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MAPPING THE ATMOSPHERE OF ARCHITECTURAL PROMENADE: ANALYTICAL SIMULATION ON NARRATIVE FORM IN THERMAL VALS

Abstract

The key aim of this paper is to explore a method for mapping the atmosphere of architectural promenade in the form of narrative. The paper suggests that the way of moving and seeing contribute to the atmosphere of architectural promenade. The narrative approach to promenade atmosphere would interlink human cognition with the factors of space and time. The research is built on large cognitive and psychological survey on peoples' narrative experience in space. However, this paper will mainly concentrate on the technical part of the research. It will scrutinize Peter Zumthor's Thermal Vals project as a case study to examine how the atmosphere of architectural promenade could be mapped out in a form of narrative by integrating real time 3D Virtual Reality (RT3D) and Space Syntax Analysis into a holistic framework. The aim is to investigate how the narrative form underlying promenade atmosphere could be analytically simulated by the proposed method.

Thermal Vals (Figure 1-2)

Thermal Vals, an integrated thermal baths and therapeutic facilities shared by five hotels around, designed by Swiss architect Peter Zumthor, was completed in 1996, and has become well known all over Switzerland and to some extent the rest of the world ever since. The architecture is a simple rectilinear structure that constructed of local stone. In plan, the building is organized around a rectangular outdoors pool and a square indoors pool, with supplementary spaces contained in small stone blocks adjacent to the pools. A continuum of voids guides the visitors meandering around the building through within to beyond. The architectural promenade offers people a rich spatial experience by the labyrinthine arrangement of spaces.



Figure 1, Perspective view from outside of the building.



Figure 2, Thermal Vals: Main Floor Plan. Image from Zumthor (2007)

The complicated spatial configuration brings the bathers inexhaustible views and surprises via their flânerie. The mysterious and dramatic atmosphere is created by the arrangement of the space, within which the light, sound and temperature guide the body into an immersive and interactive journey.

Narrative Approach to Architecture Promenade

Architectural promenade contributes to the intended atmosphere by peoples' movement under different points of view. Hence the promenade atmosphere relies on the continuous views that spaces frame for the visitors. In other words, the way of moving and seeing contribute to the atmosphere of architectural promenade. Narrative is an effective device to examine the cross area between time, space and human cognition. Many researches in cognitive science and narrative psychology are concern about the issues of peoples' cognitive and temporal experience. (Branigan 1992, Ryan 2001, Herman 2003) Branigan defines narrative as a perceptual activity that organized data into a special pattern, which represented and explained experience. Accepting this point of view, it would seem to follow that the promenade atmosphere could be approached at two levels: one is the global narrative pattern/schema of space; another is the local spatial data of moving and seeing. These two levels work together form the top-down and bottom-up process, through which the promenade experience being explained. In keeping with this approach, the simulation of the bidirectional cognitive process might help to examine spatial atmosphere from a new angle. At the local level, peoples' continuous spatial data is organized by perspectives. According to Tversky (1999, 2003), peoples' mental spatial framework and their movement are linked by three kinds of perspectives, which are Route Perspective, Survey Perspective and Gaze Perspective. Route Perspective changing viewpoint from one place to another create a kind of successive linear spaces; Survey Perspective is the stationary viewpoint from above the environment; Gaze Perspective is a single unchanging viewpoint looking onto the environment. The following section will illustrate how the immediate spatial data is simulated in a real time 3D (RT3D) virtual environment. At the global level, after a large cognitive survey by my ongoing PhD research, it has been found that there are several key narrative schemas have strong linkage with peoples' spatial perception in architectural promenade. The following sections will mainly concentrate on looking at the Narrative Structure and Narrative Plot in Thermal Vals by employing some of the measures of Space Syntax techniques. By integrating the global narrative schema with the local immediate spatial information, the atmosphere of promenade is simulated lively and comprehensively in the form of narrative.

