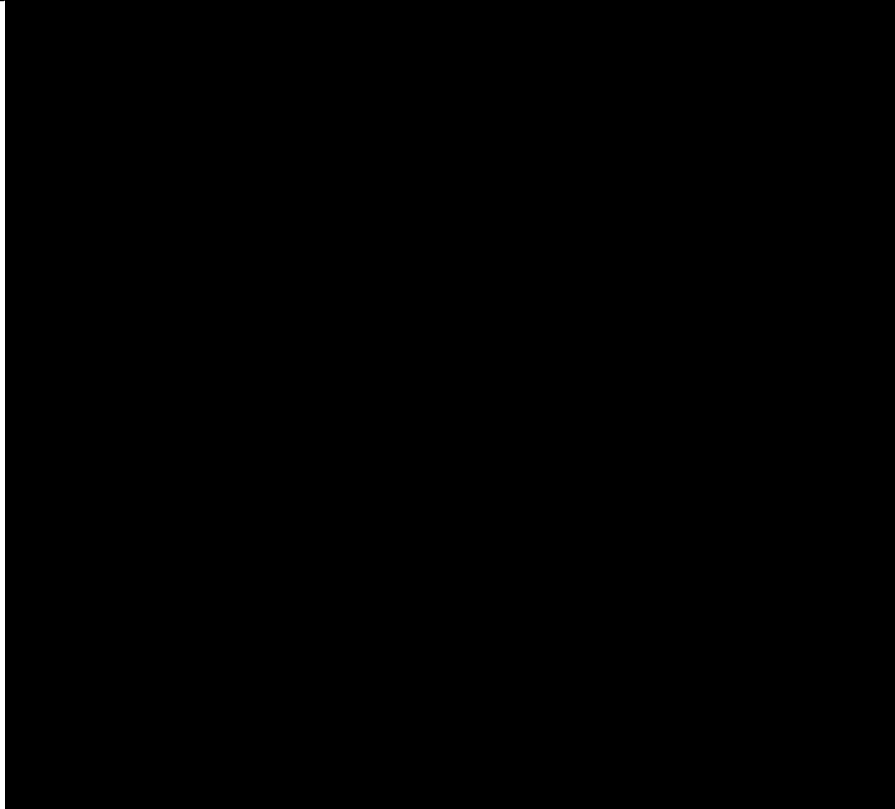
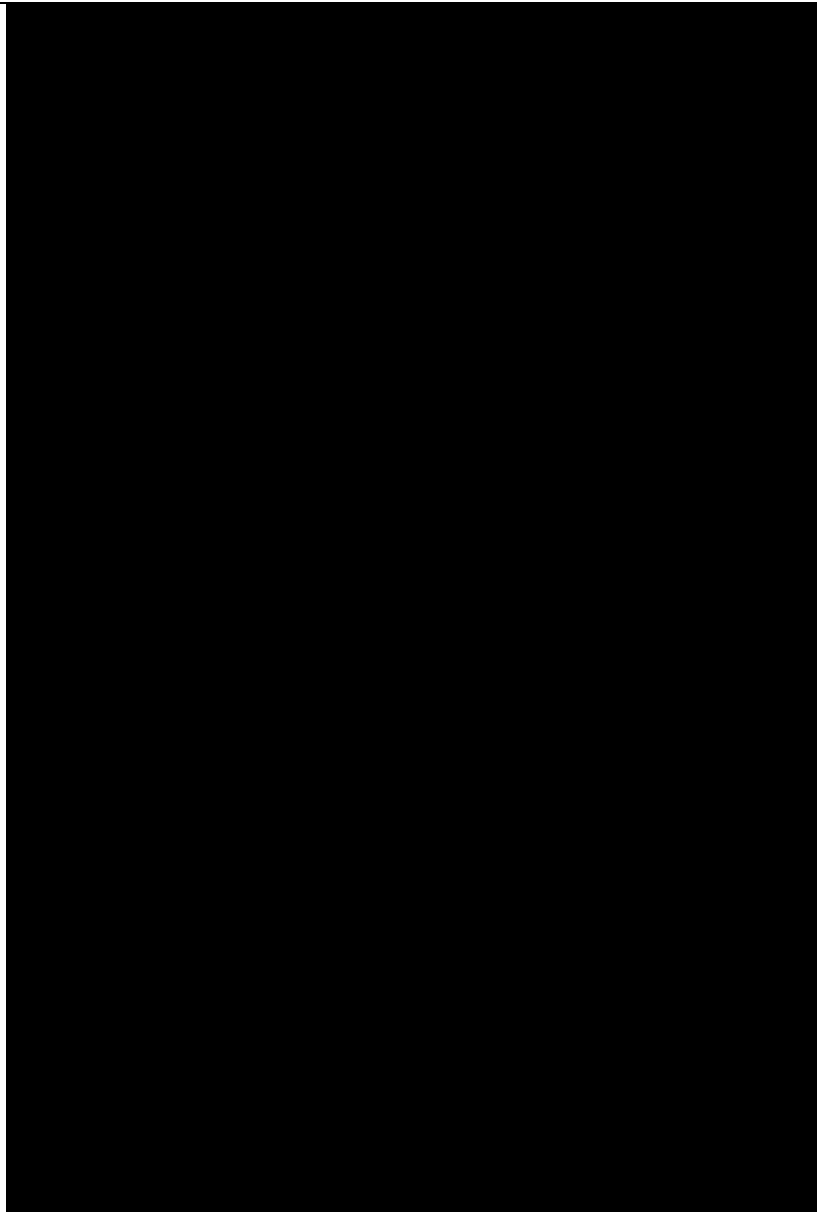


Figure 2: Cinematic plan by Nicholas Proferes of Alfred Hitchcock's *Notorious* (1946).

Cinematic plans are commonly employed for analytical purposes as well. The prominent film theorist and director Andre Bazin drew one of the first analytical cinematic plans to explain the camera movements of a scene in *The Crime of Monsieur Lange* (1936) directed by Jean Renoir (Figure 3). This plan depicts Renoir's complex camera movements as well as the arrangement of the thresholds and boundaries of the scene. By drawing the cinematic plan, Bazin's intention, as he put it, is to expose the sophistication of the camera choreography. He argued that the extent of the complexity of the scene could not be appreciated by film critics solely by watching it on the screen. He believed that the 'spatial ideas' behind a complex scene could only be disclosed through a cinematic plan (Bazin 1987: 19). As a filmmaker obsessed with 'spatial reality', Bazin proposed that the 'inherent rigor' of a complex scene

can become fathomable only if one draws its cinematic plan (Bazin 1987: 19) (Bazin 1992: 74). He does not regard the cinematic plan as supplementary material to the scene. Rather, he emphasizes that the cinematic plan is necessary for understanding the scene and appreciating Renoir's cinematic dexterity. Bazin benefits from the accuracy and legibility of the cinematic plan to decode and demystify the complicated construction of the filmic image.



*Figure 3: The cinematic floor plan by Andre Bazin for The Crime of Monsieur Lange (1936).*

## **Eisenstein, Cullen and Cinematic Plans Drawn by Architects**

A cinematic plan is a top-view drawing that incorporates three elements: the geometric form and the layout of a space, a camera (or observer) indicating the direction and range of viewing, and a path that shows the camera's movement. Within the history of architecture, the existence of a cinematic plan can be traced to two significant figures: the eminent film director, editor and cinema theorist Sergei Eisenstein, who was trained as an architect at the Petrograd Institute, and the urban theorist Gordon Cullen.

In his influential essay 'Montage and Architecture' (c. 1938), Eisenstein contends that the most effective way of filming architecture is to conceive it through the point of view of a 'mobile spectator' (Eisenstein, Bois, and Glenny 1989: 118). In order to explicate his contention, Eisenstein takes his audience on a peripatetic journey through the Acropolis of Athens. The journey through the Acropolis is explained with the help of a set of drawings that are reminiscent of filmmakers' cinematic plans. The drawings taken from *Histoire de l'Architecture* (1889) written by the historian August Choisy function in the same way as cinematic plans for filmmakers as they provide a more lucid understanding of the site by indicating the location of the viewer. The cinematic plans show how the viewer moves on the site, and illustrates the range of the viewer's field of vision, and the direction of his/her gaze.

