Chapter 17

The Morphology of Space in Virtual Heritage

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A quest for enchantment in virtual heritage

One of the central cornerstones of cultural heritage is authenticity. Its claims to the real and to some type of scientific truth or factuality are historically validated through the artefact as commodity and the aura of its unique presence in time and space. In this context, the main function of heritage is the preservation and exhibition of curiosities, with the monument as a tangible expression of permanence and historical authority.

Since the early twentieth century, heritage institutions have moved away from the collection of physical artefacts to photographic and filmic forms of reproduction, and more recently to digital creation and delivery. As the significance of digital images has grown, the form of the factual has become increasingly virtualized—that is to say, it has become separated from any real object. As Walter Benjamin observed in discussing the replacement of the original by the copy, art is severed from its relationship to ritual and magic.¹ Benjamin understood the mechanical reproduction of photography and film to involve a loss of aura associated with ritual and religious objects and a liquidation of the traditional value of cultural heritage.² He described how mechanical reproduction yielded new forms of perception that emancipated the work of art from its relationship with elite and private forms of consumption. Thus Benjamin's work brought into focus the notion of art as politics. It also brought into focus how enchantment, ritual, and other elements associated with the contextual integration of cultural heritage are displaced by technologies of reproduction.

In this era of digital technology and connectivity, access to heritage is increasingly mediated through the consumption of signs, electronic images and simulacra. In virtual heritage, an algorithmically accurate large-scale 3D model of a cathedral or castle is taken as the hallmark of authenticity. However, the reduction of the monument or artefact to visual simulation disrupts its connection to material evidence and thus to history.³ What is lost is the aura of the well-crafted object or the exquisitely designed monument that resonates with the memory trace of previous civilizations. The unique object removed from the place where it happens to be takes it away from the fabric of tradition. The commodification of artefacts extracted from place and exhibited under spotlight and glass function as one form of separation. Plaques, accurate dating, and interpretative documentation act as another separation. As interpretation replaces direct experience of the cultural object, information replaces the presence of the past. As Benjamin noted, the separation of the object from history also erases a sense of enchantment and wonder. In its place is a move towards augmented reality pieces such as virtual tours, flythrough applications and highly accurate data maps. In these digital landscapes, the emphasis is on the construction and mapping of space—for documentation, conservation and visual realism. Spatial objects, terrain maps, and complex digital environments thus become the markers for a different, more spatially inflected heritage experience.

The shape of space

The space of virtual heritage is not neutral ground. The application of digital media to cultural heritage privileges certain forms of spatial representation over others. Virtual heritage reconstructions such as the 3D modelling of Stonehenge and Amiens Cathedral, and the panoramic space of the Virtual Everglades take photorealism or its

simulated geometric 3D equivalent as the standard, unquestioning model of vision. Characterized by an attention to mathematical accuracy and the placement of solids, the translation of the monument or artefact to geometry has become the hallmark of authenticity and the standard for a certain kind of realness. The result is a divided, directional space that reduces the complexity of spatial experience down to an XYZ grid of mathematical absolutes. The experience can be like wandering in a lifeless universe lacking in human scale, or social and cultural presence.

Take, for instance, the geometric perspective exemplified in software programs such as *3D Studio Max* or *Maya* (modelling programs used in constructing many 3D virtual models for heritage). *3D Studio Max*, developed from a CAD program for use in architecture and engineering, is designed to record the shape of concrete objects and the layout of concrete spaces. Working from a grid of lines, it forces a notion of space as mathematical division and a container for objects. Within this, mathematical perspective is a particular form of construction that splits space into object-horizon polarity (figure 17.1).

3D Studio Max was initially designed for the viewer looking at a painting from a fixed position, and Mani Kaul suggests that mathematical perspective resists its restoration to a unified human space.⁴ He describes the geometric appropriation of nature within Renaissance art as an initiatory moment in the celebration of the isolated object and the division of space into distance and size. This can be seen most markedly in “The Flagellation of Christ”, painted by Piero Della Francesca in 1460 (figure 17.2).

