This is not a Peep Show!

The Virtual Room at Melbourne Museum (VROOM)

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The Virtual Room: VROOM <http://www.vroom.org.au>

Abstract

The critical analysis of historical optical devices can make a valuable contribution to the development and implication of "new media" products. The Virtual Room, currently under construction at the Melbourne Museum is a virtual/artificial reality installation consisting of an eight screen 360° rear projected stereoscopic display system. The technology builds upon several centuries of success in stereographic tools and immersive environments. In particular, the Stereoscope, the *Kaiserpanorama*, the Cosmorama and the *Géorama* are discussed as a precursor to the placement of emergent technologies within a socio-cultural framework and a history of the consumption of visual products.

Keywords: history, museums, immersion, 3D, stereoscopic, illusion, octant, rear projection, spatial audio, interaction, visualization

Introduction

One way to examine heuristic potential for virtual environments in museums is to explore histories in the consumption of visual imagery. Images have always been subject to media technologies of spatial illusion, immersion and display and 'every epoch uses whatever means available to create maximum illusion' (Grau, 2003: p. 5). Such an examination does not marginalise the principles of virtual reality

(its technical parameters and modes of interactivity) but seeks to place them in an historical context. As Oliver Grau suggests

> in the historical context, **new** [my emphasis] can be revitalized, adequately described, critiqued in terms of phenomenology, aesthetics and origin...New media do not render old ones obsolete but rather assign them new places in the system (Ibid, p. 8).

The discussion in this paper is threefold: historical, technical and critical. Part I introduces aspects of the evolution of perception — in relationship to the use of optical devices of illusion, primarily those of the 19th century. The principle focus is the history of spatial/optical immersion and associated technologies, drawing reference from stereoscopes, the *Kaiserpanorama*, and other spatio-visual constructions such as the Cosmorama and *Géorama*.

The discussion in Part II, introduces a newly configured visualisation technology for the mobilized gaze of museum visitors. The Virtual Room (VROOM) is currently in research and development at the Melbourne Museum in Australia. The virtual/artificial reality installation consists of an eight screen 360° rear projected stereoscopic display system.

The VROOM will open with its first program in December 2003. Critical evaluation of this system-in-operation is premature at the time of this publication. However, in Part III, this paper will posit the system against the broader socio-cultural implications of the digital interface.

This paper is intentionally historiographic, and descriptive, in focus. Up coming papers will discuss the VROOM as it participates in the contexts of Human Computer Interface, immersion and virtual reality (Kenderdine *et al*, upcoming).

I. Introducing vision machines

> The new media of the 19th century—the panorama, the diorama, the magic lantern 'dissolving views' and finally, film—were pure aesthetic, technical creations born of the spirit of light…(Schivelbusch, 1988: p. 213-219)

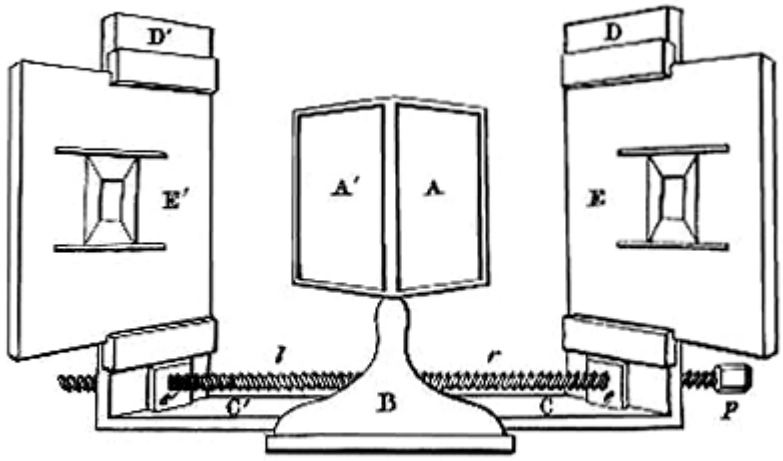
The museum visitor gazes through a lens that has been refined over many centuries. Finding 'presence' in a digital museum environment such as VROOM means having traversed the histories of technologic immersion, generations of —Orama, of sensoriums, and all manner of optical devices. It is to delight in automata, believe in magic, the phantasmagoric, and to be transported by special effects. The 'techniques of the observer' of the 19th and 20th centuries states Crary (1992) involved an array of perceptual and spatial expansions.

