

- [W]hat are the elements of continuity that link contemporary imaging with older organisations of the visual?
- [W]hat forms or modes are being left behind?
- What kind of break are we witnessing?

(Crary 1993: 2)

Such questions are necessary for four reasons. First, because we still meet and consume new media images largely in relation to more established forms of media and the ideas we have about them. This emergent culture of synthetic and autonomous images jostles alongside an already wide range of modes, genres and expectations of several kinds of lens-based media, including:

- the fictional world of the cinema (taking place 'on' the screen);
- the apparently first-hand and immediate reports on a wider world of events given by television;
- the compelling testimony to fact in documentary film and photo-journalism;
- the sheer fabricated seductions of advertising photography.

Second, while some of the new image technologies in our list (p. 104), are an increasingly familiar part of contemporary visual culture, others are not. Many kinds of images produced wholly or in part by new media technologies, or forms of vision which are mediated by sophisticated new image technologies, are only to be found, at least for now and the foreseeable future, in very specialist situations: from the impersonic fighter pilot to the well-resourced astronomer or medic. Computer vision (telepresence, medical imaging, scientific simulation, the perception of virtual spaces and objects) is not most people's 'bread and butter' experience.

Third, another class of 'new media' images, digitised photographs or digital images having a photo-realistic appearance, are only very infrequently passed off as analogue documents of reality in our daily newspapers. More often, they inhabit the realms of self-conscious graphic display, media art, and fantasy genres. Their producers will clearly know that such images are not analogue. Whether such knowledge is available to consumers will partly depend upon the context or the vehicle of consumption. We may assume that a photo-realistic image in a computer game is digitally generated, while another, printed in a newspaper, we may take to be analogue. Our sense, then, of whether an image is digital or analogue is partly dependent upon the kind of platform on which it is deployed – that is, whether this is newsprint or a website.

Fourth, even when new image technologies are used to produce images that may look different to traditional images, that may engage attention differently and offer new kinds of pleasures to their viewers (we might think of immersive virtual environments or digital special effects in cinema, both of which we discuss in more detail in 2.6–2.8), we are surely not pitched wholesale into a new culture (visual or otherwise). We do not personally or collectively undergo a change in the ways we see the world that is on a level with the changes that historians describe as happening in the 'Renaissance' or in the 'age of mechanical reproduction'. Moreover, when we dig behind such labels for past change, we find that the changes in question were extremely complex, uneven, and worked out over the long term

2.6 Immersive virtual reality  
2.7 VR as a medium of art: a quantum leap forward?  
2.8 Digital cinema

The kind of break or rupture with history and tradition that Crary proposes has, then, to be understood as provocative: it cannot be empirically grounded. Empirical evidence for such changes can only be amassed over long periods of time and, therefore, at second hand. They necessarily remain open to strong interpretation. That a fundamental change took place in the Renaissance can indeed be supported with reference to changes in how images were made, why they were made, and by attempting to establish how their significance was understood by their contemporaries. Yet, at the same time, other evidence points to the continuance of older ways of making and understanding images. Changes that began to occur in fifteenth-century image making played themselves out, in more than one way, over a further 300 years. Similarly, when Walter Benjamin explores what he sees as the 'mode of perception' and visual reproduction brought about by the technologies and social uses of photography and film in the early twentieth century, he is explicit that it has taken more than half a century for the changes that he discerns to reach a stage where it is possible to even 'indicate' the form they have taken (Benjamin 1970: 220).

We have seen that a visual culture, a culture's production and consumption of images, together with the way it organises and understands the power of vision, always involves the coexistence of several kinds of images and ways of seeing. The media technologies that are available to a culture play a part in this production and organisation of the visual, but, again, in more than one way. From the middle of the nineteenth century to the beginning of the twenty-first a series of new visual media have played an important part in an exponential proliferation of image production, the pervasion of culture by images, and the technological augmentation of vision. In one sense, our current new image media can be seen to be part of an intensification and acceleration of this 200-year process. Yet, at the same time, some key differences between the analogue lens-based technologies of the nineteenth and twentieth centuries (film, photography, and television with their mimetic capacities), and the new, digital, synthetic, and simulating technologies beg new questions.

## 2.6 IMMERSIVE VIRTUAL REALITY

In 1.2 we distinguished one kind of virtual reality (VR), the immersion in, and interaction with, an environment constructed with computer graphics and digital video, from other situations and experiences that are referred to as virtual: the virtual 'spaces' and 'communities' of cyberspace. This section is best read in conjunction with that earlier discussion (1.2). Immersive VR has widespread, if often experimental, practical applications in many spheres, and it holds intense interest for a wide range of theorists in many disciplines, from politics to geography.

For examples of the range of theorists who discuss virtual reality see a social and political theorist (Holmes 1997), a cultural geographer (Hillis 1996), the artist and art theorist (Ascott <http://www.artmuseum.net/w2vt/umeline/Ascott.html>) and the philosopher (Levy 1998), and for a further philosophical account of the 'virtual' see Part 5 of this book.

We will be concerned here with the critical issues that VR poses for visual culture as we have defined it in the previous section (2.1–2.3).

### 2.6.1 Is VR a new 'visual' medium?

While we will refer here to 'immersive VR' as a new medium we do so cautiously, as a kind of shorthand. It may be more accurate to see VR as a prime example of a technology

1.2 The characteristics of new media, some defining concepts

The building of immersive virtual realities (VR) is now the object of diverse experimentation and development in industry, medicine, education, architecture, entertainment, and other fields (see UK virtual reality forum, 'The Base Study Matrix', <http://www.vrforum.org.uk/Casestudies/matrix.html>).

5 CYBERCULTURE, TECHNOLOGY, NATURE AND CULTURE

2.1 New technologies and the issues for visual culture  
2.2 Visual culture  
2.3 Virtuality

Even VR's status as a single technology is suspect. As Hills (1999: 70) asks, does anything set us apart from TV and telephony from which VR is partly cobbled, imagined and extended?

It is, however, not to imply that a medium, so defined, is neutral. Whether or not we want to go so far as Marshall McLuhan in proclaiming that the 'medium is the message', a medium is never separable from the information or content it carries, it contributes to, shapes, allows or distorts meaning.

1.1 The characteristics of new media: some defining concepts

(or collection of technologies) which is a stage where development and investment are taking place for a variety of speculative reasons.

However, whether the technology merits the status of a visual 'medium', in the widely accepted social sense, is open to question. An important way to understand a medium is as a set of social, institutional and aesthetic (as well as technological) arrangements for carrying and distributing information, ideas, texts, and images.

Immersive VR has no firmly settled institutional pattern of distribution, exhibition or use and for this reason it is difficult to describe as a medium in a fully social sense. A medium is more than the technology it depends upon, it is also a practice. It is a kind of skilled work on raw materials (whether they be words, photographic materials or digitised analogue media) which uses conventions, structures and sign systems to make sense, to convey ideas and construct experiences. The jury must still be out on whether or not VR will ever achieve the status of a medium in this sense. Whether, in other words, it will become a form of social communication and representation in the manner of radio, cinema or television. We have already briefly discussed Stone's conviction that immersive or simulative VR will fuse with online forms at a future time to become a medium of a new and dramatic kind (1.2). However, the important point here is that neither visionary speculation nor sheer technological potential is itself a sufficient guarantee that a medium, in the ways that we have defined above, will actually be the outcome of a technology.

The social development of technologies as media

This takes us directly onto the terrain researched in considerable historical detail (with a primary interest in communications media) by Brian Winston (1999). On the basis of his research, Winston formulates and tests a number of stages through which potential communications technologies or 'media' ('From the Telegraph to the Internet' is the subtitle of his book) will pass. In a simplified form they are these.

- 1 There must be a basis in a society's general scientific competence so that a certain kind of technology is feasible. This is the ground for a technology's possibility.
- 2 Next, there is the stage of 'ideation' when an idea or concept of how that available scientific competence may be given a technological application is envisaged – typically not by one inspired individual but by several in their supporting contexts and in a number of locations. This may lead to the building of prototypes, but these, as only modelled potentialities, are not yet widely recognised or confirmed as useful social technologies by the social groups with the will to invest in them or the power to realise them.
- 3 Then there is the stage of a technology's 'invention'. Invention, on this view, is clearly not an original idea, an unprecedented inspiration, or an occasion for shouting 'Eureka!' This is when a technology can be said to exist properly as it moves beyond an idea, and the prototype stage, as a clear necessity or use is seen and it finds social acceptance.

There is no smooth passage between these stages. Winston's research demonstrates that there is no guarantee that a technology will successfully pass through each of these stages to full social realisation and use. Prototypes do not proceed to be inventions unless a social purpose or need is evident. Further, even those which do can then be 'suppressed'. History is replete with technologies that could have been, for which prototypes existed but social

need or commercial interest did not. There are also cases of technologies being invented twice, the telegraph being a case in point. The 'invention' a second time around succeeded because it was received into a social moment where there was a perceived need for it. The earlier invention was possible but redundant – to coin a phrase, 'ahead of its time' (Winston 1999: 5).

The development of VR has a complex and contingent genealogy of the kind that we outline in (1.3). From the 1950s onwards, several spheres of 'blue-sky' research in universities linked to programmes of military-industrial research into flight simulators and trainers, and related economic and cultural activity overlap one another. It is only latterly, in the late 1980s, that VR begins to constitute something like a media industry as well as an intense focus of cultural interest. With regard to the virtual space of the internet we have to remember that it was 'Designed by a confluence of communities which appear to have little in common – such as Cold War defence departments, the counter-cultural computer programming engineer community, and university research throughout the world – the Internet's infrastructure was designed to withstand nuclear attack' (Hulsbus 1997). Immersive VR's history dates from circa 1989 (the SIGGRAPH conference of that year), with foundational experiments being traced to Ivan Sutherland's experiments in the 1960s (see Coyle 1993: 152; Woolley 1992: 41; also 2.6.3)

The social availability of VR

Using Winston's terms, we might say that, currently, the hybrid technologies of immersive VR appear to be teetering between repeatedly reinvented prototype and invention. VR occasionally flickers into life (often for no more than an hour or two) at prestigious art or media festivals and trade shows. Each such event or 'exhibition' is unique and of short duration. The construction of 'state of the art' virtual spaces and environments is intensive in its use of technology and hence, outside of the military-industrial sphere, such realisations are restricted to a few fleeting occasions, usually requiring expensive travel and maintenance in real time and space for those who wish to participate. Ironically, the viewer or user has to be in a precise (and expensive) institution or place in the real world if they wish to be in 'virtual' reality.

### CASE STUDY 2.3 VR, art and technology

Douglas MacLeod, director of 'The Art and Virtual Environments Project' held in 1994 at the Banff Centre for Arts, Canada, explains that it took two years of intensive and groundbreaking work for artists and technologists to bring a range of VR projects to completion. Reflecting on the practical dimensions of the project, MacLeod writes, 'It was like staging nine different operas in two years while at the same time trying to invent the idea of opera.' Judging that this huge effort had only provided 'a suggestion of what this medium could be', he then worries that the works will never be shown again; 'Some are simply too complex to remount. In other cases, the team of artists and programmers that produced the piece has dispersed, taking with them the detailed knowledge of the assembly and installation of a particular work' (Moser and MacLeod 1996: xii, also see Morse 1998: 200).

