Where Stones Can Speak:
Dramatic Encounters in Interactive 3D Virtual Reality

Tamiko Thiel, corrected Final Draft, 25 Sept 2007

Introduction

How can a virtual reality representation of a actual site compete with the richness of actually "being there?" If a site no longer exists, how can a simulation "bring the stones to speak," imbuing empty form with an aura evocative of the fascination of the original? If a virtual world depicts a place that never existed, how can it compete with the kinesthetic, full body sensory experience of exploring a real place?

Even in the "real" world, in order to experience the true genius loci of a site it is not enough to visit it in person. Culture is not stones; it is the events that the stones have witnessed. Even if a site's form and setting are truly impressive, if we don't experience or can't imagine the culture that filled it with life, it appears like an elaborate stage set without the accompanying play. ("Mommy, I'm tired of Rome, can't we go to Disneyland instead?") Guided tours, books and films, memorial plaques and a well-rounded education are all aids we use to bring mute stones to speak.

In my "site-specific" interactive virtual worlds I embed layers of cultural, social and political references into a dramatic, first-person encounter with the spatial qualities of the site itself. Going far beyond a passive viewing of material in a "virtual museum," users actively engage with the web of meaning spun by the genius loci of the site. This dramatic encounter creates in users a more personal, emotional relationship to the subject matter, making it more memorable and meaningful. Especially schoolchildren, enchanted by the game-like quality of interactive spaces, open themselves in surprising measure to political and social content far outside of their usual spheres of interest.

These worlds do not rely on realism to convince. Realism is a false target that can distract from the true goals of an artwork: esthetic and dramatic coherence. This essay focuses on the generalized theory of dramatic structure I have developed in order to design such spaces, a theory that shifts emphasis from the classic *character-centered narrative* viewpoint to a *first-person experiential* viewpoint. I draw on narrative and drama theory, but also on architecture and music. This essay focuses on correspondences that have been useful for me as a practicing artist searching for new ways to think, and I beg leniency for the superficiality with which I touch each of these vast topics.

As examples I use my large, interactive narrative 3D spaces for which I prefer the now almost archaic term "virtual reality" (VR) because it expresses the fusion I seek between fantasy and reality[1] It is the age-old human drive, as Margaret Wertheim discusses in her book *Pearly Gates of Cyberspace* (Wertheim, 1999), to transcend restrictions of space and time, using culture to extend and enrich physical space with metaphysical meaning. As we will see, this technology is also particularly suited to provoke a Brechtian internal dialog[2] in users as they seek to collate their experiences and impressions of a virtual world into a coherent narrative whole.

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[1] Tamiko Thiel's online portfolio: http://www.mission-base.com/tamiko/
[2] Bertolt Brecht: http://en.wikipedia.org/wiki/Bertolt_Brecht

Project Descriptions

This essay refers to two kinds of projects, each with different structural requirements. *Starbright World* was a networked multi-user virtual playspace meant to foster communication and play among seriously ill children in hospitals. The other works discussed here (*Beyond Manzanar, The Travels of Mariko Horo, Virtuelle Mauer/ReConstructing the Wall*) are all single-user installations in which the goal is a dramatic encounter between the user and the spatial environment of the virtual world itself. Any "occupants" of the space must be carefully considered so as to add to rather than distract from this encounter. The following brief descriptions lay the basis for a more detailed discussion of dramatic method later on.

Starbright World networked multi-user 3D VR playspace (1995-1997)[3]

kidsWithStarbright_300dpi-bw.jpg   StarbrightScreenshot-300dpi-bw.jpg

Children playing in *Starbright World*
Photo credit: Mt. Sinai Hospital, 1995

Starbright World screenshot
Image credit: Mt. Sinai Hospital, 1995

Starbright World, commissioned in 1994 by the Starbright Foundation[4] under its then chairman, film director Steven Spielberg, was a virtual playspace where seriously ill children in hospitals across the U.S.A. could meet and play online via the private Starbright Network. Using technology that was essentially the same as today's *Second Life*, children sat at PCs in the hospital playrooms, viewing the virtual world on a monitor and moving through the world with a mouse or cursor keys. They saw each other in the virtual world as "avatars" (graphic characters) and could communicate via text, audio and video chat.

Worlds, Inc., the first company to bring PC-based, interactive networked realtime 3D technology onto the commercial market, received the commission to build *Starbright World* and hired me as creative director and producer. I developed the initial concept for the world in discussions with doctors and child psychologists and managed the team that built the virtual world in close collaboration with Spielberg.

This 3D version of *Starbright World* ran at several children's hospitals in the USA between 1995-1997, but during that time the interactive 3D technology remained very unstable. Additionally, as I recommended in my concept study, the Starbright Foundation wanted to go beyond a simple playground concept to develop a true online community, but this meant the children needed access to the system at home as well as in hospitals. These two considerations led Starbright in 1997 to replace the 3D version of *Starbright World* with a multimedia website that was more stable and accessible for an average family.[5] It was the right decision for the needs of the children, but it meant the end of an early experiment in online 3D community.

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[3] Website on the 3D version of *Starbright World*: http://www.mission-base.com/tamiko/starbright/
[4] Starbright Foundation website: http://www.starbright.org
[5] Current *Starbright World*: http://www.starlight.org/site/c.fuLQK6MMIpG/b.1090027/k.A0FF/Starbright_World.htm

Beyond Manzanar interactive VR installation (2000)[6]

BMinstallview_300dpi-bw.jpg

Beyond Manzanar, installation view Photo credit: Tamiko Thiel (2000)

The Manzanar Internment Camp in Eastern California was the first of over 10 internment camps built by the U.S. government during World War II to imprison Japanese-Americans on a false pretext of military necessity.[7] In collaboration with theater director and poet Zara Houshmand we created the installation *Beyond Manzanar* to compare and contrast this American immigrant experience with that of Iranian-Americans, who were the target of similar calls for internment during the Iranian Hostage Crisis in 1979-1980. A year after this artwork was completed, the terrorist attacks of September 11, 2001 triggered a new wave of mass detentions on the basis of ethnicity, belying the common contention that "it could never happen again."

Users explore the internment camp not in the omnipotent role of a guard or a "white visitor," but in the role of an internee. Entering the barracks leads into internal spaces that speak of the immigrant's American Dream, contrasting with the external bombardment of media stereotypes demonizing an entire group as the "face of the enemy." The landscape of Manzanar, a dry desert hell to the Japanese internees but to Iranian eyes poignantly evocative of the landscapes of Iran, forms a poetic bridge between these two very diverse ethnic groups.

