

# Designing games: Structure, playability and intelligibility

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## Abstract

As part of an experimental studio which takes a work in another medium (literature, cinema or painting) as a program for architectural design, students are asked to create three-dimensional games. The games mediate between a reading of the original work documented in diagrams, and the design of an architectural project aimed at the exploration of architectural language. In this paper the logical and formal structure of games is examined in greater detail to explore the interaction of structure, playability, and intelligibility in the creation of a morphic language.

## Keywords

Diagrams, Games, Morphic Language, Structure, Playability, Formal Intelligibility

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## 1. Introduction

This paper explores the generation of a morphic language through the design of games based on a work from another medium. In the discussion on morphic language, Hillier and Hanson use the games of hide and seek and chess in order to introduce questions of *description retrieval* and *knowability*.<sup>1</sup> This paper uses three-dimensional or constructive games to argue that a three-step process occurs in the formation of a design language. In the design of games there is a process of description retrieval from the original work. This is further developed through instrumental rules and objects that eventually generate a design language. It explores the relationship between *description retrieval* and *knowability* through a construction of spatial patterns of order, arrangement, and relationships. The paper explores the formulation of design problems as games in order to understand these ideas in a more controllable "experimental" setting. In most games there is a manipulation of physical objects within a predetermined framework following specific rules. Playing a game involves a process of description retrieval. Unlike board games, in constructive games there is a greater sense of spatial intelligibility due to the creation of a complex object at the end of the process. From the point of view of the theory of morphic languages, the significant interaction is between structure and playability on the one hand, and formal intelligibility on the other. This paper address the issue of how fields of

potential intelligibility arise from the interplay of structure and playability, and conversely, how can our morphic knowledge allow patterns that have previously become intelligible to inform the design of playable structures.

## 25.2

In the work done over the last few years on diagramming, design reasoning, and problem formulation in architecture we have deliberately used literature, art, and film as program, as opposed to the more conventional programs that immediately force the designer to consider issues of typology, function, and the like that have been traditionally dealt with in architecture design<sup>2</sup>. This undoubtedly directs one to consider issues of translations across art forms. In translations across arts there are formal realizations from abstract spatial models and programmatic requirements that play a significant role when investigating issues of representation and transference of meanings. Translations across symbolic forms necessarily involve shifts and transformations of meaning due to the logic of the medium. They challenge us to examine fundamental metaphors as an aspect of design reasoning, particularly in relation to the construction of spatial relationships and meanings. They also involve the exploration of diagrams as a way of moving from the space of linguistic description to architectural space where topology and visual image are tightly interfaced. The work presented in this paper is deliberately designed to focus on issues of translation, which play a crucial role in any design activity as design involves translation from abstract spatial models and programmatic requirements into a formal realization. More specifically, this study aims to examine how meaning(s) can be transferred across symbolic forms.<sup>3</sup> An important aspect of this work is problem formulation. In his discussion on charge and brief, the art historian and theorist Baxandall draws a significant distinction between the formulation of a design problem and specific requirements that need to be satisfied. The term “charge” is used to refer to the design problem and requirements as given at the outset, while the term “brief” is used to refer to the designer’s approach to the problem.<sup>4</sup> The distinction becomes especially relevant when there is a weak charge because the critical factors in the understanding of design reasoning are not linked to the usual specifics that guide design decisions, whether typology, program, or function.

This paper, in particular, presents part of an experimental theory studio that focussed on design languages, which are significant when translating across art forms. In a series of these studios conducted over a span of two years, literature, film, and painting, were used as a point of departure to understand the link between program and design development in architecture. Pedagogically, this was undertaken as a three part process wherein the students initially went through a process of diagramming, then designed three dimensional or constructive games, and finally an architectural project, all three of which grew out of each other and were based on

a particular work from another medium. In this paper, I focus on the second part of this studio – the design of constructive/ three-dimensional games based on: 1. A literary text (Italo Calvino's *If on a Winter's Night a Traveler...* and *Invisible Cities*) 2. Film (Peter Greenaway's *The Draughtsman's Contract*) and 3. Painting (*Duchamp's The Bride Stripped Bare by Her Bachelors, Even*).