In terms of spatial or geographical distribution, it is very likely that VR is rarer than handmade pictures were in the era before photography and mass reproduction. A popular

1.3 Change and continuity

work on VR (Rheingold 1991) reads like a personal world tour of university research departments and the R&D divisions of major multinational entertainment and communications corporations: the University of North Carolina; Kansas Science City, Kyoto, NASA, Massachusetts, MIT, Tsukuba Japan, the US Marine Corps research facility in Honolulu; an inventor's house in Santa Monica, companies in California's Silicon Valley; a computer science laboratory in Grenoble, France (Rheingold 1991: 18-19). Such places are hardly public or even semi-public venues for the consumption of a new medium.

Few can travel to expensive installations and exclusive institutions, so how is VR experienced as a medium in the social sense? The most ubiquitous form of VR is the stripped-down version seen in 'shoot-em-up' arcades. While this genre of VR may be of social and cultural significance it barely matches the promise of VR's advocates, whom we shall meet shortly. Outside of commercial arcades and theme parks, university or corporate research departments, immersive VR is hardly accessible to most of us.

We can contrast this situation with the increasing ubiquity of the personal computer. It is possible to say that the PC is used for 'entertainment, interpersonal communication, self-expression, and access to information of many kinds', and therefore 'Computers are being used as media' (Mayer 1999: xiii). It is also clear that such uses are developing distinct genres (hypertext, edntainment, games), institutional frameworks (service providers, user groups, training in software use) and patters of consumption (browsing, surfing, gaming, participation in online communities, newsgroups). As we have seen, at this time it is difficult to say the same for immersive VR. The importance of VR as a proto-technology must lie elsewhere. This, we will argue, is an implied challenge to settled historical practices of image making and receiving, and to the technological conditions which angnt our visual and related aural and tactile experiences. However, for the same reasons that immersive VR is not a generally available experience, the basis or evidence for such claims needs careful inspection.

2.6.2 The importance of that which hardly exists

Let us remind ourselves of Cray's view that we met in section 2.5. Cray sees a 'vast array of computer graphics techniques' bringing about an 'implantation of fabricated visual "spaces" radically different from the mimetic capacities of film, photography, and television'. It is this that he sees as bringing about a transformation in visual culture that is 'probably more profound than the break that separates medieval imagery from Renaissance perspective'. This break with tradition is 'relocating vision to a plane severed from a human observer' and is supplanting 'most of the historically important functions of the human eye' (Cray 1993: 1-2). Yet another commentator considers that in VR we are witnessing a 'quantum leap into the technological construction of vision' (Hayles 1999: 38).

These are heady claims that call us to investigate several ideas. They face us with the need to understand what the 'fabricated spaces' are that Cray sees as so different from the mimetic (or imitative) character of photography. If we trace the early history of VR technology we find, in a practical and instrumental context, a strange shift taking place in the relationship of images and other sensory experience to external or pre-existing reality. This has been conceptualised as a shift from the practice of 'imitation' (or 'mimesis') to that of 'simulation'. This is discussed in 2.6.3.

We should also think hard about the metaphors that are energetically employed to capture the nature and significance of immersive VR. Many of these are used by the artists

2.5 New image technologies

2.6.3 Spheres collide from imitation to simulation - VR's operational history



2.1 The Daily Telegraph front page: 'Dawn of another World'.

and producers who experiment with the technology with the aim of developing it as a medium of art and cultural expression, and the theorists who reflect upon and debate the outcomes. How do they understand the 'profound' transformation of visual culture and 'quantum leaps' in the nature of vision? In doing this we will find that there is a wide, possibly unbridgeable gap between the metaphors that are used to grasp the significance of VR and reports of its actuality. These are discussed in 2.6.4 and 2.6.5.

A third issue that will repay attention is Cray's yardstick for measuring the profundity of the change brought about by the new 'fabricated visual "spaces"': Renaissance perspective. The importance given to pictorial perspective in many discussions of immersive VR is summed up in a frequently used phrase: VR is like 'stepping through Alberici's window' or entering 'into the image' (Robins 1996). This is a metaphor for the experience of immersion, but pictorial perspective is also a technology (especially in the sense of 'know-how' (see 1.6.3)) that, together with the 'point of view' that it constructs, has been more or less central to a Western tradition of image making. It has structured many of the possible relationships viewers can have to images for several centuries. Key to the cultural forms of the image that utilise perspective are the frame and the surface, the edge between real world and virtual world, and the presence of images as artefacts within

2.6.4 VR: the actuality and the hyperbole  
2.6.5 VR: trimming the metaphor

1.6.3 Williams and the visual shaping of technology

the world. What is involved in breaking with these conditions that we have associated with images for so long? What is involved in this 'quantum leap into the technological construction of vision'? This is investigated in 2.7

### 2.6.3 Spheres collide: from imitation to simulation – VR's operational history

#### VR as the ultimate computer interface

A continuing source of interest in VR is its use as an ultimate kind of human-computer interface; the means by which a human interacts with the machine. It offers to provide an interface that removes all signs of a mediating apparatus between the user and computer-generated or stored image, information or content.

It is seen as promising to dispense with the residual forms of the computer screen, keyboard, and mouse (hand-overs from television, typewriters and mechanical controls). As the 1960s pioneer of graphic and immersive computer interfaces Ivan Sutherland put it, we should 'break the glass and go inside the machine' (quoted in Hillis 1996), or, in the words of the more recent developer of VR systems, Jaron Lanier: in VR 'the technology goes away' because 'we are inside it' (quoted in Penny 1995: 237).

Ivan Sutherland was a key figure in the operational and conceptual history of VR, and a pioneer of computer graphics and simulation technologies, who worked within military funded research programmes. In this context, Sutherland tackled the question of what symbolic form a computer's output might take or, as we would now put it, what would be the form of the human-computer interface? Given that a computer's internal activity is a vast and continuous stream of electrical impulses, Sutherland asked how the results of this invisible activity might be 'output' or externalised. What form – language or sign system – should be used to display the results of computation? Sutherland demonstrated that these impulses could be translated into an electron beam that was visible on a visual display unit – a screen. The origin of contemporary computer graphic interfaces, such as those used by the Apple Mac or Microsoft Windows, is first seen in his now famous prototype 'Sketchpad'.

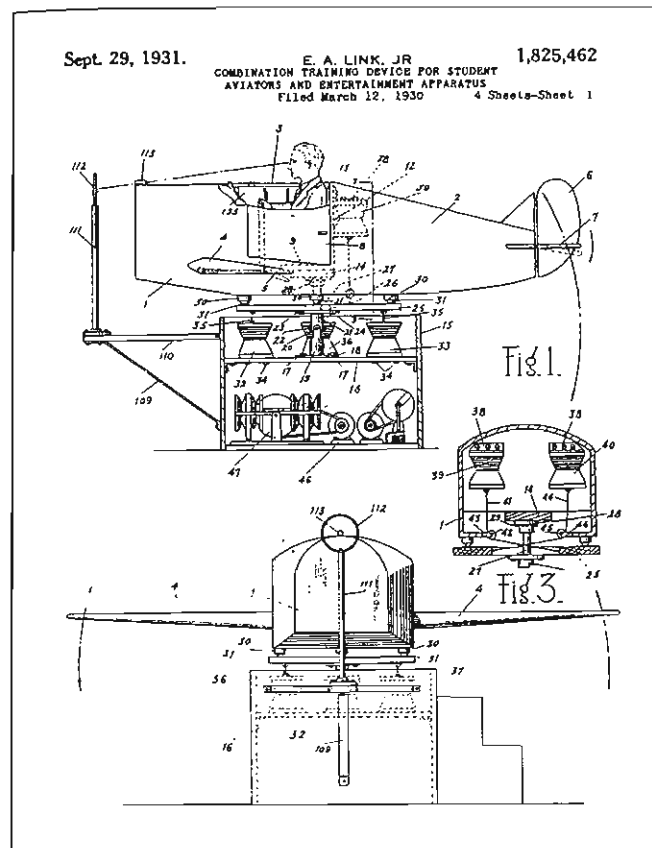
Sutherland also envisaged the possibility of going beyond graphic display to make the results of computation tangible. He conceived that if a computer reduced and processed any kind of information as a series of impulses, given the appropriate algorithms and programming, the physical movement of the human body – and even material resistance to that movement – could also be encoded as information which the computer could process.

#### From imitation to simulation

Sutherland's inspiration was the joystick of a Link Flight Trainer in which 'the feel' of a mocked-up aircraft's parts, moving as if against wind and air pressure, was mechanically fed back to the trainee pilot. In working upon the development of flight simulators, Sutherland drew upon several breakthroughs in technology and mathematics (see Woolley 1992: 42–48). Sutherland's work showed how human actions could become computable information that was then passed back to the human subject, via servo mechanisms and sensors, to then inform or control their further actions. This took a graphic and tactile form in a cybernetic 'feedback loop' between computer and human being (see Part 5)

Where Sutherland's inspiration makes empirical references to a real aeroplane by a functionally quite unnecessary copying of its wings and tailplane, after Sutherland the

flight simulator eventually becomes an enclosed environment, a 'black box', with no external, morphological reference to aeroplanes at all. Yet once such a 'black box' is entered the sensory conditions experienced in real flight can be more fully generated to include, for instance, the programmed vicissitudes of the weather, or engine failure, acting upon the virtual aircraft. Such simulators, without any external mimetic reference to real planes, can then simulate planes that have not yet been built or flights that have not yet been taken. Let alone there being no imitation of wings or tailfins as in the Link Trainer, there are no particular planes to imitate. Here we meet the distinction between imitation and simulation: the notion that in simulation (as against imitation or mimesis) the model now, in some senses, precedes the reality – a reversal of the expectation that 'models' are built (imitate) pre-existing realities. (See Woolley 1992: 42–44 for a more detailed discussion.)



2.2 A Link Jr. Combination Training device

2.7 VR as a medium of art: A quantum leap forward?

See Boller and Gross (1999: 161–167) for a brief discussion of VR in these terms or as 'the end of mediation'.

From the end of the Second World War, the US government began serious funding of research aimed at improving flight simulation and the computation of ballistic tables, the calculation of the trajectory of shells and missiles necessary to accurate targeting. The great cost of modern military aircraft, and the enormous demand for ballistic calculation, fuelled the development of electronic/digital computation. This was not the first time that the demand for calculation threatened to outstrip the human capacity to produce them fast enough and then drove the development of computers. See Mayer (1999: 506) on Babbage's Difference Engine (a version of which was completed in 1854), a mechanical computer which was partly a response to the demands for maritime navigation in the nineteenth century. Woolley (1992: 49) reports that in the 1940s the 60-second trajectory of a single missile would take 20 hours to work out by hand, one of the first electronic mainframe computers, the ENIAC (1946) took 30 seconds. For more on the military origins of cybernetics, and therefore contemporary computing, see Part 5.