The Travels of Mariko Horo interactive VR installation (2006)[8]

TravelsOfMarikoHoroinstallview300dpi-bw.jpg

The Travels of Mariko Horo, installation view Photo credit: Peter Graf (2006)

[6] *Beyond Manzanar* website: http://www.mission-base.com/manzanar/
[7] Coram nobis in Korematsu vs. USA: http://bss.sfsu.edu/internment/Congressional%20Records/19850219.html#n13
[8] *Travels of Mariko Horo* website: http://www.mission-base.com/tamiko/mariko-horo/

The Travels of Mariko Horo is a reverse Marco Polo fantasy (Polo and Latham, 1958), imagining the fictitious Mariko Horo as a Japanese time-traveler searching for the Western Paradise of Buddhist mythology, the Isles of the Blest floating in the Western Seas. Mistaking Venice for the entire Western World, she builds an exotic, fantastic Occident visually inspired by Byzantine icons and Dante's cosmology, but structured according to Buddhist concepts.

Users experience the Western World through Mariko's eyes, exploring a lonely, abandoned archipelago at the farthest ends of the earth. The virtual world however is a non-cartesian space in which vast universes can be hidden in small, drab buildings: a pavilion transports users to a piazza filled with jeweled palaces; a small temple can open into heavens filled with angelic hosts or hells of shrieking fire. Trapped in an eternal cycle of death and rebirth, users see that their actions have consequences, letting loose evil into the world or transforming it into a paradise.

Virtuelle Mauer/ReConstructing the Wall interactive VR installation (2008)[9]

VirtuelleMauerSimulation300dpi-bw.jpg

Virtuelle Mauer/ReConstructing the Wall, simulation of on-site installation
Image credit: T+T / Tamiko Thiel and Teresa Reuter, 2005

In the early morning hours of August 13, 1961, the East German government sealed off the entire western half of Berlin to block a massive population drain to the West. *Virtuelle Mauer/ReConstructing the Wall,* by the artist team T+T (lead by myself and the Berlin architect Teresa Reuter), deals with the Berlin Wall and the cultural and social life that developed in its shadow. We will rebuild a section of the Wall and its accompanying Death Strip, plus the surrounding neighborhoods in East and West Berlin. As in *Beyond Manzanar*, the exterior spaces defined by the Wall will be the stage for an even more important inner life that communicates the social and cultural differences that arose on opposite sides of the Wall. The user is not the guard with the gun and license to kill, but the resident whose neighborhood ends abruptly at a military border in the middle of the street. Scheduled for completion in 2008, the project will be shown both as an indoor installation in museums and galleries, as well as outdoors on the former site of the Berlin Wall.

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[9] *Virtuelle Mauer* website: http://www.virtuelle-mauer-berlin.de/

User interface

Although I call my works "virtual reality," I use no helmets or stereo effects. As enthralling as such "full immersion" technology can be, it also severely limits the audience I can reach. *Starbright World's* audience of seriously ill children, for instance, already spent too much time alone, physically attached to machines (dialysis, intravenous, etc.) and fighting nausea from their medications. The isolating, uncomfortable, often nausea-inducing stereo virtual reality helmet was the last thing they wanted to use for fun. The children used normal keyboards and mice to navigate through the virtual world, typing into text windows to chat and clicking on icons to initiate audio and video conferencing.

The primary content of *Starbright World*, as in any online multi-user world, is the interactions between users, and encouraging play among children was also the therapeutic intent of the virtual world. Child Life specialists lured children out of their beds by putting the Starbright PCs in playrooms where they would sit together with other children to collaboratively explore the virtual world. We provided collaborative activities such as mazes with portals that required two avatars to open, and the "Build-Your-Own Zone" (BYOZ) where children could construct their own environments (buildings, gardens, racetracks, mazes, etc.). My dream was that the world would become a stage set for the theatrical narrative "make-believe" games that are the basic component of child's play, but unfortunately, we were before our time. Years after the 3D *Starbright World* went offline, the 3D virtual world *Second Life*, using the now matured technology, has been able to achieve now what we hoped to provide for the children back in the mid 1990s: the ability to create their own world in a large online community.

In contrast to *Starbright World*, all other works discussed in this essay are single-user offline installations meant to be meditative, contemplative experiences that allow users to form their own internal narrative based on their encounters with the virtual world. The works are shown as large (3x4 meter or 9x12 feet), single screen projections. Even without stereo, if a life-sized image fills most of the peripheral visual field, the body perceives the image as a space, rather than an image, reacting kinesthetically to movement through that space even when the conscious mind knows it is "merely" an illusion. The large screen format also allows small groups to explore the piece together and thus discover and discuss aspects that each person might have missed alone.

In order to reach the widest possible audience, the user interface is kept to a simple joystick. Users "walk" up to objects and into buildings, where proximity sensors then react to the user's presence and trigger the next part of the dramaturgy. This simplicity allows me to show my works in relatively low-tech venues, thereby reaching people who would never buy computer games – and perhaps would never touch a computer at all. With *Beyond Manzanar*, for instance, an important target audience was former internees of the Manzanar Internment Camp, the very youngest of whom were born in 1945.

BM-installationAndUser300dpi-bw.jpg

Beyond Manzanar installation with user, Photo credit: Tamiko Thiel, 2000

User as dramaturgical lynchpin

When I started building first-person interactive worlds, I realized a profound perspective shift was needed in order to apply classical narrative theory to these works. Classical narrative and drama theory focus primarily on characters and the tensions between them in their roles as protagonist and antagonist, love interest, etc. The audience is expected to emotionally project itself into the drama, identifying with the characters and their conflicts. This classical model translates well into character-based games, in which users' characters are the protagonists who "develop" martially, economically, socially, etc. as they progress through different levels of the game. Games give users clear measures of this development in points, more weapons, etc. As users invest time in developing their characters, they become emotionally engaged; if their characters die, they suffer concrete feelings of loss as their investments of time and energy are wiped out instantly. Even in games such as *Myst*, *World of Warcraft* or my own *Starbright World*, in which the virtual world itself is an important and finely detailed part of the game, the virtual environment is still essentially a backdrop for the tasks and actions of the users and their goals. Without these tasks and goals, the game would lose its point; the virtual world might be beautiful, but would be empty of meaning.

In my VR installations however, the entire point is the encounter between the virtual world and the user, and the goal is for the user to understand the special qualities of the site itself, its genius loci. How can this encounter be itself dramatic and meaningful; how can the path become the goal?

Conventional wisdom holds that drama is almost impossible without characters, and research in interactive drama often focuses on developing better autonomous characters rather than on investigating the dramatic potential of the first-person interactive viewpoint itself. Yet anyone who has climbed a mountain or watched a sunset has experienced a dramatic arc created through a personal encounter with an environment and the effects of this encounter on one's body and mood. In such situations an additional "character" who emotes about the beauty of the sunset is not only unnecessary but in fact extremely annoying.