The role of games in this design exercise is significant in that it alternates between the open-ended nature of diagrams and the architectural project. In doing so, it brings into focus the importance of the instrumental nature of the game that triggers the emergence of a design language in the last phase – the architectural project. The design of games in this phase seeks to link a form to a set of instrumental rules that are deployed and to well-defined outcomes: essentially, who wins and who loses. This instrumental mediation then serves to facilitate and speed up the emergence of a design language in the third exercise. An important aspect in the design of games due to the finite outcome of winning and losing is the removal of a one to one correspondence between the game and the original work. In a unique way this absolves the designer of a direct semantic burden. In this exercise, the games are bounded since they are circumscribed by essentially the reading, analyzing, and diagramming of the original work. There are two constraints linked to game design: one, that all games have to be three dimensional, in other words shape-based or constructive games, to facilitate the formal and spatial nature of the final architectural exercise; and two, there has to be a well defined outcome in terms of winning and losing (unlike certain open-ended games). This paper aims to show that: 1. There are three aspects to the design of constructive games: structure, playability, and intelligibility 2. Playability and intelligibility provide the context within which the structure evolves 3. In broader design terms, the internal logic of the medium becomes the significant factor, which guides the design development so that the new design becomes a work of art in its own right. In this case, the game becomes art in its own right with playability and intelligibility interacting to transform the direct link to the original.

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The first section discusses various interpretive options that games take in relation to the structure. The second section examines the notion of playability with respect to two games. The third part considers formal intelligibility as realizations of formal patterns, as well as, in the larger context of the original work, concluding with the interactions between structure, playability, and intelligibility in terms of developing a morphic language.<sup>5</sup>

### Interpretive options in relation to the game structure

The range of approaches observed in diagrams and games gives us some idea about certain aspects of the original work that take primacy. One finds emphasis placed on different facets of the original work. For instance, in the game based on the film *The Draughtsman's Contract* (Figure 1) there were elements of “perception”, “control”, “deception”, “symmetry”, and “triangulation” that were distilled from the film and these were emphasized in the translation into the diagram and the game itself. The diagram conveys the audience’s complex relationship with the film, the web of relationships between characters and the director’s amount of control of what is visible or invisible to the audience and/or to the characters of the narrative. The exterior boxed frame, the red light gels, and overlapping grids are representative of the manufactured, blurred, and fragmented picture revealed to the audience. Similarly the plot and the stage sets of the film exaggerate levels of deception and imply that drama relies even more on what happens outside the camera’s view. For instance, Greenaway has structured the relationship between individual frames and scenes to support the skewed symmetry and triangular relationships occurring in the plot and in each frame’s visual construct.

25.4

Figure 1. Diagram – *The Draughtsman's Contract*  
(Student: Teresa Harrold)

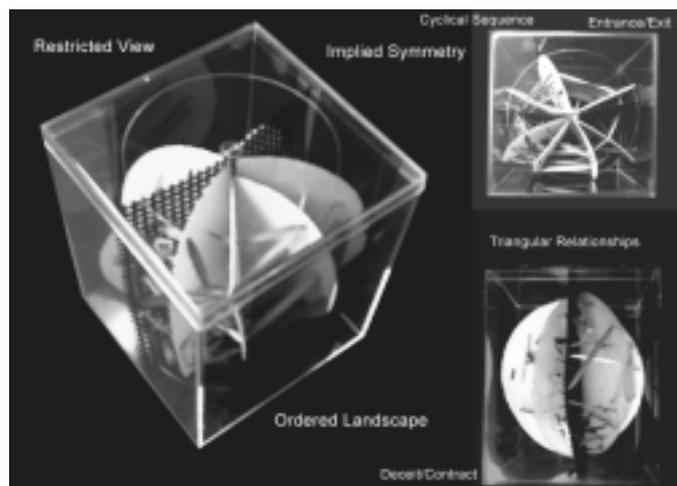
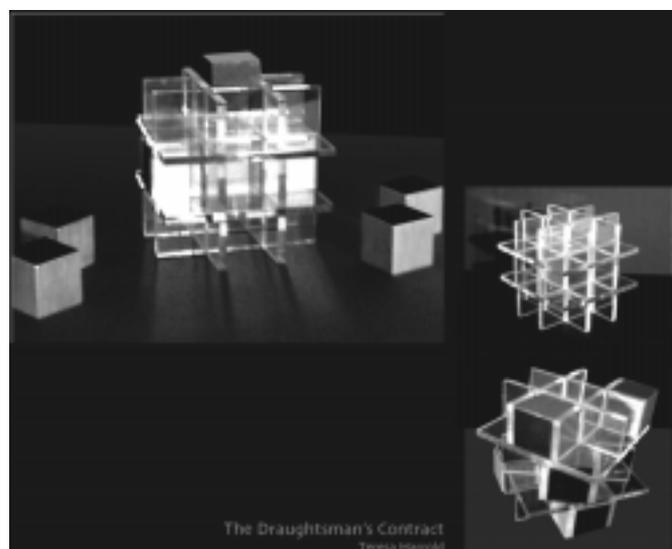


