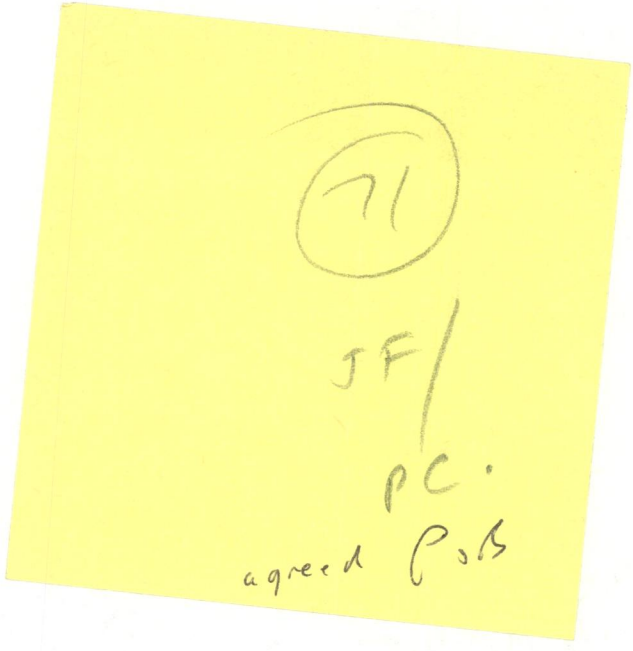
The Eye of the Beholder :

a Cultural and Historical Study of Virtual Reality
and its Implications for Art, Design
and the Visual Technologies

by
John Kennedy

Faculty of Design
Department of Industrial Design
National College of Art and Design

1994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Submitted to
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Introduction

The Eye of the Beholder

Virtual Reality, for many, is just a new form of video game, another computer based technological development, complete with computer jargon and media related sensationalism. For most of us it may not seem to offer much in the way of changing how we work with and understand the increasing amounts of technology that we surround ourselves with.

This thesis aims to show the reader that the opportunities offered by Virtual Reality as a concept, a technology, an industry or a medium of communication are inspiring as it becomes not only a new, but a more important way of interacting with, understanding and relating to our technologies.

The term Virtual Reality comes in a number of guises; VR, Virtual Environments, Artificial Reality, Virtual Worlds and may be considered to be the ultimate form of interaction between human and machine. It refers broadly to the generation of realistic three dimensional visual, audio and tactile worlds, using computer graphics in which a suitably equipped user can interact with virtual objects in a normal manner.

This thesis aims to quantify and realistically assess the strongest elements of VR; communication, participation and visualisation. These elements stress the opportunities offered to computer based artists and designers.

In a Virtual World, everything perceived is generated by a computer that responds to the user's movements in the real world via interactive equipment, usually special clothing and head-mounted equipment. This enables the user to adjust the perception of the Virtual World giving the impression of being of being immersed in a real world.

The basic concept of Virtual Reality has grown from both cultural and technological developments. Both areas of influence are explored in this thesis in an attempt to show how we relate to the visualisation technologies we create and the implications that Virtual Reality has for aspects of art and design in contemporary 1990s culture.

Late twentieth century visual culture has given rise to rapidly advancing visualisation technologies. Thanks to video-phones, satellite and infra-red imaging, night vision and hidden cameras, what before was unseen can now be seen. Of all these technologies, VR has emerged as perhaps the most imaginative and captivating.

Virtual Reality became public knowledge at an early stage in its public commercial development, falling victim to media speculation, public misunderstanding and the untimely positioning of it as a superficially impressive, burgeoning, but immature industry, which is still at an early stage, lacking a full theoretical and academic grounding, with much research and development yet to be carried out.

This thesis addresses the cultural climate into which Virtual Reality has been assimilated. It will reflect upon the impact of modern technology, particularly media-related and visualisation technology and its relationship with cultural thought-patterns. The aim of such discussion is to show that Virtual Reality is different from the technological tools of visualisation, such as television or computer graphics, that have preceded it,because it is a medium that involves the user as a participant rather than a spectator. It is this premise that in the thesis will show the influence and potential of Virtual Reality in areas of art and design.