The combination of first-person viewpoint and interactivity in virtual worlds allows designers to create spaces in which stories are *experienced* rather than being narrated or depicted. To construct my artworks I have therefore developed a *first-person experiential* model of dramatic structure that focuses directly on interactions between the virtual world and the user, rather than on a projected sympathy with characters or narrators. To sum up the key concepts:

- It is not the users' characters who are the protagonists;, it is the users themselves. "Character development" happens not within characters, but *within the users themselves* in the course of their explorations of the virtual world.

- This means focusing on the *internal emotional states* that users should feel at specific points in their explorations: curiosity, trepidation, delight, fear, surprise, frustration, relief, exaltation.

- I "*choreograph*" these different emotional states together into sequences to create a dramatic structure for the virtual world and to define meaningful pathways within this structure. If the pathways are hyperlinked and/or looping rather than linear, this choreography becomes *episodic* with multiple dramatic arcs, rather than a classical drama with a single, all-encompassing arc.

- To convey a sense of *completeness,* the scenes in a virtual world must provide a balance of positive and negative, beauty and terror, drama and calm. Only beauty and joy is saccharine; only darkness and fear is depressing. The scenes with different emotional moods must fit together in a *cohesive* whole, with *constraints* on user movement concentrating the dramatic action and guiding users through the world.

I will give an example of such a choreography further below, but first I discuss how space and sequences of spaces can affect our emotional state, and thereby our behavior and perceptions (i.e. the emotional affect [10] of space,) and I define a character-independent concept of dramatic structure. Much of my thinking on this topic comes from the work of my father, Philip Thiel, who has examined the first person user experience in detail in the context of architecture and urban planning. I refer to just a few of his concepts here, but his influence underlies this entire essay.

The anatomy of space (from People, Paths and Purposes, *Thiel, 1997)*

A small space can feel cozy and protecting, or confining and claustrophobic. A large space can seem expansive and liberating, or overwhelming and terrifying. In order to be able to talk about the emotional qualities of space, and how to construct spaces to evoke specific emotional reactions in users, let us first discuss a few of Philip Thiel's concepts of the *anatomy of space.* The discussion here is drastically simplified; for a full discussion see Thiel, 1997.

First-person experiential viewpoint: the "forward isovist"

forward-isovist300dpi-bw-NEW.jpg
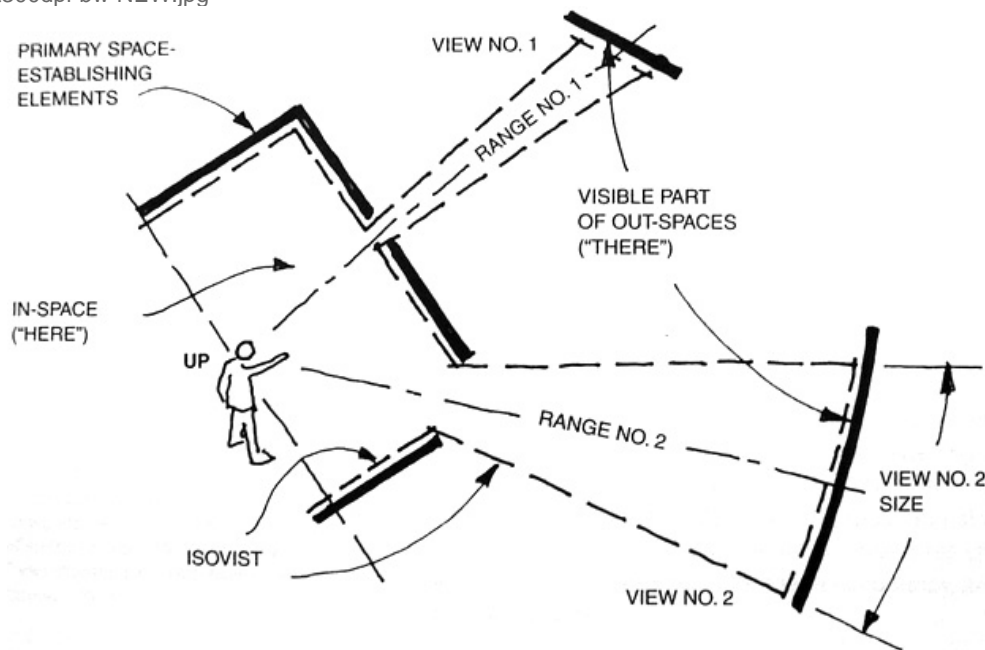
The forward isovist   Image credit: Philip Thiel

Philip Thiel always deals with space in terms of the *first-person experiential perspective* of a person moving through that space. At any given time, a person is situated at a specific point in space, and can influence or react to the volume of space contained in their *forward isovist.*. This is the space they can see in front of them and in which they can move without encountering an obstacle, plus more distant spaces visible through openings (such as windows or doors.) In my virtual worlds most interactions are triggered by location-specific proximity sensors that react to users' presence, and I lure users through the work with visual cues. Therefore the forward isovist is the primary spatial field that concerns me when designing user interactions with the virtual world.

Space, place and occasion

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[10] See Damasio, 1999 and the discussion of emotional affect at: http://www.affectivedesign.org/archives/30

Any given *scene* can be dissected into the components of *space, place* and *occasion:*

space-place-occasion-scene300dpi-bw.jpg
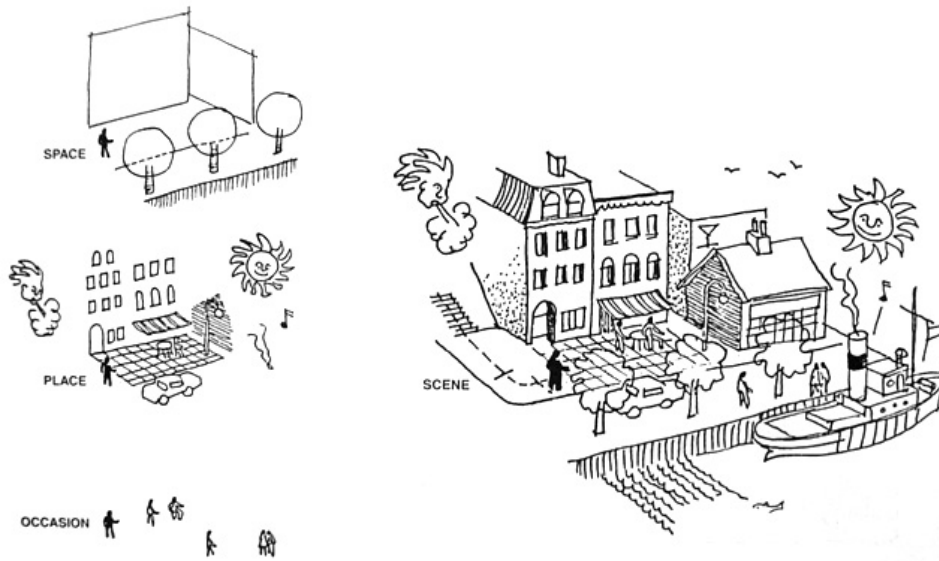
Space / Place / Occasion / Scene   Image credit: Philip Thiel

- **Space:** The physical volumes of the space itself, delineated by solid *surfaces* that block passage and sight, *screens* that block passage but not sight, and *objects* that users can go around. A specific space can be defined by attributes of size, shape, proportion, complexity and degree of enclosure.