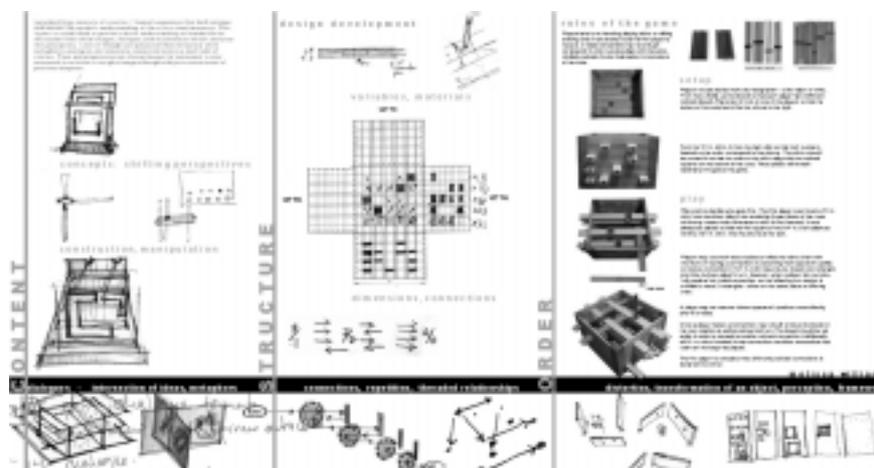
Figure 2. Game - *The Draughtsman's Contract*  
(Student: Teresa Harrold)



The game, in this case, emerges from the themes explored in the diagram (Figure 2). As in the film, the game consists of three opponents: two players, and the frame within which the game is played that acts as a third player with a given set of conditions. The three faces on each player's cubes must conform to three levels of the playing field in the frame. Players begin by placing their cubes into the playing field, matching corresponding colors on the face. After all the pieces have been played, cubes may be removed and replayed. The goal is to obtain two rows of one player's cubes, faces aligning on the outside as well as on the inside, in the center of the field. However, each player may only place cubes in the framework which faces him/her or the center. By aligning faces across the center of the field from one opponent's side to the other, a player may create a new center and new playing field by twisting, turning, or flipping the entire framework.

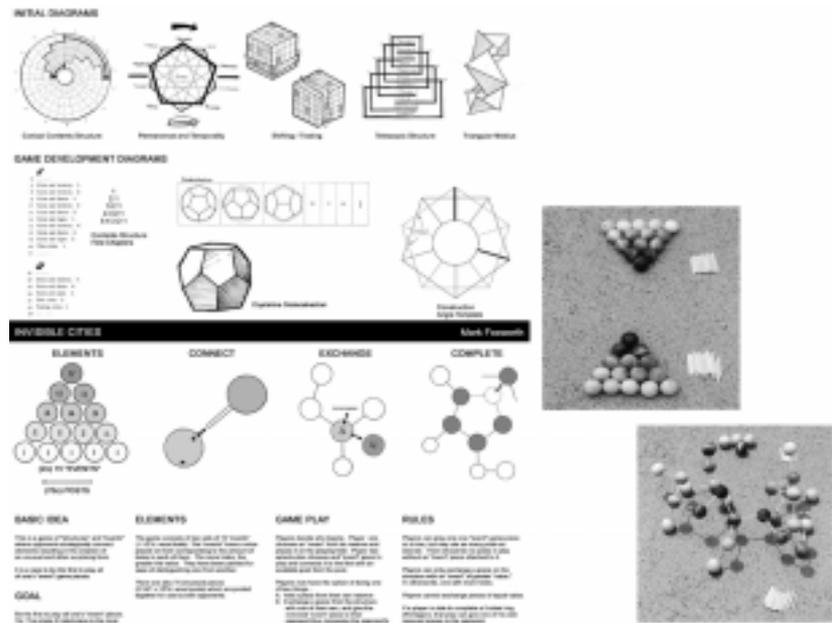
25.5

As in the game just discussed, there are others where the operative dimension of the work exhibited in the diagrams is emphasized even further in the games. For instance, in the game shown in Figure 3 based on *Invisible Cities*, the student's analysis of the book consisted of a series of framed sequences that both enlarge and narrow the reader's understanding of the cities simultaneously. This layout is established to provide a basic understanding or foundation for the reader from which images, dialogue, and occurrences distort and alter this perception. Lines of thought are projected then retracted, while metaphoric analogies are tenuously connected across a multitude of stories. Time and progression are discontinuous because movement is only measured in relation to insights/images/thoughts/objects reminiscent of previous chapters. The game is played by strategically moving the thinner wooden strips so as to get maximum correct colored connections through which the dowels can pass.