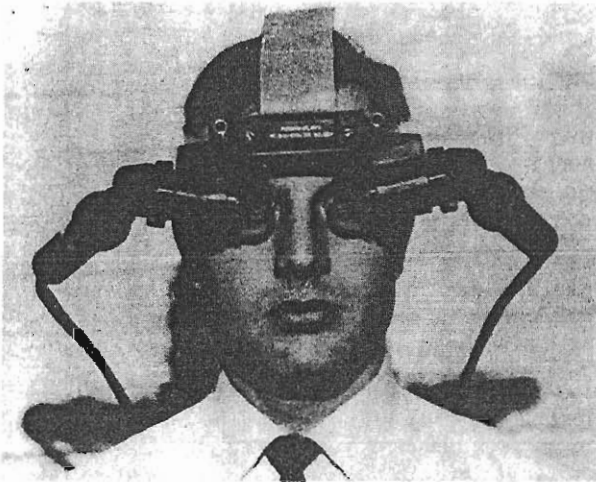
The 'universal machine' is Turing's term for what we now call a 'computer' – a machine with no dedicated purpose. Turing saw that a computer could be more than a numerical calculator, potentially it could be a machine open to a whole range of tasks – a machine that could become any other machine.

### 'A head-mounted three dimensional display'

In a 1968 scientific paper of this name, Sutherland reported on an apparatus that would, in effect, generalise the flight simulator. Here, Sutherland made a conceptual move similar to that made by Alan Turing when he conceived of the computer as a 'universal' machine. Sutherland built an apparatus that included a rudimentary head-mounted display. The HMD's basic purpose was to 'present the user with a perspective image which changes as he moves' (Sutherland 1968: 757). The space that the wearer of the helmet 'saw', and which shifted as they moved their head, was generated mathematically. It was structured by a three-dimensional Cartesian grid with its three spatial co-ordinates imaged stereoscopically on the binocular TV screens held close before their eyes.

For Sutherland, this apparatus had no specific purpose such as flight simulation. It was a visual and tactile interface with a computer, an alternative to the early punch cards, or to a keyboard, light pen and screen. Instead of human-computer interfaces being holes punched in paper tape or two-dimensional manipulable graphics displayed on a VDU, this interface was, however rudimentary, spatial, visual, tactile and kinaesthetic. A prototype of the kind of interface described at the start of this section.

How can we connect this short instrumental and technological history with ideas about change in visual culture: the sphere on which these developments will later impact in the form of VR? Two important elements in the history of Western visual culture make an appearance in our brief account of Sutherland's work. We have already met the concept of imitation or mimesis, which is now challenged by that of simulation. Now we also meet a conception of space which is historically and culturally specific to Western art and science – in the form of a Cartesian grid which appeared to the wearer of Sutherland's head-mounted display.



2.3 Sutherland's Head Mounted Display.

### Mimesis

Mimesis, the studied and skilful copying of the appearance of nature, lying at the centre of a traditional theory of visual representation dating back to ancient Greece, seems to have given way to another activity – simulation. This is the way in which a reality effect – an image drawing upon the culturally accepted ways in which reality is understood to be faithfully represented – is produced without copying any particular pre-existing thing.

Despite its subsequent theorising (see Baudrillard 1988: 166–185), this is a distinction that can be hard to grasp. For present purposes we will be content with the following recognition: what distinguishes simulation from imitation is that an artefact that is a simulation (rather than a copy) can be experienced as if it were real, even when no corresponding thing exists outside of the simulation itself. We are, after all, now familiar with such simulated reality effects from watching the seamless insertion of computer animations and special effects in contemporary blockbuster movies and television adverts.

### Cartesian space

Sutherland's prototype VR helmet made visible to its wearer a 'Cartesian grid', a schema or conception of space defined by the co-ordinates of height, width, and depth, a cubic, gridded, measurable space: the classical, mathematical representation of three-dimensional space. A conception of space that after some 400 years of habit and assimilation within Western science and culture, and wherever its techniques and knowledges have been imposed or adopted, is for most work-a-day purposes how we experience and negotiate space as part of our visual culture. We are obliged, when we think of imaging and visualising (and this clearly includes computer scientists) to recognise the Cartesian grid. Such a conception of space is anticipated by the employment of pictorial perspective in the Western pictorial tradition, which emerged in the painting of the fifteenth century, was built into the lenses of photographic and movie cameras in the nineteenth and twentieth centuries, and is currently the space produced by digital image software programs. (For a fuller discussion of this see 2.3.)

### 2.6.4 VR: the actuality and the hyperbole

#### Virtual reality's metaphors and 'as ifs'

Immersive virtual reality (and the more generic 'cyberspace') are largely thought about with the aid of metaphors, drawn from the social and cultural world that we are familiar with, and existing media forms.

Immersive VR is frequently talked about in terms of entering into images, being swallowed by television (Dery 1993: 6), walking into the computer (Morse 1998: 181), passing through the cinema screen, etc. (As we shall see in 2.7.1, such metaphors owe a great deal to one founding idea – that of 'stepping through Alberti's window'.)

Another set of metaphors seek to give content to the 'non-space' of the founding metaphor of networked VR – 'where you are when you are on the telephone'. These tend to conjure up familiar and comforting visions of lost communities regained: the village pump, the town square, the ancient meeting place or agora, or a neighbourhood in a digital city (Robins 1996: 96–102). Such metaphors have become key ways in which VR and cyberspace are conceived as objects of study within circles of academic and critical thought. However, they are also used to promote and market VR in various forms, and are thus 'just barely removed from the commercial hype' (Hillis, 1996).

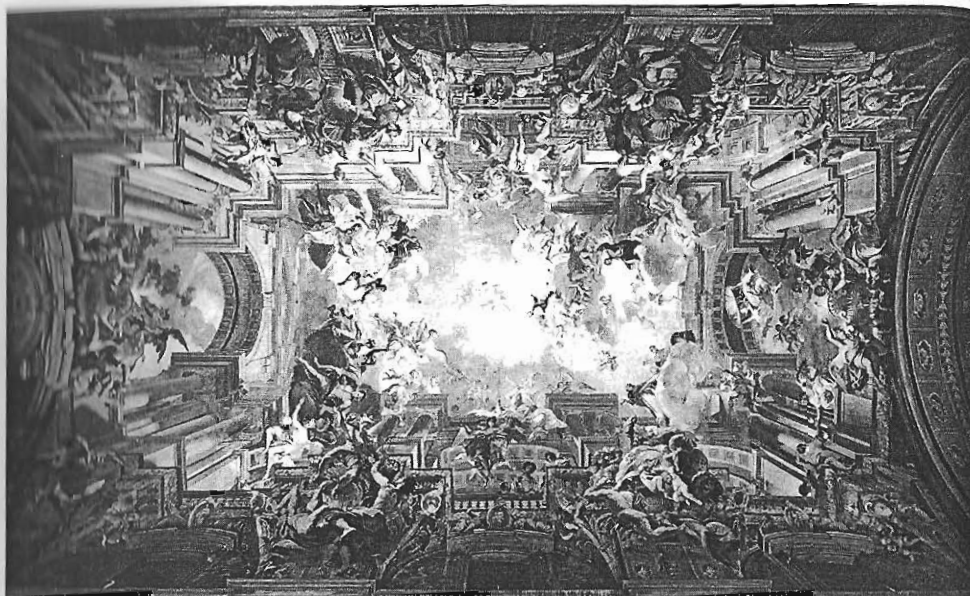
Metaphors help us to see things in terms of what we are already familiar with, that is,

However, one increasingly sophisticated practice of 'mimesis' in the history of Western art did have a 'simulationist' character in rendering as if real or natural the artificial and the unreal – as in trompe-l'œil painting (see Robins 1988: 65–86).

For a discussion of the script regime of Cartesian perspectivalism in Western representation see Jay (1988).

2.3 Visuality

2.7.1 What is Alberti's window?



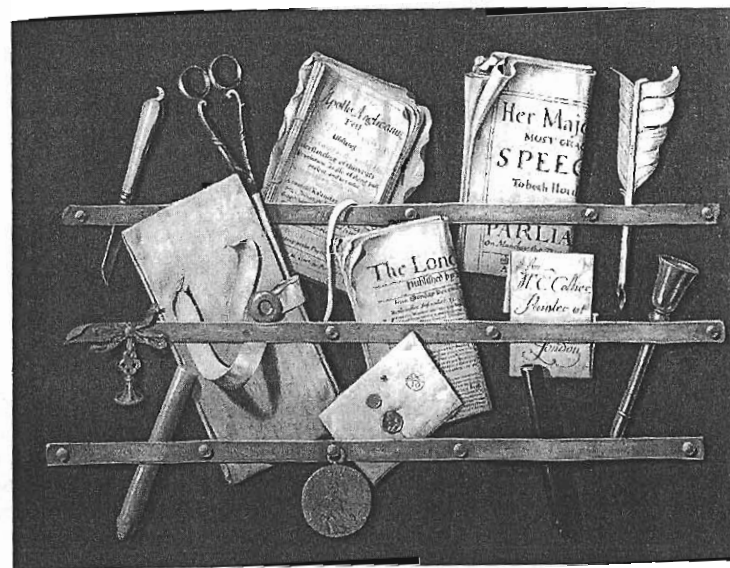
2.4a Fresco in a Baroque cathedral. Fra Andrea Pozzo, *St Ignatius Being Received into Heaven* (1691-4). Church of Sant Ignazio, Rome. Courtesy of Scala.

### 2.5.3 The discursive construction of new media

they enable us to map the familiar onto the unfamiliar. Metaphors are also dangerous. They can be overextended, we can push them too far and they slip from being useful to obscuring our view of what interests us. When this happens the metaphor forecloses our enquiry prematurely. The metaphor stands between us and the event, object or situation that we want to understand. Most dangerous of all, the metaphors we use become part of our discourse; they become the very terms that we use to define what we wish to analyse. (See on discourse 1.5.3.) As a result of the way that metaphors eventually part company with any sustained attempts at understanding, a yawning gap has opened up between the actuality of VR and the discourses which surround it. This is a situation which demands that we look closely and critically at the metaphorical terms employed and seek an alternative account of VR.

#### The launch of VR

The yawning gap opened up with the earliest appearances of immersive VR technology. Benjamin Woolley's acute and entertaining account of the launch of early VR systems at the SIGGRAPH (Special Interest Group, Graphics of the American Association of Computing Machinery) conferences of 1989 and 1990 tracks this process (Woolley 1992: 11-38). At this early stage the metaphors were truly grandiose, as VR was immediately likened to dreams, childhood imagination, and to parallel universes where the laws of (Newtonian) physics did not apply



2.4b *Quod Libet*, Edward Collier (1701). Victoria and Albert Museum, London.

Woolley contrasts his experience of these early VR systems with the euphoric terms in which they were described by the computer graphics pioneers who presented them. On trying out VPL's demonstration of 'RB2', Woolley recalls: 'I... experienced a crudely rendered primary coloured series of badly co-ordinated images.' Simultaneously, Jaron Lanier, the head of VPL Research, the company that built the system that so disappointed Woolley, described VR as 'an experience when you are dreaming of all possibilities being there, that anything can happen, and it is just an open world where your mind is the only limitation' (Woolley 1992: 14). Another panellist, an academic from University of Washington's Human Interface Technology Laboratory, suggested that 'virtual reality' was 'about much more than reality'. VR was not merely a way of simulating the real world (with its physics and constraints) but a way of building worlds in which the constraints of reality could be thrown away. Virtual reality was a subjective reality that existed only in the 'eye of the beholder'. For Lanier, this aspect of VR was comparable with the (supposed) freedom of dreams or the lost freedom of childhood imagination: 'The thing that I think is so exciting about virtual reality is that it gives us this freedom again. It gives us this sense of being able to be who we are without limitation' (Woolley 1992: 14).