Within the context of this paper, we have chosen to place the VROOM within an historical framework of analysis. The intent is not to deny the specific differences between historic forms of optical devices for immersion, and virtual reality worlds. As Theodore Adorno has warned: 'In the relation of modern art works to older ones that are similar, it is their differences that should be elicited' (Grau op cit. p. 7). In this paper we maintain however that by exploring the socio-cultural contexts that have propelled engagements with optical devices —we are better able to understand our own contributions and potential impact.

Discussion of these optical devices could include everything from cave paintings, scroll painting, interior frescoes, and church interiors through to magic lanterns, *mondo nuovo*, various phantasmagorias, all manner of 17th through to 20th century optical devices, *cabinets des curieux*, wunderkammern, the Great Exhibitions, glasses house and winter gardens (for a comprehensive list see the Dead Media Project <http://www.deadmedia.org>). The few examples selected in this paper have been chosen because they mark pivotal points in the history of vision and, for the qualities of the immersion they display that can be considered parallel earlier versions of the VROOM in particular.

The micro-history of the Stereoscope

It is possible to argue the changed notions of vision through several emerging devices in the 19th century, and the Stereoscope has received considerable study by historiographers and art historians. The philosophies of vision dating from the Renaissance were based on a single 'ideal eye'. Implicit in this idea was the notion that direct transference of light emanating from the object was realised by each eye. However, when Sir Charles Wheatstone first presented the Stereoscope to a public assembly in 1838, he postured: "What would be the visual effect of simultaneously presenting to each eye, instead of the object itself, its projection on a surface plane as it appears to that eye"? Wheatstone's experiments demonstrated that depth perception resulted from the mind forcing reconciliation between two dissimilar points, thus challenging the previously held notions of the reliability of vision. The theories that developed cast the body as an active producer of sensation (Schiavo, 2003: p. 116). **Figure 1.**



The Wheatstone stereoscope used angled mirrors (A) to reflect the stereoscopic drawings (E) toward the viewer's eyes.

Figure 1. Wheatstone Stereograph line drawing of principles, 1838.

As Schiavo argues the ideological lessons taught by the Stereoscope changed as the *device* moved from scientific instrument to popular amusement. Her thesis engages the uses and conditions of this reappropriation. Many articles appeared that emphasised the deceptive nature of vision and the capacity of the mind to create illusion. Stereoscopic visions were declared "phantom-like". Ingleby

(1853), from his analysis of binocular vision, stated that "the objects of vision are but mere phantasmagoria of the organ of sight" (Ingleby, 1853: p.24) that is — based on phenomena. A somewhat contradictory notion was expressed in 1861 by Oliver Wendell Holmes who praised the instrument for its ability to represent accurately real-world sites recorded by photography (**Figure 2**). Commercial photographers had begun to recognise the potential for the device to turn 2D images into 3D. With the invention of the lenticular Stereoscope first shown at London's Crystal Palace Exhibition in 1851, a product for popular consumption (the parlour version) was introduced. These somewhat polar views represent the scientific debates surrounding vision on the one hand, - and the commercialisation of stereographic views on the other (i.e. Holmes's thesis).

Figure 2. Stereoscope of Holmes and Bates, 1869.

Mobilizing the touristic gaze

> [The] visual media of the moving image has embraced the prospect of vision as unlimited travel (Cubitt, 1998: p. 79).

The era also signified by the development of 'simulated travel', witnessed in other forms of optical device (for example the Italian *mondo nuovo*, see Bruno 2002). Most popular were for this were the photographic images of modernisation and industry, and imperialist views of the colonial world. By 1870 the stereograph was firmly associated with exotic locales, becoming a necessary "adjunct to the

telescope and microscope, showing us the true form and configuration of the distant world" (O.G. Mason quoted in Earle, 2003: p. 44). **Figure 3 & Figure 4.**

Figure 3. "Diabutsu" - The colossal bronze statue of Budda, Kamakura'. n.d.