Basic Concept of Space Syntax

Before engaging in the detail analysis of Thermal Vals, it is necessary to explicit the concept of Space Syntax, a theory and method for analyzing spatial configurations and relating them to social function or cultural meanings (Hillier and Hanson, 1984; Hillier, 1996). The key issue of Space Syntax is the relationship between space and movement. According to Hillier, that there are three kinds of activities happening in space: movement, encounter and seeing. The space geometry that reflects to those three activities can be understood as Axial line, Convex Space and Isovist respectively. Axial Line represents the sight and movement or spatial paths that cross a number of spaces in one direction. (Figure 3) Convex Space is a spatial unit within which any

point could see any other points. (Figure 5) Isovist is the visual field of the viewer from any point in space and is drawn by connecting the viewing point with the edge of the surfaces. (Figure 4) Base on that theory, people’s understanding of the complicated spatial layout is accumulated by those units as moving through building and urban spaces.

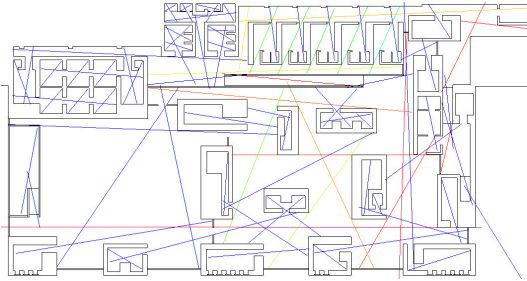


Figure 3. Axial line diagram of Thermal Vals

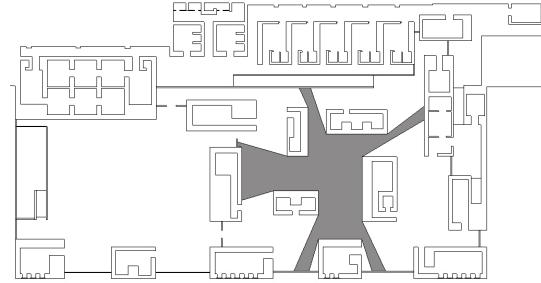


Figure 4. Isovist of the indoor pool space in Thermal Vals

Narrative Schema of Thermal Vals

Convex Space

The total number of Convex Spaces of the Thermal Vals is 213. It includes 144 convex spaces on the upper floor and the rest in the lower floor. In the Convex Space diagram, each space is indexed with a reference number, which distinguishes that space from all the others. For instance, the entrance space is number 1, the indoor pool is 84, and the outdoors pool is 111. (Figure 5) The thick black lines between spaces represent the connection of spaces.

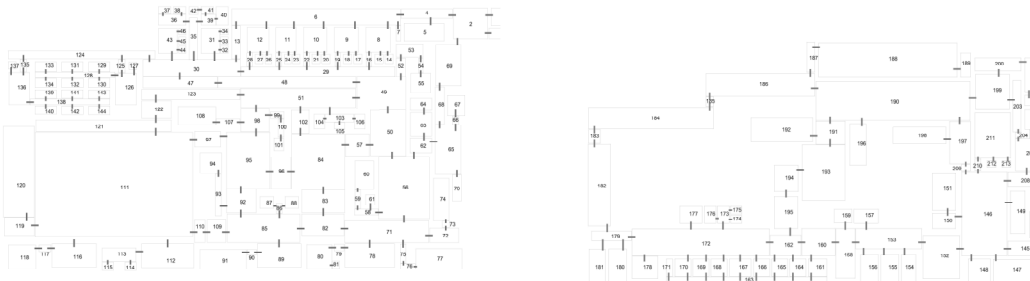


Figure 5. Convex Space diagram of Thermal Vals: Upper Floor(left), Lower Floor (Right).

Narrative Structure

Narrative structure is generally described as the structural framework that underlies the order and manner in which a narrative is presented to a reader, listener, or viewer. Thus the narrative structure of space is at once objective and subjective: the objective configuration of the space is transformed by the viewer’s subjective interpretation of the layout. The narrative structure can be mapped by employing the Justify-Graph property of Space Syntax techniques. Justify-Graph contains both the ego-centric and allo-centric characters. Spaces are mapped in a cognitive manner, through which the spatial structure are various depends on the spectator’s location in the spatial layout. (Figure 6) From Justify-Graph analyses of Vals, diagram (a) is the narrative structure for the bather who is situated at the entrance; from his point of view, the deepest spaces in the upper floor are the outdoor rest spaces around the outdoor pool; the

deepest space of the whole building are the massage rooms and toilets in the lower level (therapeutic level).