As Woolley points out, the gap between what he actually experienced and these euphoric metaphors could not be accounted for by the crude state of the technology's development at the time. 'Lanier's rhetoric was not about the future, it was about the present. This technological liberation was already underway' (1992: 16)

It can be argued that the difference in Lanier's and Woolley's estimations of VR's power or effectiveness in 1989 is still typical of contemporary thought about VR. It entails a collapse of past, present and future, in short:

See Robins (1996: 89-90, 94-95) on infantile tendencies and VR

- what actually exists (immersive and interactive VR technologies and their crude products);
- rapid and visible development (especially as now seen in the application of digital simulation technologies in film);
- their future promise (vividly imagined in cyber-fiction and cinematic representations of future virtual worlds);
- the rediscovery of historical 'virtual' cultural forms such as the phantasmagoria.

The 'phantasmagoria' was a nineteenth-century form of visual entertainment in which slides were back-projected onto a translucent screen facing an audience. It was accompanied by artificial lighting effects and dramatic sound to produce, usually, effects that were intended to suggest the supernatural (see Neale 1985: 25). However, the term has also been used (see Buck-Morss 1992) to describe the way that 'a narcotic was made out of reality' in the introduction of new forms of spectacular and sensuous experience in the nineteenth century (urban vistas, displays of goods in the new department stores, elaborate domestic interiors of nineteenth-century consumer culture).

Overall, we have a situation where the past, the present and the potential or future are, at the very least, difficult to disentangle.

#### An unbridgeable gap

Even as its technical resources have developed, this contrast between the visually impoverished or trivial sensory experience of 'being in' VR, on the one hand, and a sense of its profound cultural implications, on the other, has become a constant theme in critical discussions about immersive virtual reality. VR seems to be both crude or trite (in its form and content) and something profound and new in the history of visual culture. There continues to be an immense gap between the way that the general significance of VR is expressed and the way that it is extrapolated from a relatively small number of privileged and inaccessible examples.

For example, in 1998, some nine years after Lamer's euphoric description, we find a philosopher of 'virtuality', Pierre Lévy, judging that

virtual reality systems enable us to experiment with the dynamic integration of different perceptual modalities. We are practically able to relive someone else's complete sensory experience.

(Lévy 1998: 38; our emphasis)

In short, in VR it is as if an 'I' were experiencing the world as someone else. Leaving aside the question of how we can even begin to know that what we perceive and feel in VR is a reliving of someone else's 'complete' sensory experience, this continues to fly in the face of any actual experience of virtual reality systems. In any but the most fanciful accounts of first-hand experience of 'being in virtual reality' their crude approximation to anything like 'complete sensory experience' is always noted.

Throughout the 1990s this point was made again and again. In a discussion of the difficulties facing interactive media in achieving the kind of content-rich absorption traditionally associated with narrative cinema, Andy Cameron (1995: x) observes that the demands made on computing power, merely in order to construct the bare bones of an interactive VR environment, are such that, 'VR to date has barely been able to dress the set, let alone cry "action", or murmur "once upon a time".' Jeremy Walsh (1995: 113–119) judges that VR, in its popular forms, is a 'sterile technological form' animated only by a kind of cyber-sexuality of leather fetishism, pornography and violence. In the work of more experimental VR artists, folkloric new age themes, nature myths and childlike dramas predominate.

Jon Dovey (1996: xi–xii) recalls his experience of navigating a virtual environment which simulated deep space. He found as he grasped the stars that appeared to rush toward him ('No

See Clair Davies (1998) for her own account of her work 'Osmose', and Brenda Laurel and Rachel Strickland's account of their work 'Placeholder' (in Moser and Macleod 1996) as examples of such themes.

mean feat when your hand is encased in a medieval gauntlet') that they were actually 'digital' packets of Marlboro cigarettes. Nicola Green (1997: 57–78), in her analysis of the immersive VR game 'Dactyl Nightmare', concludes that the identities acted out by participants in VR turn out to have a great deal to do with the real world in the sense that they borrow from familiar media stereotypes to be found in television drama and advertising.

#### 2.6.5 VR: trimming the metaphors

Can we think about VR in ways that bridge this stubborn gap between such experiences and the hyperbole that invests them with great historical significance? In other words, can we find less metaphoric ways of understanding VR? As a concept, virtual reality has been contested since its inception in the late 1980s. Many developers and practitioners, as well as academic critics, have felt uneasy about its connotations. By paying attention to these critics we can begin to arrive at a way of thinking about VR as a practice utilising quite particular technologies (often with problematic outcomes in terms of the visual and sensory experiences produced). This will help us pursue our interest in VR as a medium. However, at the same time, we will see that misleading metaphors continue to figure in these critical accounts.

#### VR is an overextended term

Michael Heim, a philosopher, and author of *The Metaphysics of Virtual Reality*, who in much of what he writes has a euphoric view of VR, has nevertheless pointed out that the term 'virtual reality' is open to a kind of over-extension that threatens to make it meaningless:

On first hearing the term virtual reality, many people respond immediately: 'Oh, sure, I live there all the time.' By this they mean that their world is largely a human construct. Earth itself has become an artifice, a product of natural and human forces combined. Nature itself . . . no longer escapes human influence . . . But once we extend the term virtual reality to cover everything artificial, we lose the force of the phrase. When a word means everything, it means nothing.

(Heim 1993: 112)

Heim warns us of a confusion. A confusion between a way of characterising our contemporary 'postmodern' world and a specific technological and cultural project to develop a new medium (VR).

#### VR is not the same as the virtualisation of culture

The heart of Heim's complaint is that it is hard to think about VR as a 'medium' that produces a 'virtual' sense of reality if we fail to distinguish it from thinking about something else; that is, the way that technologies of all kinds have deeply penetrated and refashioned nature and culture – to such an extent, some argue, that we should no longer think of them as separate realms. The experience produced by immersive VR technologies may be a vivid symbol for certain ways of understanding postmodern techno-culture, but this is another matter. From the point of view of VR as a technology, or as a proto-medium, it is not a symptom of a world which has lost touch with reality, it is simply a material technology that is used to produce situations that have some of the qualities of reality. David Holmes, a sociologist, makes a similar point. For him it is an especially potent example of wider kinds of technological and cultural change:

Of the myriad technological and cultural transformations taking place today, one has emerged to provide perhaps the most tangible opportunity for understanding the political and ethical dilemma of contemporary society. The arrival of virtual reality and virtual communities, both as metaphors for broader cultural processes and as the material contexts which are beginning to enframe the human body and human communication . . .

(Holmes 1997: 1)

So, not only is VR conceived of largely in terms of metaphors it is also used as a metaphor in itself. A metaphor for the condition of the contemporary world. 'Oh, sure, I live there (or like that) all the time.' But, as Holmes also suggests, VR is also a material context which 'enframes' (is the context in which we have come to understand) the human body and human communication. That is, it is a specific set of technological and cultural arrangements that we encounter and use in physical and social space – much like any media. A VR installation and the machines that power it may not be as cumbersome and grossly physical as a 1940s Hollywood film set, or a television news studio, but they are material. Media are real and material things. It is only on this material basis that VR is able to produce illusions (however imperfect) of being virtually present with other objects in electronically constructed spaces, or, for that matter, of feeling that we are 'with' others in the 'spaces' created by online communication.

The point is that both ways of thinking about VR are important: as a metaphor for a contemporary condition and as a material and technological context for bodies and ways of seeing. However, the fervour with which the first way of thinking has been pursued – the metaphoric value of VR itself – has tended to divert us from thinking about the latter: what VR actually is in the material world. In fact, it seems likely that we will not get far in understanding VR as a new medium (if it is, how it is, why it is, and with what implications) simply by noticing how it nicely represents the way that the world at large is increasingly artificial. This, at least, is one meaning we can take from Heim's warning. This physical aspect of VR is explored further in 5.4.

#### VR is not complete sensory experience

A second kind of impatience with metaphorical overload comes from Brenda Laurel, researcher, interface designer and VR artist, who argues that 'virtual reality' is an oxymoron, or a contradiction in terms:

Most of us in the [VR] business dislike it a lot. The word 'virtual' is okay because in fact we're creating environments or realities that don't necessarily have concrete physical components to them. But the use of the word 'reality' in the singular belies a certain cultural bias that most of us are not very comfortable with.

(Laurel, quoted in Coyle 1993: 162n)

We should stop to consider this statement. One of Laurel's arguments, that 'virtual' and 'real' cannot be joined together as a sensible name for something, only has bite if we agree that what is 'virtual' cannot by definition be 'real'. This obviously depends upon accepting a popular conception of the virtual as 'not real'. (See 5.4.2 for an account of why the virtual and the real should not simply be opposed.) More importantly, given the material, technological production of virtual environments that we have discussed above, what could she mean when she describes VR as 'environments or realities that don't necessarily

have concrete physical components to them' This may not be metaphorical but neither does it make sense. The experience of VR, however, facilitated by invisible electronic or digital processes, is, of course, physical. It involves receptive, sensing, human bodies and technologically generated, physical channels of information.

Laurel suggests an alternative to virtual reality, 'telepresence'. She defines this as 'a medium that allows you to take your body with you into some other environment'. Immediately, Laurel checks herself because she feels that this attempt at redefinition is still 'kind of metaphorical'. She then offers a further definition of VR: 'What it really means is that you get to take some subset of your senses with you into another environment' (our emphasis). This, we should immediately note, is a far cry from Lévy's opinion that VR is a reliving of someone else's 'complete sensory experience'. And, despite Laurel's odd (and in our opinion, mistaken) view that virtual environments are non-physical, her attempt to guard against metaphorical inflation in her definition helps close the gap between actuality and metaphor.

#### VR technologies construct 'environments' not 'realities'

Like Laurel, Mary Anne Moser, writer on contemporary art and co-editor of *Immersed in Technology* (1996), also prefers 'environment' to 'reality'. She is unhappy with the latter term because of the sensationalist 'ballyhoo' that was immediately attached to it, and warns that VR should not be seen as differing fundamentally from all other technologies. She urges (1996: xvii–xviii) that virtual reality technology needs to be viewed as part of a continuum of technological developments. In an attempt to focus attention on VR's social, cultural, ethical and political implications, rather than the sensationalist 'allure' of the new technology itself, she and her colleagues (at the Art and Virtual Environments Project, Banff, Canada) abandoned the term 'virtual reality' for the less sensational 'virtual environments'. An environment, understood as the surrounding conditions in which people (or other organisms) live and act, is something that can be built and arranged. It is more manageable than 'reality': a term with many meanings which always begs further definition and context.