- **Place:** The physical characteristics of the surfaces, screens and objects (furnishings), plus light, sound, olfactory and thermal effects that make this *space* particular and unique. These characteristics suggest but don't necessarily determine the emotional relationship the user might have to the *place*, for instance a prosperous and tidy village square or a dismal, garbage-strewn slum lot.

- **Occasion:** What people are doing in this place at a specific time: partying or rioting, children playing or soldiers shooting, etc. Designers can provoke strong emotions in the user in a single *place* by having a happy *occasion* turn into a violent one, for instance by having a party scene turn into a riot scene.

  If the virtual world is without "animate" occupants, the role of music, sound and lighting expands beyond a background function indicating *place,* to a foreground function also indicating *occasion*. For example a darkened room with dirge-like music and sounds of weeping suggest an emotionally negative occasion. such as a death in the family, whereas the same *place* brightly lit with festive music and happy voices suggest an emotionally positive occasion, such as a party. *Occasion* is time-based and the context of what occurred beforehand and the users' anticipations of what could come afterwards strongly affects the emotional tone as well. As in film, music can be used to create a mood and imply a coming *occasion* that belies the emotional mood created by the *place*: when dark, threatening music is played in a bright, pleasant room, we become tense and expect an unpleasant surprise.

- **Scene:** A given *space* detailed as a particular *place* during a particular *occasion*. Note that even if the *space* and *place* remain the same, if the *occasion* changes, the *scene* has changed too.

Examples of the emotional affect of space
Examples of how space affects emotional state
Examples of the emotional effects of space

The *place* together with the *occasion* help set the emotional tone of each *scene*. As the user, however, your emotional reactions to a space are very dependent on your situational context and freedom of movement. The same space can feel safe if you can leave at will; threatening if you are trapped. In *Beyond Manzanar*, for instance, the largest space is defined by the stunning beauty of the mountain backdrop. If you are in the middle of the camp, you do not see the fence and it seems you can just walk away into the mountains. Emotionally, you are a visitor, perhaps disturbed by the implications of the camp but not personally involved. If you go towards the perimeter, however, the barbed wire fence springs into view and you realize you are not in the omnipotent role of a guard or a "white visitor" who can leave at will, but are imprisoned here in the role of an internee.[11] (All images in this section: Tamiko Thiel and Zara Houshmand, 2000.)

BM-viewMiddleOfCamp300dpi-bw.jpg   BM-viewNearFence300dpi-bw.jpg

Beyond Manzanar: View in the middle of camp …   … and near the fence

Virtual reality lends itself to visualization of figures of speech, which can insert a "narrative voice" into the borderline between place and occasion. In the sky above the internment camp, headlines of the war and anti-Japanese signs fade in and out, literally "filling the air with fear." They underscore that you are confined not only by the barbed wire, but also by a wall of hate and media hysteria.

BM-campHeadlines300dpi-bw.jpg

Beyond Manzanar: Camp with headlines

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[11] For a detailed discussion of these techniques as applied to *Beyond Manzanar*, see my paper for the conference COSIGN2001 Semiotics of Computer Games: http://www.cosignconference.org/cosign2001/papers/Thiel.pdf

As a countering voice, when your path is blocked by the barbed wire fence, you see it contains poems of exile and imprisonment, inner thoughts of internees entangled in the barbed wire.

BM-FencePoem300dpi-bw.jpg

Beyond Manzanar: Fence poem

Playing with the contradictions between the signals given by place and occasion can also produce strong emotional affect. You are inside one of the seedy tar-paper barracks and can see the barbed-wire fence and watchtowers outside, but on the walls are happy family photos: the Jive Bombers jazz band, kids playing baseball. The music in this scene is a lively, happy tune, but if you listen more closely to the music you realize you are hearing the Jive Bombers' ironical theme song, "Don't Fence Me In."

BM-JAdream-barracks300dpi-bw.jpg

Beyond Manzanar: Japanese-American Dream/Barracks life

Unrestricted as it is by the "rules" of conventional Cartesian space, virtual reality can employ the user's own movements as triggers to change the world in ways that drive the spatial narrative forward. A space when entered does not have to have the same size – or content – as the space when seen from outside. At one point in *Beyond Manzanar,* when you enter a barrack the space within transforms into a much longer sequence of rooms, each representing different experiences within the immigrant American Dream. In the Iranian-American Dream scene the room is decorated like a family living room, with carpets on the floor and framed family photos on the wall. If you approach the photos too closely, however, the walls turn transparent. You find you are surrounded by media images of "evil Iranians" and are no longer on the ground, but are suspended in the air over the Manzanar Internment Camp – threatened with the same fate that befell Japanese-Americans decades before. Your own movements change this room from a secure and comfortable place to one that provokes feelings of insecurity, vertigo and fear.

BM-IAdreamRoom300dpi-bw.jpg

Beyond Manzanar: Iranian-American Dream …

BM-IAmediaNightmare300dpi-bw.jpg

… and the Iranian-American media nightmare

This ability to radically alter the place is one of the most powerful tools of virtual reality. At two different points in *Beyond Manzanar,* users can enter a barrack and exit into paradise gardens that were not there before. These scenes play on the gardens actually built by Japanese-American internees inside the barbed wire fence at Manzanar, and echo the paradise gardens that Iranians have coaxed out of their own deserts since time immemorial. To emphasize the emotional contrast between prison camp and paradise garden, we linked the scenes with the user's own actions: When you go too far into the Japanese garden, it vanishes around you and you fall back into the prison camp. If you leave the security of the Iranian garden, you trigger a war. This framing of the Manzanar landscape, sometimes with the prison camp, sometimes with a paradise garden, underscores how your emotional relationship to a space strongly depends on your situational context.