The thesis threads together the concepts of Virtual Reality and Cyberspace, that is, the computer generated space or environment that is perceived as being virtually real, with its dark background in military research, tracing its development that eventually led to the present state of Virtual Reality where the paths of cultural ethics and technological advancement have crossed. The opportunities that this cross fertilisation of ideas offers the artist and designer in terms of visual communication and representation are many. It is to this subtle vantage point of the meeting of modern culture and technology that we are brought and from which the arguments of this thesis are explored.

The tendency to digress and explore questions arising on subjects such as our relationship with technology, mass media

manipulation and the ethics and practice of computer generated art in virtual space may be excused in this analysis of a promising and potentially new field of application in art and design. While these subjects are indeed deserving of further argument and exploration, a necessity for the awareness of their existence and how this serves to create a deeper and fuller understanding of the broader implications of Virtual Reality particularly on elements of art and design explains their inclusion in the course of this thesis.

Few of the now widely available texts by writers in the field of Virtual Reality fail to address the subject on a common cultural and technological basis with a view to establishing a direction the creative and communicative potential of Virtual Reality. Instead texts such as *Cyberspace: First Steps* (1991) edited by Michael Benedikt or *Virtual Reality* (1991) by Howard Rheingold, although inspiring and informative amount to little more than a factual account of the technology coupled with a superficial, fictional, fantasy-world discourse on the promise and potential of human-machine interaction. Such texts fail to address the fact that the Virtual Reality industry requires room and time to develop properly to become something of worth. Papers abound on the hard facts of the new industry, while many more are concerned with the sociological, cultural and even spiritual side of Virtual Reality, but few have attempted to examine both areas in context with each other, with a view to exploring the creative potential found when the pace of excitement and promise is in keeping with that of technological development.

To aid the foundation of arguments and paths of discussion in this thesis, the constructive texts of various authors and writers are drawn upon. Articles by writers such as Timothy Druckery and Julian Bleecker offer valuable insight on the cultural placement and understanding of Virtual Reality in our society. Mark Dery, whose forthcoming book, *Cyberculture*, published later this year by William Morrow, addresses in his work issues of popular culture, mass media and technology. His articles contribute to and support the areas discussed in this thesis on the potential that Virtual Reality and computer visualisa

-tion offers the art world, both as a medium to computer artists, such as David Em or ~~Mick~~ Matt Mullican, and as a platform for artistic expression, exhibition and communication as seen in the efforts of Myron Kreuger, Wolfgang Staehle, Jeffrey Shaw and institutions such as the National Gallery in London.

The cyberpunk spirit evoked in the works of William Gibson such as *Neuromancer* (1984) and *Virtual Light* (1993) lend much to defining the subtleties of the term "cyberpunk" and how it is used to describe the cultural climate of today's highly industrialised, technology saturated world.

While each work cited contributes much to the arguments and conclusions drawn upon throughout the thesis, the aim of this thesis is to realistically discuss issues that have not been fully addressed with regards to each other by considering the essence of both the cultural d technological elements of Virtual Reality, drawing them together by discussing their value as an aid to visualisation, communication and expression in areas of art and design. It concludes by relating and expressing the need for an understanding of this essence as a means by which we can gain a fuller understanding of how we can work with, and relate to, the representational and visualisation technologies that we create.

Glossary of Technical Terms :

VIRTUAL REALITY (VR) : a computer generated multimedia environment or three dimensional space in which the user interacts under the illusion of physically existing in that space, as though it is "virtually real". "Virtual Reality is an event or entity that is real in effect but not in fact" (Heim, 1993, p.49).

TELEPRESENCE, TELE-EXISTENCE : the name given to the experience of immersion in a virtual reality, describing the illusion of being present in a virtual space. It also refers to the application of VR technology to the interaction and control of remotely operated vehicles such as bomb - disposal machines, where the operator of such a vehicle is presented with workstation facilities capable of producing the illusion of being present at a remote site, the site of the remotely operated vehicle.