In this painting, space is broken down into the separate components of the human form, the architectural form, and the background spatial matrix. In such paintings, space itself is the object of study, with structural distance and symmetry

designed for an idealized eye. Mathematical perspective, as Kaul writes, is a space outside the being, a projection of the unreal.⁵ Such an approach emerges from a longer history based in Western cosmology where space is understood as static and uninhabited. Part of the problem is the English word for space—conjuring, up as it does, the distance between two points, or the background containing objects. As Margaret Wertheim notes, Rene Descartes’ model of *res extensa* and *res cognitans* split space into the physically extended realm of matter in motion and the invisible realm of thoughts, feelings and spiritual experience.⁶ As she points out, by the end of the eighteenth century, *res cognitans* was effectively eliminated with no place for mind/spirit/soul. As a result, the realm of the real was reduced to a self-contained mathematical machine with anything outside of physical matter categorized as empty space.

An understanding of space, of course, has multiple inflections and discourses relating to cultural context and perception. Outside of a European framework, the Cartesian model of spatial demarcations was barely noted except by Japanese thinking.⁷ Take, for instance, Indian cosmogony, which considers space as the prime factor as a “matrix of dimension”. In this Indian framework, space encompasses what has been polarized in the West—that is, the outer and inner, spiritual and material, human and divine. The Sanskrit word for space, *akasa*, denotes multiple dimensions, not a void but a substance.⁸ Aspects of *akasa*—*cittakasa* (mental space), *cidakasa* (consciousness) and *bhutakasa* (physical space)—include ritual space, human perception and material space.⁹ Within Yoga-Vasistha, *akasa* serves as the powerful symbol of pure consciousness, with *cidakasa* (consciousness), not the mental and physical aspects of space, as ultimately real. As Bettina Baumer notes, in Indian spatial cosmogony, not only are things in space, space is also in things. In other

words, we are active agents in spatial creation and create space as much as space creates us—a kind of “homo spatialis”.¹⁰ Such an approach presents quite different ways of inhabiting space, as experienced in Hindu temples, Persian miniature painting, *yantras*, and classical dance.

In spite of its cultural specificity and limitations, virtual heritage remains resolutely bound to a cultural model that unquestioningly maintains mathematical perspective and its translation into Cartesian coordinates as standard practice. What the use of 3D laser scanning and 3D modelling programs then represents for virtual heritage is an embalming of the idea of space as the emptiness between three-dimensional solids, devoid of the realm of thoughts, feelings and experiences. High levels of verisimilitude are taken as evidence of increased user presence or immersion in virtual environments. And, by implication, this increased density of object information is associated with a more engaged and enchanted user.

Imaging space as an extension of Cartesian mathematics as reflected in the 3D geometry of walkthroughs and modelling may have value for database and archival purposes, but it omits other, more useful forms of representation. While the simulation of the “real” through the XYZ dimensions of digital reconstruction remains standard practice, cultural heritage offers a limited range of ways to experience the past. Large-scale 3D models and algorithmic representations of a cultural site, while being “historically accurate”, can only present history in an aesthetized, desocialized, and artificialized form. An over-emphasis on the production of “historically accurate” digital representations at the expense of other types of user engagement can result in a dumbed-down form of heritage devoid of cultural meaning. As many commentators have argued, an emphasis on detailed rendering and an exaggeration of the foreground background axis limits the user’s social presence.¹¹

In the highly geometric space of 3D modelling, the space for sociality is denied along with the performative and ritual dimensions of heritage. Within it, the body remains disembodied, abstracted into the spectator, locked out from the expectation of individualized agency. A broader morphology can open up the field of virtual heritage to explore how past communities perceived and represented their physical and social environments.¹² As Anthony Pace argues, this can include various non-material aspects such as symbolism, ideology and ritual, a concern with the social and abstract dimensions of heritage, ceremony and the creative use of aesthetic objects and spaces.¹³ If virtual heritage is extended to take account of the complexity of interfaced being, there can be a return to a form of enchantment as a varied array of culturally and historically specific spatial encounters with the past.