BM-JapaneseGarden300dpi-bw.jpg

Beyond Manzanar: Landscape framed by Japanese garden …

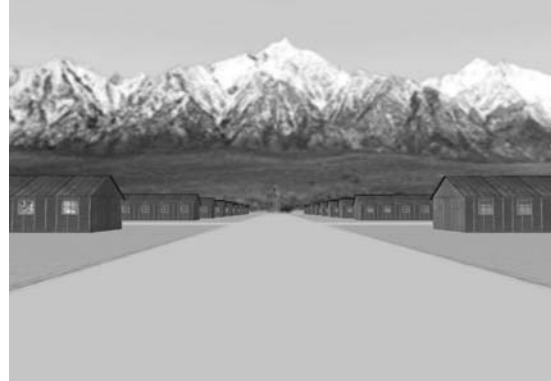BM-WithoutJapaneseGarden300dpi-bw.jpg

… and same view framed by internment camp

BM-IranianGarden300dpi-bw.jpg

Beyond Manzanar: Landscape framed by Iranian garden …

BM-WithoutIranianGarden300dpi-bw.jpg

… and framed by internment camp

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All these techniques create moments of Brechtian estrangement for the user, as Matthew Smith lucidly analyzes in his discussion of *Beyond Manzanar* in *The Total Work of Art* (Smith, 2007). They form an important part of the dramatic tension between the work and the user, provoking an internal dialog that fuels her personal "character development" as she traverses the virtual world and makes sense of its multiple meanings. Although at the time of this writing the final form of *Virtuelle Mauer/ReConstructing the Wall* is not determined, we will employ similar techniques to create dramatic tension in this work, contrasting the normalcy of daily life along the Wall with the military incision the Wall made into a placid residential area, and the grimness of its Death Strip with the bucolic idylls that grew up in its shadow. In both these works the point of dramatic confrontation is within the virtual world itself, between the cultural and social devices residents used to create a positive and protected personal space, and the grim realities of the negative external space.

In *Starbright World,* on the other hand, the point of dramatic confrontation was not *within* the virtual world but actually between it and the realities of hospital life for seriously ill children. They had enough life and death drama in their own lives; what they needed from us was a fantasy space where, like the internees in the gardens of Manzanar, they could for a while escape the prison of their own conditions. For the design team that meant having to tone down our impulses to build drama into the system, and focus instead on the psychological needs of the children, designing the virtual world to be a therapeutic counter to their "everyday" life.

We therefore designed a wide variety of environments to fit the children's varying emotional needs. To counteract the children's restricted, bed-ridden reality, we gave them a seemingly vast virtual world in which they felt they had total freedom of movement. Rather than creating a single large "playground," we created several smaller spaces that visually gave the sense of openness but were actually quite bounded. These spaces were linked together via magic portals (a rainbow, a cave entrance, etc.) which caused the current scene to be turned off and the next one to be turned on, giving the sense of a continuous world. We created a tropical oasis with waterfall and pool as a sunny and positive environment for a child who wanted cheering up, a dark labyrinth of caves for a bored child who was up for more of a thrill, a serene sky world for a child looking for peace and calm, and the bright and cluttered game cloud and building zone for the restless child who wanted stimulation. Children could go to a space that fit their mood and expect to meet other children in similar emotional states.[12]

A generalized theory of dramatic structure

How can these various components of an interactive virtual world be fit together into a dramatically and emotionally meaningful whole? As Kandinsky looked to music for a model of how to create meaning in paintings without figurative references, I looked to music to understand how to free dramatic structure from a dependence on characters. Although some music uses leitmotivs that refer to specific "story characters," and there are cultural conventions in which certain keys are perceived as "happy" or "sad," these are clearly not the sole source of emotional affect for the listener. How can music evoke powerful emotional reactions and the feeling of deep meaning even without explicit references to the human world?

The music theorist Leonard B. Meyer, in his book *Emotion and Meaning in Music* (1956), proposed that music evokes emotional responses in listeners largely by purely structural means:

- music always operates within a well-defined but culturally specific *structure*

- within this structure it *arouses expectations* of what the work is about and how it will develop

- *it plays with these expectations* to create suspense and tension: fulfilling them, disappointing them, surprising them, leading them on, etc.

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[12] See "Images" link at http://www.mission-base.com/tamiko/starbright/

- finally, it creates meaning by *resolving the tensions* thus created, concluding with culturally based conventions that indicate the piece has come to an end.

How can we apply these abstract musical concepts to a very different medium, that of interactive 3D virtual reality? Here I am indebted to Brenda Laurel's seminal *Computers as Theatre* (1993), in which she showed how the classical drama theory concept of dramatic arc can be applied to interactions with computers. If we extend this analysis to other time-based arts, looking at how they engage with the attention and emotions of the audience, we see that they all use these same basic techniques. In the following section I use the Pyramid diagram of the 19th century German dramatist Gustav Freytag[13] as a general framework to compare dramatic structure for interactive virtual worlds, classical narrative drama and various forms of music.[14] For a hyperlinked, looping dramatic structure, we concatenate and superimpose multiple pyramids in various ways.

freytagPyramid300dpi-bw.jpg
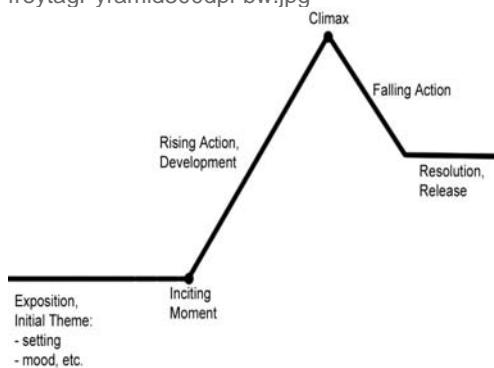
Pyramid of dramatic structure after Freytag
Credit: Tamiko Thiel

freytag-looping300dpi-bw.jpg
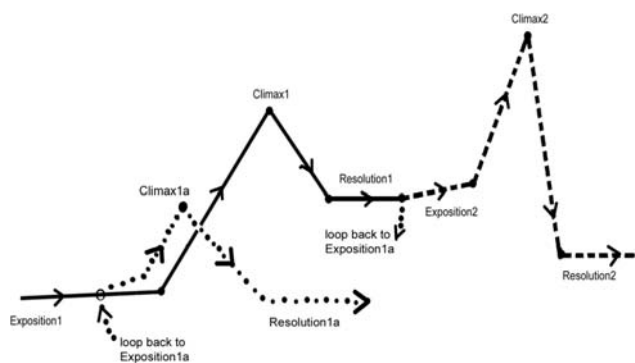
Pyramid for a hyperlinked, looping structure
Credit: Tamiko Thiel

- **Exposition/Initial theme:** The first scene that users encounter sets their initial expectations: "What type of world is this? What could happen to me here?" This is analogous to introducing the main character and primary conflict in a narrative, or introducing the primary theme in a musical work.

  Even if the work is looping and hyperlinked, with no real beginning or end, users will perceive the first scene they happen to see as an initial theme when they construct their own internal narrative. Users will employ common nonlinear narrative conventions such as flashbacks or "waking from a dream" to order scenes as necessary to "make sense."

- **Inciting moment:** The "inciting moment" which ends the exposition is analogous to the act of "crossing the threshold" or "accepting the challenge" in Joseph Campbell's theory of the Monomyth (Campbell, 1968), the point at which the narrative leaves the familiar and embarks on an adventure.[15] In a virtual world, I often implement this literally, so that crossing the threshold to a portal changes the world around the user.