Boxed sets of exotic locations were introduced which signalling a move away from collections (where a single image represented an entire nation) per se — to re-creations in context. This same transition to objects embedded in context was also occurring in anthropological displays in museums of the period.

Figure 4. Anaglyph stereo image Japan, ca. 1905 - by H. C. White Company.

Unlike previous stereographs, the box set cards were frequently imprinted with lengthy descriptions on their reverse sides. Such descriptions partook in a semantics of "being there" traditionally utilized within travel literature and later by some ethnographic texts. Lines such as "You are on a country highway west of Dordecht" hailed the spectator, placing them in the scene and in the shoes of the photographer (Strain, <http://www.lcc.gatech.edu/~strain/Stereoscope/>).

Using sequential images allowed multi-perspectival viewing. This followed the standards of visual anthropology (with aerial or elevated views followed by more intimate shots of the participant-observer). Tim Mitchell calls this paradox of the traveller's "double-demand" – the desire to see an environment as a focused and containable image while simultaneously enjoying the immersive aspect of travel.

It is not possible within the scope of this paper to consider more broadly the mobilization of vision, and the evolution of perspective by cultures on the move – 'as filtered through the machine ensemble' (Schievelbusch, 1979: p. 27). These histories would require examining the development of the perambulating eye of tourists, of spectacle and the spectacular, and of the walking history of the *flanéur* (as expounded by Walter Benjamin among others). The pre-history of cinema also provides a rich discourse which cannot be conveyed here. More extended reference of this discussion in relationship to digital cultural heritage and the tourist can be found in Kenderdine (2003).

Techno-phantoms and invisibility

As noted by Crary (following on from Karl Marx and Theodoro Adorno) lenticular stereography down-played its operative mechanism within the shell of the device thus enhancing its phantasmagorical nature. For Walter Benjamin and others also the word 'phantasmic' was assumed central to the discursive notions taken to define the visual culture of the mid-19th century. There was a "fascination with in(visibility)" (Bruno, 2002).

In his landmark 1856 book on 3-D photography, *The Stereoscope,* the optical scientist Sir David Brewster suggested:

For the purpose of amusement, the photographer may carry us even into the realms of the supernatural. His art enables him to give a spiritual appearance to one or more of his figures, and to exhibit them as "thin air" amid the solid realities of the stereoscopic picture (cited from <http://www.photographymuseum.com/believe1.html>). **Figure 5.**

Figure 5. Ghost in the Stereograph, 1856.

The Stereoscope was a tool for the enhancement of mimetic representation. The suspension of belief was important to the illusions of "being there", produced not only by the 3D effect but also the photographic mimesis and the goggle type design which foreclosed the visual perception of immediate surrounding while filling one's full frame of vision with an image.

The Kaiserpanorama 1883

The optical engineer August Fuhrmann devised a mechanical viewing device for the public consumption of his glass stereoscopic photographs. Described as essentially as 'stereographic

peepshow' it was a large-scale circular construction for multiple viewers similar but on a grand scale to the earlier 1850s kinetescopes (**Figure 6**). The ensemble used transparent and colour tinted slides in association with a diorama as illusionary 3D scenes augmented by concealed lights and translucent paintings (Crary, 2001: p. 136). Hugely popular (and lucrative) mass production of the device followed with over 250 in surrounding Western Europe.