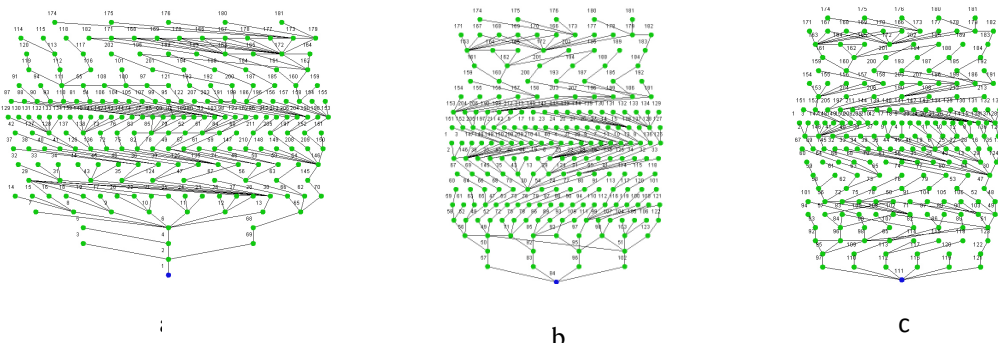


Figure 6, *Nnarrative Structure of Thermal Vals: Situate at the Entrance (a), Situates at the indoor pool (b), Situate at the outdoor pool (c)*

Narrative Plot

According to the interpretation of Aristotle/Fretag's notion of plot structure of mainstream movies, a group of people including Thomas, Lindstedt and Wright produced a diagram, which illustrated the elements and construction of formal plot structure. In that diagram, it shows the plot structure is comprised of time and intensity of acts. Through time the intensity of acts is subdivided into series of processes which forms the wave-like diagram. From the beginning to the end within certain amount of time, the intensity of acts develops from the trough towards the peak of the wave, and goes down again. It sequentially goes via exposition, complication, climax, and resolution. (Figure 7)

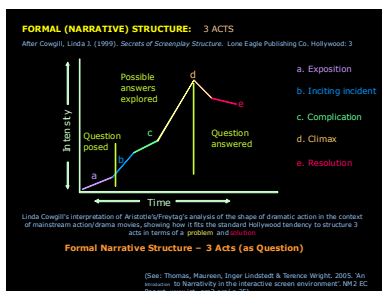


Figure 7., *The Narrative Plot Structure diagram . Images from Maureen Thomas, Inger Lindstedt & Terence Wright (2005).*

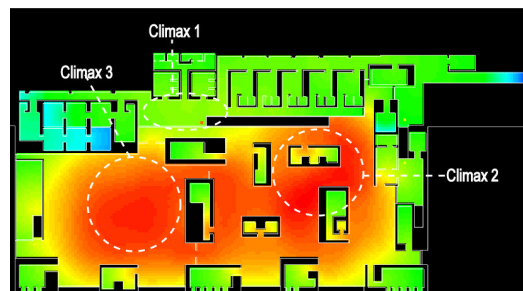


Figure 8., *Metric Node Count R15 analysis. Red areas indicate the key sub-centre spaces of that floor, which represent the 3 climaxes in the narrative structure of space*

From cognitive point of view, narrative plot of space can be understood as peoples' mental pattern of architectural promenade. Although people experience architecture a bit at a time, their sense of the whole promenade experience does not reflect this fragmentation. On the contrary, peoples' sense of architecture is made up of different parts and the transitions between them. The narrative plot underlying architectural promenade could be mapped out by employing the syntactic measurements of Metric Mean Depth (MMD) and Metric Node Count (MNC). MMD means the metric distance from any location to any other locations in the layout. In another word, MMD can calculate which space is the closest in distance to all other spaces within the whole spatial layout. MNC means topological depth from any location to all the others within certain radii. It is the total number of the connected spatial elements

within radius R . In other words, it can map out which space is the shallowest in topological depth to all other spaces at the local or global level (depends on the length of radius R).