A user-centred model of interaction with the past

One aspect of virtual environments is the user's ability to "walk through" digital screen space. In the last decade, laser scanning, 3D modelling and photogrammetry have provided astonishingly high levels of geometric verisimilitude. Such regimes of digital simulation undermine the indexical relationship to the object, replacing it with an emphasis on spatial modelling. So, whilst the art or archaeological object might still be visualized within the digital landscape, there is a privileging of spatial representation and navigable construction. Along with this, the role of the audience as merely a knowledge recipient is challenged. Yet, as researchers of virtual reality have observed, virtual environments lack the richness of association and the levels of user engagement that we find in computer games. As Mona Sarkis and Laetitia Wilson have identified, interaction has often been used to mean a form of interpassivity where the user has limited options within a pre-programmed menu.¹⁴ In large-scale virtual

heritage environments, user engagement is often restricted to a disembodied walk through a clean simulation, devoid of the marks of human habitation and endeavour. In being exposed to limited interaction, the user exercises little purposeful action that can generate a sense of “being there”. Any approach that does not take user experiences as central will produce less than engaging spaces.

Rather than questing after the holy grail of greater realism, or forcing a narrative interpretation onto spatial experiences it might be useful to ask different types of questions focusing on the role of navigation and the user’s sense of agency—such questions as: What types of embodiment might be represented? How might these geographies then constitute an authenticity of experience? Can metaphysical or symbolic ritual experiences be simulated? In what ways can virtual environments take into account feeling, perception, and agency to convey cultural context?

In seeking to create forms of interaction and spatial engagements that convey the cultural context in virtual heritage, it is useful to explore the ways that games have brokered effective user models of interaction. Computer and console games offer the most sophisticated examples of user-driven navigation. Games from the massively multiplayer online computer role-playing games (MMORPGs), such as *EverQuest* and *Ultima online*, to PC games such as *Civilization* and PlayStation’s *Final Fantasy* or *Grand Theft Auto* construct spatial landscapes which the player must navigate and interrogate. This approach substantially changes the role of digital media consumer from knowledge recipient into active participant—so that, rather than data retrieval and access, there is aesthetic immersion—rather than narrative structure there is interactive agency.

Computer games offer substantial attractions to the player through the provision of choices. These are too numerous to canvass fully here, but include

challenges or tasks responsive to the user's level of knowledge; sociality with other players; discovery through exploration; and a sense of being there, or presence. In seeking to move away from costly supercomputers and CAVE or reality centres to more consumer level applications, a number of virtual heritage developers are adapting game engines for heritage purposes. An early example of this is Victor DeLeon and Robert Berry's *Virtual Florida Everglades* project.¹⁵ Developed in 1998, it utilizes Epic's *Unreal* 3D games engine to introduce AI organisms, emergent behaviours and environmental triggers. For DeLeon and Berry, the illusion of being there is constructed through high-end 3D visualization, detailed texture mapping and atmospheric conditions. While these regimes of visibility are still privileged as the markers of authenticity and "realness" they are augmented by responsive ecologies that simulate the chaotic patterns of organic systems. Such an approach, resulting in random and self-generating environmental behaviours, can create a more complex and dynamic simulation that offers interaction options beyond representation.

Virtual heritage as individualized trajectories of memory

In entertainment-based computer games, agency or the act of doing is constituted through diverse modes of spatiality. These modes of spatiality contribute to game-play through such strategies as constraint and concealment, challenging the player to negotiate terrain to access objects, meet avatars, find portals, and do battle.¹⁶ One aspect that makes such games so interesting is that the environment—the roads, bridges, paths and doorways—cannot be perceived as a whole all at once by the player. Building up knowledge requires commitment to a series of spectral voyages—an extensive exploration of terrain through panoramas, cartographic maps, isometric diagrams, abstract expressionist planes, and geometric landscapes. Through

these sets of spatial negotiations, players become involved in the sequential unfolding of a record of signposts and metaphors embedded in the landscape.