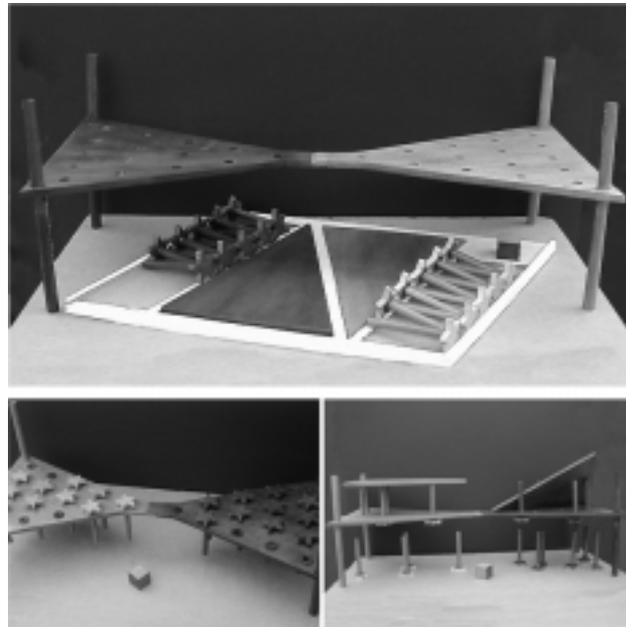
**Figure 3. Diagrams and Game – Invisible Cities**  
(Student: Melissa Williams)

**Figure 4. Diagrams and Game – Invisible Cities**  
(Student: Mark Foxworth)



25.6

Sometimes it is in the organizational structure of the original work as evident in Figure 4 showing diagrams and the game. In this case, the diagrams and game of Calvino’s Invisible Cities are an example of this particular line of thinking. Here the compositional and combinatorial aspect of the text takes prime significance in the diagrams, and through this, the design of the game itself.



**Figure 5. Game - If on a Winter's Night a Traveler...**  
(Student: Kristin Hibbs)

The overall mood of the book was an important factor for some students to be translated in the game. In *If on a Winter’s Night a Traveler...* the text exemplifies a feeling of ever increasing tension; the game shown in Figure 5 represents this aspect. It is designed such that winning and losing is dependent on the breakdown of the structure. In this game, the operations of the first half (where the players

plug-in pegs), creates the scaffold for the second half of the game. This is similar to the novel where after the middle of the book the framework interacts with the infill stories. It is ultimately in the removing of these pegs that the breakdown of the structure occurs.

In some games the structure of the work gets translated into the number of elements that constitute the game field or the pieces and the shape of the game pieces, while colors take a more symbolic or figurative role that may be linked to operational rules within the game. The game based on *The Draughtsman's Contract* (Figure 6) has rules that are fundamentally embedded in the colors of these pieces. They, in turn, are based on the handling of color and its associations in the film. For instance, the clothing of characters in the film - black and white is reversed symmetrically around the center of the film. Incidentally, this is where the color red appears, and one realizes the underlying scheme of murder in the film. In the game, this idea is brought into action by reversing the direction of play when a red piece is placed over a black and white. There are other rules shown in the illustration that are also adapted from colors and the manner in which they are used in the film.