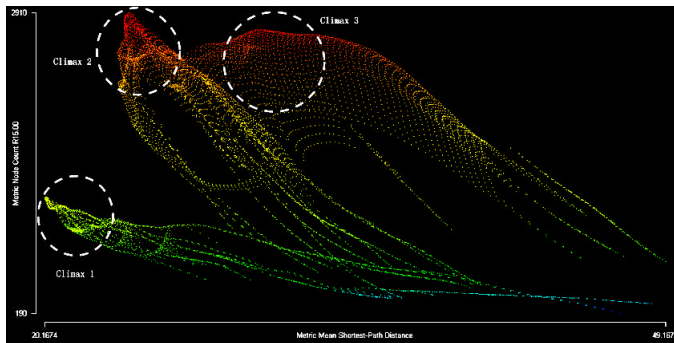


Figure 9. Scattergram of MNC R15 and MMD. This diagram indicates the deformed plot structure of space in Thermal Vals. The 3 peaks are corresponding to the climax spaces in Figure 8.

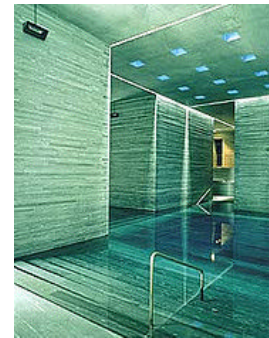


Figure 10. Photograph of the indoor pool space, which is the highest peak space of the building

The scattergram and the Metric Node Count diagrams together represent the deformed plot structure of space in Thermal Vals (Figure 8-9). The peaks in the scattergram indicate the remarkable spaces in the building, through which people would have the climax sense while experiencing those locations. The shape of the peaks indicates different spatiality. There are three peaks in the plot structure of Vals: the first peak is the intersectional area between the changing rooms and Turkish bath; it is also the landing platform of the big step, which connect the utility area at the high level and the bath area at the low level. The scattergram shows that this location is more like a small climax in the plot structure, since it is at once shallow in metric distance and deep in topological distance. The second peak is the area around the main indoor pool. This peak is the highest and sharpest in the plot structure, which indicates it provides the bathers the highest climax in their promenade experience. Compared it with the first peak, the second peak is more remote in metric distance but much shallower in the topological depth. In fact, this location is the most dramatic area of the building. The atmosphere is mysterious and theatrical. It seems the architect wants to make this location the landmark of the building, as Sigrid Hauser described *“The indoor pool and its surrounding spaces taken by a number of photographers, in color or black-and-white, printed in many publications of available as postcards.”* He continues, *“This photo series presents the Indoor Pool without water, the space looks like an empty stage, like a backdrop, stairs step up and step down, corners leave narrow cracks open, the room play itself, shows what it is capable of.”* (Hauser & Zumthor, 2007, pp75-76) (Figure 10) The third peak is the area around the outdoor pool. Compare with the first and second peaks, this location is the most distant in metric depth but very shallow in topological depth (higher than peak 1 but lower than peak 2). The shape of this peak is less sharp than peak 2, which indicates the promenade experience is less dramatic around this area. Effectively, the atmosphere of the outdoor pool area is rather smooth as the plot structure indicated. It is a vast open space at the far end of the building; it is remote to other spaces in distance, but connects very well with spaces around. People are gathering here for swimming, sun bathing, resting; the atmosphere is calm and relaxing.