The particular ways that users inhabit computer game space play an important part in rethinking the practice of virtual motion. Virtual motion provides ways of looking differently or more intensely. The close scrutiny of architecture required to find objects and decode the logic of the navigable world suggests geography—a sense of inhabiting a map—rather than filmic models of spectatorship. There is also a spatial pleasure gained through travel in a well-designed virtual landscape, which is quite separate from ludic or game-play pleasures. In games such as *Exile* and *Final Fantasy*, the movement of the player materializes picturesque space as spatial practice. In turn, this spatial practice offers up multiple habitations that afford ritual experiences or emergent narrative traces.¹⁷ The designer structures a trajectory through game-space to regulate the practice of play in a specific direction. Often we disrupt these intended trajectories by adopting our own individual, idiosyncratic pathways or strategies of navigation. These individual trajectories—or, in Michel de Certeau's terms, “tactics”—transform place into space as a series of unfolding relationships. In this way, a process of labyrinthine meanderings invite re-collection of structure through “spectorial trajectories of wanderers who make up their own cultural maps along the way”.¹⁸

In navigation, we develop an internal map or associational relationship to place by recall and numerous visits, which becomes a type of architectonics of the memory theatre.¹⁹ A fragmentary aesthetics of space is joined together by the experience of disparate trajectories through space and the high points of memory associated with this traverse. As the Situationists highlighted in mapping the *dérive*, or the drift across Paris, our landscapes are fashioned by psychogeography—by the

sphere of the emotional being moving through space. This affective traverse of space, which details the effect of the geographical environments on behaviour and emotions, speaks to the experience of the meander or the wander in virtual space. As Giuliana Bruno suggests, a form of psychogeographic mapping may periodically return to reinvent the measure of spatiotemporal configuration itself.²⁰ Such an approach embedded within a montage of experience assumes that navigation is far from a primarily narrative configuration. Instead, it bypasses arguments about games telling stories, espoused by narratologists, or the primacy of conflict-ridden conquest, argued by ludologists, to suggest that navigation itself, as a mode of spatial engagement, activates an inter-subjective terrain mobilized by aesthetics of fragments and discontinuities.²¹

An increasing number of game-players engage in navigating through landscapes that are alive with a simulated aura of place. Relationships between mastery of terrain, symbolic encounters, emergent patterns, and seductive objects transform the idea of a bounded place into a dynamic and resonant space. Michel de Certeau, writing about the art of doing, makes the distinction between space and place where place is a stable and distinct location, and space is composed of the intersection of mobile elements, taking into consideration vectors of direction, velocities, and time variables.²² Using de Certeau's terms, the user enunciates space through the practice of movement. Navigation as practice creates a sense of enchantment or wonder through the occupation of space (figure 17.3).

If, as de Certeau suggests, space becomes a practised place only through the activity of walking, then by extension it could be argued that in virtual spaces it is only through navigation that the terrain has a language and can bring meaning to the experience. This can be considered a different type of aura—an aura of spatial

enchantment associated with the practice of virtual motion. In the atmosphere of these emotionally moving situations, space becomes an affective landscape inhabited with an intense form of subjectivity.

Embodied movement

What, then, of a body moving in virtual space? The mathematical realism of virtual mobility has tended to assume a passive viewing subject. In this legacy, the virtual body is rendered invisible or translated into a visual element of screen design.

However, spatial aesthetics, ways of moving through space, structures of navigation, and perceptions of the virtual self or avatar are not only forms of the visual. A too-narrowly inflected approach to spatial design obscures the fact that virtual forms/embodied beings need a space. In *Architecture from the Outside: Essays on Virtual and Real Space*, Elizabeth Grosz argues for space that takes the body into consideration: “Space like time, is emergence and eruption, orientated not to the ordered, the controlled, the static, but to the event, to movement or action.”²³

She takes up Henri Bergson’s concern for spaces sensitive to the emotion and actions that enfold in them suggesting that perhaps space has a materiality itself rather than the materiality resting only with the contents.²⁴ For Bergson’s space is an emerging phenomenon through specific motions and specific spaces where motion unfolds and actualizes space.²⁵ Rather than motion as distance or space over time, space is unfolding and defined by the arc of movement, and thus is a space open to becoming:

To remember (to place oneself in the past, to relocate, to cast oneself elsewhere) is to occupy the whole of time and the whole of space, even admitting that duration and location are always specific, always defined by

movement and action. It is to refuse to conceptualise space as a medium, a container, and instead to see it as a moment of becoming, of opening up and proliferation, a passage from one space to another, a space of change, which changes with time.²⁶

These notions move us beyond a limited, divided, directional space and have a particular relevance for cultural heritage as an embodied way of evoking the presence of the past. This evocation of space represents a shift away from a Cartesian model of space as mathematical division and space as a container for objects to a notion of space as mobile, dynamic, and active, and as reflective of the marks of human endeavour. Space then emerges from techniques and forces before representation, suggesting that the morphological scheme of virtual spaces might be responsive to the act of doing rather than seeing. That is, it might be responsive to process as becoming, to identity formation, and to an embodied subjectivity.