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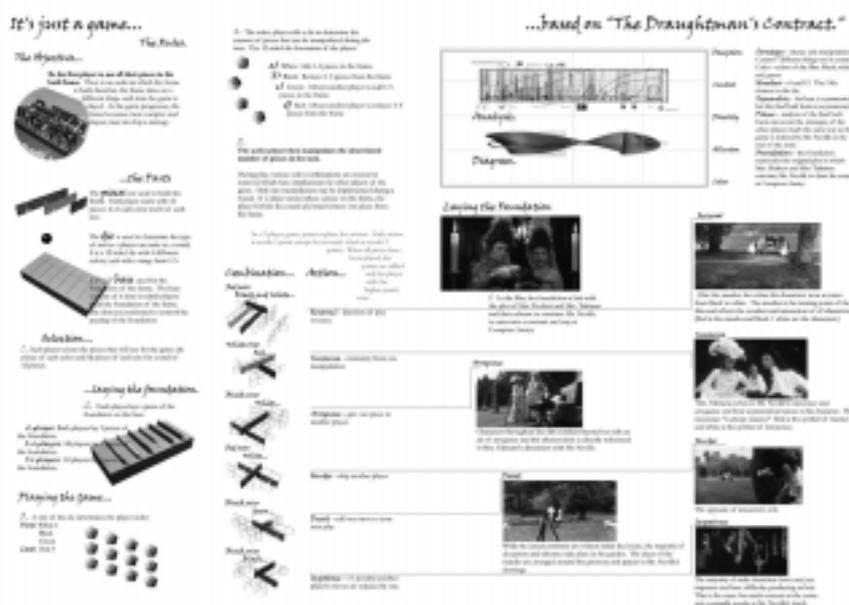
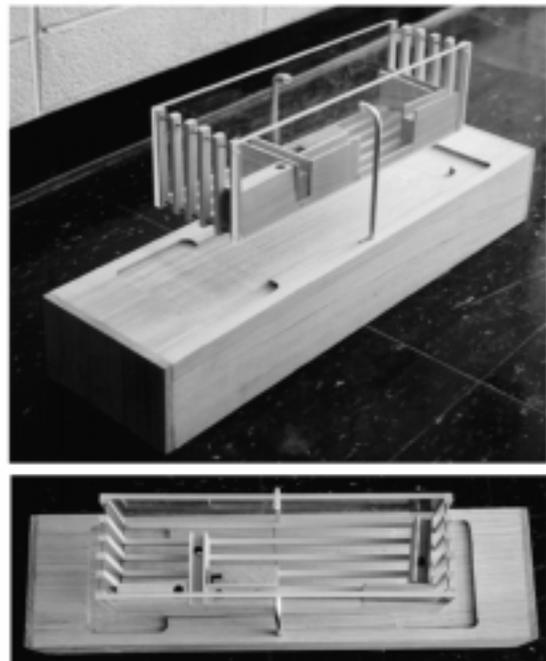


Figure 6. Diagram and Game - The Draughtsman's Contract (Student: Jason Schneider)

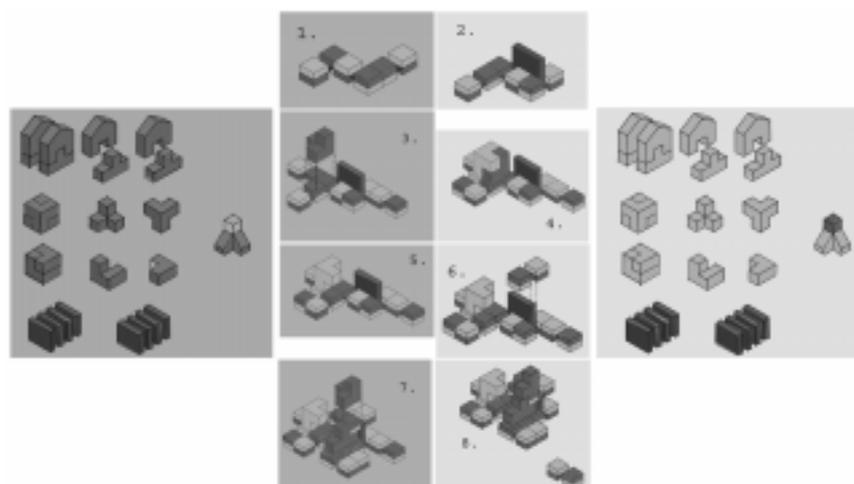
The next two games illustrate how the shape properties are crucial to the design structure and the playability of the game. The shapes here are not figuratively based on the original work but conceptually they are intrinsically linked to it. Attention is immediately drawn to the shape properties of a medium if one considers the game shown in Figure 7 based on *If on a Winter's Night a Traveler...* It takes the form of a rectangular acrylic box that has openings on the shorter sides. The objective is to take the metal ball from one end to another. This signifies the idea of linear reading

that is present in any novel and is the way in which we first read this novel. Nevertheless, what makes this book unique is that within the main narrative framework is a series of independent beginnings of other narratives, all of which are different but with certain shared characteristics. This is translated into the game through a multitude of wooden pieces that must be put in place within the linear framework. Each piece is unique, nevertheless it shares some characteristics with the others. In addition, all pieces can be linked such that the ball bearing passes through them from one end to the other. What makes the process of playing this game very much like the novel is that the cavities through which the metal ball travels can be in any direction and may change paths during the course of the game, making the ball fall down and forcing players to restart.