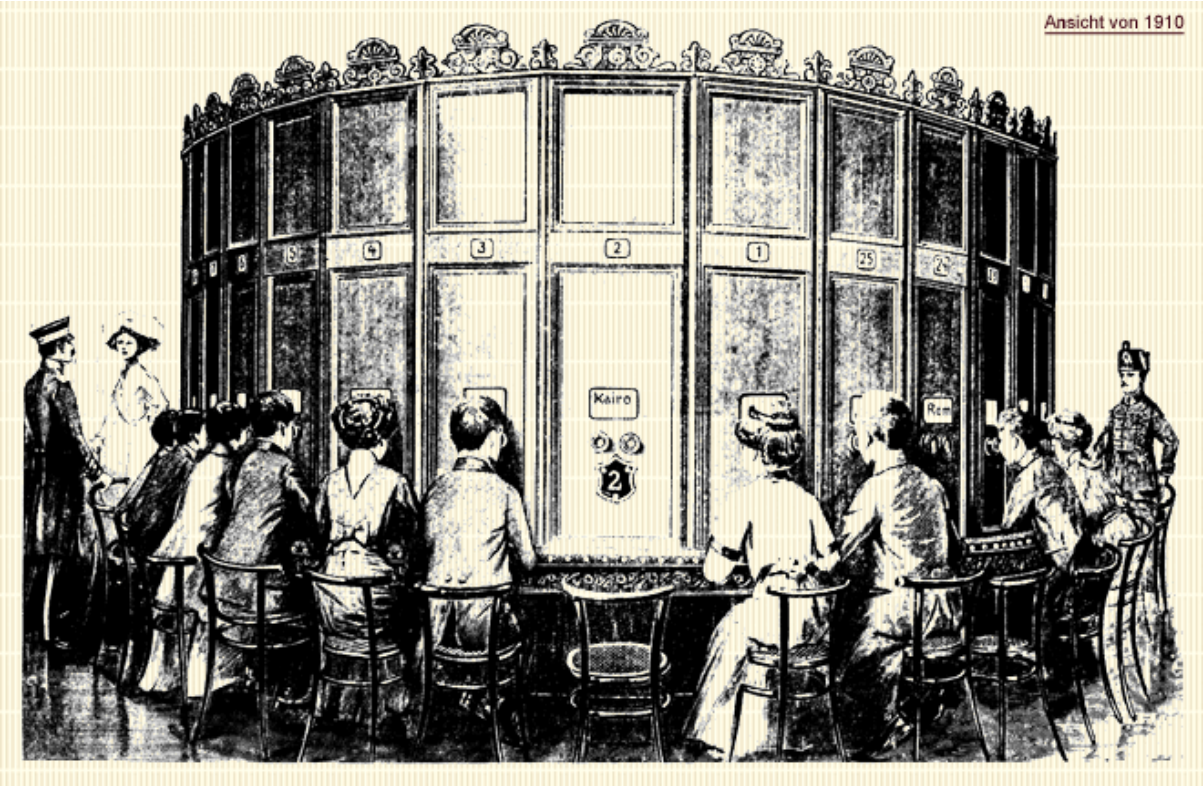


Figure 6. The Kaiserpanorama, 1910.

What is of interest in this device is the how the audience could be organised to have an individual mechanized engagement (of up to 50 minutes!), and the consumption of hardware and software provided by a single operator. (op cit p. 136). As the demand for software intensified, the need for new images intensified, especially of those of exotic locales in what Oettermann describes as "the visual equivalent of the political imperialism of the age".

The *kaisepanorama* represents one example among many of the industrialisation of visual consumption (op cit p.138). What is also apparent, as with so many pre-cinematic devices, is the

fragmentation of perception inherent in the apparatus is, at the same time, presented in terms of a mechanically creation "continuum" that naturalises the disjuncture (Ibid).

Museum space

Voyage around the room

> I have just completed a forty-two day voyage around my room. The fascinating observations I made and the endless pleasures I experienced along the way made me wish to share my travels with the public…Be so good as to accompany me on my voyage…When travelling around my room, [I] rarely follow a straight line (Xavier de Maistre, 1794, *Voyage around My Room,* quoted in Bruno, 2002).

Early museographic forms, as mentioned variously the cabinets des curieux, wunderkammern, kunstkamner, studioli and museums — were all part of the architectonic spaces whose images and relationships excited the private/public curiosity and that opened into new worlds of knowledge. The polytheism of cabinets of curiosity blurred distinction between art and nature and as Susan Stewart notes "the arrested life of the displayed collection finds its unity in memory and narrative" (quoted in Bruno, 2002: p.133).

As part of the development of the evolutionary complex that Tony Bennett describes, the institution of the museum established a linear direction for viewing in tune with an evolutionary view and prescribed a regulated practice of sequentialized looking.

> The Cosmorama, Regent Street, presents correct delineations of the celebrated remains of antiquity, and of the most remarkable cities and edifices in every part of the globe. The subjects are changed every two or three months; it is, altogether, a very beautiful exhibition.