#### VR is part of a series of historical technological developments

Moser's view (1996) that VR needs to be understood as part of a 'continuum of technological developments' refutes the absolute novelty of VR. Geoffrey Batchen (1998: 276) asks us to recall the stereoscope, 'an early nineteenth-century technology of seeing that would appear to parallel closely the VR experience that so many commentators want to call "revolutionary" and "altogether new"':

He quotes a contemporary response to the stereoscope's image and the sense of disembodiment that it created: '[I] leave my outward frame in the arm-chair at my table, while in spirit I am looking down upon Jerusalem from the Mount of Olives' (Holmes 1859, quoted in Batchen 1998: 275–6). The three-dimensionalisation of photography which the stereoscope achieved (in photography's early days) is only one way in which, at the beginning of the nineteenth century, a number of boundaries between what was real and what was represented began to blur. 'the very dissolution which some want to claim is peculiar to a newly emergent and postmodern VR' (276).

#### VR involves the technological management of the senses

Finally, the sociologist David Holmes (1997: 1) adds something to Laurel's recognition that in VR only a subset of our senses are engaged. He suggests we think of immersive VR

See also margin note on 'phantasmagoria' (p. 118)

See also Erkki Huhtamo, 'Armchair traveller on the ford of Jordan: the home, the stereoscope and the virtual voyager', *Mediamatic* 6.2/3, (n.d.) 13–23 and 'Encapsulated bodies in motion: simulators and the quest for total immersion', in Simon Penny (ed.) *Critical Issues in Electronic Media*, New York: SUNY Press, 1995.



1.6.2 Mapping Marshall McLuhan  
1.6.4 The many virtues of Saint  
McLuhan

as 'the technological management of the body's senses'. In some ways this echoes the McLuhanite definition of media technologies as extensions of the body or the senses (1.6.2, 1.6.4), but it also adds a sense of agency. Management is more than extension, it involves direction and control for some identified purpose. Hence, in VR, and again like any other medium, the viewer or user is in some part subject to the designs of the producer. It follows from Holmes's definition that we must ask 'if VR is a world of dreams, then whose dreams are they?'

VR disturbs the body's relationship to its senses and mental activity

Simon Penny, VR artist and critic, puts some detail on Laurel's reminder that only a subset of the senses is involved in VR. 'The VR condition is . . . the limited case of a simulated, interactive, stereoscopic, visual (and occasionally auditory) environment, in which the body is represented only visually' (1994, 243). For this reason, Penny suggests, VR involves a 'dislocation and dissociation' of the human body. However, in pursuing this observation, metaphor creeps back into Penny's account: in immersive VR, 'it is as if we have two partial bodies – a corporeal body that wears the apparatus' and 'an incomplete electronic "body image"'. As he pursues this metaphor, the 'as if' of having two partial bodies in VR, matters go wrong:

One does not take one's body into VR: one leaves it at the door. VR reinforces Cartesian duality by replacing the body with a body image, a creation of the mind (for all 'objects' in VR are a product of the mind). As such, it is a clear continuation of the rationalist dream of disembodied mind, part of a long Western tradition of the denial of the body. Augustine is the patron saint of cyberpunks.

(Penny 1995: 243)

A compelling image, no doubt, and yet another instance of VR being placed within long traditions of Western thought and feeling. Yet we should note two things. First, Penny has been led to think of the act of entering virtual or cyberspace as like walking through a door, of passing physically across extended space, as we do when we move from one room to another. By definition, this is something that bodies do. If the body stays (is left) at the door then what moves through it? A somehow disembodied mind? (No wonder that Descartes is so frequently invoked to explain VR.) It is surely better to revert to the conception of VR as 'the technological management of the body's senses', and Penny is on safer ground when he suggests that in VR the body is provided with an incomplete image of itself (the image of a gloved hand hovering in advance of the body's movement, the kinaesthetic sense of walking on a treadmill, etc.). Second, Penny compounds the idea that a disembodied mind or consciousness enters VR without 'its' body, by then suggesting that 'all "objects" in VR are a product of the mind'. Surely the objects in VR are also the products of computers processing masses of data and analogue image inputs?

Summary: another take on VR

Where does this critical review of the thoughts and comments of practitioners and theorists of VR leave us? Some of the qualifications we have discussed (and there could be others) are steps toward refusing the seductions of the runaway metaphors that surround VR. However, as we have seen, some of these very attempts to pin down the experience of VR carry yet more overextended and confusing metaphors in their train. Let us sum up what we have learnt. As we do we can now also return to Cray's phrase with which we

started and look again at his suggestion that virtual environments are 'implantation[s] of fabricated visual "spaces"'

When we 'use' VR, some of our senses (principally vision, but also hearing and to some extent touch) are technologically managed within an artificial or constructed environment; in Cray's terms, 'fabricated "visual spaces"'.

- While we can be easily led to think of VR as a powerful symbol of a new cybercultural condition (and possibly be seduced by the existential glamour of the idea) we always meet it within material circumstances. These may be research laboratories, hospitals, amusement arcades, art installations in galleries, or high-end PCs in our homes. The visual spaces fabricated by VR are implanted within the material reality of such institutions and places. They are not in a parallel universe of some kind.
- This technological management of the senses has elements of continuity with a history of other media-technological developments and their cultural meanings. However radically different immersive VR may seem to be from other image media, it has precedents; it has a history.
- The experience we have in a virtual environment has disturbing consequences for our sense of embodiment as it dislocates or dissociates our senses, and the mental activity they give rise to, from our bodies. This does not mean, however, that we lose or 'escape' our bodies in VR.
- This sense of disembodiment has led theorists of VR to see it as a technology that compounds a problematic way of thinking of the body and the mind as separate and separable entities, derived from the influential seventeenth-century philosopher Descartes.

## 2.6.6 VR as a discursive object

We have argued that, at best, VR has to be seen as a proto-medium but that this is itself of particular interest when thinking about new media. In 1.5.3, through a series of case studies, we introduced the notion of (new) media and technologies as discursive objects. We need, briefly, to take this idea up again in considering VR. We saw that the emergence of new technologies and media focuses the attention of different groups within a society (through its press, journals, professional bodies, its communicative media, and as an everyday topic of conversation) on issues and preoccupations that it already has. VR is a striking case of this and may help us understand the gap between its actuality or social availability and its perceived significance. We saw earlier in this section how VR is socially inaccessible on the one hand and impermanent on the other. Despite this, throughout the 1990s little can have exercised the minds of technologists, artists, academics and journalists so much as these technologies of virtual space. It now seems to be the case that VR is something that is reported upon rather than seen; the 'presence' of which is talked up and its significance elaborated through intense speculation rather than first-hand experience. And it is now also the case that it is not so much the widespread social use of VR environments that is important, but the way that VR seems to call up questions about the nature of 'reality' and the relationship of the physical or organic human body to 'experience'. It is also still largely the case that knowledge of VR is highly dependent upon

its representation in other media, cinema, TV, novels, and comics, rather than frequent first-hand experience (Hayward 1993, Holmes 1997).

For each of these reasons, the apparatuses which produce the phenomena of 'virtual reality' are, for most people, 'discursive objects' in this sense rather than concrete operational technologies which are frequently met in the everyday world, like telephones, TVs, VCRs or PCs (which, of course, also have significant discursive presence as well, as the case studies in 1.5.3 reveal).

The historian of visual culture, Jonathan Crary, whose theories we have been discussing, provides a detailed account of an image technology which can be seen as an antecedent to the VR apparatus: the camera obscura of the eighteenth century (1993: 25–66). Today, we mainly think of the camera obscura as a forerunner to the photographic camera, a kind of camera without film, which was used by painters and draughtsmen as an aid to constructing images in perspective; an instrumental technology Crary disagrees; he argues that we only think of the camera obscura predominantly in these terms due to the fact that it is mainly art historians who have paid attention to it. He argues that throughout the eighteenth century the main use of the camera obscura was not the making of visual images. More frequently, it was an object which was possessed by people in order to stimulate philosophical reflection and speculation on the nature of perception and knowledge, the external world, the eye and the brain (Crary 1993: 29). It was a practical model and a point of conversation and discourse, used in the effort to understand the processes of perception and our experience of the visual world more generally.

With the difference that the camera obscura can be thought of as a discursive object, because of how it was used, and that the VR apparatus is one because it is seldom available for use, it looks as if both apparatuses serve similar functions, some two and a half centuries apart, in the way that they promote intense abstract speculation about vision, embodiment and the nature of experience.

### 2.6.7 VR's cultural resources

Any medium utilises (and may transform and recombine) the signifying resources (codes, conventions, languages) of other existing and established media. This is evident in VR in a number of ways. In some genres of VR, photographic verisimilitude is the goal and the standard of realism against which its often stretched resources are judged (Cameron 1995: x; Penny 1995). In other versions which stress that the potential of VR is not to simulate photorealism or material reality with its 'physics' but to construct fantasy worlds, or when it is used by artists who explore other sensory states and situations, a range of ideas, themes, and conventions are drawn from the history of art.

In the context of popular entertainment there is a direct reliance on cinematic content and the key convention derived from the coincidence of the camera and the spectators' viewpoint in mainstream cinema – the cinematic 'point of view' now adopted, and entered into in VR jargon as POV. Morse has pointed out that the 'fly throughs' of contemporary TV graphics and advertisements (the twisting and tumbling logos and images which appear to emerge from behind the TV viewer to zoom into the TV screen and recede into its infinite space) share much with VR producers' use of 'flight' to move 'users' around virtual space. The connections between early twentieth-century theme parks, white-knuckle rides and VR has also been researched (Darley 2000: 43–47). VR, then, is deeply concerned with the 'remediation' of other media forms, as Bolter and Grusin argue (1999: 161–167).

### 2.7 VR AS A MEDIUM OF ART: A QUANTUM LEAP FORWARD?

We saw in 2.6.1 that VR has been described as a medium which breaks with a long Western tradition of visual representation stretching back to at least the beginnings of the European Renaissance in the fifteenth century. We met it described as a 'quantum leap into the technological construction of vision' (Hayles 1999: 38). Essentially this is because the technologies employed by VR are literally 'worn' by the viewer as extensions of their visual and tactile senses, and the experience that results is that of entering 'into the image' (see Robins 1996). This experience is captured in the widespread use of the phrase that is, arguably, the main metaphor for immersive VR: when a user dons the head-mounted display of a VR apparatus they are thought to 'step through Alberti's window'. The reference here is to Leon Battista Alberti, a fifteenth-century Italian art theorist, who formulated a practical method of perspectival depiction in which he conceived of the framed surface of a picture as a window through which a view of the world was seen. This puts contemporary thought about VR in touch with a long history of perspectival image making in Western culture.