Games make space between virtual architecture and the virtual body so that the player is engaged in multiple transitions between space and the body. In their radical examination of architecture, Arakawa and Madeline Gins theorize how the body will seek out perceptual landing spaces, sites where the viewer's perception lands here or there.²⁷ A mobile and structured series of events is based on the "heres" of position and the "theres" of perceptual landing places. For Arakawa and Gins, space is active and dynamic and occupied by a sensate body. This approach bypasses subject/object distinctions and conceives of agency in a manner common in many games (figure 17.4).

In *Shenmue*, *Final Fantasy*, and *Grand Theft Auto*, as well as many other first-person exploratory and simulation games, agency emerges from the player's planning

of architectural landing sites. In *Grand Theft Auto*, this is negotiated through shifts between top-down, first-person, third-person point of view. The player maps the landscape through the filling in of the gaps between an imitation of position and imaged landing sites. Such an approach includes intention and an invitation to perception, and thus presupposes a mobile and a thinking body. Space has a trajectory—imagined, planned, and made real through user action. In the presence of an embodied player, terrains become paths, paths become perceptual landing places, landing places become habitable environments. Maurice Merleau-Ponty, discussing the limits of scientific thinking in the ideology of cybernetics, makes distinctions between geometric space and anthropological space²⁸—that is, between the static position of the body in a self-enclosed feedback loop and the mobile body in a socially embodied spatiality. His understanding of phenomenology suggests that space is not positioned at a distance in front of us, but surrounds the body and emerges from a spatiality of situation. Game-designers strive towards such a sense of space—space as an affect of the body’s own motility—so that players form an understanding of the world and situate themselves within it. In the games *Grand Theft Auto* and *Splinter Cell*, the body is such an experiential body, developing skills and engaging in any number of bodily situations. The virtual body of the player is expressed as a portion of space, with frontiers and vital centres, defences and weaknesses. The player’s spatial domain is literally (technologically) created in real time through the action of driving, running, crashing, and numerous other spatial acts (figure 17.5).

Representing space as embodied perception moves us away from understanding space as numerals and geometry. While Cartesian geometry underlies much game design, a number of perceptual and experiential tricks are used to enhance

the composition of the landscape and its modes of reception. Immersion in play is also based on transference between the haptic feedback at the controls of the console and the governance of the on-screen avatar. For the player, kinetic journeys across a fragmented terrain generate kinaesthetic feelings. The feelings of sweat, excitement, frustration, and anxiety are evidence of the visceral engagement of the body. Any trip to a games arcade shows the level of spatial bodily engagement as players physically jump, rotate their necks, and duck to avoid on-screen attackers. Pursuing, conquering, devouring spaces, and the spatial bodily contents translate directly to physical bodily affects. Players find this visceral environment exciting to the point where players remain in virtual space long after the body has reached its limit.²⁹ This internal kinaesthesia and the dynamic feedback between machine and player indicate a phenomenological subjectivity whereby the player is simultaneously immersed in screen and physical worlds.

The state of virtuality is a matter of this dual immersion between the virtual world of the interactive and the external physical world. There is also a parallel oscillation between the experience of presence in simulated screen space and the reflection required for interpretation. Roger Caillois described the simultaneous presence in simulated and external worlds as vertigo characterized by a state of dizziness and disorder.³⁰ Andrew Murphie argues for the centrality of vertigo in the experience of game-play—in the experience of new affects in the body.³¹ As Murphie puts it, this state of distraction emerges from identifying with your own action and perceptions at the same time as simulating these perceptions and actions. He reminds us that, for Caillois, mimesis (role-play) can be as much about losing oneself to space and thus the pleasures of vertigo as finding oneself. For Caillois, mimicry and vertigo can operate to destabilize more competitive and regulated forms of play. Arguing that

pantomime or role-play assures intensity and social cohesion in more collaborative societies, he suggests that mimicry and vertigo can be productive in terms of shaping and expressing culture.