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**Figure 7. Game – If on a Winter’s Night a Traveler...**  
(Student: Randolph Plemel)



**Figure 8. Game - Invisible Cities**  
(Student: Allison Schapker)

Similarly, in the game illustrated in Figure 8, shape properties of the medium are the prime focus. The image of Venice, Marco Polo's city to which Calvino's *Invisible Cities* refers is the point of departure for this game. Much like Venice, wherein the ground has to be created in order to place buildings, in this game the ground pieces have to be first put in place and matched in order to place the building blocks. It places an emphasis on the compositional structure of the work and the balance between structure and content. The game works with the notion of cyclical form. Players create the structure, which is 64 units of earth. These relate to the total number of parts of the book – 55 cities set within 9 sections of conversation between Marco Polo and Kublai Khan - that many critics have linked to the chess board.<sup>6</sup> This structure can be used by both players on which buildings of the same color (in this case the game was created by using two different woods) are placed. Strategic removal of pieces is as important as placing them. Relating to the structure of the book, wherein numbered sequences from 1 to 5 appear and disappear in a specific pattern forming a loop, each player has 4 pairs of building blocks and a single block of dual colored buildings, all of which can be placed or removed. Each player has 8 wall pieces of a neutral color that can be used to obstruct, as well as to build upon. Similarly, during play, the building pieces may take on structural significance, thereby enhancing multiple readings that alternate between building and structure. Emphasis is given to understanding symmetries of buildings by strategic advantages of coupling. This is related to the metaphoric pairing and the mirror symmetries present in the book. The final objective is to get all the building pieces on the structure, ultimately placing the dual colored building.

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### **Structure and Playability**

To design a game is to design a number of physical objects and a set of explicit rules about how these objects are to be moved, arranged, or combined, in a step-by-step manner. At times, the statement of the rules implies an abstractly structured spatial framework, and usually a physically present spatial field, a game board or some other sort of scaffold that receives the deployment of moves. Or, at other times, rules incorporate the creation of a structured framework as part of the play, which presents a spatial field for the other objects, as described further in the game *If on a Winter's Night a Traveler...* (Figure 10). Taken together, the objects, the rules and the spatial pre-structures implied by the rules could be described as the structure of the game.

Playability is intrinsically linked to the structure of the game. The physical objects and the rules that govern the play of these objects have to find a fine balance that makes the game challenging enough for the players but at the same time not be so overtly so complicated that players find it impossible. This means that the



Considering two games, one based on *The Draughtsman's Contract*, and another based on *If on a Winter's Night a Traveler...*, the issue of structure (both physical - the game pieces and scaffolding - and conceptual - the operative, i.e. the rules by which the game are played) and playability can be discussed in relation to description retrieval.

In the game of *The Draughtsman's Contract* (Figure 9), the scaffolding or board on which the game is played is notched and grooved to insert the acrylic scenes and swivel. The board represents the gridded frame through which the draughtsman arranges each scene he chooses to capture. In this game, the transparent scenes etched on acrylic are abstracted versions of the draughtsman's drawing frames. The position of characters within these scenes determines the holes through which pegs are inserted and linked to one another. These, in a sense, constitute the more direct relationships between the original work and the game. The ultimate objective of the game comes from the motive that drives the plot of the film –the production of an heir for the estate. This is achieved in the game through a maximum nesting of pegs to gain more points. If nesting is accomplished with one's opponent, it increases the points received. The game is played by drawing cards that tell the players which scene piece to use. The draw of the card employs the element of chance, nevertheless, by knowing the second scene one gets, the players can strategize for a maximum nesting of pegs. Each player plays on his or her own side until the red peg can be passed through six scenes after which one can swivel the board and play on either side. This operation can be traced to the draughtsman's role in the first half of the film as against the second half, which in the film can be separated through the first 6 drawings as against the second set of 6 drawings. It is only at this mid-point in the film that the viewer realizes that the draughtsman is set-up in what seems to be a murder mystery and starts looking for clues in the drawings. The notion of perception and relationships between game pieces, the play on either side of the field after a certain stage in the game, the very form of the game pieces, the set up, and the manipulation of framework, are all characteristics that the game shares with the film.