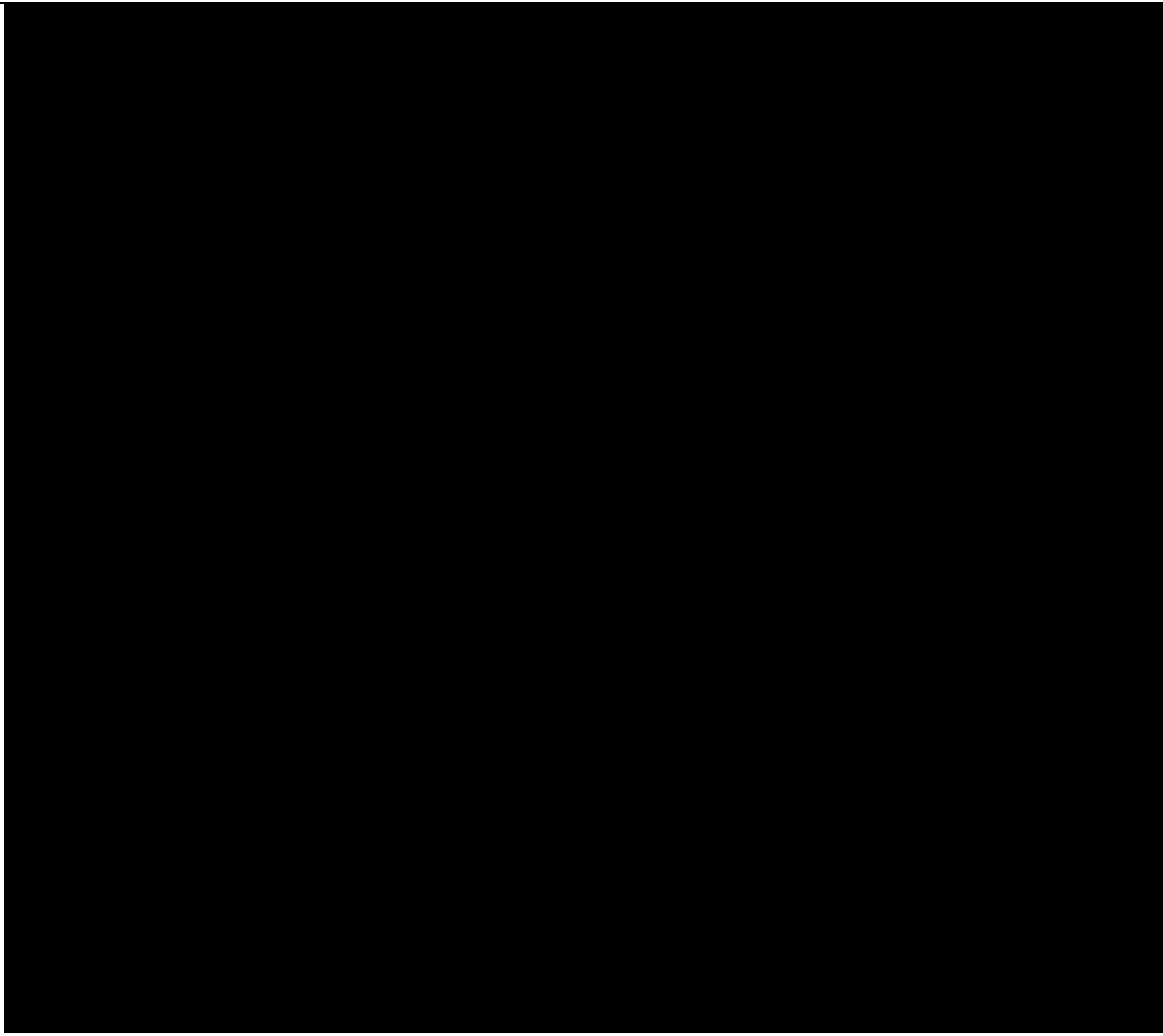
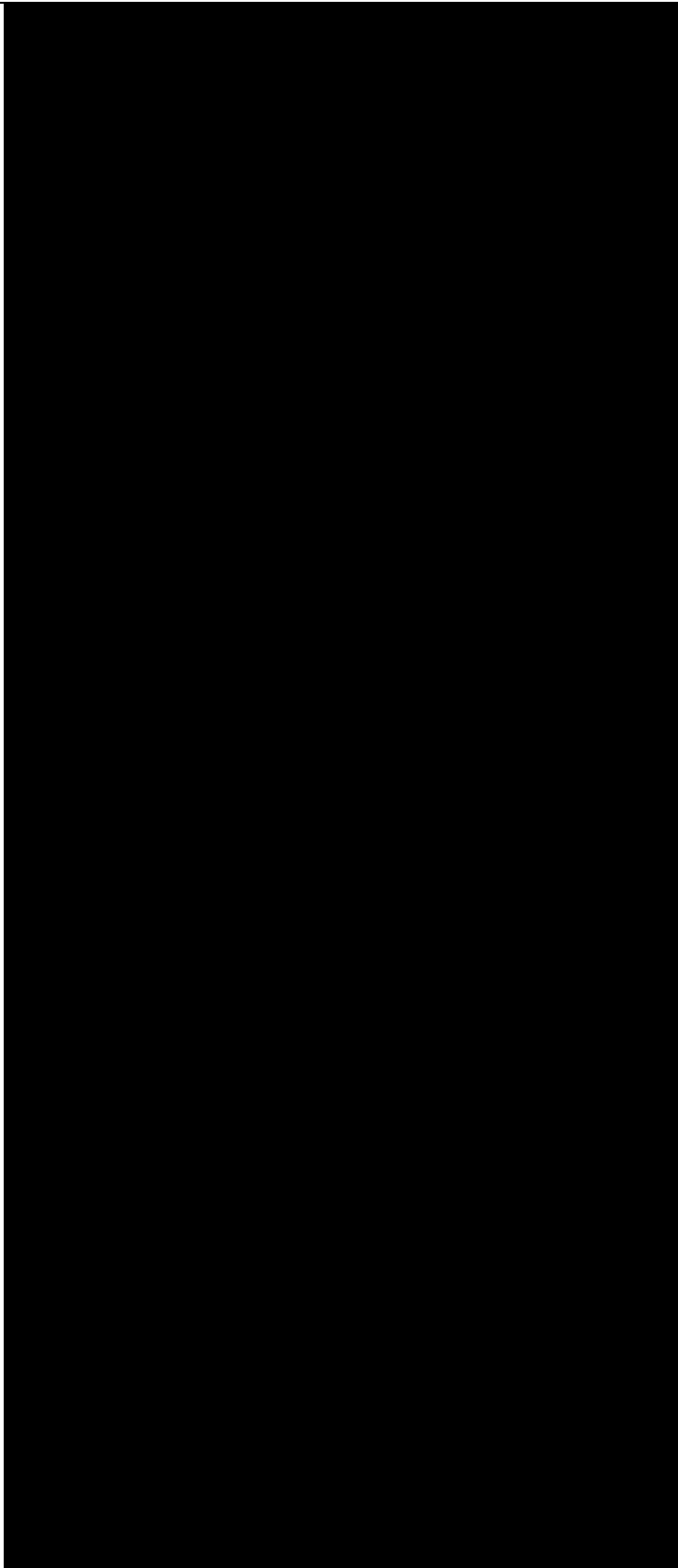


Figure 4: Plans and perspectival views by Auguste Choisy, used in 'Montage and Architecture' (1938) by Sergei Eisenstein.

Years later, Gordon Cullen published *The Concise Townscape* (1961), a text in which, similar to Eisenstein, benefited from the use of floorplans to explain his storyboards (perspectival views) and his newly coined term 'serial vision' (Cullen 1971: 6). Cullen drew plans to show the 'position', movement, and direction of the gaze of a spectator. His plans were meant to accompany a sequence of views demonstrating what a spectator sees in every point of progression through the space of the urban townscape.



*Figure 5: Plans and views from Cullen's The Concise Townscape (1961).*

For Cullen, the ‘position’ of a spectator within a space is a crucial factor and he resorts to the floor plans to visualize it. Comparing the experiences of ‘a man on the edge of a cliff’ and ‘a man at the end of a deep cave’, he stresses the importance of ‘the sense of position’ and, further emphasizes why it is vital to show the location of the observer on a plan (Cullen 1971: 10). In other words, he finds the plans and the marked position of a moving spectator as elements that are inevitable. He implies that plans are central to the reading of the array of perspectives.

Although he labels floorplans as ‘incomplete’ suggesting that perspectival views ‘bring a plan to life (like nudging a man who is going to sleep in church)’, the way he laid out the perspectives and plans as inescapable components of the same representational system demonstrates that he understands storyboards are incomplete without the plans. Cullen admits the foundational role of the plan by stating that the slightest alteration of the position/direction of a spectator on a plan ‘will have a disproportionately powerful effect in the third dimension’ in storyboards (Cullen 1971: 17).

The storyboard-plan schism can be comprehended by referring to the way in which the Roman architect Vitruvius distinguished the notions of ‘*orthographia*’ and ‘*scenographia*’ (Rowland and Noble Howe 2014: 25) For him *orthographia* — which can be considered as the equivalent of cinematic plan — and *scenographia* (storyboards) fulfil two discrete and somewhat contradictory objectives. *Orthographia* deals with ‘metrics’ and accuracy while *scenographia* relates to ‘appearances’ and ‘depth’ (Young 2022: 5); *Orthographia* is invented as a tool to serve thinking, method of making and process while *scenographia* possesses pictorial qualities.

The idea that perspectival images, produced ‘only for an instant, at a given moment’, visualize a deceptive ‘false’ view of reality stems from the theories of the post-modern philosopher Gilles Deleuze (Deleuze and Guattari [1988] 2013: 289). Young explains how the discipline of architecture tends to naturally succumb to this theory of the falsity of perspectival representations. He compellingly explicates that architects historically regard perspectival renderings and 3D images as ‘extra-

disciplinary’, ‘potentially unethical in their visual seduction’ and ‘false copies of reality’ (Young 2022: 5). Whereas orthographic images are seen as defensive disciplinary position in response to seductive perspectival images, a defensive position that is ‘epistemologically grounded and ethically honest (Young 2022: 5). Young’s explanation is even applicable and relevant in an interdisciplinary context where orthographic drawings can demystify the complexities of another discipline such as cinema.

By planning scenes and shots through a plan or section entailing the position of a camera and the layout of a space, a designer endeavours to imagine how a specific spatial condition, as a process shown on a plan, results in a cinematic image. In contrast, when a designer creates a storyboard, they rely on imagining a final product, such as a shot in the way it will be seen on screen, without considering the process that might lead to the shot. The difference between storyboarding and designing through orthographic drawing is the difference between designing the process that leads to a specific product and designing by applying modifications to the product itself. Shots are the final products that are going to be seen on the screen and drawings such as cinematic plans reflect the processes through which a shot (product) can be produced. Therefore, starting with a cinematic plan is an attempt to generate a product (a shot) by controlling its generative process.

The analytical capacity of plans is not only underscored by filmmakers such as Bazin, but it is also well noted by architectural theorists and educators. Architect and educator Simon Unwin posits that the plan is the ‘most appropriate medium for analysis’ in which ‘spatial ideas’ are most clearly apparent (Unwin 2009a: 10, 24) (Unwin 2015c: 1). Like Unwin, Edwards argues that the role of a plan is imperative not due to its representational potential to communicate ‘spatial or formal possibilities’ but because it can reflect design ‘intentions’ and provide the ‘clue to power and order’ (Edwards 2006: 12-13). Unwin suggests that by the virtue of the analytical potential of a plan it should ‘take precedence’ over any other analytical tool (Unwin 2009a: 24). He remarks that ‘one learns a lot more about, for example, the Villa Savoye or the Barcelona Pavilion by drawing its plans and sections than just by looking at them or visiting the buildings’ (Unwin 2015c: 1).

A study conducted on a series of structured interviews with practising architects elucidates that storyboards can have ‘misleading’ effects in the production of architectural animations (Eshagh 1998: 30). The research, an early survey about walkthrough and fly-through animations, examines the effectiveness of storyboarding in the production of the animations. Based on the survey responses from a large group of architects, the study concludes that a ‘fixed storyboard often does not give the exact camera viewpoint’, the storyboard shots ‘do not appear the same in the computer-animated sequence’, ‘clients do not understand and cannot imagine these sketches in relation to the animation’ and the ‘inaccuracy may prolong the time spent in the overall production process’ (Eshagh 1998: 210-228). The investigation divulges that the questions we raise about storyboards is an enduring one.

Premised upon these theoretical and historical lessons, the article presents the creation of a filmmaking design studio for architecture students to test the potential of cinematic plans. The objective was to structure a studio that, unlike other filmmaking studios in architecture schools, does not rely on storyboarding. Instead, the studio was programmed with an emphasis on designing through cinematic plans.

### **Architectural Film Design Studio; Cinematic Plans in Action**

The design studio was taught for three consecutive years in the Master of Architecture program at the University of Melbourne, where more than fifty students were trained in the studio and several award-winning films and animations were produced. The design studio subject took place over a twelve-week semester in which graduate students were equipped with fundamental architectural knowledge from their Bachelor of Architecture coursework but did not have any professional or amateur filmmaking and animation experience. Key learning outcomes included empowering students to use the medium of film in a confident and independent manner and for students to learn how the architectural skills they already possess can be turned into practical tools for designing films and cinematic storytelling. Another intended learning outcome was to have students foster their own space-



oriented filmmaking method based on the minimal filmmaking knowledge and skills introduced to them.

Students were required to submit a series of four different assessments which built upon each other. Every two weeks students submitted a short film exercise focused on a specific cinematic lesson to be employed in the final project. Such filmmaking skills included cinematography, scale, montage, editing, composition, and spatial narrative. These exercises were to be documented in a film-architecture diary, which was one of the four assessments. Students experimented with varied tools, techniques, and methods but cinematic plans operated as a prime component of the film design process. A third assessment was the creation of an architectural video-essay. Students selected an analytical, historical, socio-political or aesthetic argument approach to the video-essay. With this project, students could decide to pose an argument, underscore an issue, observe an unnoticed, curious or intriguing phenomenon, or critique something using visual evidence. The final film assignment brought together all of the filmic aspects learned throughout the semester, with students choosing the type of time-based narrative medium such as film, animation, virtual reality (VR), or augmented reality (AR). Here students curate a time-based narrative using diagrams, plans, section, models and analytical drawings. They also select a category of narrative style, such as an analytical work, atmospheric, poetic, thematic, conceptual or speculative. Many of these aspects are qualitative and therefore, in addition to subject rubrics listing the grading criteria, invited academic guests viewed and commented upon the work in pin-ups and final critique forum throughout the semester so that students were provided feedback from multiple scholars and their assessments were moderated. The assignment rubrics were broken down into multiple technical cinematic skills and analytical aspects including: sound design/editing, *mise-en-scene*, colour, tone, texture and sharpness, editing, rhythm and temporality as well as framing, composition, camera movement, exposure. The findings of this approach to design studio revealed three key insights to the incremental use of orthographic drawings – directionality, camera choreography, and design generation.