From knowledgeable tourist to active agent

The cultural tourist engages in a particular form of vertigo refined through codes and cultural patterns associated with the mobilization of the gaze.³² Losing oneself, the art of wandering, placing oneself as the subject in a landscape, capturing history—these are all modes of the discourse of tourism. As Scott Lash and John Urry suggest, the objects of the tourist gaze are functionally equivalent to the objects of religious pilgrimage.³³ In the traditional pilgrimage, the pilgrim followed an itinerary dotted with stages and high spots, the completion of which was a rite of passage or an initiation. From this perspective, tourism to the historical monument is not just a form of sightseeing; it is also an opportunity for a form of spiritual contemplation, direct experience, and immersion in the past.

Opportunity for direct experience through personal observation is disappearing. In an effort to safeguard cultural sites, UNESCO and other conservation groups are increasingly opting for reduced public access.³⁴ Extreme examples include the closing of Stonehenge to public access and the construction of a simulacrum of the Lascaux Caves next to the original. Access to heritage is increasingly mediated through digital simulations of the original or digital photographic representations. These simulations, as well as being accurate representations of material culture, can also offer forms of simulated travel adopted by the virtual tourist. In the simulation of “site seeing”, the aura of the object as understood by Benjamin may be lost. Instead of

Benjamin's cult object imbued with a mysterious power we may have gained the experience of navigation, immersion or vertigo as another form of "losing oneself".

The contemporary museum has itself moved away from being solely defined through the exhibition of objects or curatorship of physical sites. In a recent charter, the International Council of Museums (ICOM) outlined its commitment to public service—to society and its development.³⁵ This extends the role of the museum to a place not bound by material culture, but "a place for inquiry into the memories of the past, a forum for consideration of the present, and a site from which to inspire, instruct, and inform".³⁶ Lash and Urry, reflecting on network culture, describe the heritage industry as an emblem of "aesthetic reflexivity".³⁷ By aesthetic reflexivity they mean a reflection on the social conditions of existence. For them, aesthetic reflexivity is characterized by an informed and knowledgeable tourist/visitor, openness to others, a willingness to take risks, an ability to reflect on and judge aesthetically between different nature, places, and societies.

Reinstating an informed and knowledgeable tourist opens up the possibility of a form of subjectivity and the reconstitution of community and the particular. In a simulation environment, presence and excitement are privileged over the reflection and contemplation associated with direct experience at the monument. As has been shown, there is much in game design that can be applied to virtual heritage aspects of user exploration and aesthetic immersion. Virtual movement has the potential to create a simulated spatiality that extends the real to a more imaginative, enchanted, lyric relationship to spatial immersion. As users pass through and inhabit virtual space, the creation of a simulated reality moves beyond the purely visual. As the player inhabits screen worlds—takes up space—the relationships between mastery of terrain, kinetic engagement, and experiences of space transform data space into place.

Like geography, virtual traverse is a metaphoric and associative experience owing much to our memory of garden promenades, speeding in a car, the country meander, and other personal recollections.³⁸ The sense of being able to mark territory and impose an idiosyncratic trajectory on its lines of action leads to the sense of a private cartography. Metaphors of space are used which construct a discursive structure or arrangement. This structure demands kinetic journeys across a fragmented terrain, allowing users to apprehend the world and use it for their own ends. Like geography, virtual traverse is associative and transforms what might be initially understood as a mainly visual experience into a kinetic one. In this way, virtual heritage can become a space for tactics—for contextual, personal adaptation of cultural heritage. Rather than the authority of the object, we can take pleasure in a series of games and the paradox of choices—where not just objects or monuments, but interfaced being and space itself are there to be interpreted.³⁹