(Mogg's New Picture of London and Visitor's Guide to it Sights, 1844 cited <http://www.victorianlondon.org/>.)

With the development of the *Cosmorama* the spectacles of the mobile devices such as the *mondo nuovo* and the Stereoscope became embedded in the interior of architectural space (Bruno, 2002: p.162). The user would enter a darkened room and through a series of openings in the walls enjoy a spectacle of views. These inserts through the wall were enhanced through mirrors, lenses and other perspectival and optical devices.

As noted above the 19th century witnessed a proliferation of spectacle that simulated travel experiences. The panorama as a device was central for expounding the theory that travel was good for developing ones mind (Oettermann, 1997). The geographical nature of panorama device is perhaps best illustrated by the Giant Globe and the *Géorama* (**Figure 7**).

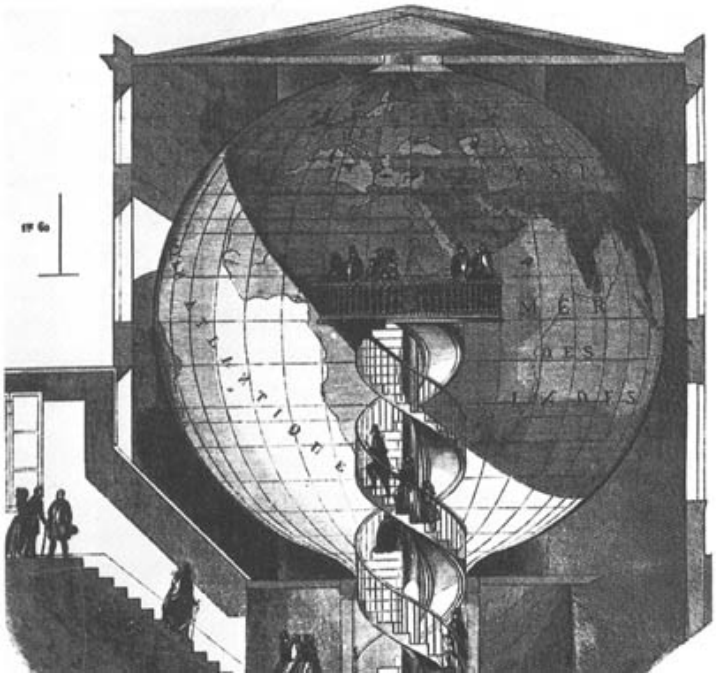


Figure 7. Géorama, 1880s.

The patent of 1822 reads

> With the aid of this machine, one could embrace in one single glance the whole surface of the earth: it consists of a sphere of 40 feet in diameter at the center of which the spectator is positioned on a platform of 10 feet in diameter, from which is discovers all parts of the globe.

This version of the *Géorama* shown in London from 1851 to 1862 was the Great Globe of James Wyld (**Figure 8**).

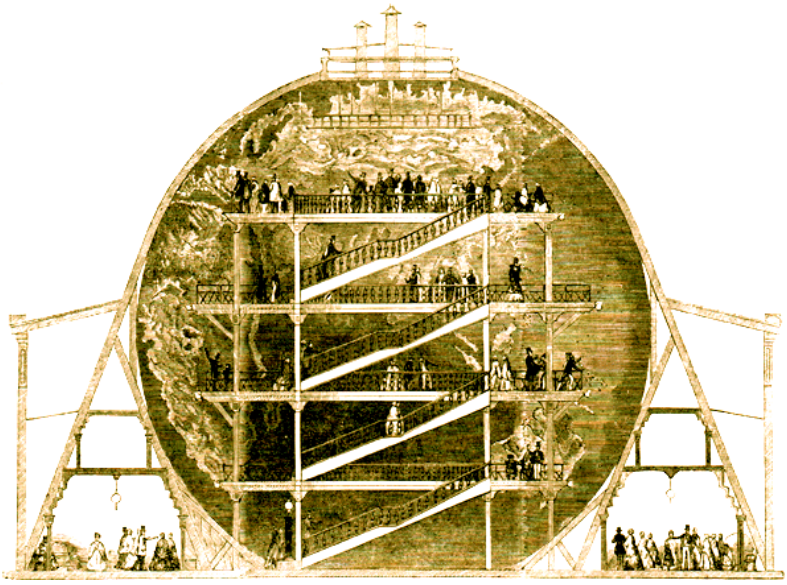


Figure 8. The Giant Globe, Anonymous. Interior of Wyld's Great Globe, Leicester Square, 1851. *The Illustrated London News*, 1851.