## **Directionality, cinematic sections and cinematic axonometry**

Directionality in film was one of the intricate notions that necessitated the existence of a visual two-dimensional orthographic — and not perspectival — design tool such as a cinematic plan. The direction of movement and viewing (gaze) are two types of directionality that have always been one of the obsessions of filmmakers and even led to specific cinematic rules such as the 180-degree rule.

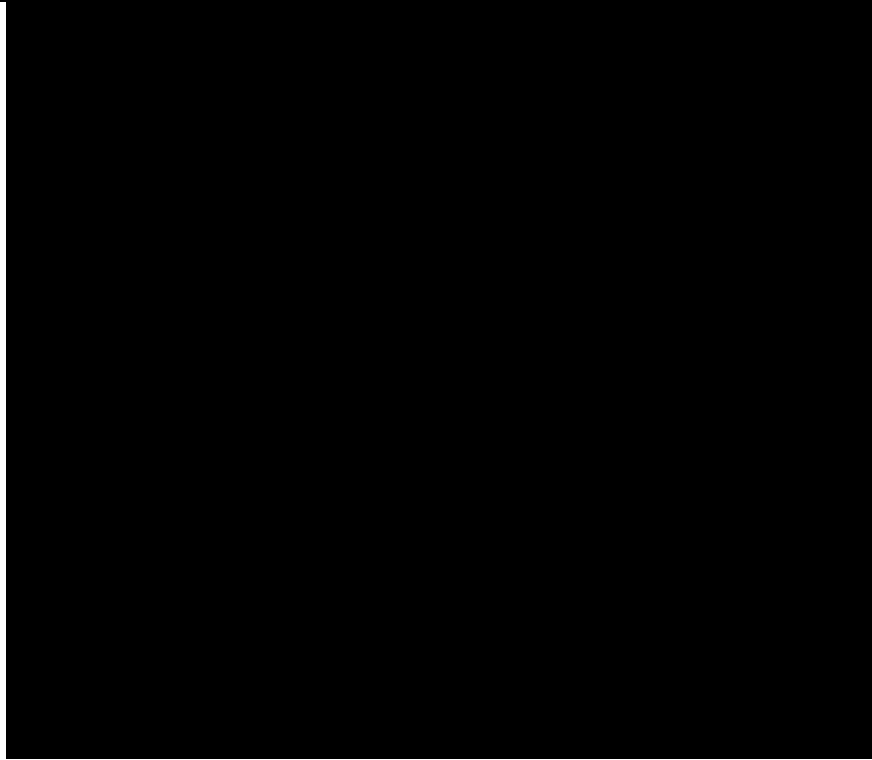
Columbia University Film Language Glossary defines 180-degree rule as a film grammar convention of ‘shooting and editing that keeps the camera on one side of the axis of action’ (Film glossary). This rule allows for a seamless connection between the screen and off-screen space. Producing a seamless transition between the shots through correct handling of the 180-degree rule, was only possible to teach through sketching on cinematic plans. In the student films *The Road Not Taken*, *Re-flect*, *Princes Pier* and *A Visit to The Shrine of Remembrance*, the 180-degree rule and the spatial organization of the journey of the characters were sketched on plans. (See Appendix for video links for *The Road Not Taken*, *Princes Pier*, and *A Visit to The Shrine of Remembrance*)



*Figure 6: A cinematic plan showing the overall camera staging and spatial narrative of a short film (one of the studio exercises) by Yu Chie Tseng.*



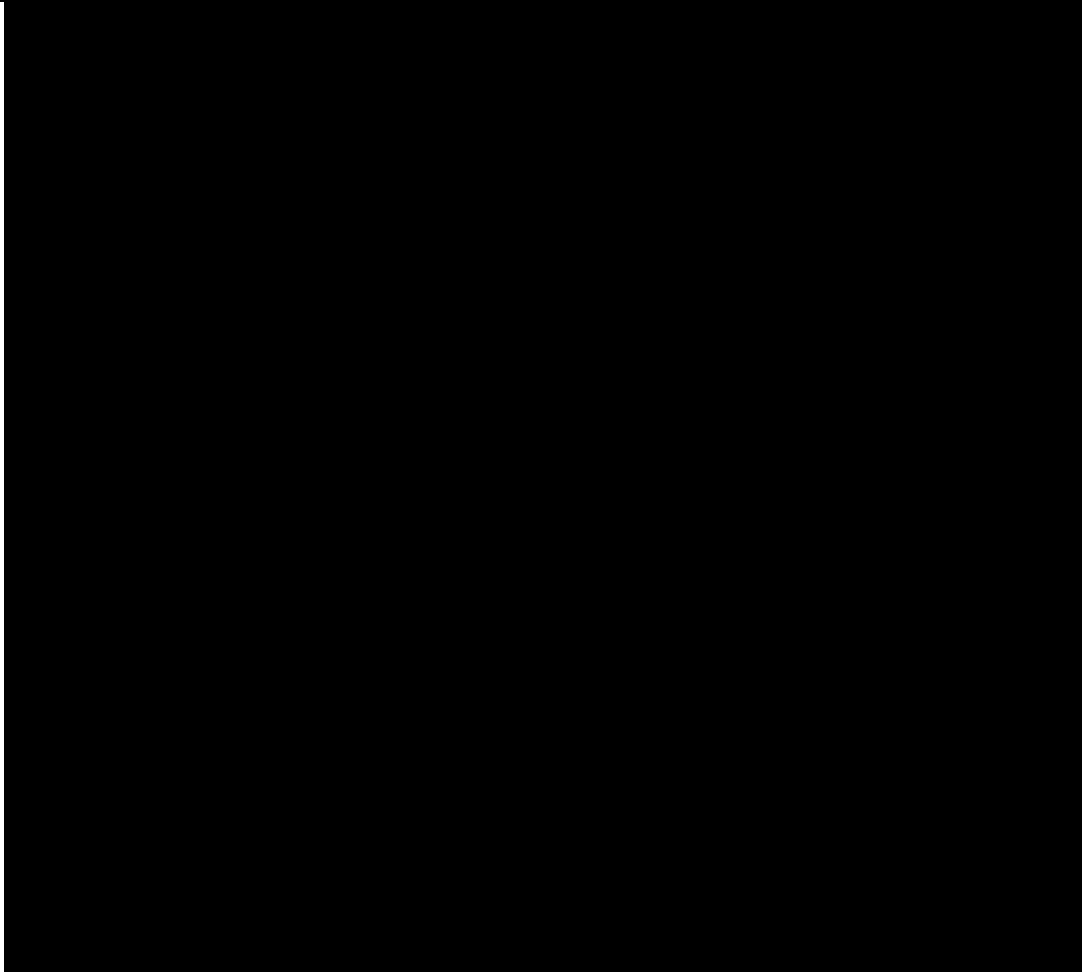
*Figure 7: A cinematic plan showing the overall camera staging and spatial narrative of a short film (one of the studio exercises) by Hao Lin.*



*Figure 8: Cinematic plans used for designing direction at Federation Square, Melbourne. By Song Chen.*

### **Camera choreography: Learning from Film-makers and Architects**

Camera choreography, another crucial filmmaking skill, was taught through cinematic plans. Students discovered that the camera movement design was more challenging when the camera movements needed to respond to the motion of a character. Precedent studies and the analysis of camera movements by other filmmakers using longer takes and wandering camera works became the most efficient way to teach camera movement design. Most importantly, the intricacies of camera movements with complex changes in choreographies were translated into lines on a two-dimensional cinematic plan.



*Figure 9: A precedent study of a scene in Paterson (2016) directed by Jim Jarmusch. Cinematic plan and axonometric drawing by Alice Woods.*

After completing short exercises in precedent studies and camera movement, students were assigned to make short films with Gimbals and Steadicams in which camera movements were to be designed on a plan first. Although the movements designed on plans were not reliable unless tested through shots, the movements were smoother when they were drawn as arrows showing the direction and the path of a movement on a plan at the first stage.

After testing the camera movements through filming, the movements were revised on plans and, then re-filmed. The iterative process of sketching the movement on a plan and testing it in a preliminary filming test made a notable, qualitative contribution to the production of fluid camera movements. Studies on architectural animations demonstrated that one of the common challenges that

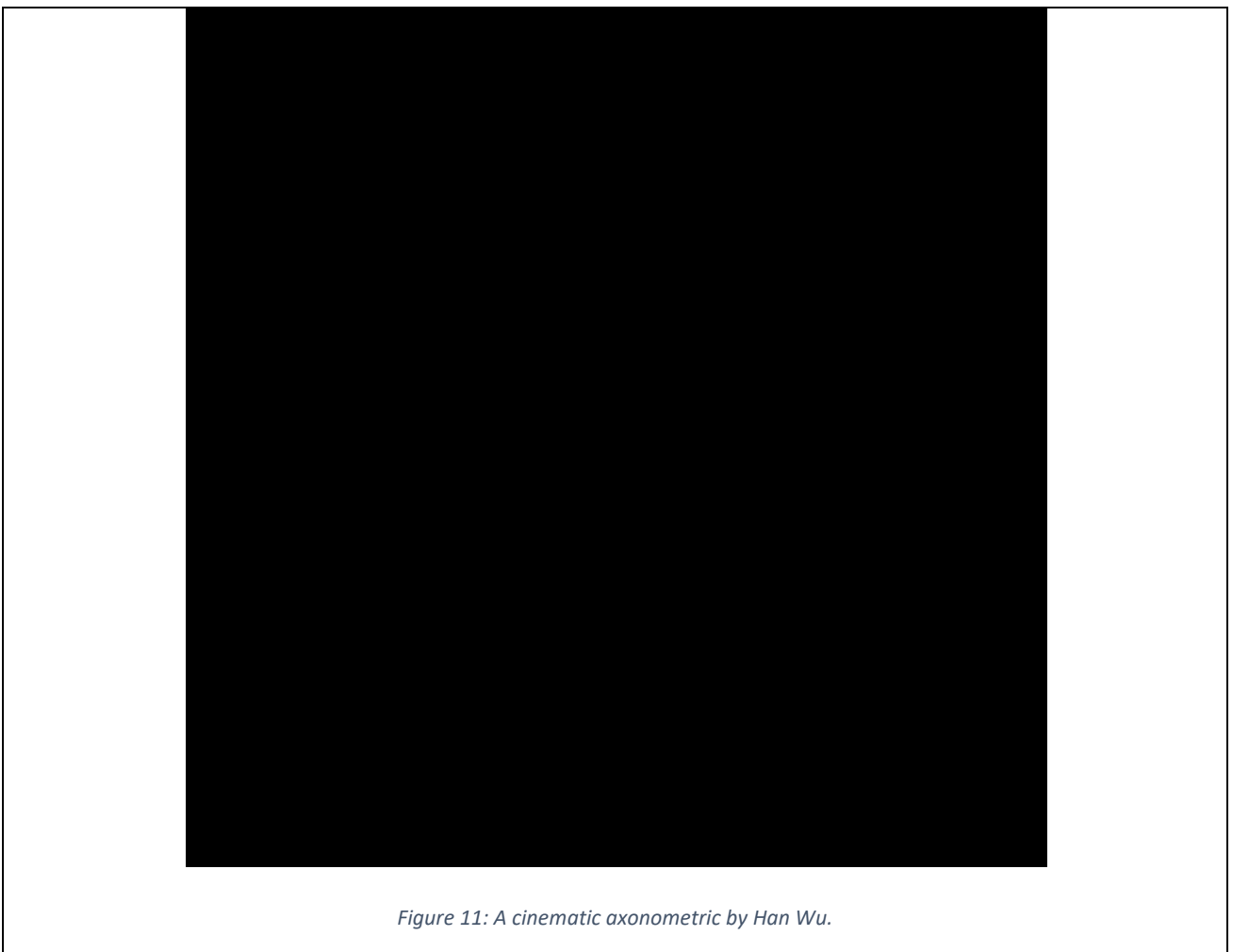
architects face is to achieve ‘smooth’ and ‘continuous’ camera movements in architectural animations (Al-Saati, Botta, and Woodbury 2011: 643). In the studio, cinematic plans made a notable contribution to the improvement of the fluency of camera movements.