LINEAR : any television, video or sound recording / transmission experienced "couch - potato" style, without the participation of the viewer from beginning to end.

CYBERSPACE : first coined by William Gibson in *Neuromancer* in 1984. A term describing the computer-generated space of virtual reality and one that could carry significant depth of meaning depending on the user and the use being made of this space. It can be experienced by the individual or by a number of individuals via a computer based network, with envisaged applications ranging from business and education to leisure and exhibition.

MULTIMEDIA : any electronic system such as a video game which mixes together text, moving video, sound and graphic images usually under the interactive control of the user.

INTERACTIVE : the opposite of Linear. It involves the user's participation. VR technology is highly interactive.

IMMERSION : the experience of being immersed in a Virtual Reality and experiencing it as real as though one's actual environment did not exist and the computer generated environment was real. The interactive clothing and equipment of VR technologies is often described as immersion technology.

CYBERPUNK : a term that has come to gain a broad meaning. Originally used in 1983 to describe a group of science - fiction writers and their style, the term has come to touch on all aspects of modern life from Fashion to music to film to art and visually addresses the issues of the human and his /her interaction and relationship with the technologies and social environments we create in today's world.

HUD (HEAD UP DISPLAY) : a virtual image system originating in the late 1950s, used in aircraft cockpits providing a display, now usually computer generated, as an overlay of the environment that the pilot sees in an aircraft providing flight information while simultaneously keeping the pilot's attention out of the cockpit and on the surrounding environment.

HMD (HELMET MOUNTED DISPLAY) : A display system mounted on a helmet or visor unit providing information usually through a binocular display, thus creating the illusion of a three dimensional environment. They are also used (in fact originated) in flight technology providing information wherever the pilot is looking.

VISUALLY COUPLED SYSTEMS : the specialised development of Helmet Mounted Display (first started by Ivan Sutherland in the late 1960s) that has come to be recognised as today's VR technology where the image seen relates directly to the position and direction of the user's head and line of sight.

REAL-TIME : The speed at which VR applications are expected to operate to create a natural "real-world" effect.

DATAGLOVE : an interactive device developed by VPL (Visual programming Language) Research Ltd, California. A glove worn by the VR user that provides an image of the user's hand in the Virtual Space and allows the user to "move" about and execute commands in this environment. Other companies have developed their own version of the Dataglove.

DATASUIT : a full-body version of the Dataglove operating on the same principle of using fibre-optic strands to measure the user's posture and position in the real world and relate it directly to the Virtual World.

BOMB-CAM : an explosive missile or aircraft launched bomb with a camera contained in its head for guidance and target confirmation purposes.

Part One

Technology and Culture

Chapter One

Visual Culture and Virtual Reality

> The twentieth century is...the filmed century...The whole world is on film, all the time. Spy satellites, microscopic scanners, pictures of the uterus, embryos, sex, war, assassinations, everything (Dery, 1992, p.46).

We have become a culture dependant on what we see. Our absorption and acceptance of technology, particularly media technology has given rise to a culture of what has been described as "retinal fetishism" (Dery, 1992, p.48).

Just over a century ago, the cinema as a tool of technological visualisation was introduced to the public, having derived itself from an earlier development in artificial representation - photography. Since then our culture has centred itself on the presentation and control of images. The television screen determines what we see and learn of our world and society. Thus, the vast proliferation of image-making technologies from film and digital cameras to bomb-cams, camcorders and fax-machines and on to computer controlled image alteration techniques has created an environment, culturally speaking, that has primed itself for the acceptance of Virtual Reality (VR) as a new method of visualisation.

Those working in the VR industry predict that the first home VR systems will be available within the next five years. Home entertainments giants Sega and Mattel have already introduced low end virtual reality products for children's home entertainments systems. They anticipate that the impact of VR on our domestic lives will be a somewhat exaggerated version of the impact that video games, satellite television and the home computer had in in bringing about an acceptance of technology into our lives.