Grau describes one of the key parameters of panoramic device is to draw "immense crowds into closed environments, with the world laid out in spectacle" into which "one could project oneself imaginatively" (Grau op cit, p. 8).

Technicity: the politics of immersion

Discussion of new and not so new optical tools cannot be considered without reference to the socio-cultural frameworks through which they are constructed. Jonathan Crary's study on the relationship of 19th century ocular devices and modernity suggests some of the elements that made some artificial

"ways of seeing" more successful than others. Rather than accepting the dominant history of an evolutive narrative culminating into cinema, he shows a history of politics of the conformation of the body. For him, the optical devices that survived were the ones that combined primarily two factors: 1) they were sufficiently "phantasmagoric," meaning by that not only their capacity of creating illusion, but even more, in his quotation of Adorno, their "concealment of the process of production." And, 2) the ones that have the ability to create a visual experience that presuppose the body as immobile and passive.

Edison is used by many theorists to illustrate the transformation of perceptual awareness through his contributions to the creation of optical devices (namely the kinetescope). With Edison we can see how he moved away from earlier forms of pre-industrial practise and early 19th century forms of display and exhibition, and consumption—to those of quantification and abstraction. Crary, concerned primarily with the cultural economic implications of Edison's work states:

> Edison was the marketplace in terms of how images, sounds and energy, or information could be reshaped into measurable and distributable commodities and how a social field of individual subjects could be arranged into increasingly separate and specialised units of consumption. The logic that supported the Kinetscope and the photograph—that is, the structuring of perceptual experience in terms of a solitary rather than collective subject—is replayed today in the increasing centrality of the computer screen as the primary vehicle for the distribution and consumption of electronic entertainment commodities (Grau, 2003: p. 32).

Edison recognised the integration of software and hardware that foreshadows the late 20th century: "the in-distinction between information and visual images, and the making of quantifiable and abstract flow into the object of attentive consumption" (op cit: p. 33). Edison was aware that the products were in fact inseparable from the creation of new needs in consumers thereby altering the network of relations continually.

> Jobs, Gates and Grove are manufactures of the same historical project of perceptual rationalisation and modernization…the management of attention depends on the capacity of the observer to adjust to continual re-patterning of the ways in which a sensory world can be consumed. Throughout the changing modes of production, attention has continued to be a disciplinary immobilization as well as an accommodation of the subject to change and novelty—as long as the consumption of novelty is subsumed within repetitive forms (Ibid).

Another related and important development was in the work of Muybridge achieved in 1879 with his sequential images of moving horses. While Crary notes the dissimilarity between the two examples (i.e. with Edison) what draws them together is that they represented two ways (among many) in which "…the selectivity and rhythm of attentive response could be determined through externally controlled variables. Crucial here is how the automation of perceptual experience produced new experiences of dissociation" (Crary, 1998: p.147).

Attention can be viewed as a specific mode of behaviour within a historical structure of socially determined norms — and it has contributed to the formation of a modern technological milieu. As Crary notes part of the cultural logic of capitalism with its development of complex machines for new productive and spectacular tasks has demanded attentiveness and, the natural switching from one task to another in rapid succession. (Grau, 2002: p.30).

With the understanding of this brief historical analysis we will introduce a contemporary optical device —the VROOM at the Melbourne Museum. In the preceding section we hope to have described a historical background against which VROOM can be considered.

II. Inside-out: The virtual room (VROOM)

Description

The Virtual Room (VROOM) will be a revolutionary visualization laboratory – an interactive and immersive environment which we hope museums and galleries will use to covey complex and challenging information to audiences in a variety of unique, innovative and engaging ways. The project evolved after discussions between Swinburne University and Museum Victoria in 2001. VROOM will captivate the imagination of young people, enhance their learning opportunities and encourage them to pursue careers in science and technology. VROOM will occupy a dedicated exhibition space in the Science and Life Galleries at the Melbourne Museum, a campus of Museum Victoria.