As cinematic plans are not able to convey how a camera might fly and dive at different heights and vertical angles, students employed cinematic sections and axonometric drawings. From a technical point of view, the drawings, called cinematic sections here, are in some cases elevations. Nevertheless, as the architectural technicality of the drawings is not a concern, the umbrella term ‘section’ is given to drawings that depict a spatial situation from a lateral view. The functionality of the section does not solely lie in the ‘vertical calibration of spaces’ (Lewis, Tsurumaki, and Lewis 2016: 8). In the studio, it was observed that a section offers various ‘heuristic’, ‘narrative’, and ‘programmatic’ possibilities as it not only unveils relationships that are not ‘directly perceivable by the human eye’; it is a reliable ‘point of comparison’ and ‘manifests the effects of the plan’ (Lewis, Tsurumaki, and Lewis 2016: 7, 12). Edwards argues that the countless ‘invisible relationships’ between a plan (top view) and section (side views) provide an enriched and instructive ‘source of ideas’ (Edwards 2006: 20).

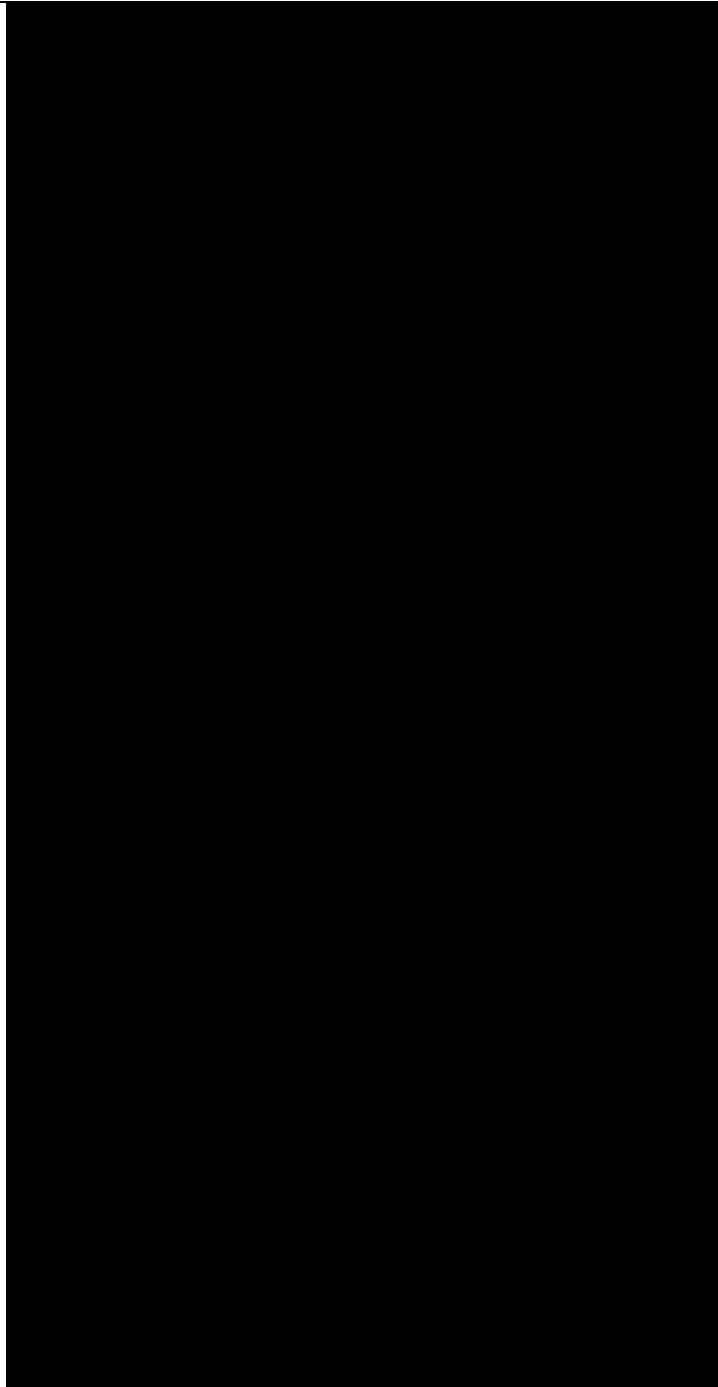
Students were instructed to test every camera movement on both the plan and section multiple times. The constant alteration of perspective from horizontal (plan) to vertical (section) is charged with potential and tension and was treated as a design opportunity. The change in the point of view allowed students to scrutinize the projects on both vertical and horizontal planes. Student directors of *Archway; Odysseys’ Enigma*, *The Window* and *Urban Below* employed a combination of cinematic plan, section and axonometric drawing. While plans were used as the paramount ‘locus of design agency’, vertical camera manoeuvres were sketched on sections, and axonometric drawings were utilized for more complex movements entailing both vertical and horizontal moves plan (Lewis, Tsurumaki, and Lewis 2016: 7).



*Figure 10: A cinematic axonometric by Marissa Wong.*



*Figure 11: A cinematic axonometric by Han Wu.*



*Figure 12: Cinematic section Jia Pin for the film The Window.*

Cinematic orthographic drawings were useful in dealing with complexities at two levels. First, cinematic plans contributed to the planning of the physical sequence of a shot (from where to where) based on what it captures at different phases (beginning, end and middle of the route). Cinematic

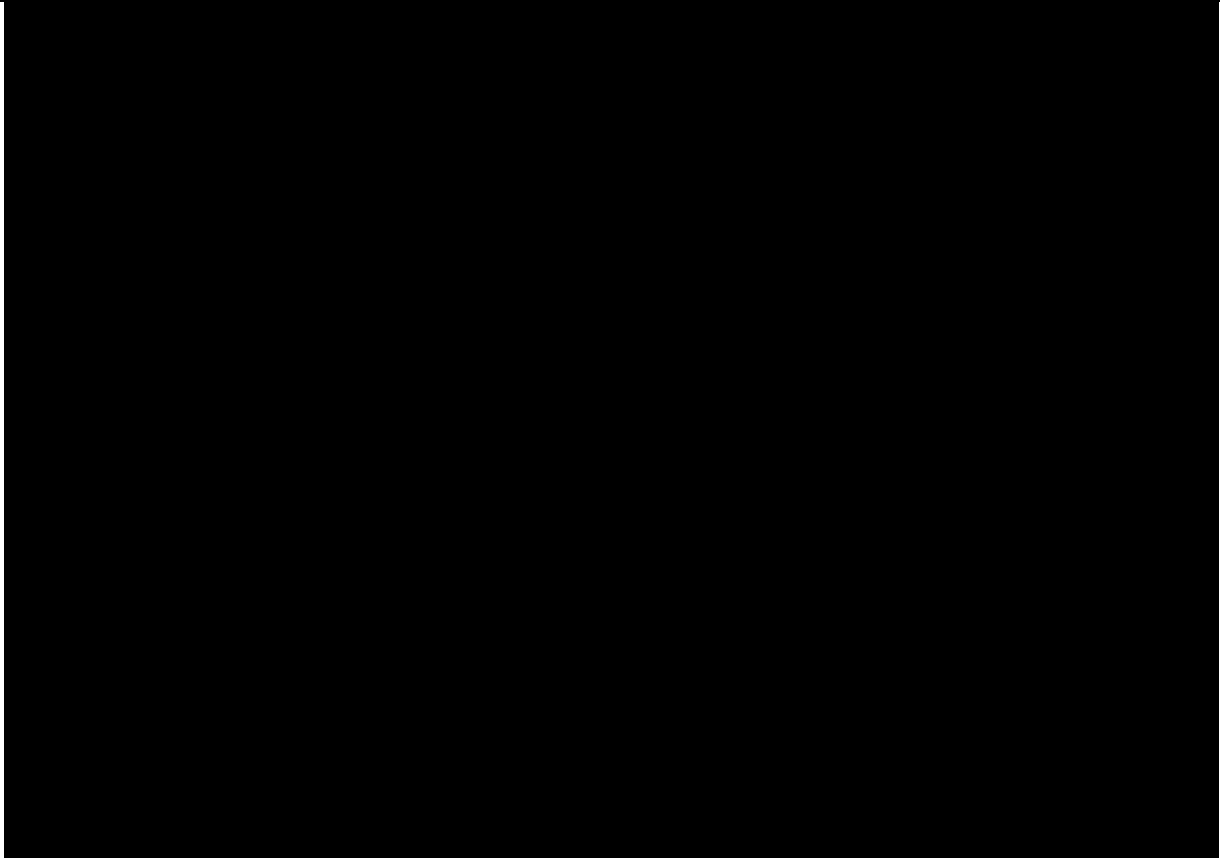


sections and plans enable a designer to evaluate the journey of the camera from a ‘synchronic’ and ‘diachronic’ point of view at the same time (Meisenheimer 1993: 66-74). The diachronic feature of the drawings allows one to imagine what a camera will capture in every single location at a specific angle and height along the path of the movement. The synchronic view that the section and plan provide facilitates an intact reading of the cinematic journey of the camera and yields a view to look at a sequence as a whole.