Reconfiguring navigation as a cultural act allows for “diverse geographies of curiosity” that have the potential to reanimate virtual heritage spaces.⁴⁰ In large-scale virtual walkthroughs, a fascination for views and the physical hunger for space lead subjects from vista to vista in an extended search for spatial emotion. Adopting the strategies of immersion by incorporating the user into the action can increase the spatial pleasures of presence and embodiment. These strategies are more than the graphic immersion and organized sensuousness in computer games. Applied to cultural heritage, navigation structures can operate as significant elements in the creation of engaging and “authentic” experiences for visitors. As Caillois notes, the destabilization associated with mimicry and vertigo—the experience of dizziness, of “losing oneself”—can be productive in terms of shaping and expressing culture. In this way, spatial immersion becomes central in the animation of the past through the

movement of a perceptive body incorporating memory and personal experiences. The user, as a knowledgeable tourist, occupies a cultural and dynamic space through a responsive haptic engagement with the past.

The adoption of quests with inventories, records of interaction history, and game-play responsive to the user's skills can create emotional purchase through the vehicle of responsive interaction. In adopting interaction strategies from games, a virtual environment has the potential to intensify sensation. Task-directed artefacts, advances in complexity over time, and real-world conflict can add to a heightened sense of agency and achievement through the act of doing. Through the subjectivity of the lived body, spatial environments can function precisely at the level of metaphysical or symbolic ritual offering different cultural perspectives and creating a sense of being.

To evoke the presence of the past relies on a different treatment of space that creates cultural and social presence. Applying constraints, affordances and challenges within the architecture of virtual reconstruction can convey a direct negotiation with specific cultural context. This can lead to the imagined presence of the organically social rather than the ordeals of solitude. In this way, heritage is restored not only as a spatial representation on screen, but also as a place for habitation—as a kinaesthetic sense of presence in the past.

¹ Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, ed. Hannah Arendt, trans. Harry Zohn (London: Jonathan Cape, 1968): 223.

² As an example of the aura Benjamin gives the example of the elk portrayed on

the prehistoric cave wall painted as an instrument of magic rather than an exhibit.

³ This paper uses the term simulation to refer to a dynamic rule bound system whose mode of representation, particularly in cultural heritage, has adopted the tradition of verisimilitude. Frasca and other ludologists have taken another approach in arguing that simulation is not necessarily a mimetic or representational system.

Gonzalo Frasca, <http://www.ludology.org/articles/sim1/simulation101.html>.

⁴ Mani Kaul, “Seen from Nowhere,” in *Concepts of Space: Ancient and Modern*, ed. Kapila Vatsayana (New Delhi: Abhinav Publications, 1991): 415.

⁵ Kaul, 415.

⁶ Margaret Wertheim, *The Pearly Gates of Cyberspace: A History of Space from Dante to the Internet* (Sydney: Doubleday, 1999): 153.

⁷ Hans Fisher Barnicol, “Body as Measure in Architecture (criteria for human living),” in *Concepts of Space: Ancient and Modern*, ed. Kapila Vatsayana (New Delhi: Abhinav Publications, 1991): 313.

⁸ Stella Kramrisch, “Space in Indian Cosmogony and in Architecture,” in *Concepts of Space: Ancient and Modern*, ed. Kapila Vatsayana (New Delhi: Abhinav Publications, 1991): 103. The term *akasa* is from the Upanishads, which are the final part of the Vedas and the philosophy of Vedanta written in 8–4BC.

⁹ Bettina Bauma, “The Mystical Cave in the Vedic and Saiva Traditions: From Guha to Akasa,” in *Concepts of Space: Ancient and Modern*, ed. Kapila Vatsayana (New Delhi: Abhinav Publications, 1991): 113.