However remote and ancient the reference to Alberti and painting may appear to be in the context of 'new media', it is not at all at odds with making other connections between VR and the more 'modern' technological media of photography, film and television. We find clear Albertian echoes in, for instance, Mark Dery's *Culture Jamming: hacking, slashing, and sniping in the empire of signs* (1993), where he suggests that 'in virtual reality, the television swallows the viewer headfirst'. In *Virtualities: television, media art, and cyberspace* (1998), Margaret Morse draws extensively upon an (unacknowledged) Albertian framework when she likens VR to 'passing through the movie screen to enter the fictional world of the "film"'. Or, she suggests, entering a virtual environment is like 'being able to walk through one's TV or computer, through the vanishing point or vortex and into a three-dimensional field of symbols' (Morse 1998: 181). Morse thinks of the TV screen as a thin membrane between an immaterial world of symbols – a 'pocket of virtuality' – and the material world from which we view it. She also suggests that virtual environments which use perspectival frameworks 'may even be considered the last gasp of Renaissance space' and the VR user is a spectator whose 'station point is inside the projection of an image, transformed from a monocular and stationary point of view into mobile agency in three-dimensional space' (Morse 1998: 182). In short, references to the Western pictorial tradition underpin much of our thinking about the new medium of VR.

In this section will pursue this conception of VR to see what it holds. This will mean looking at the implications of the proposition that in VR images are no longer artefacts that we look at but environments that we inhabit. Imagine that instead of watching a movie you were in it, 'wearing', as it were, one of the characters. Such is the proposition of VR.



2.5 Mantegna's 'window': detail from Andrea Mantegna, *St Christopher's Body Being Dragged Away after His Beheading* (1451–5), Ovetari Chapel, Eremitani Church, Padua.

Such references can be found in Morse (1998), Meezell (1998), Heim (1993), Bolter and Grusin (1999), Marchessault (1996), Nunes (1997), Hills (1996).

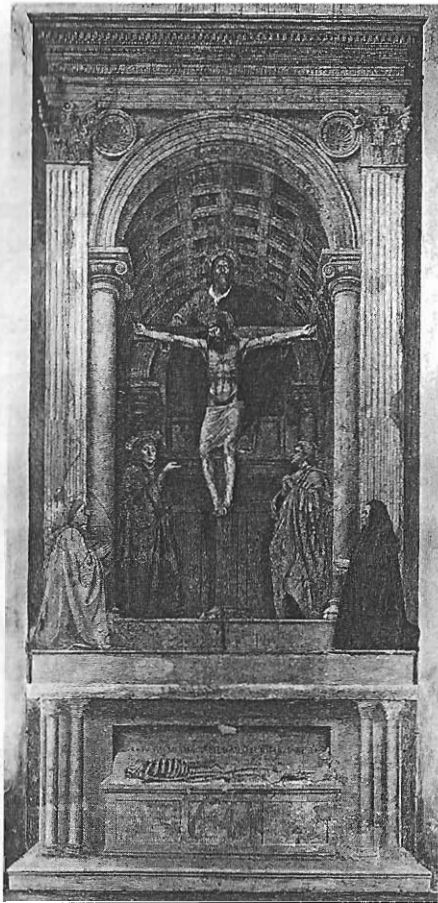
Della Pittura, first published 1435–6, a key, founding text on pictorial perspective. See Alberti (1966).

See William Gibson's concept of the 'sim-stim' in his novel *Neuromancer* (1986).

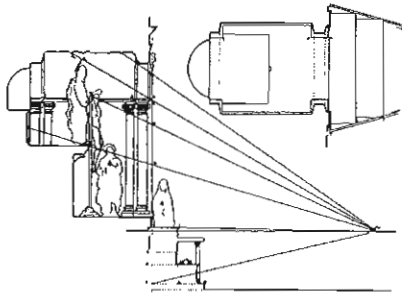
1.5.3 The discursive construction of new media

See Chr. Craven's 'Simose' (1998) and the examples discussed by Morse (1998: 186) for discussions of VR in traditional artistic terms.

2.6.1 Is VR a new 'visual' medium?



2.7 Masaccio 'Trinita' 1425, Santa Maria Novella, Florence, Italy. A classic case of the kind of image that was produced by Alberti's method, which actually predates the publication of his treatise by about 10 years. This is Masaccio's painting of the 'Trinity', circa 1425. It seems clear that Masaccio had a firm practical grasp of the system that Alberti was to make explicit later. The view that this painting offers implies that it is being 'seen' by a virtual spectator whose eyeline coincides with the top of the painted sarcophagus. If the picture is treated as an 'elevation' (a frontal plan of a building or structure) it can be used to make a 'section' through the depicted or virtual space from the front edge of the sarcophagus to the deepest recess of the niche which holds the figures. Courtesy of Scala.



2.8 Diagram of depicted space in the 'Trinita'.

become in picture making before the pervasion of photography, that event definitely clamped it on our vision and our beliefs' (Ivins 1964: 108, cited in Neale 1985). In short, the photographic camera industrialised perspective and naturalised the Cartesian conception of space which is antecipated by perspective.

Some 50 years later, movie film, utilising the photographic lenses in which perspective is mechanically encoded, complicates the picture in many ways. In film the 'centred eye' of Albertian perspective is still at work, but it is multiplied and mobile as we look:

- from our cinema seats – in the dark – as spectators of the projection screen;
- with the camera – in its movement – sometimes as if it was with us in our seats (as in certain kinds of long shot) but more often looking from some place within the 190 degree space depicted by the film itself;
- with a depicted character (usually a main protagonist) within the fictional world of the film narrative (as in the subjective shot-reverse shot)

Having established something of the character of perspectival representation, and noted its continuing embodiment in modern technological media, we are now in a position to address a number of problems that VR brings to this long tradition of image production and the modes of spectatorship associated with it. We can do this by considering three key elements of this visual culture and other related narrative and performative practices. These are:

- perspective as a symbolic form;
- the framing of images;
- images as material surfaces

### 2.7.3 Perspective as symbolic form

The term 'perspective as symbolic form' is borrowed from the art historian Erwin Panofsky, whose famous essay of this title was written in 1924. Panofsky's premiss is that perspective is more than a geometry or a mathematics of pictorial space. Debates about the status of perspective have been complex and long running. Does it match, in some especially truthful way, the conditions of human vision (the regular diminution of objects with distance, the convergence of railway lines, for instance)? Are the principles of pictorial perspective consistent with the laws of optics; the physics of vision? Or is pictorial perspective a set of cultural conventions for depicting space that have become dominant but which, in principle, exist alongside several others – the Western medieval, the Japanese, the Australian native peoples, for example (this is largely Panofsky's argument)? Is it, in short, a theory and a method of image making which has a privileged relation to the optics of human perception or is it a set of expressive and representational symbols: is it best understood in terms of natural science or semiotics (cultural science)? Is perspective 'real' or 'symbolic'? Our best guess is that it is, in part, both. However, Panofsky's contribution to the debate is to emphasise and show, through detailed exposition, how perspective works as a symbolic form. He shows how, from its very inception, artists like Masaccio in Italy and Van Eyck in the Netherlands grasped perspective as not only a way of constructing pictorial space or modelling the processes

of vision but also as a means of giving expressive significance to their images and of expressing ideas in visual form

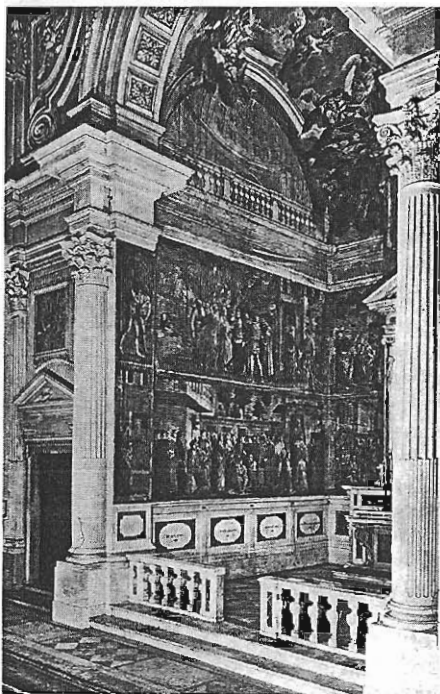
Panofsky begins by noting the expressive or communicative problem which perspective presented to artists. The problem arose from the manner in which perspective worked to construct a unified space, one which begged to be lit coherently and coloured naturalistically rather than according to a logic of symbolic significance. When using the new perspective, the size and prominence of depicted objects was determined by their position in space rather than their conventional, widely understood symbolic importance. In this way, perspective caused considerable representational problems for artists who adopted it as they emerged from a medieval tradition; artists who were skilled at arranging icons and symbols laden with meaning on flat surfaces and for whom space, depth, and volume were treated differently in different parts of the picture.

It is likely that perspective also presented problems for contemporary viewers of paintings. The problem for painters was how to mark out what was significant in an image when matters such as size, scale, and appearance were determined by a degree of perspectival naturalism not symbolic importance. For spectators, the other side of the problem was how to discern what was significant and what was not? Panofsky's

demonstration of how painters began to tackle these issues is extremely detailed and complex. Here, we can return to the work of Masaccio to see perspective 'in action' as symbolic form. It is clear from Figure 2.9 that Masaccio uses perspective to project and integrate pictorial space into the architectural space in which he worked. He constructs the space of pictures that are placed upon opposite sides of the central altar as if their pictorial space continues or extends behind the altar. But he uses perspective to achieve more than this. He uses the depth axis of perspective to solve a narrative problem: how to depict the unfolding of an act over time, in a single, static scene.

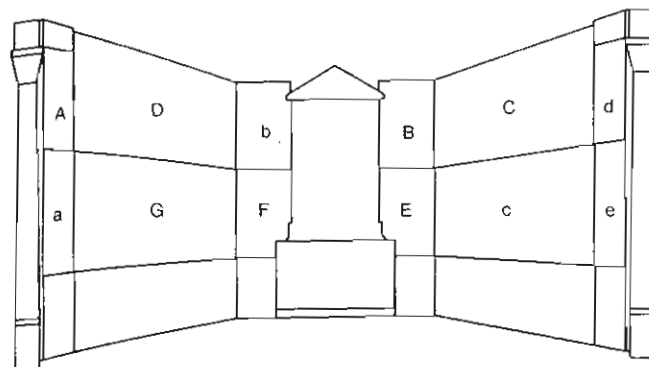
In 'The Baptism of the Neophytes' we see one neophyte in the process of undressing, another waits, naked and shivering, and a third receives baptism. These three images can also be read as three moments in a continuous process. We can read this as an image of three men doing different things or as stages of one man's actions. Elsewhere in the 1420s such narrative conventions take place 'simultaneously' on the picture plane but in different spaces. Telling stories by painting a sequence of separate moments, rather like a series of frames in an animation or the panels in a comic book, was a common practice in the fifteenth century. Normally, however, each moment would be separately framed or placed on a separate part of the picture plane. In Masaccio's work, they become embodied and embedded in depicted space, and a sense of anticipation as well as physical experience is expressed.