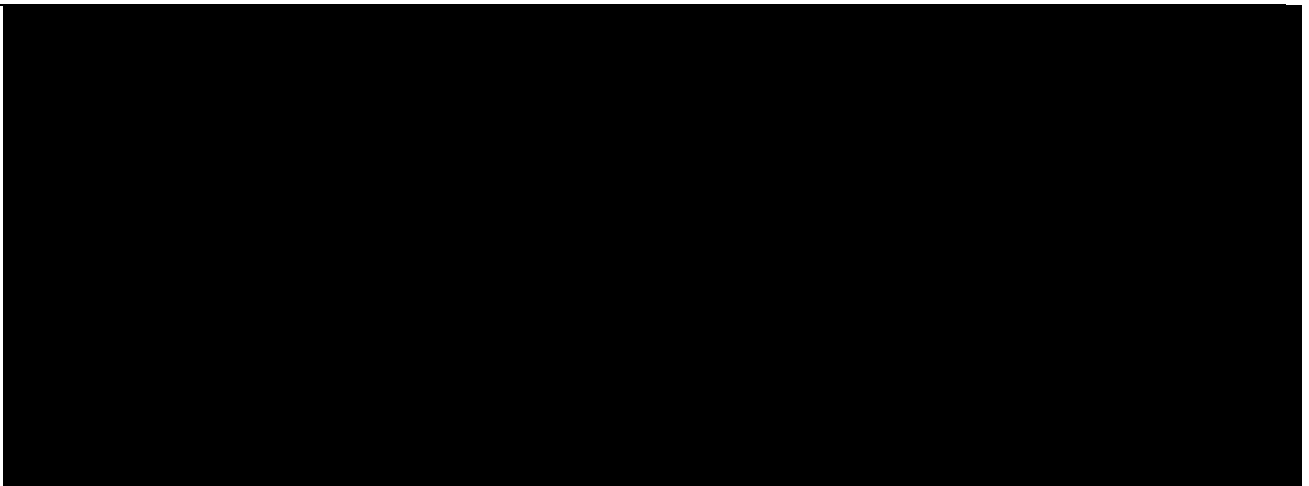
Secondly, by mapping the moments of cinematic narrative, which is traditionally conceived as a temporal notion, on a plan or a section, the narrative transcends from being a sheer temporal entity and elevates itself to a spatially designed system consisting of multiple spatial units. The animations *In Search of The Soul*, *Urban Below*, *Archway*; *Odyssey’s Enigma*, *Mubaraq Manzil* and *Hide and Seek* were based on the progression of a camera through various spaces of a narrative. In the mentioned examples, the cinematic plans and sections assisted students to handle the complexities of camera movements and, more significantly, the drawings helped students to think and imagine in three dimensions and organize a narrative based on its related spaces.

### **Design Generation: Cinematic Plans and the Reverse Design Processes**

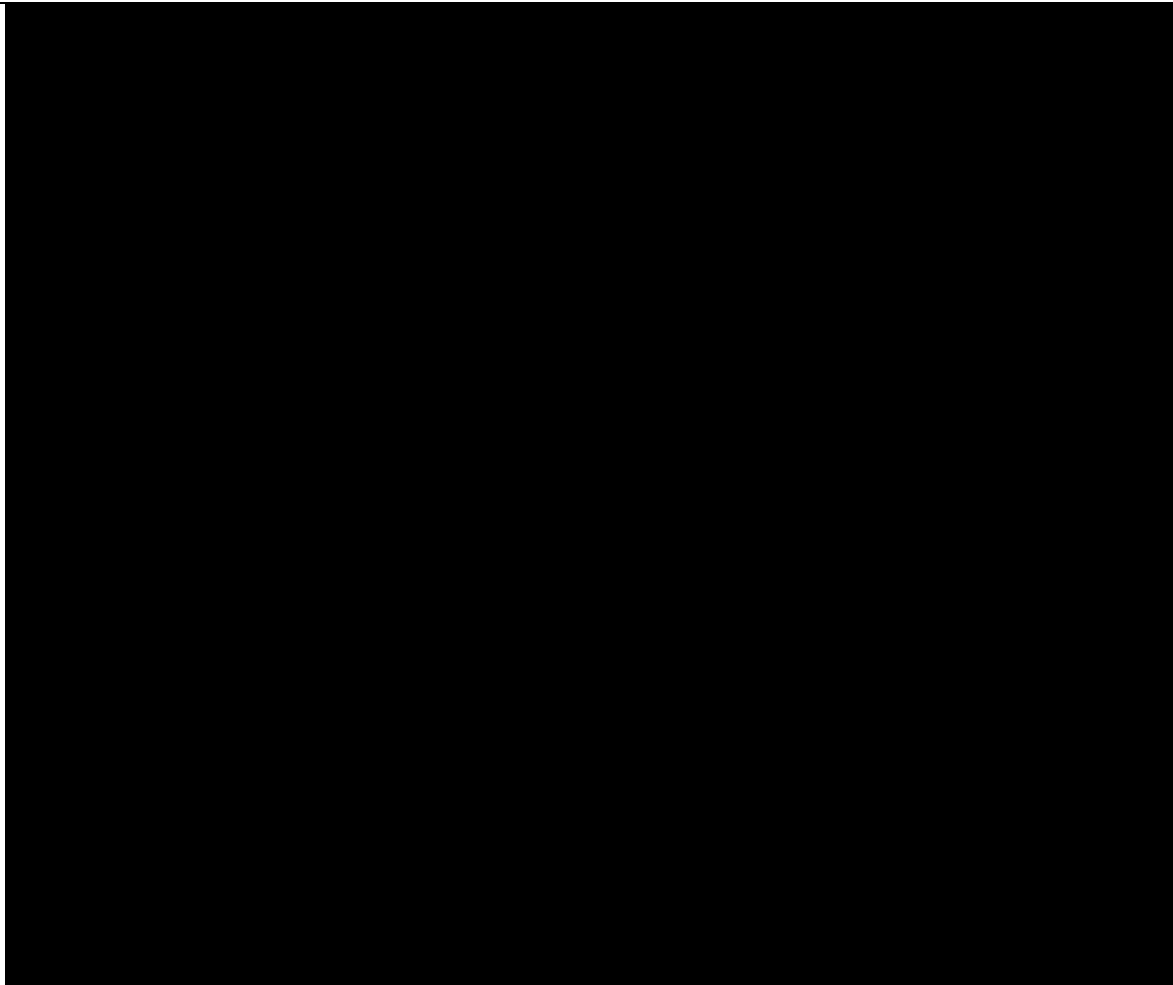
A notable aspect that emerged from working with cinematic plans and sections was the possibility of a reverse design process. The cinematic plans made it possible to design the camera work first, and spaces in the following phase. In effect, spaces were designed for camera movements rather than camera movements based on spaces. This process is the exact opposite of what happens in filming real spaces, nevertheless, it was remarkably convenient and efficient for architectural animations. By setting the camera choreography on a plan and highlighting needed spaces and spatial elements, students only modelled and rendered what was going to be captured by the camera and not the entire space.



*Figure 13: Cinematic plan for programming as a means of programming a scene by Yu Chie Tseng.*



*Figure 14: Axonometric programming of Urban Below by Han Wu. A closer view of the diagram is shown in the next image.*



*Figure 15: A detailed view of the axonometric programming of the Urban Below from the previous figure.*

The act of orchestrating the spatial elements around the camera on the cinematic plans assisted students to order and control the expected spatial experience viewed by the camera. Configuring a plan to achieve a specific spatial experience in three-dimensional space has a history among architects. Prominent contemporary architects such as Norman Foster, Will Alsop, Richard Murphy, Gordon Murray, Ted Cullinan and Nicholas Grimshaw confirm the use of the plan as the ‘primary generator’ of spatial experience in their works (Edwards 2006: 245). Mies van der Rohe drew many plans to generate a desirable perspectival effect, a vanishing point and a ‘midground’ (Luscombe 2019: 43). In the office of James Stirling, diagrammatic plans were employed as a reference for making arrangements and adjustments in three-dimensional space (Dyson 2015).

In most of the studio animations, both 2D and 3D, the movement/position of the camera was drawn first, and then architectural elements such as thresholds, enclosing walls and corridors were structured around the camera path and its specific viewpoints. For example, in the 3D animation *In Search of the Soul*, the narrative illustrates the development of the character as he goes through multiple spaces of the animation. In this case, the specific stages of the narrative were decided, the general shape of the journey of the character and camera positions were defined and then, as the last step, the spaces of the narrative were placed on the planned locations along the narrative path.

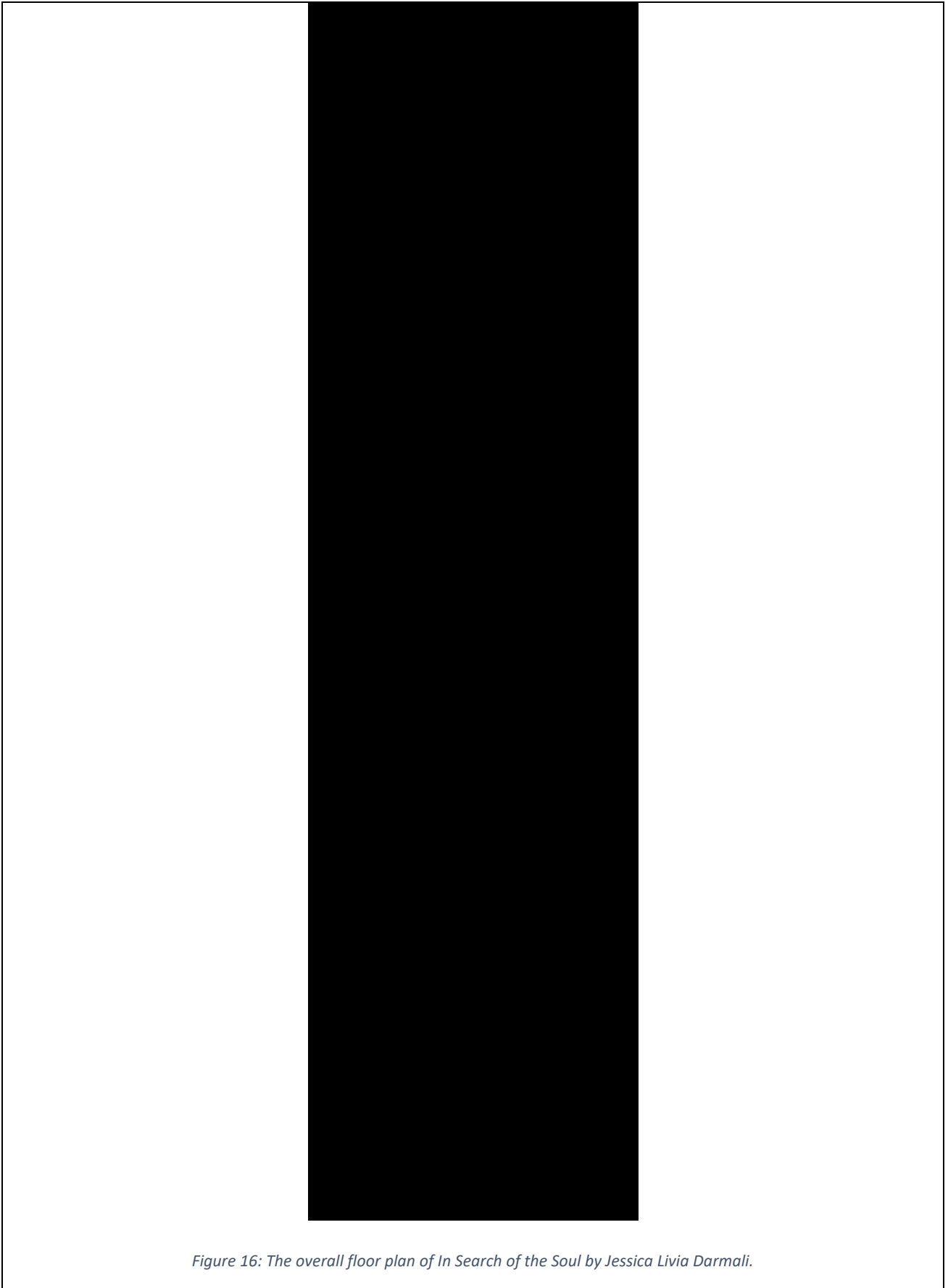


Figure 16: The overall floor plan of *In Search of the Soul* by Jessica Livia Darmali.