The VROOM will consist of an eight screen 360° rear projected stereoscopic display system. The system can be configured to be interactive with the use of wands and motion tracking devices, movement and immersive qualities will also be enhanced through the use of spatial soundscapes. The environment can be reconfigured to position the viewer into the interior or panoramic immersion (an octant enclosure), or perambulatory (or circumlocutory) exterior viewing (of a contained world). Current projects under development for the opening will only use the latter configuration. **Figure 9.**

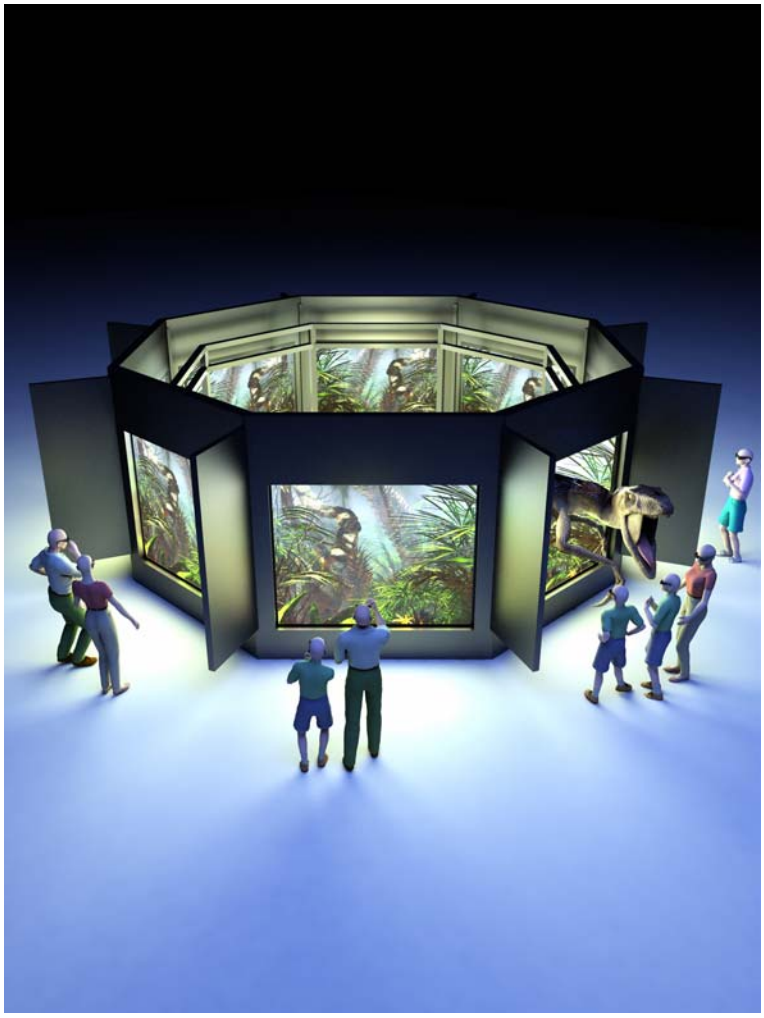


Figure 9. Axonometric visualisation of the VROOM.

One of the unique aspects of the display system will allow participants to experience a changing perspective as they walk around whatever is contained within the VROOM. In many cases the audience will be provided with the illusion that the entity (such as a dinosaur, city or galaxy) is physically contained within the confines of the eight screens. **Figure 10.**

Figure 10.VROOM logo.

This unique project has tremendous educational, export and technology diffusion potential. Melbourne Museum has no existing interactive 3D exhibits, so this is an excellent chance to provide a state-of-the-art showcase of Victoria's virtual reality abilities. VROOM will have broad appeal: small children will be able to "chase" virtual dinosaurs or Thylacines as they roam around the exhibit. Secondary students will be able to learn about more complex 3D dynamical systems like the weather, evolution or the structure of the Universe. The VROOM is not just about education and entertainment; it represents the latest in scientific visualization technology and will give the public access to cutting-edge research project in stereoscopic visualisation.

Supplementary curriculum materials and content statements will be provided in hand-outs for visitors. The shop-front window displays at the entrance to the exhibition will visualize the VROOM inside to reinforce the circumlocutory nature of engagement.