This expressive use of perspective is even stronger in the section on the other side of the altar 'St Peter Raises the

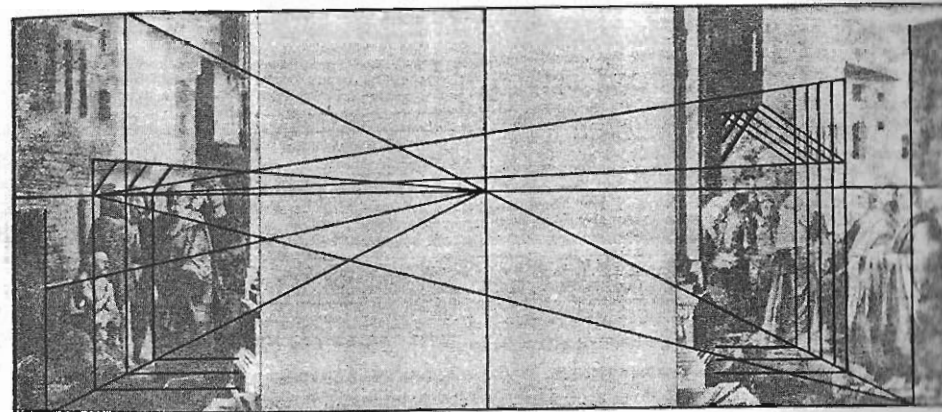


2.9 Masaccio: Overview of fresco cycle in the Brancacci Chapel, Santa Maria del Carmine, 1421-7

As has been noted, such a use of iconic images organised and marked according to significance is now to be seen in screen-based multimedia (Woolley 1992)



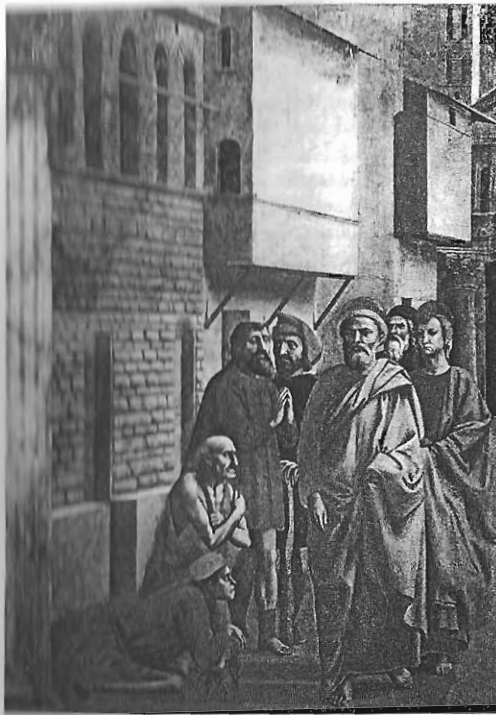
2.10 Diagram of fresco sections in Fig. 2.9.



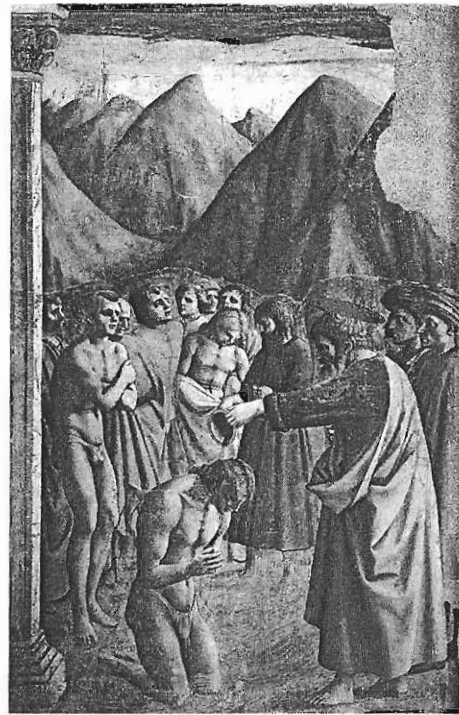
2.11 Diagram of perspective construction of Brancacci Chapel frescoes - vanishing points.

Cripples with his Own Shadow'. Here, the perspective which integrates pictorial and architectural space also enables Masaccio to represent St Peter as walking past three beggars, and as he does the cripples are cured and rise up. They appear to be cured in the time that he passes by: the cripple furthest back in space, whom Peter has passed, now stands upright while the man he is about to draw level with is still unable to stand but will (so the narrative promises) imminently be cured. More than this, Peter looks ahead, out of the picture space and above the head of the spectator, whose viewpoint, also constructed by the image, is beneath the saint. He appears to walk, curing the sick as he passes, and with a powerful implication that he is about to enter into (our) real space. Are we, therefore, next in line?

We might even think of perspective as a kind of 'software'. The knowledge and technique once held in the painter's 'head' is now not only replicated in the optical lenses of mechanical cameras, it is replicated in the form of the algorithms and programming which guide digital virtual cameras in 3D software applications.



2.12 Fresco section: 'St Peter raises the cripples with his own shadow'.



2.13 Fresco section: The Baptism of the Neophytes.

This question is given some edge by claims that VR promises a form of 'post-symbolic' communication. In this view, immersive VR is 'post-symbolic' because we experience its worlds as if we do those of real life, where we interact directly through our bodies and bodily actions with objects and spaces. It is a claim that also draws upon the distinction between simulation and representation: where a simulation (rather than a copy) can be experienced as if it were real, even when no corresponding thing or situation exists outside of the simulation itself (see 2.2.3). In this sense, immersive VR, as a simulation, does not refer, copy, imitate, signify or symbolise in the same way that analogue media may do, in order to represent this or that particular thing existing 'out there' in the world. However, this cannot mean that in VR we no

#### Virtual reality and pictorial perspective

At this point in our analysis we might think of pictorial perspective as a technology, a technology for constructing the space in an image. But, as we have seen here, it can also be used to give expressive force and add meaning to what is represented. We have seen how the pictorial space that perspective constructs is used to extend material, architectural space. It also reaches out, as it were, to position the embodied viewer in real space, in relation to what is depicted or represented. In one case, that of St Peter raising the cripples, the pictorial space effectively 'envelops' the spectator as it is implied, visually, that the saint's temporal progress through space continues toward the spectator.

Given that the immersive nature of VR is described as 'stepping through Alberti's window' it can appear in principle to be a stage further on, a progressive development of the achievements of perspective. In the perspectival images, there was only a connection or alignment of real and constructed space, however powerful in some cases; now, in VR (the metaphor proposes), one becomes the other – they become synonyms. However, given this radical reconfiguration of the relationship between spectator and image that takes place in VR (the idea that the spectator is now inside the

image) the question arises: how can VR function as a symbolic form? In other words, how do the technologies of VR operate as the technology of perspective has – as more than a technology for constructing pictorial space but also as a means of giving form and expression to ideas?

For artists and experimental producers of virtual environments a practical barrier stands in the way of finding solutions to this question. At present, at least, the intense and expensive work entailed in constructing VR, together with their short duration, means, amongst other things, that it is difficult to accrue experience, from one experiment to another, of solutions to problems and to develop conventions. As Margaret Morse points out:

Virtual environments are produced like packages that are designed without knowing what they might hold on the inside. In a field where the lore of veterans is nonexistent and where conventions are invented ad hoc as one goes along, even the artists ... could not be sure what to expect once the machine or 'environment' was finished.

(Morse 1998: 200)

This is not the only practical problem, for if the massive computing power needed to run a VR work can only be achieved for brief periods (in work that Morse is considering – only two hours) and the work subsequently exists only as memory (the users and the computers, and as video documentation) how will we ever arrive at answers (Morse 1998)? However, there may be a still larger problem. This is that the act of 'stepping through' a window or 'into an image' makes no sense. VR may indeed lead to a new kind of relationship between spectators and images, but it is a very problematic relationship which raises some difficult questions for the use of VR as a medium. It is to this question that we now turn.

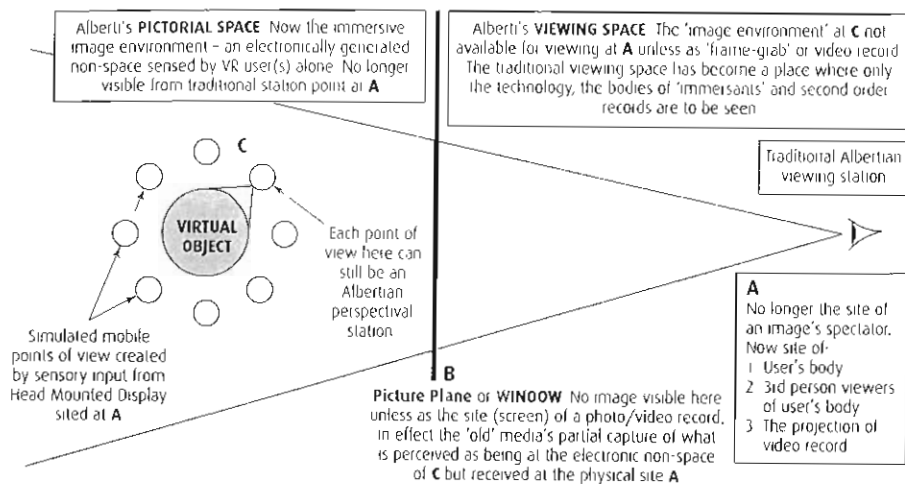
#### 2.7.4 The condition of Alberti's window after VR

It is instructive to see what happens if we take the diagram or schema that locates Alberti's window (and therefore the image) in relation to a spectator (Figure 2.6) and then reconfigure in terms of VR. Figure 2.14 takes the key elements of Alberti's method – the viewing station of the spectator (A), the picture plane (B), and the image or pictorial space (C) – and uses them to conceptualise what occurs in a 'virtual reality' or 'environment'. By looking at the three points A, B and C we can observe the following.

First, a question arises. What remains at point A – the position traditionally occupied by a spectator of an image? The viewer's (now user's or immersant's) body remains there. But it is a body that cannot see the world it occupies. Its field of vision is wholly filled by the electronic stimulus provided by the small, binocular LCD screens held close to the user's eyes. They are rendered blind to the world that they stand in and therefore they are also unable to establish their relationship to the virtual world that they see. In terms of the sociality or social rituals of spectating (sharing the act and occasion of looking with others, especially important in the way we consume cinema and television, and once important in the way that paintings and prints were used as a basis of discussion and conversation) we should also recognise that the immersant is sealed off from others. At point A there can be other viewers, who are not immersed in the virtual environment but are an audience for the VR event. What they see is the immersant's body moving to the logic of a space that they, in turn, cannot see.

longer deal with representational elements (visual languages, sign systems or symbols) at all. The digitally processed and reconfigured data that are fed to the VR user via helmets carrying stereoscopic LCD screens and wired gloves or body suits providing tactile and positioning feedback, are normally built from analogue, photographic or video images of objects, persons and places. It would otherwise be meaningless: its immersive, stereographic, and interactive simulation, or production, of a world that is virtually real harnesses images and symbols that we would otherwise understand as representations. This is a proposition that is echoed in the notion that VR may be the 'ultimate display or interface with a computer by doing away with the screen, the mouse and keyboard, etc.' (see 2.6.2).

The fact that only one or two people can normally enter a virtual environment is a problem for the exhibition of VR. One solution is for a 'secondary' set of spectators to watch the immersant's 'exploration' of a virtual world, while also seeing a projected video version of the immersant's visual experience on a screen.



2.14 The condition of Alberti's Window after VR.

The overcoming of the solitary or private nature of VR experience lies in the development of 'avatars' (a Hindu word for the visible form of a deity). Here representations of the self and others exist in cyberspace. Presently, they take extremely crude forms and their future development may be in the same realm as we discussed in section 1.2.7: the digital simulation of high resolution images of the human body in cyberspace.