- **Rising action/Development:** In interactive worlds, the narrative is driven by users' actions or explorations. In their explorations users may discover unexpected aspects of the world which change their understanding of what the world is about and their expectations of what could happen in the future. Designers can play with the sequence of scenes or of moods within scenes to provoke emotional reactions in the users. If the previous scene had a positive atmosphere, the next one could be negative; if the first scene is a normal everyday world, the next one could be fantastical. This is analogous to how new characters and plot complications are

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[13] Freytag's Pyramid: See Laurel, 1993 and http://en.wikipedia.org/wiki/Dramatic_structure
[14] Many thanks to Betsy Marvit and Steve Le Blanc for their clarifying discussions on this topic.
[15] For an overview see also: http://en.wikipedia.org/wiki/The_Hero_with_a_Thousand_Faces

introduced into a narrative, or the introduction of a secondary theme or dissonance in a musical structure.

- **Climax:** I define climax in an interactive world as the scene in which users experience an emotional high point, a point of maximum visual and acoustic turbulence, whether of positive or negative emotions. In classical narrative the turning point marks a distinct change in the protagonist's affairs to a situation that is much better (comedy) or far worse (tragedy); in music this can be the point of maximum dissonance or maximum tempo, loudness, etc.
- **Falling Action followed by Resolution/Release:** The climax is followed by a pronounced reduction of emotional arousal in the falling action phase, with a return to a state of "normalcy" or relative calm. The falling action phase, or alternately a jump directly from climax to resolution, is necessary for users to perceive the climax as a high point, as our bodies adapt to and finally ignore a continuing stimulus, even one at a very high level. Classical narrative drama often aims for a grand resolution in which hidden connections among various subplots are revealed, the fates of the major characters are explained and the various threads of the story are all tied together. In a VR installation, however, users can enter and leave the exhibition space at any time. There is no real beginning, and especially in a looping structure there is no real end. How can we create a sense of emotional conclusion for users?

  Here it is useful to look at episodic or serial narratives, which are experienced by the audience as sub-plots in a larger narrative, each with its own climax and falling action. There is no complete resolution of the drama but rather a release of the built up emotional tension to create a calm point of lowest emotional turbulence, after which the story continues into the next dramatic arc. Western music uses an analogous device, reducing or resolving dissonance by returning to the original or a harmonically related key. Another form of resolution for music pieces is a strong change in tempo, ether slowing to a stop or driving to a frenzy that then suddenly ends. In all case, the works create emotional turmoil that is then soothed or driven to a yet higher peak, followed by a sudden release that provides a catharsis.

- **Restart:** After a dramatic arc ends, an interactive world must provide some incentive to continue, an indication that new experiences may come if the user sallies forth again. Perhaps the world has changed, perhaps there are other paths not taken that are waiting to be explored. For myself, the rewards of such a world that can be repeatedly visited and explored outweigh the lessening of the dramatic climax. This means however that I must provide enough content in each scene to reward users for multiple visits. In summation, rather than giving users a fragmentary experience of a work of unknowable extent, I want to give them episodic experiences that are clearly part of a larger dramatic narrative – a small but emotionally significant difference.

Example: Choreography of scenes in The Travels of Mariko Horo

To create a dramatic "choreography" of scenes in an interactive world, designers need to be aware of the basic emotional mood of each scene, whether neutral, negative or positive, and how that basic mood is modulated by what could come before or after. Designers should concatenate sequences of scenes as composers arrange phrases within a piece of music, complementing or alternating emotional states, building suspense or releasing it dramatically. Neutral spaces can function as resting points, a place of calm or of lowest dramatic turbulence, that provide resolution or release within the dramatic arc. In works that loop, these function as restarting points for users' explorations.

In *The Travels of Mariko Horo* the logic of completeness, of a balance of positive and negative spaces, meant that once I decided to build Heaven I also had to build Hell. I used the Buddhist concept of rebirth to structure the multiple paths through these spaces into cycles that consciously disturb the linearity of the Christian cosmos and provide multiple dramatic arcs that give users a feeling of closure at the end of each cycle. (All images in this section: Tamiko Thiel, 2006)

Introduction / Initial theme

Scene 1: Mariko's house interior
You can walk into the installation at any point in the work, so there is no true "initial scene." You always return to Mariko's house after rebirth, however, so this is a common starting point for many choreographies. If you have no experience in Japanese culture the interior may be exotic, but as a stable, recurring environment it becomes familiar and of all the scenes is relatively realistic and commonplace. The scene may feel slightly claustrophobic but otherwise calm and neutral.

MH-marikosHouseInterior300dpi-bw.jpg

Travels of Mariko Horo: Mariko's house, interior

Scene 2: View outside of Mariko's house
The screens open automatically and you see a herd of dolphins playing around the house – depicted in a stylized fairy tale esthetic. Outside, a gondola is waiting for you at the foot of some steps. In the distance you see low islands in the lagoon and a few buildings. The mood is still calm and fairly neutral. There may be slight negative feeling of loneliness, balanced with a positive feeling of curiosity.

MH-marikosHouseGondola300dpi-bw.jpg
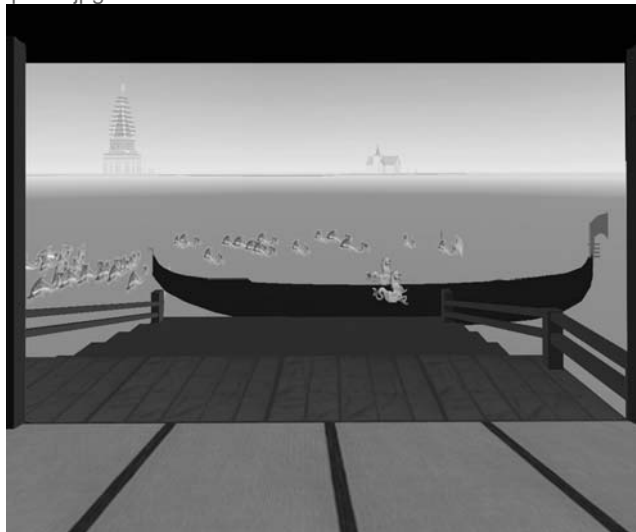
Travels of Mariko Horo: Mariko's house, view onto gondola dock

Inciting Moment

Scene 3: Into the gondola and underway in the lagoon

When you step into the gondola, golden seahorses inflate to full size, sparking a brief feeling of surprise. Any subsequent motions with the joystick cause the seahorses to pull the gondola through the water. We have clearly crossed a threshold into the fantastic, but the world still feels fairly neutral, tinged with positive feelings of delight at the movement of the gondola and perhaps a touch of negative feelings of loneliness and uncertainty as to what will happen next.