Spatiality of Promenade Experience

Base on Tversky's argument, the promenade experience of space contains three kinds of perspectives which link the mental spatial framework with body movement and action. The way of seeing and moving therefore could be mapped in the real time 3D (RT3D) virtual environment. RT3D is the interactive virtual world, which is animated by the user's manipulation of the cameras or the movement of the agents in virtual space. RT3D interactivity adds the participation of the user to animation; hence the spatiality it simulates is similar to the ways that human body moves in space. In fact, it could do much more by adding more layers of information to create a hyper immersive and interactive environment than just represents the reality. The RT3D virtual environment of Thermal Vals is created by Virtools, which is the extensive collection of technologies for interactive 3D visualization. Virtools provides a platform for the user to bring 3D contents (such as 3D model, image, light, and sound) to live by its behaviour technologies. The 3D contents are organized and brought into interactive virtual environment through the scripting program. The promenade experience in Vals is being processed by the action of Eva, which is the behaviour agent used in virtual Vals. Eva has been assigned some basic navigation behaviours such as waking, swimming, waiting, sitting and so on. The behaviours need to be connected with the computer controller, such as the mouse or the keyboard, by using Controller program to build up the connection. All the Behaviours of Eva compose in a logical way in an enclosed system, within which all the behaviour scripts are connected or linked with other behaviours. The promenade experience of Vals is transformed as series of scripted behaviours which allow the user to experience those behaviours through interacting with the computer interface. Through the RT3D virtual environment the user is able to promenade in the virtual Vals by controlling the movement of Eva. In that sense, in the process of involving the users' head, the eyes, the ears and the hands, the atmosphere of space is simulated lively.

Analytical Simulation of Promenade Atmosphere

Integrating RT3D behavior engine and Space Syntax would effectively simulate the atmosphere of promenade in the form of narrative. Through the proposed interface, the user is able to control the movement of the Eva in RT3D virtual Vals and experience the real time immediate virtual environment. Moreover, the user is able to view the real time narrative schemas that animated by the navigation of the Eva. Thus, the atmosphere of space is simulated in the form of narrative via both the levels local and global simultaneously. (Figure 11) The proposed interface is to visualize the spatial experience in the form of narrative. The interface layout is thus divided into several screens, each of which represents different aspect of peripatetic experience. The biggest screen on the left above is the real time third person point of view (POV) which constantly follows Eva while she navigating through spaces. The two smaller screens on the right above are also the real time views from above and from the eyes of Eva. These three real time POVs represent the ways of moving, seeing and comprehending space in Vals, through which the light, texture, color, and sound of the space are simulated by the movement of Eva.

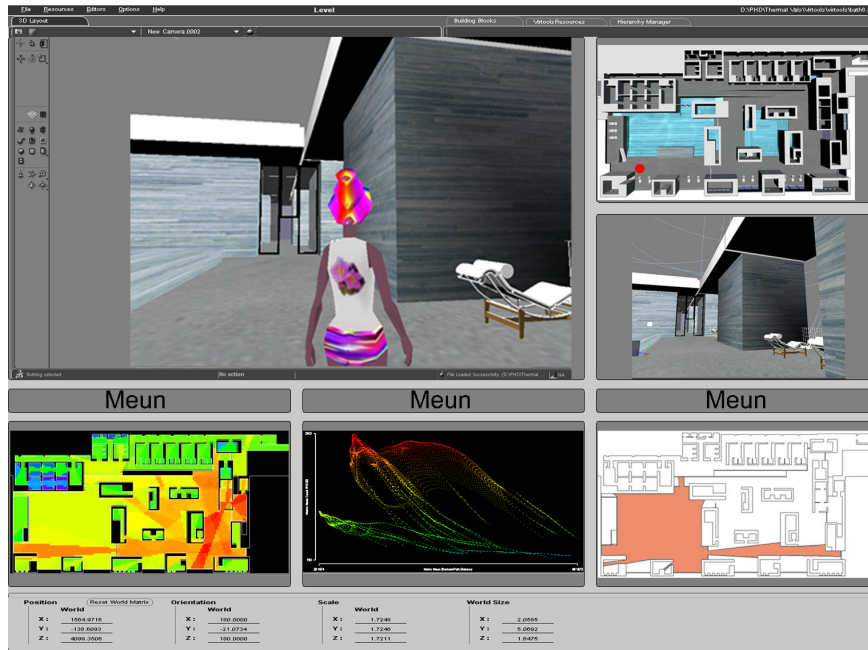


Figure 11. RT3D interactive and analytical simulation of promenade atmosphere in Thermal Vals

Another three screens below are showing the analytical diagrams of the navigating spaces. These diagrams are the representations of narrative schemas of architecture promenade, which in this case study include the narrative structure, plot, visual fields, and so on. At the bottom of the interface is a literal/numerical screen, which shows the spatial or other additional information of the space where the agent is locating. Through this interactive narrative device, the atmosphere of promenade in Vals is simulated and explained lively.

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