In the game based on the Calvino novel *If on a Winter's Night a Traveler...* (Figure 10) the design explores the theme of desire and the interdependent relationship between frame stories and infill narratives. The game is predicated on attraction between pieces and the simultaneous creation of framework and infill. Players place pieces that match the color of the adjacent framework but also have the opportunity to manipulate this framework, thereby altering the sequence of the game in the same fashion that the translator's interruptions complicate the novel. Colors on the faces determine the operations and rules of the game. In addition, the

composition of the game closely follows the composition of the novel seen in the parallel readings of the two main protagonists that form the frames within which a series of ten stories constructs the work. The triangular relationships in the novel are transferred to the game through the composition of the game itself – the frames pieces, infill cubes, and color that determines the operations of both these objects in play. Thus, in the design of this game, the elementary pieces are the two frame pieces and 10 infill cubes, all of which have faces painted white and red and follow a set of explicit rules about how these objects are to be moved, arranged, or combined. The statement of rules always implies an abstractly structured spatial framework, and usually a physically present spatial field, a game board or some other sort of scaffold that receives the deployment of moves. For example, in this game, the rules state that cubes are to be joined “face to face” according to color, or that partitions are to be placed on a board at notched facing intervals so as to allow, and prevent, the subsequent placement of transverse elements.

Although both games have unique pieces, i.e. in *The Draughtsman’s Contract* each transparent scene is unique while *If on a Winter’s Night a Traveler* has each cube that is a unique entity in the manner in which the colors are used, the Draughtsman’s game does not try to exhaust the combinatorial possibilities like the Traveler’s game. Although there is an element of chance in the latter game (in that the players pick the cubes randomly so that one does not have the best combinatorial possibility by choice; moreover, the first placement of the two frame sticks is done prior to the placement of the cubes, hence one cannot choose which combinations of colored cubes might work best), once the player understands the combinatorial possibilities in the game and the constraints of the structure, for instance the options for the placement of frame pieces in relation to the cubes a player has, the players can strategize by placing the opponent at an advantage or disadvantage.

In contrast, in *The Draughtsman’s Contract* there is no mathematical exhaustive combinatorial strategy in the number of pegs. There are six sizes with two of each, totaling twelve. This matches the number of drawings in the film, and in a sense, both link parts of the film to each other and separate them, with a thirteenth red peg that can be attributed to the drawing of the murder location and where the draughtsman is also finally murdered. Again, there is no mathematically exhaustive combinatorial strategy in the design of individual scenes. These are a result of particular situations in the film which amount to twenty-nine in four different widths. The scenes correspond to the setting through the draughtsman’s lens. They are conceptualized in two sets: the first set corresponds to the first half of the film with drawings 1-6 that have one width and a second width that has Mr. Neville, the draughtsman, within the scene; and the second set that has drawings 7-12, with a

third width and again Mr. Neville within the scene as the fourth width. Nevertheless, in the design of the scenes there is an element of adjustment and fine tuning achieved with the positioning of holes so as to make the level of difficulty in achieving the points both conducive at times and challenging at other times for the players. The earlier versions for the design of the Draughtsman's game had 12 scenes that corresponded to 12 drawings in the film and had to be modified for the sake of playability. This was due to the number being too little to give a reasonable duration needed for a game to have enough time for players to develop an understanding and strategize, thereby making the experience less enjoyable. The choice of having more scenes was then rationalized to suit the overall idea of the film and game. Similarly, rules were modified, such as when the players could play on both sides of the board etc., to fit with the structure.

Learning to strategize in this game involves more of a process of discovery as compared to the Traveler game that had a more precise mathematical combinatorial design. In a most elementary sense, for any game, this is about developing an intuitive sense of what the difficulties are, and how the opponent may be placed at an advantage or a disadvantage. In essence, learning to play any game involves a process of description retrieval, where the constraints implicit in the structure are gradually understood reflexively, so that the understanding can subsequently inform individual moves and overall strategy. The elaboration of game designs internalizes repeated cycles of description retrieval leading to modifications of game structure. Generally this entails a two pronged design process; one where the structure is modified to fit the rules that are set in place, and the other where the rules are adjusted to fit the structure. Both of these processes are constantly tweaked for enhanced playability.

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### **Formal Intelligibility**

The differences between a board game and the three-dimensional or constructive games discussed here are significant, especially since configurational properties are emphasized in board games. These seem to be label-based, as in Chess. In contrast, constructive properties are emphasized in shape-based games. The end product, in constructive games is not merely winning or losing but the creation of a complex object. Here, more often than not, description retrieval is not merely a mental process that leads to the final outcome, as in most board games, since there one is generally left with an empty board, but a de/re-construction of the object. This more abstract understanding of the game as a formal structure is the "formal intelligibility". The understanding of constructive games involves more than the interaction between structure and playability. These games can also be understood as realizations of formal patterns. This can happen in two directions. The objects comprising the game may, as a set, be full or partial realizations of a mathematical structure, spatial,

geometrical or algebraic. For example, the colors placed on the sides of cubes can illustrate the permutational possibilities determined by cube symmetries, or the directionality of the scene cards will determine the possibilities of the alignment of holes. At the same time, the structure emerging with the play may itself be characterized by interesting formal properties. This is particularly significant in constructive games, in which, unlike board games, the physical realization of the process of playing becomes more, not less complex, over time, so that the end state is a complex object in its own right.