In the student film, *Elevatoria*, an imaginary city was generally planned but the details were designed specifically in the area to be filmed. Similarly, in *Archway; Odysseys' Enigma*, the movement of the character was mostly horizontal and featured moments in which the main camera work consisted of changes in camera height and elevation. Due to the horizontal spatial progression of the narrative of the film, axonometric drawings were chosen to design the camera movement choreography first. In the next phase, spatial elements such as archways, thresholds and experiences depicted in the film were designed in response to the camera movements.

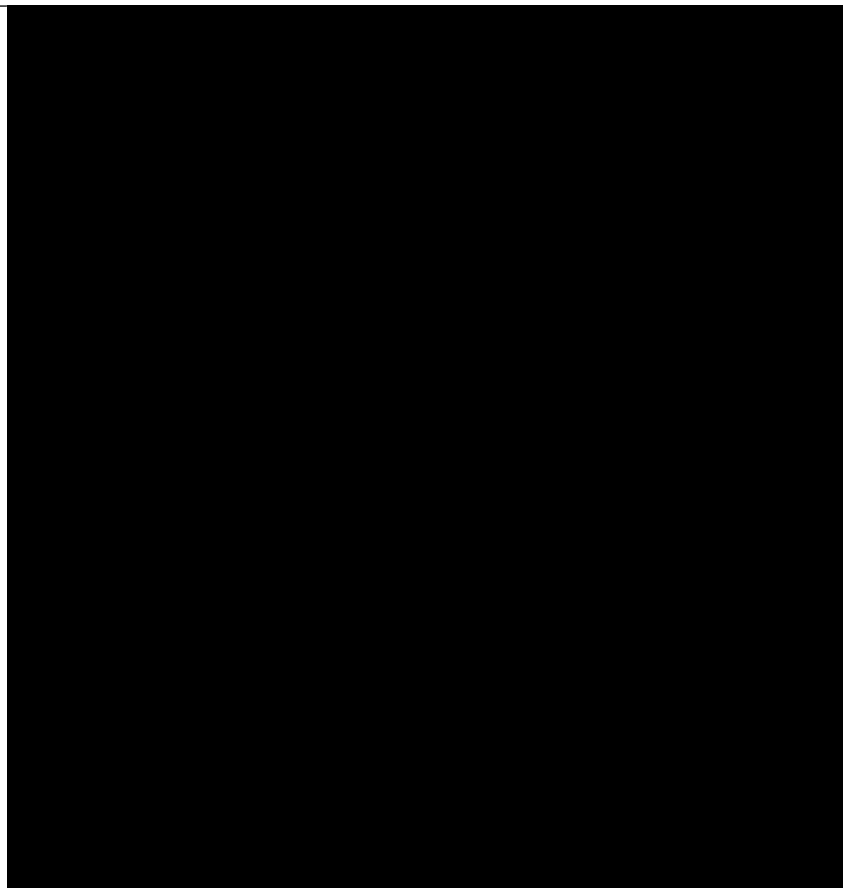


Figure 17: An axonometric view of the camera journey for *Archway; Odysseys' Enigma* by Marissa Wong.

In 2D animations, the reverse design method of creating scene-based camera positioning on a cinematic plan or section was even more crucial. For the 2D animations *Portal Bowl*, *The Window* and *6PM*, the plan, spatial layout and camera positions were designed and then the compositions of spaces tested on plans or sections around them. For example, in the Roman bathroom scene in *Portal Bowl*,

as the first stage, the plan of the layout of the scene was arranged and camera positions were highlighted, and the number of necessary shots was defined.

In the second phase of the studio, spaces were designed according to camera staging and only necessary parts that were meant to be in the frame were drawn. In a similar fashion, in the films, *The Window* and *6PM*, the spaces were designed according to the camera staging marked on a plan. This method of designing the camera movements/positions in the first phase of a plan and installing the spaces and spatial elements around them afterwards is, in effect, opposite to the traditional techniques of storyboarding but has a well-founded architectural background.

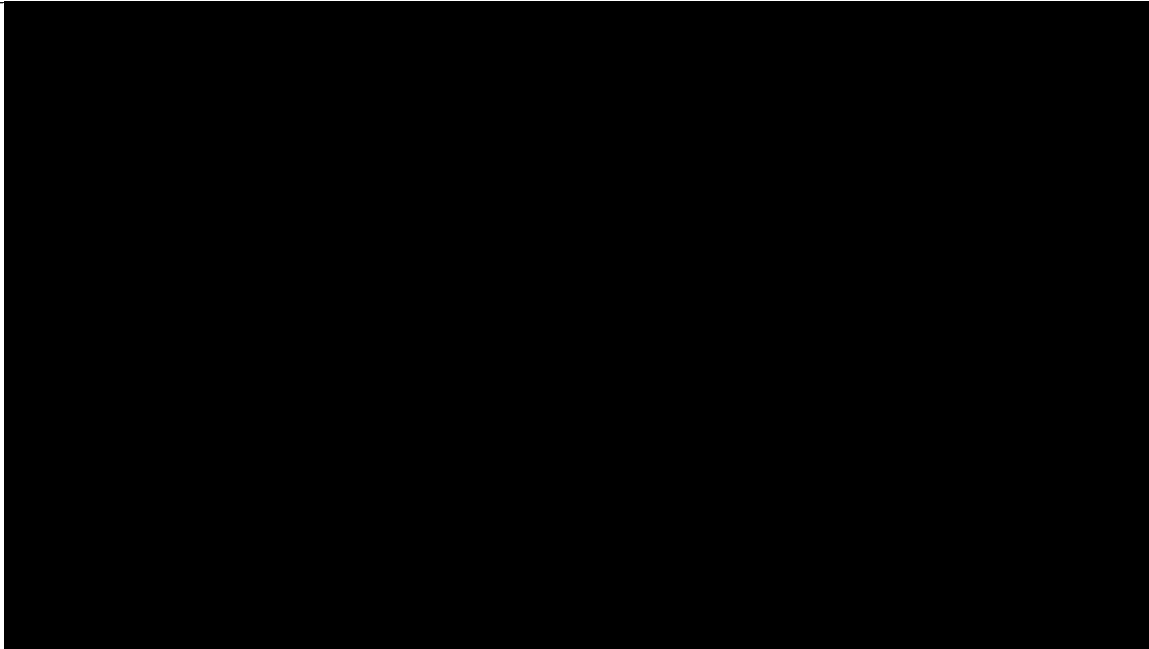
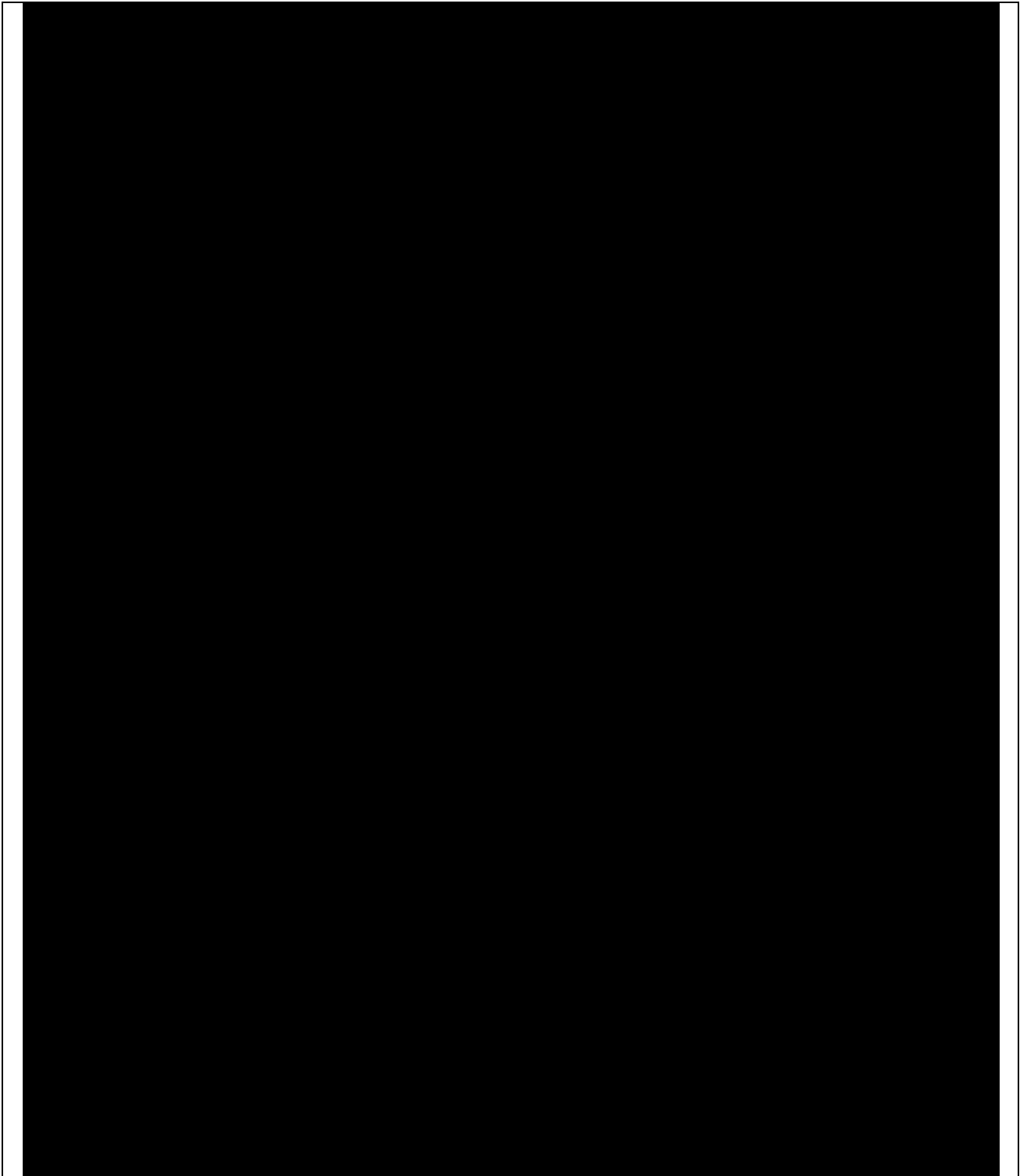


Figure 18: Cinematic Plan of 6PM by Su Ke.