Research in Victoria includes areas as diverse as nanotechnology, medical imaging and astronomy and will be presented through VROOM in a fascinating and engaging way. Content for VROOM will be highly ambitious in visual style, audience engagement and technique. Content development will leverage the VROOM platform as a museum and gallery delivery strategy for leading edge

visualisation and education. The technology and the content will be made available to other organizations following the initial installation at Melbourne Museum in December 2003.

III. A digital realisation

This paper attempts to situate the VROOM within a continuing discourse of historical and socio-cultural implications. Western perspective has informed the discourses of verisimilitude in traditions of scientific visualisation, industrial and commercial design, and the GUI. These histories are concentrated in the visual and spatial logic of the digital interface of such devices as the VROOM. User engagement in the VROOM can then be considered as, "a condition of interaction produced and sustained by historically and culturally bracketed understandings of visuality and the spatial" (Harpold, 2001: p.17).

The VROOM is analogous to 19th century forms of exhibition installations, architectural spaces and optical devices, and utilizes a lexicon of specific visual cues from Cartesian and Euclidean world views (projection, vanishing points, lengthening shadows and so forth).

Both Jay and Elkins have argued that linear perspective and the cult of "Cartesian perspectivism" (Jay, 1988), is just one among a variety of optical regimes used in Western science and art. As Harpold notes:

> …our responses to these visual conventions are always – if not always consciously – adaptable. We take them to be markers of a reliable representation of the realms of the eye. Yet we also understand implicitly that they belong to a domesticated, geometrically sanitized version of those realms. In this way, the "visibility" of a GUI's spatial forms is a function of both a tacit acceptance of visual conventions, and a pragmatic willingness to suspend some of them, if circumstances require it (Harpold, 2001: p.11).

Is it possible to consider the VROOM a success if it encourages users to suspend belief and render the interface "invisible"? Harpold warns on "direct manipulation" (i.e. possible where there is the illusion of user immersion) stating it "among the most privileged methods of psychic and political coercion of the post-Enlightenment period" (Ibid p: 18). He goes on to suggest however that we may — through understanding the history of contested spatiality of science, art and politics **off** the computer "provide strategies of design that break the epistemic confines of direct manipulation" (Ibid) — through the computer.

These discussions of the spatial politics of the digital interface start to alert us to the complexity of creating content for mass audiences in museums using high-end technologies. The VROOM requires a lexicon for a space that promotes collaborative narratives and enhances potential for human-computer-human interaction. We understand the key to this will be in the development of spaces for Real Time interaction and, emergent behaviors and systems.

Conclusion

VROOM can be placed within in a broader context of the history of optical devices. Many of its key modes of operation and optical trickery are directly analogous to previous forms. These include the invisibility of technological apparatus itself —to demands for containment and attention of the user. From the above discussion it is obvious that the technologies we produce can not be divorced from broader socio-cultural domains. However, with the historical analysis at our disposal we are more able to design sophisticated and enduring principles for content development.

The VROOM is a complex visualisation tool. Its configuration within museum environments and the processes of designing content for such a device is intricate. The success of the project is not simply an issue of HCI and its technical assemblage, however important this may be. By beginning to articulate a lexicon of spatiality for VROOM we may better understand and use a sophisticated technology without compromise or bias. The opportunity to drive research in the design of high-end interfaces from within the Museum presents an exciting challenge and opportunity.

Acknowledgements

VROOM: the Virtual Room has seed funding from the Victorian Government's Science, Technology and Innovation (STI) Initiative. The STI unit is acting as a catalyst for knowledge and wealth creation by enhancing Victoria's science and technology base and by facilitating the delivery of beneficial research outcomes. Museum Victoria has five significant research partners with complementary experience in VR technologies working on the project. These are based at: Swinburne University of Technology and the Centre for Astrophysics and Supercomputing; RMIT University. The Interactive Information Institute; Monash University and the Centre for Electronic Media Art (CEMA) in the School of Computer Science and Software Engineering; Adacel Technologies Ltd, and; The University of Melbourne and Documentation & Cultural Heritage Animation & Visualisation Unit.

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