We can recall that Ivan Sutherland's prototype, his head-mounted 'ultimate' display, provided its user with a Cartesian spatial grid of space (see 2.6.3). From limitation to simulation as does the VR world 'Osmose' built by the artist Char Davies (Davies 1998).

## 2.6.5 VR trimming the metaphors

Point B is the site of the old picture plane or window, the material surface or substrate of an image. Nothing is left here. Rather than being 'stepped through' it is more accurate to say that it has dissolved or, more accurately still, that the extreme proximity of the binocular LCD screens that carry the image to the eyes of the spectator is such that no edge can be detected and no consciousness of the surface of the image be maintained. However, this picture plane or surface may be resurrected for the 'secondary' audience in the form of a return to 'old' media, video or photographs, which partially capture and print into public space what is individually experienced in the virtual environment.

Point C (this could only be an imagined, notional point inside Albertian 'picture space') is now an electronically generated environment: the virtual world itself. In many examples of virtual environments, perspectival images (of cartesian space) survive here, at least in the immersant's perception. They are mobile and dependent upon the immersant's point of view in a way that is reminiscent of perspectival lines of sight in cinema. This perceived reality or simulation is being generated and managed by technological extensions and data inputs to the human sensorium which is taking place at point A, the place where the spectator's body remains, its sensorium split in two. As we saw in 2.6.5 you only get to take some of your senses with you into VR. At point C, there is nobody, partial or otherwise.

From this comparative analysis of spectatorship as it is structured by (a) the technique of perspective and (b) the technology of VR (which amounts to an inspection of the sense contained in the metaphor, 'stepping through Alberti's window'), we can conclude the following: no stepping through has occurred but two other things have – the spectator has lost sight of the frame and the surface of the image, and they cannot gauge their relationship to it, perceptually, imaginatively, or physically.

## 2.7.5 Frames and surfaces

Our analysis of the shift from perspectival image making to immersive VR, summed up in the phrase 'stepping through Alberti's window', has allowed us to discuss VR in terms of the pictorial conventions which have been central to most forms of image making in the West since the fifteenth century. We have also seen that these conventions work to bring about a certain relationship between spectator and image, a relationship which has served many purposes as well as being the source of several pleasures. The next problem we address is that as VR surrounds the user's (or the old spectator's) vision, 'the frame of earlier visual technologies, from landscape painting to TV, recedes from view and with it a degree of awareness of our separation from the machine' (Hallis 1996: 84).

## Frames

The physical picture frame begins to appear in the fifteenth century. Frames are coeval with perspective (with the conception of the window), but also appear for social reasons concerning the ownership and uses of pictures. Pictures began to shift from being literally a part of walls to become smaller, portable, often domestic, objects. Framed images or pictures, with their material substrates, are clearly in the same physical world as the viewer. They are both part of the everyday material world and conventionally separated off, by their frames, as being a special kind of object or event in the world. They are spaces of representation and surfaces which invite imaginative projection. Frames, of course, are not confined to paintings and photographs; we might also note the proscenium arch of the theatre, the edges between the cinema screen and the darkness which surrounds it, the physical limits of the TV screen. Indeed, the covers, title and end pages of a novel perform a similar framing function, within them imagined worlds are represented, outside of them the real world extends.

There are also temporal frames, the occasions for telling stories in the communities of oral cultures, the serialised narration of drama on radio, the allotted 'bedtime' story within contemporary family units. We can even think of carnivals and festivals as occasions which are a combination of spatial and temporal frames as, on certain dates and within certain neighbourhoods, identities and behaviours are performed that are discontinuous with those we occupy in the real world.

In all of these cases, the frame functions to distinguish the fictional, possible, rehearsed, imagined, or desired (and the virtual) from everyday physical and social reality. It is largely this framing which marks out spaces in which the unthinkable, the terrifying or the transgressive can be explored from a position of 'relative safety'.

## Surfaces

Images also have surfaces (we usually only notice this about windows when they have smudges on them). The oscillation between seeing the surface or looking through it has been crucial to our experience of visual media. Image-makers of all kinds know that the play and tension between erasing the picture surface and stressing it as a sight of sensual pleasure and reflection is a main site of our fascination with images.

Again, this is not only true of the 'old' medium of painting, even if this is a paradigm case. Consider the acknowledged tension in movies – between (1) the onward drive of a narrative sequence in which each image or shot has to be subsumed to the logic of the narrative, and (2) the iconic image which film can also give us, as in the lustrous images

Watching transgressive art from a position of 'relative safety' is clearly a major element in the experience provided by cinema. See Morris (1998: 19).

See Bolter and Grusin (1999: 20–52), for whom seeing the surface or looking through it are elements in their concepts of 'immediacy' and 'hypermediacy' as the twin poles of attention given to media images.

of the modern 35mm print or the now lost technique of black and white cinematography of classical Hollywood – the tellingly named 'silver screen'. In the first case, the image passes relatively unnoticed as we are caught up in the temporal unfolding or diegesis of the character's psychologies and actions. In the second, the narrative is punctured or arrested by the single image held before us on the screen – for as long as the director may dare.

A virtual environment or installation also has a spatial and temporal frame of sorts – it is obvious, although seldom mentioned in VR discourses, that you have to be present in an institution, at the appropriate time, to experience VR (See 2.6.1 for a further discussion of how rare and inaccessible such events are.) But it is a form which, at the level of consumption, attempts to deny it even more radically than some kinds of cinema, a medium which has attracted criticism as a form that hides its own means of production (2.4). The 'blinded' body, the split sensorium, and the absence of a social form of exhibition or performance are all major difficulties facing VR which arise from this absence of framing.

#### Conclusion

This discussion has left us with more questions than it has provided answers. How does a culture in which frames, of the many kinds listed above, are crucial to its forms of expression, narration and representation, use a medium which has none? How can we deal with the prospect of a medium which seeks to collapse the boundaries between its representations (or its simulations) and the material world in which the representing and simulating is taking place?

To put this another way, in the history of Western visual representation, the aesthetic forms that we have been discussing – perspective, as a way of positioning viewers of images and as expressive form, the framing of images, and their material surfaces – have been used to refer meaningfully to the material and social world. At the same time, they have provided spaces or opportunities within that world for reflecting on it and thinking beyond its immediate limits. That has been one function of art and also of many forms of popular culture (the latter usually being turned into the former at some point in their history). If we think of media production as a cultural practice we could say it is, at its best, a way of commenting on and possibly criticising, celebrating or envisioning alternatives to the world we live in. How can we do this 'in' VR? What part does the difference between representation and simulation play in thinking about this? What is the difference between a representation with its frame, referring to a reality outside of itself, and a VR simulation with no apparent frame which seeks to generate an apparently real world which may, or may not, refer to anything outside of itself? Just how unresolved, just how problematic, immersive VR is, when we attempt to think of it as a medium, should now be clear.

The relationship between immersive VR's imperfect simulations that stand as realities in themselves and the history of media representations which refer to the world in especially realistic ways is a complex and hardly explored area. However, as the technologies that underpin VR are also being put actively to work in the production of popular film and cinema, we now need to shift our attention to what has come to be known as digital cinema.

#### 2.8 DIGITAL CINEMA

[Virtual reality] is frequently seen as part of a teleology of the cinema – a progressive technological fulfilment of the cinema's illusionistic power.

(Lister 1995: 15)

Popular ideas about, and expectations for, the potential of VR are inseparable from the cinema as aesthetic form. Whilst the ubiquity and simultaneity of broadcast television, or the communication 'spaces' of the telephone or Internet are in many ways more significant to the development of VR technologies and applications, it is the clarity and seduction of cinema's visual imagery and the 'immersion' of its viewers against which emerging (and potential) VR experiences are measured. As we will see, cinema is a key factor in VR's 'remediations'.

Conversely, cinema has developed and disseminated images, ideas and dreams of VR and the virtual, particularly in recent science fiction films. Moreover, the design of certain VR systems draws heavily on cinematic imagery, forms, and conventions.

In this section we will consider the popularisation of CGI (computer-generated imagery), and its use in special effects and computer animation. These forms will be considered as, on the one hand, materially and historically situated technologies and media, and on the other as informing a technological imaginary in which the impact of digital technology on cinema is presented as either symptomatic of, or a causal factor in, the 'virtualisation' of the modern world.

There is great excitement about the future possibilities of immersive or interactive entertainment, but also fear that digital technologies are leading film into a descending spiral of spectacular superficiality. Such fears are evident in both popular film criticism and academic, postmodernist discourses. The latter extend the argument to Western culture as a whole, now characterised by a waning of 'meaning', becoming (and the metaphors are telling) simulated and flattened, screen-like.

#### 2.8.1 Virtual VR

To the distinction between immersive and metaphorical VR (2.6) we could here add one more, what Ellen Strain calls 'virtual VR' (Strain 1999: 10). On one level this is simply the representation of speculative forms of VR and cyberspace in science fiction films such as *Lawnmower Man* (1992), *Strange Days* (1995) and *Johany Mnemonic* (1995). On another level Strain refers to the phenomenon of fictional and speculative images of VR becoming blurred with actual existing forms and uses of VR technologies. Given the point made in 2.6, that VR is in fact a rather exclusive experience and not a mass medium, it is not surprising that films have projected fantasies of digital worlds that have generated a misleading sense of the current state, or putative soon-to-be-realised future, of VR.

What is perhaps more surprising is that both VR researchers and cultural theorists have drawn so heavily on popular science fiction literature and film as if they were technological fact.

Philip Hayward lists the subcultural and popular cultural points of reference of the early VR enthusiasts: to science fiction he adds New Age mysticism, psychedelia and rock culture. This promotion of the possibilities of VR through popular cultural discourses not only shapes public expectations but may even affect VR research itself:

These discourses are significant because they have shaped both consumer desire and the perceptions and agenda of the medium's developers. In a particularly ironic twist they have created a simulacrum of the medium in advance (against which its products will be compared).

(Hayward 1993: 182 [bold added])

See special issues of *Screen* 40.2 (Summer 1998) and *Convergence* 5.2 (1999)

The terms 'virtual' and 'virtualisation' are, in this section, used in the rather imprecise sense prevalent in much academic and popular film criticism. See 1.2.5, 1.2.6, 2.6, 5.4.2 for more considered discussion of 'the virtual'

1.2.5 Virtuality  
1.2.6 Which virtual reality?  
2.6 Immersive virtual reality?  
5.4.2 Cybernetics and the virtual

2.6 Immersive virtual reality

This, however, is not always naive, there are instances where this is a particular strategy reading (science) fictions as one would read any other document or source of data. See David Thomas, 'The technophilic body, on 'technicity' in William Gibson's cyborg culture', in David Bell & Barbara M. Kennedy (eds) *The Cybercultures Reader* (London: Routledge, 2000), pp. 175–189. Thomas there reads William Gibson's fictional worlds as straight sociological data, from which informative results are gathered (see 5.1)

Key text: Philip Hayward, 'Situating cyberspace: the popularisation of virtual reality', in Philip Hayward and Tana Wolfen (eds) *Future Visions: new technologies of the screen* (London: BFI, pp. 180–204)