¹⁰ Kapila Vatsayana, *Concepts of Space: Ancient and Modern* (New Delhi: Abhinav Publications, 1991): 20

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- ¹¹ Simon Penny, "Virtual Bodybuilding," *Media Information Australia*, theme issue on Art and Cyberculture, no. 69 (1993): 17–22; Eugénie Shinkle, http://finartforum.org/Backissues/Vol_17/faf_v17_n08/reviews/Shinkle.html
- ¹² This idea draws on Rupert Sheldrake's work on morphic resonance, where he proposes that memory is inherent in nature and these morphic fields occupy "structures of probability".
- ¹³ Anthony Pace, *Maltese Prehistoric Art 5000–2500BC* (Malta: Patrimonju Publishing, 1996): 4.
- ¹⁴ Mona Starkis, "Interactivity means interpassivity," *Media Information Australia*, no. 69 (1993); Laetitia Wilson, http://finartforum.org/Backissues/Vol_17/faf_v17_n08/reviews/wilson.html
- ¹⁵ Victor J. DeLeon and H. Robert Berry, *Virtual Florida Everglades*, Virtual Systems and Multimedia, VSMM 98 (Japan: Ohmsha, 1988).
- ¹⁶ Ernest W. Adams, "The Construction of Ludic Space," paper delivered at Digital Games Research Association Conference, Utrecht, Holland, 2003.
- ¹⁷ Henry Jenkins, "Game Design as Narrative Architecture," in *First Person: New Media as Story, Performance, and Game*, eds. Noah Wardrip-Fruin and Pat Harrigan (Cambridge, MA: MIT Press, 2004): 118–30. Jenkins proposes the term "emergent narrative" to suggest that narrative is not predefined in virtual environments, but is embedded in the architecture and emerges from the user's navigation through space and interaction with spatial objects.
- ¹⁸ Giuliana Bruno, *Atlas of Emotion: Journeys in Art, Architecture, and Film* (New York: Verso, 2002): 154.

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- ¹⁹ Bruno, 352. The memory theatre was an imaginary theatre used during the Renaissance as a rhetorical aid for memorising concepts and knowledge. For more on the memory theatre, see Frances Yates, “The Art of Memory.”
- ²⁰ Bruno, 267.
- ²¹ For more on the debates about narratology and ludology see Janet Murray, Brenda Laurel and Henry Jenkins on the significance of narrative; and Markku Eskelinen, Jesper Juul and Gonzalo Frasca on the importance of game rules and play action.
- ²² Michel de Certeau, *The Practice of Everyday Life* (Berkeley and Los Angeles: University of California Press, 1994): 117.
- ²³ Elizabeth Grosz, *Architecture from the Outside: Essays on Virtual and RealSpace* (Cambridge, MA: MIT Press, 2001): 116.
- ²⁴ Grosz, 116.
- ²⁵ Grosz, 128.
- ²⁶ Grosz, 119.
- ²⁷ Arakawa and Madeline Gins, *Architecture: Sites of Reversible Destiny* (London: Academy Editions, 1994). Thanks here to Andrea Blundell, who drew my attention to Gin’s work on architecture and navigation.
- ²⁸ Maurice Merleau Ponty, *Phenomenology of Perception* (London: Routledge, 2000). Cybernetics is the self-regulating feedback loop between humans and machines.
- ²⁹ In extreme cases, this can lead to players continuing game-play to exhaustion, collapse, and even death. Two cases that have been given much media attention are the death of a man in China who died after playing the popular online game

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- Saga* for 20 hours in 2004, and the death of a South Korean man who played *Binge* for 86 hours: www.theage.com.au/articles/2004/03/09/1078594344830.html and www.geek.com/news/geeknews/2004Mar/bga20040309024200.htm.
- ³⁰ Roger Caillois, *Man, Play and Games* (London: Thames and Hudson, 1962).
- ³¹ Andrew Murphie, "Vertiginous Mediations," *Media International Australia Incorporating Culture and Policy*, no. 110 (2004).
- ³² Rebecca Solnit, *Wanderlust: The Art of Walking* (London and New York: Verso, 2002).
- ³³ Scott Lash and John Urry, *Economies of Signs and Space* (London: Sage, 1994): 256.
- ³⁴ ICOMOS Burra Charter (International Council of Monuments and Sites).
- ³⁵ Stephen E. Weil, *Making Museums Matter* (Washington and London: Smithsonian Institution Press, 2002): 34.
- ³⁶ Weil, 111.
- ³⁷ Lash and Urry, 256.
- ³⁸ Solnit, 2002.
- ³⁹ Lash and Urry, 276. Lash and Urry propose a notion of post-tourism as "a series of games with media texts and no single authentic experience".
- ⁴⁰ Bruno 154.

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