*Figure 19: Cinematic Plan and a shot of Portal Bowl by Rayyan Roslan.*

## **Reflections and Evaluations: in Praise of Orthographic Projections**

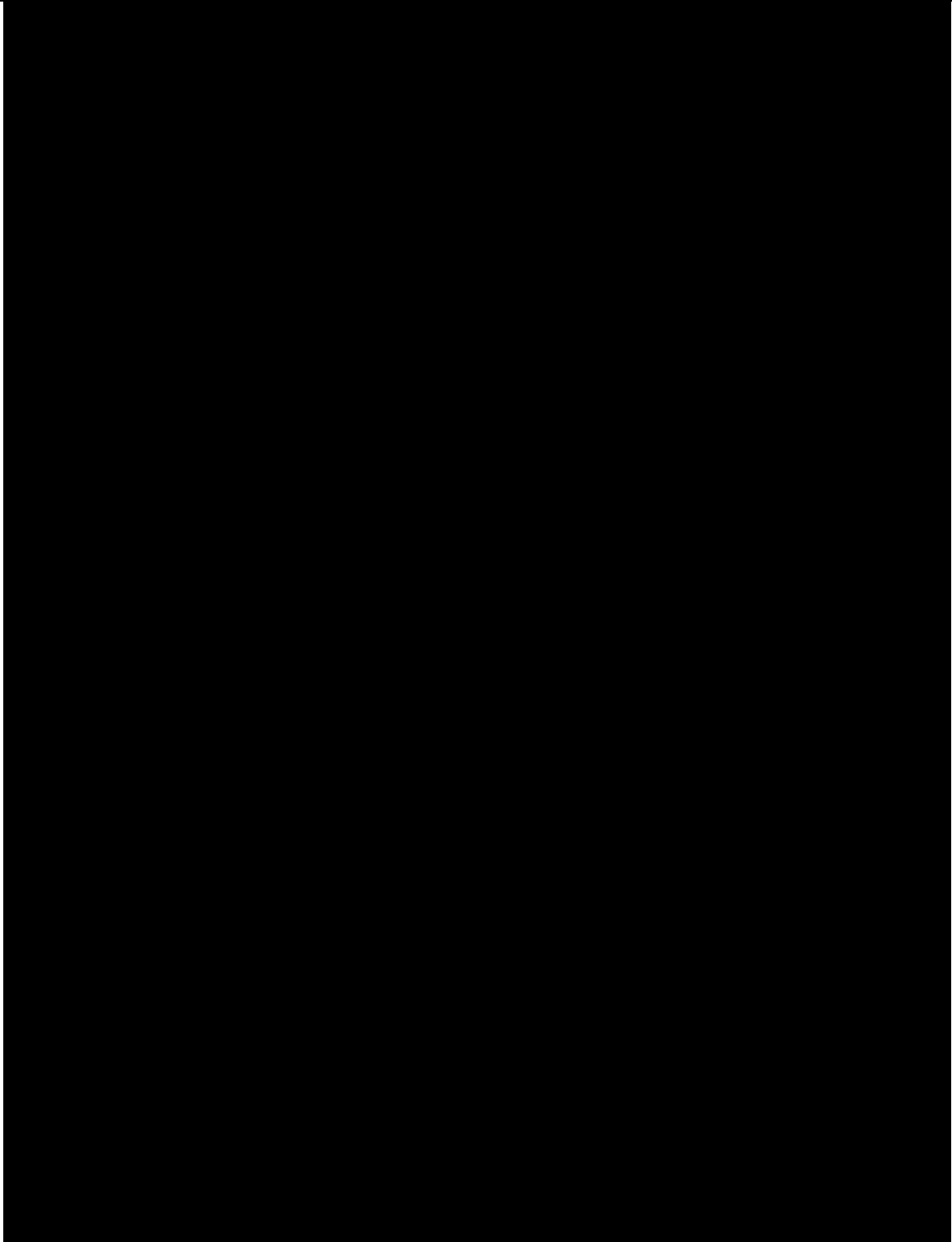
Over the course of the studio, cinematic plans functioned as the spine of the project around which



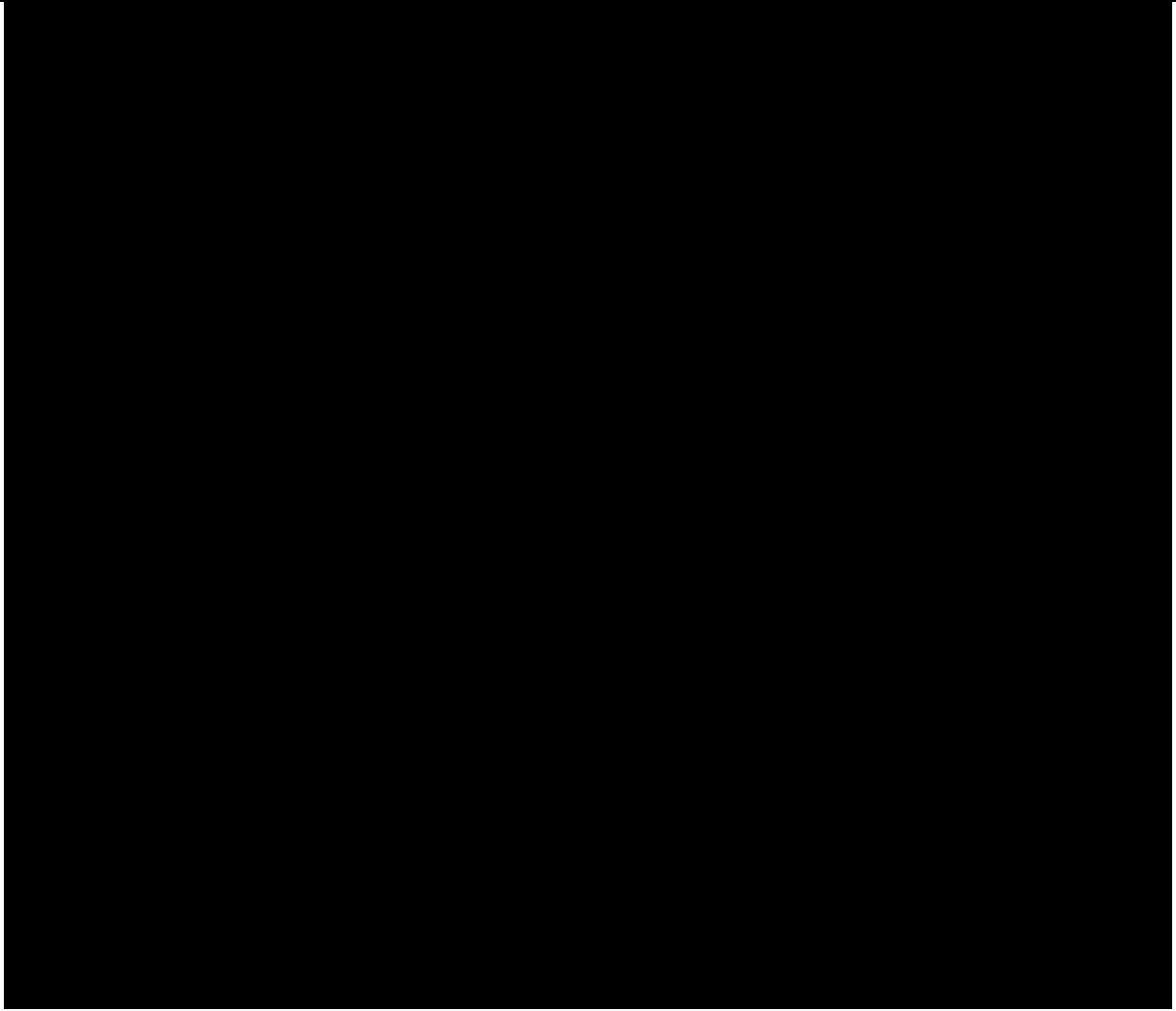
every stage of design was structured. Working with cinematic plans was always prioritized over storyboarding and preceded other phases of design. The cinematic plan was treated not only as a representational and visual element but as an idea originator or, as theorist Irina Davidovici designates it, ‘an intellectual construct’ (Davidovici 2022: 40).

The experience of the studio demonstrated that a similar approach should be taken in the production of architectural films and animations, especially in a discipline that has a developed discursive constellation around the plan. Edwards proposes that in architecture, as a discipline that is based on ‘spatial ideas’ rather than pictorial images, the use of 3D renderings and photography should take ‘a secondary role’ (Edwards 2008: 68). The ‘incomplete angle’, the ‘disembodied gaze’ and the ‘accidental views of objects’ and spaces that perspectival views offer are problematized by architects such as Le Corbusier, Giuliana Bruno and Kenneth Frampton (Le Corbusier, & Ozenfant, [1920] 2000: 72) (Frampton 1983: 29) (Bruno 2000: 129).

Observations reveal that cinematic plans and sections render it possible to foresee the cinematic construction of scenes and films in their entirety on one plan. For instance, the cinematic plan for the film *Frame the Dream* demonstrates how the construction of the scene and camera staging is designed and, in parallel, shows how shots relate to one another. The cinematic plan also illustrates how the camera is staged for every shot as indicated by different shot numbers. Visualizing the overview of the organization of a scene while illustrating its microelements on the same image is not attainable by any other tool.



*Figure 20. Cinematic plan as a programming technique for Frame the Dream by Tang Enquan.*



*Figure 21: Cinematic plan and the visual construction of the shot in *Frame the Dream* by Tang Enquan. Based on the cinematic plan the shot with character is filmed through the technique of green screen (top right) and the it is overlaid on the 3D rendered shot (bottom right).*

In his design studio portfolio, the student director of *MagLev City* reflected on the utility of cinematic plans. He expressed that by working with orthographic drawings, he was forced to think about how ‘narratives of spaces’ can be crafted:

[H]aving the cinematic plan of my film as a whole, made me tweak my camera features based on my spaces and my spaces based on my camera work several times. I changed the angle and the type of my camera work as well as the spaces that were filmed by my camera for the shots I had in my mind.

The comment discloses that it was through the exercises with cinematic plans that students perceived filmmaking as a spatial practice and not as a collage of a series of images as is the case with storyboards where the static and ‘fragmented’ nature of the ‘stop-frames’ can undermine the continuity of motion as a desirable effect that the medium of film can generate (Porter 2004: 176). More specifically, shots are the mere outcomes of the physical location and the physical movement of the body of a virtual or real camera in space. The interaction between camera and space can be planned and controlled efficiently through an engagement with orthographic drawings. In this sense, a purely visual method such as storyboarding does not reflect the complex process behind every shot and might not be an adequate tool for designing architectural films and animations.

It should be noted that two-dimensional projections such as cinematic plans and sections are meant to illustrate the process and its configuration through abstraction and geometrization. These orthographic drawings are not representational tools that communicate the atmospheres and experiences of spaces. As architectural theorist David Leatherbarrow explains, plans and sections work in the same vein as ‘x-ray images’ (Leatherbarrow 2000: 89). These orthographic drawings are able to provide a precise picture of the geometry of the complex cinematic arrangement concealed behind the skin of the screen.

Despite their advantages, there are filmmakers who do not use cinematic plans. Nonetheless, these types of drawings are used in principal film directing texts and play a significant role for filmmakers who accentuate the spatial experience of their scenes and/or have complex camera movements and *mise-en-scenes*. In big productions with sophisticated technical requirements and VFX, cinematic plans are indispensable for the construction of scenes. For architects and architecture students that lack sufficient professional filmmaking experience but possess architectural skills, conventional drawings such as plans and sections can be distinctly practical and effective.

Unwin convincingly argued that the discipline of architecture needs to re-value the use of plans and sections not only as the primary thinking tools of a designer, but as narrative devices through

which ‘spatial ideas’ are articulated. The pedagogical experiment discussed in this essay elucidates that Unwin’s position is defensible even in the context of multidisciplinary approaches to pedagogy and practice, where architecture shares its territory, tools and language with other disciplines such as digital media and the moving image. This essay proposes that in the exact same manner that an architectural floor plan is a generative design tool in the architectural design process, a cinematic plan is a critical, non-verbal and, according to Unwin, a ‘descriptive account, manifest spatially’, which tells stories and makes sense of a cinematic and spatial situation (Unwin 2015: 127) (Unwin 2009: 3) (Unwin 2012: 1).