Intelligibility is of course what emerges when, in the course of playing the game, one is able to acquire a sense of the possibility of moves, i.e. cast the given moves within a broader context of permissible and impermissible moves. Nevertheless, there is a larger level of intelligibility and in these games it is inextricably linked to the original work. The recognition of the original work in the final game bears on complex analogies which are composed of elementary ostensions (by which I mean a game piece corresponding to a specific element or characters, tends to acquire a figurative, iconic, or symbolic dimension) and simple relations or means of use<sup>5</sup>. By means of use I mean that the game piece or the framework acquire a multitude of layers of meaning, and more often than not, meaning is conveyed through the operations undertaken. In other words, meaning is constructed through use. In shape based games, meaning constructed through use is inextricably linked to the means of representation. For instance, if one was to lose a queen or pawn in chess, one could replace it by any object or sign that was agreed upon between players, nevertheless in shaped based games forms/colors are integral to the play and cannot be easily replaced. A significant complex analogy engenders the interaction between behaviors and aesthetic consequences, which arise over and above the pursuit of the specified game outcomes. In this, the implication of physical shape in the architectural construction of game is rather significant: while many conventional board games proceed towards depletion or reduction, the games considered here proceed towards completion or enrichment of structure.

### **Conclusion**

A majority of the games maintain their link with the original, motivating work mainly through their structure, while playability, in these cases, is what emerges. These games do not necessarily build the specific relationship with the original work through the strategies of playing, and in that sense, what the students are actually producing is an instrumental set of structural elements which include the physical artifact, rules that generate spatial relationships, and general organizing strategy. Since designers, notoriously work as bricoleurs, the instrumental set is key to further designing-it is the source of the morphic language. The question then is what role

does playability have in this process? In these cases the role is indirect although essential. For the instrumental set not to be arbitrary, it needs to be developed within a context. Playability is what determines the context and thus helps refine the instrumental set that defines the structure. As designers attempt to enhance playability, the direct link to the original work becomes increasingly tenuous to a point wherein the game becomes a work in its own right. The interaction between structure and playability on one hand and formal intelligibility on the other determine the internal logic of the game design. The significance of this phase of game design in the context of the larger exercise which is to design an architectural work based on one from another medium, then, is the instrumental set. However, what seems to happen with the design of the game is that instrumental set is developed in a context—the playability and intelligibility of the game give the players or designers an understanding of the possibilities emergent within the instrumental set (in fact, what also seems to happen as playability provides a context for developing the instrumental set, is that intelligibility is more and more explicitly and reflexively explored). They develop their instrumental set by using it and therefore finding the meaning in use. Also here one can see the difference that shape based games make—they keep the instrumental set resolutely spatial, so that its use is built into it, rather than imposed arbitrarily, as in the case of a chess piece. That is the potential of the detour the students take in designing the games as the first step towards designing the architectural work. Within the context of a design studio, structure, playability and intelligibility, although not defined or distinguished as explicitly as here, are all considered in conjunction or in turn, as the game mediates a more complex design process.

25.15

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### Notes

<sup>1</sup> B. Hillier & J. Hanson, *The Social Logic of Space*, (Cambridge: Cambridge University Press, 1984) pp. 26-51

<sup>2</sup> There have been graduate studios and doctoral courses that were initiated at the University of Cincinnati, Georgia Institute of Technology, and the National Technical University of Athens in the past 3 years. Refer Special Issue of the *Journal of Philosophica: Diagrams and the Anthropology of Space*, volume 69 edited by Kenneth J. Knoespel (Ghent University, Belgium, 2003).

<sup>3</sup> The term 'symbolic forms' is used in Cassirer's sense of the word.

<sup>4</sup> M. Baxandall, *Patterns of Intention* (New Haven and London: Yale University Press, 1985) pp. 12-40

<sup>5</sup> Morphic language is understood here in the sense of Hillier and Hanson's explanation of the term. Refer B. Hillier & J. Hanson, *The Social Logic of Space*, (Cambridge: Cambridge University Press, 1984).

<sup>6</sup> William Gass, *Invisible Cities in Via 8*; Beno Weiss, *Understanding Italo Calvino*, University of South Carolina Press, 1993; JoAnn Cannon, *Italo Calvino: Writer & Critic*, A. Longo Editore, Ravenna, Italy, 1981.

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