MH-GondolaToPagoda300dpi-bw.jpg

Travels of Mariko Horo: Gondola to the Pagoda

Rising action / Development

Scene 4: Pagoda portal to the underwater realm

If you dock at the island of the Pagoda and enter the building, the ground opens under your feet, provoking a transitory negative feeling of alarm, followed by positive feelings of surprise, delight, curiosity as you fall into a fantastical underwater realm with lacy white buildings. You may recognize Venice's Piazza San Marco, or, depending on your cultural background, you could have associations with Alice's descent into Wonderland or the Palace of the Dragon King from the Japanese fairy tale Urashimataro. Even if the scene awakens no specific associations, the mood is of positive fairy tale expectations.

MH-underwaterRealm300dpi-bw.jpg
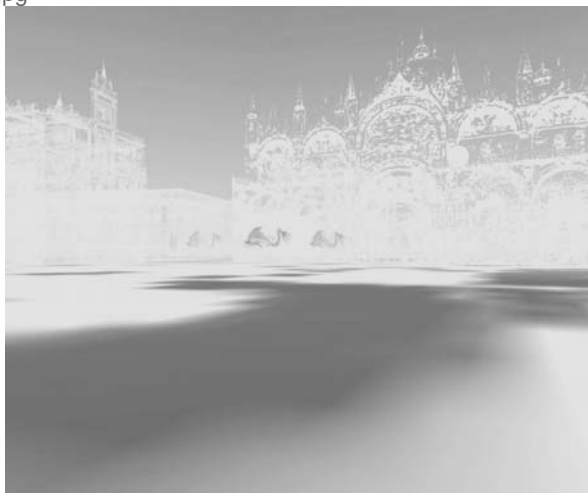
Travels of Mariko Horo: In the Underwater Realm

Scene 5: In the Palace of the Heavenly King

There are many buildings here, but I will detail only one path: When you enter the building with the most extravagant façade (the Basilica San Marco), it transforms from lacy white to bejeweled gold; the space fills with clouds of angels singing sacred music. You also see men with halos like saints, but red, demonic faces and large, staring blue eyes. Even those who do not recognize the references to "oni" and "tengu" – ogres and goblins frequently representing foreigners in Japanese mythology – might find the figures puzzling and somewhat disturbing. The mood is a mixed of positive delight at the beauty of the building and negative apprehension at the peculiar men. If you then approach a large seated figure, half hidden by the intricate façade of the building itself, the saints immediately surround you, the music strikes a loud chord –

MH-HeavenKingAndSaints300dpi-bw.jpg

Travels of Mariko Horo: Saints and the Heavenly King

Climax

Scene 6: The Court of Final Judgment

– and you are transported up to the Court of Final Judgment. Here presides the Byzantine icon of Christ from Venice's Basilica San Marco – but his red skin, huge, staring blue eyes and eight arms give him the aspect of a fierce Buddhist Heavenly King. He sits in judgment surrounded by heavenly hosts, the music is loud with wild, clashing cymbals and the flames of Hell lick at your feet. Clouds of the saved rise upward; clouds of the damned fall into the hellfires. The scene has a dramatic beauty but your senses are overloaded, you are startled, confused, and apprehensive about what will happen next.
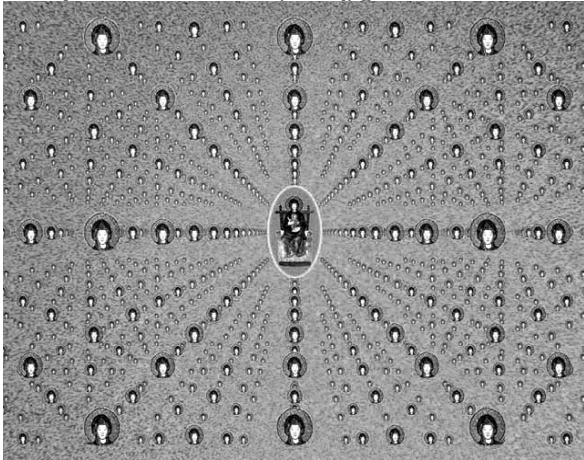
MH-CourtOfFinalJudgment300dpi-bw.jpg
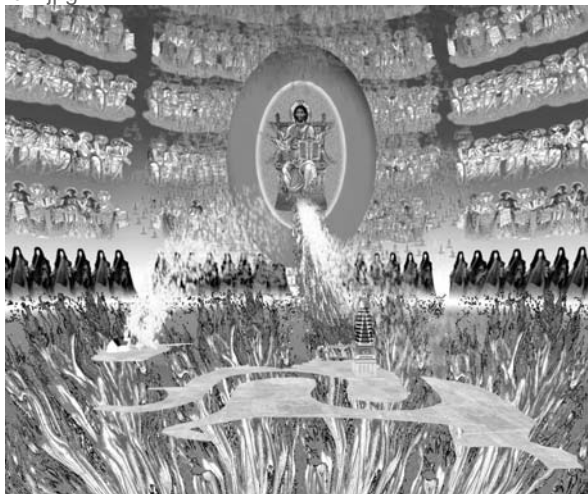
Travels of Mariko Horo: The Court of Final Judgment

Scene 7: Heaven or Hell

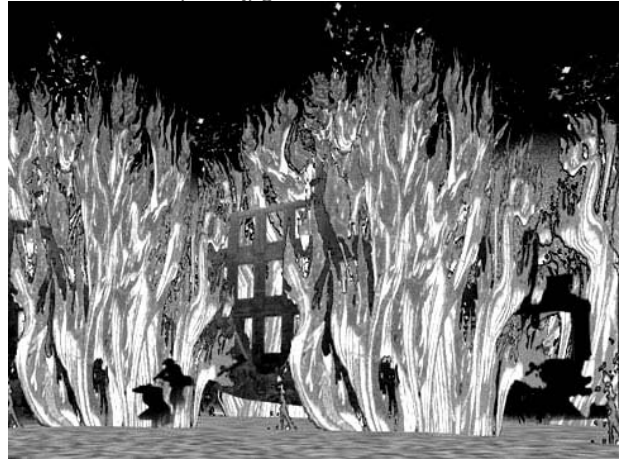Your own movements now determine where you go next: to Heaven or to Hell:

MH-CrystallineHeaven300dpi-bw.jpg

Travels of Mariko Horo: Crystalline Heaven

MH-Hell300dpi-bw.jpg

Travels of Mariko Horo: Hell

In Heaven, the music becomes soothing, peaceful; the air filled with the thousandfold countenance of the Goddess of Mercy. You feel sudden relief and a sense of tranquility. Here a Christian cosmos would end, but Mariko's cosmos is structured according to Buddhist concepts. Only the enlightened who are free of desire escape the cycles of death and rebirth. Those who are restless and continue to explore will fall back to earth.