## References

- Al-Saati, Maha Zeini, Botta, David, and Woodbury, Robert (2011), 'The Emergence of Architectural Animation: What Architectural Animation Brought to the Fore and Pushed to the Background', *The Proceedings of INTERCAD 2011: The International Conference on Architecture and Design*, <http://architecture.scientific-journal.com/articles/1/8.pdf>. Accessed 11 December 2022.
- Al-Saati, Maha Zeini, Botta, David, and Woodbury, Robert (2012), 'Architects on Architectural Films and Animations', *Proceedings of the 17th International Conference on Computer-Aided Architectural Design Research in Asia*, [http://papers.cumincad.org/data/works/att/caadria2012\\_021.content.pdf](http://papers.cumincad.org/data/works/att/caadria2012_021.content.pdf). Accessed 9 December 2022.
- Amouzad Khalili, Hamid (2020), 'The Architecture of Film: Tarr, Angelopoulos and How to Ride a Wild Horse', Dissertation University of Melbourne.
- Aroztegui, Carmen, and Solovyova, Irina (2011), 'Architectural Research and Representation: Expressing Sense of Place through Storyboarding and Animatics', Paper presented at the ARCC/EAAE 2010 International Conference on Architectural Research.
- Banou, Sophia. (2017), 'How to Draw the World: from the Plan to an Architectural Storytelling. Paper', *Book of Abstracts of European Architectural History Network Conference: The Tools of the Architect*, <https://uwe-repository.worktribe.com/output/878209/how-to-draw-the-world-from-the-plan-to-an-architectural-storytelling>. Accessed 9 December 2022.
- Bazin, André (1992), *Jean Renoir*, (trans. by W. Halsey and William Simon), New York: Da Capo Press.
- Bruno, Giuliana (2002), *Atlas of Emotion: Journeys in Art, Architecture, and Film*, New York: Verso.
- Cairns, Graham (2012), 'Crossing the Boundaries of Film and Architectural Pedagogy', *Journal Of Pedagogic Development* 2:2, pp.16-23.
- Cairns, Graham (2013), *The Architecture of the Screen: Essays in Cinematographic Space*, Bristol: Intellect.
- Carmo, Mario (2011), *The Alphabet and the Algorithm*, London: MIT Press.
- Criterion Collection (2019), 'Carlos Reygadas on Storyboarding and Scripting JAPÓN', YouTube, <https://www.youtube.com/watch?v=zovvxouEpg>. Accessed 14 July 2022.
- Cullen, Gordon (1971), *The Concise Townscape*, London: Architectural Press.
- Davidovici, Irina (2022), 'The Discipline of Concept and the Judgement of the Eye: Pedigrees of Form in Architectural Practice', in Caroline Voet, Eireen Schreurs, and Helen Thomas (eds.)

- The Hybrid Practitioner: Building, Teaching, Researching Architecture*, Leuven: Leuven University Press, pp. 37–50.
- Davids, Rene (1999), 'Serial Vision: Storyboards. In the Design Studio', Paper presented at the Legacy + Aspirations: Considering the Future of Architectural Education.
- Deleuze, Gilles, & Guattari, Felix ([1988], 2013), *A Thousand Plateaus: Capitalism and Schizophrenia*, London: Bloomsbury Academic.
- Durham, Hannah (2022), 'Building Stories: Using Animation and Room Models as Design Tools', RIBA, <https://www.ribaj.com/intelligence/building-stories-using-storyboards-room-models-as-design-tools>. Accessed 1 August 2022.
- Dyson, Chris (2015), 'No House Style: The Drawings of Stirling and Wilford', Architects' Journal, <https://www.architectsjournal.co.uk/practice/culture/%20no-house-style-the-drawings-of-stirling-and-wilford>. Accessed 16 July 2022.
- Edwards, Brain. (2008). *Understanding Architecture Through Drawing*, London: Taylor & Francis.
- Eisenstein, Sergei, Bois, Yve-Alain and Glenny, Michael (1989), 'Montage and Architecture', *Assemblage* 10, pp. 110-31.
- Eshaq, Ahmad Rafi Mohamed (1998), 'Computer Animation for Architectural Visualisation', Ph.D. thesis, Glasgow: University of Strathclyde.
- Film Glossary (nd), '180-Degree Rule', Columbia University, <https://filmglossary.ccnmtl.columbia.edu/term/180-degree-rule/>. Accessed 14 July 2022.
- Frampton, Kenneth (1983), 'Towards a Critical Regionalism: Six Points for an Architecture of Resistance', in Hal Foster, ed. *The Anti-Aesthetic: Essays on Postmodern Culture*. Seattle, WA: Bay Press, 1983.
- Jacobs, Steven (2007), *The Wrong House: The Architecture of Alfred Hitchcock*, Rotterdam: 010 Publishers.
- Katz, Steven (1991), *Film Directing Shot by Shot: Visualizing from Concept to Screen*, Studio City, CA: Michael Wiese Productions in conjunction with Focal Press.
- Koehler, Robert (2011), 'The Thinking Image: Fred Kelemen on Béla Tarr and the Turin Horse', Cinema Scope, <http://cinema-scope.com/cinema-scope-magazine/interview-the-thinking-image-fred-kelemen-on-bela-tarr-and-the-turin-horse>. Accessed 16 July 2022.
- Layden, Garry (2011), 'Brands and Movie making: using storyboards to develop spatial design students' understanding of narrative', *Journal of Pedagogic Development*, 1:1, <http://hdl.handle.net/10547/253279>. Accessed 16 July 2022.
- Le Corbusier & Ozenfant, Amédée ([1920], 2000), 'Purism', in Robert L. Herbert Modern (ed.) *Modern Artists on Art*. Mineola, New York: Dover Publications, pp. 83-95.

- Le Corbusier ([1923], 1986), *Toward a New Architecture*, (trans by John Rodker), Oxford: Butterworth Architecture.
- Leatherbarrow, David (2000), 'Architecture Is Its Own Discipline', in Andrzej Piotrowski and Julia W. Robinson (eds.) *The Discipline of Architecture*, Minneapolis: University of Minnesota Press, pp. 83-102.
- Lewis, Paul, Tsurumaki, Marc, and Lewis, David (2016), *Manual of Section*, New York, NY: Princeton Architectural Press.
- Luscombe, Desley (2019), 'Ludwig Mies van der Rohe and Architecture's Spatial Distraction', in Luscombe, Desley, Thomas, Helen, and Hobhouse, Niall (eds.) *Architecture through Drawing*, London: Lund Humphries, pp. 40-51.
- Meisenheimer, Wolfgang (1993), 'The Difficulties in Depicting of Time in Space', *Daidalos*, 47, pp. 66-78.
- Monaco, James (2009), *How to Read a Film: Movies, Media, and Beyond*, New York: Oxford University Press.
- Ng, Kal, Schnabel, Marc Aurel and Kvan, Thomas (2006), 'Architectural Animation Becomes Alive - Creating Spatial Narrative with Spatial Characters for Animations', *Proceedings of the 24th International Conference on Education and Research in Computer Aided Architectural Design in Europe (eCAADe)*, <https://doi.org/10.52842/conf.ecaade.2006.598>. Accessed 11 December 2022.
- Penz, Francois (2013), 'Foreword', in Graham Cairns (ed.) *The Architecture of the Screen: Essays in*, Chicago: Intellect, pp. ix-xi.
- Porter, Tom (2004), *Archispeak: An Illustrated Guide to Architectural Terms*, London Taylor & Francis.
- Proferes, Nicholas (2008), *Film Directing Fundamentals: See Your Film before Shooting*, Boston: Focal Press.
- Rabiger, Michael. (2008), *Directing: Film Techniques and Aesthetics*, Waltham, Massachusetts: Focal Press.
- Reygadas, Carlos (2016), *Luz*, México Universidad Autónoma de Nuevo León: Ciudad de México anDante Monterrey.
- Rowland, Ingrid and Noble Howe, Thomas (2014) *Vitruvius, Ten Books on Architecture*, Cambridge: Cambridge University Press.
- Schöning, Pascal, Löffler, Julian and Azevedo, Julian (2009), *Cinematic Architecture*, London: Architectural Association.



- Swathika, Anandan, So-Yeon, Yoon and Uddin, M. Saleh (2006), 'Architectural Animation and Cinematic Interpretation', *Proceedings of the 11th International Conference on Computer Aided Architectural Design Research in Asia*, <https://doi.org/10.1051/shsconf/20184107004>. Accessed 9 December 2022.
- Türeli, Ipek (2021), 'Projections for the Urban Night: A Film-Based Exploration in the Design Studio', *Journal of Architectural Education* 75: 2, pp. 213-223.
- Unwin, Simon (2009), *Analysing Architecture*, London: Routledge.
- Unwin, Simon (2012), *Exercises in Architecture: Learning to Think as an Architect*, London: Routledge.
- Unwin, Simon (2015), *Twenty-five Buildings Every Architect Should Understand*, London: Routledge.
- Wahid, Arif Rahmanand and Atmodiwirjo, Paramita (2018), 'Storyboard as a Representation of Urban Architectural Settings', *Proceedings of International Conference on Architectural Education in Asia (eduARCHsia 2017)*, 41, <https://doi.org/10.1051/shsconf/20184107004>. Accessed 11 December 2022.
- Weintraub, Steve (2016), 'Werner Herzog on Masterclass, Filmmaking, and Why He Abhors Storyboards', Collider, <https://collider.com/werner-herzog-masterclass-interview>. Accessed 15 October 2020.
- Young, Michael (2022). *Reality Modeled after Images: Architecture and Aesthetics after the Digital Image*, New York: Routledge.
- Zell, Mo (2008), *The Architectural Drawing Course: Understand the Principles and Master the Practices*, London: Thames & Hudson.

#### **Appendix: links to student video works**

*The Road Not Taken*: [https://www.youtube.com/watch?v=XKXiHv\\_p\\_4Y&t=1s](https://www.youtube.com/watch?v=XKXiHv_p_4Y&t=1s)

*Princes Pier*: <https://www.youtube.com/watch?v=nssbsFIwbZg&t=201s>

*A Visit to The Shrine of Remembrance*: <https://www.youtube.com/watch?v=vPhi7y4J2m4>

*Elevatoria*: <https://www.youtube.com/watch?v=Ggz7F6vn0Ps>

*Archway; Odysseys' Enigma*: <https://www.youtube.com/watch?v=KWHjRZ4Ie78>

*In Search of The Soul*: <https://www.youtube.com/watch?v=YjXfWuP7ICA&t=3s>

*Urban Below*: <https://www.youtube.com/watch?v=fLTvtGvRdFg&t=48s>

*Mubaraq Manzil:* <https://www.youtube.com/watch?v=CLD3vc8NCYY>

*Hide and Seek:* <https://www.youtube.com/watch?v=xyv1B06esGs>

*Re-flect:* <https://www.youtube.com/watch?v=4t27jNTIJNU>

*The Window:* <https://www.youtube.com/watch?v=9jBjFryrhOM&t=32s>

*Portal Bowl:* <https://www.youtube.com/watch?v=nfICMuRm34I&t=88s>

*6PM:* <https://www.youtube.com/watch?v=IvP4Nr-UpKM&t=131s>

*Frame the Dream:* <https://www.youtube.com/watch?v=H41gJdLAmQw&t=214s>

*MagLev:* <https://www.youtube.com/watch?v=pTnPAUcUgrM>