In Hell the negative stress of the previous scene is driven to a peak. Your already beleaguered senses are additionally assaulted by shrieking flames and roaring gunfire as you find yourself in a videogame war zone of ruins. Luckily, in the circular structure of Mariko's Buddhist cosmology, you can even escape from Hell. If you try to raise yourself – if you really want to – you can return to the mortal world.

Resolution

Scene 8: Rebirth in Mariko's house

Whether you have been in Heaven or Hell, you are reborn in Mariko's house. It is familiar, you have awakened from a dream, returned to real life. You may feel regret at losing Heaven or relief at escaping Hell, but for now you are at a neutral point, a release from the tensions of your journey and the stress of the unfamiliar.

MH-marikosHouseInterior300dpi-bw.jpg

Travels of Mariko Horo: Reborn in Mariko's house

Scene 9: Garden or Ruin

From outside however you hear strange music … the sliding screens open, revealing a changed world. Depending on your past actions you have changed the world for better or worse. Positive delight or negative dismay replace the quiet neutrality of your rebirth. You have returned to the beginning, but the world is different and you embark again into the unknown, in delighted anticipation or worried apprehension.

MH-WorldAfterHeaven300dpi-bw.jpg
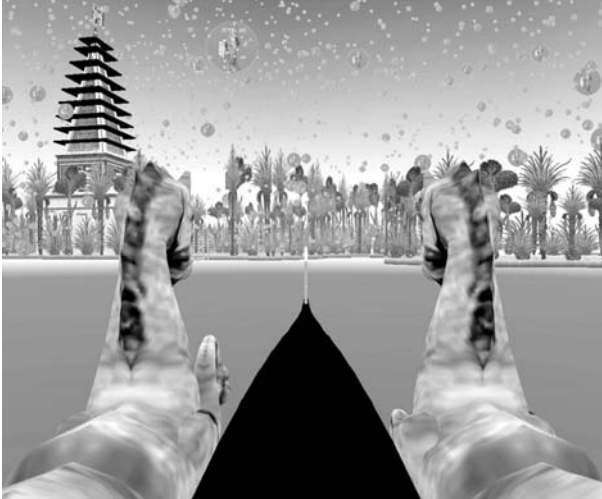
Travels of Mariko Horo: The world after Heaven
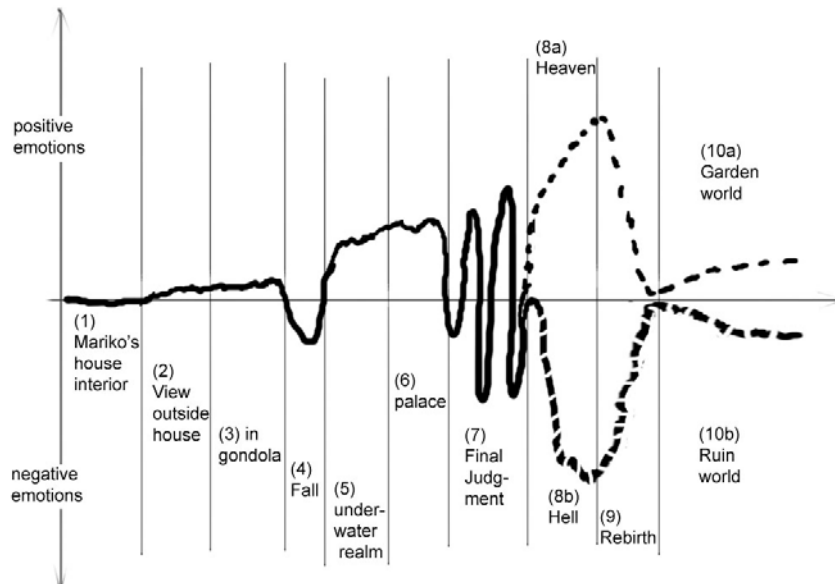
MH-WorldAfterHell300dpi-bw.jpg

Travels of Mariko Horo: The world after Hell

Overview

If we graph the positive and negative levels of arousal versus time, scene by scene, it could look as follows:

MH-arousalGraph300dpi-bw.jpg

Graph of emotional arousal versus time in *The Travels of Mariko Horo*

If Mariko's world consisted only of the fantastical underwater realm, without a "normal" world as reference, after a time your initial surprise and delight would fade and the dream-like character of the world would seem

normal and mundane. Without the dramaturgical tensions of the Last Judgment scene, the fall from Heaven and the possibility of descent into Hell, the world would lose its edge and its dramatic arc would be much flatter. Your encounters with the sometimes unsettling imagery and experiences in the piece are more intense and memorable because you are not a passive viewer, but an active if sometimes unwilling initiator, triggering them with your own decisions and movements.

Conclusion

Interactive virtual reality can provide a site-specific experience that goes far beyond "real life," enhancing exterior form with interior spaces carrying cultural and emotional meaning. Spaces and sequences of spaces can tell stories, if the designer understands the expressive qualities of space and how to use sequence to create dramatic structure for the user experience. The designer must understand the emotional affect of each of the virtual spaces on the user, and organize these scenes into phrases or movements, sequences of scenes that play with users' expectations to create the classic build up, climax and resolution of dramatic narrative. The interactive first-person viewpoint puts users in the role of protagonist, allowing them to drive the narrative forward with their own movements and actions, giving them a sense of participation in and responsibility for the events that happen to them in the course of their explorations. Thus the encounter becomes an actively lived experience rather than a passively absorbed lecture.

Space, place and occasion do not have to be logical, and in fact their affective power is enhanced when used to express verbal metaphors visually and spatially. Internal states of being can be built directly into the 3D form, as when entering a room is "retreating into one's memories," or when archival newspaper headlines float in the sky to express "air thick with fear." These effects of Brechtian estrangement are powerful stimulants to users' internal dialog, which is the true source of their "character development" as protagonists of the interactive experience. The designer should not restrict herself to replicating real space, but should use the transformative powers of interactive virtual reality, opening up worlds of imagination and memory in which the user is an active participant in a dialog with the genius loci of the site – where stones can speak.

Works mentioned in this essay

Campbell, Joseph (1968). *The Hero with a Thousand Faces.* Princeton, NJ: Princeton University Press.

Laurel, Brenda (1993). *Computers as Theatre.* Reading, MA: Addison-Wesley Publishing Company.

Polo, Marco and Latham, Ronald, translator (1958). *Marco Polo: The Travels.* London, Penguin Books.

Meyer, Leonard B. (1956). *Emotion and Meaning in Music.* Chicago, IL: University of Chicago Press.

Smith, Matthew Wilson (2007). *The Total Work Of Art: From Bayreuth to Cyberspace.* New York, NY: Routledge.

Thiel, Philip (1997). *People, Paths, Purposes: Notes for a Participatory Envirotecture* Seattle, WA: University of Washington Press.

Wertheim, Margaret (1999). *The Pearly Gates of Cyberspace: A History of Space from Dante to the Internet.* NewYork, NY: Doubleday.