It is often the case in media coverage of any subject and certainly an example in the case of VR, that the often more radical and "new" aspects of the subject are focused upon intently,

to the extent that other and by no means less revolutionary fields of research and application are overlooked. For those working with VR and aiming ultimately at its widespread commercialisation, care should be taken to understand it's place in the public psyche to make sure that it evolves into an acceptable and safe form of future mass media.

This discussion, for the moment, does not centre on the promotion and mass media perception of VR but instead, aims at considering the cultural placement of VR and why and how it will gain acceptance and integration into modern society. Jaron Lanier, a key figure and pioneer of commercial Virtual Reality discusses an interesting aspect of our relationship with the artificial objects we surround ourselves with;

> Gadgetry is the mythology, the ultimate medium of our culture. What distinguishes one life from another is as much the gadgets associated with that life as the life story (Druckery, 1991, p.5).

There is a disturbing truth evident in this consideration of VR. While it is being praised on one hand as being a liberating experience filled with potential and promise, it is, on the other, falling victim to consumer driven mediated presentation as television has before, without a proper attempt to gain an understanding of how we relate to these "gadgets".

Perhaps VR is ultimately more than just an electronic tool of visualisation. Perhaps with the emergence of artificial reality and computer generated environments or cyberspaces, the media presenting experience of our lives and world to us will be realised for what it is. VR may prove to be the seeing mechanism that will wake us up to our reliance of the all seeing electric eye of the television screen. We are too dependant on the pretty packages mediated to us through our television sets. Perhaps now as we, in public perception, come to terms with the concept of Virtual Reality and how it involves us rather than makes spectators of us, we will come to address the darker side of our techno-cultural dependence on visual images.

To discuss further and exemplify the eyes of the world as seen on television let us consider the following; Timothy

Druckery interviewing Jaron Lanier of VPL (discussed in Chapter Four) conducted the interview during the Persian Gulf War in 1991, relevant itself in the light of discussion on how the media presents the world to us. During the war the mass media was permitted only to give limited coverage with practically no live transmission of crucial events as they took place. In other words the powers that be were mediating what we saw on CNN or BBC television reports, their justification being that they did not want another television war scenario as experienced in the United States during the Vietnam War where daily, millions of viewers took Cronkite and his news coverage of Vietnam for granted ultimately serving to numb the reality of war and simply transforming it into a television show.

Media coverage and reaction of events such as the Gulf War or any case in which we are dealing with issues of life and death especially as they happen before our eyes only serve as testimony to the now deep rooted distance from reality we assume when we view the realities on our television sets. To return to the article by Timothy Druckery, he makes a valid point on the subject of modern culture and its dependence on visual images:

> ...here's a culture that has been evolving toward a wholly complete reliance on visual images, even to the detriment of other senses - or the totality of senses. Think about the last ten days watching smart bombs with cameras crashing into buildings. This gives you an incredibly haunting sense of the power of images. It's astounding and hypnotic, and it's about mortality and destruction. The media play into this fascination with the visual world (Druckery, 1991, p.5 - 9).

Television, photography, computer generated special effects, image enhancing, etc. all form part of the cultural association we assume as normal with the objects or gadgets we choose to make part of our lives."What You See is What You Get", becomes through vision culture more like: "What You See is What They Want You To Get." However, with VR an understanding may emerge. Each time we look at the virtual worlds presented to us via VR technology we become aware of the

simulation, the fact that we are looking at a computer generated environment, something artificial. VR provides the opportunity to realise that "What You See is not Always What You Get."

Visual Culture is a part of our identity, the surface layer of the world around us, a complex intertwining of politics, truth, society, reality, public, perception and mass media. It is the part of our social make-up that we all too often take for granted, yet it provides a unique opportunity to see that VR could potentially teach us to learn more of ourselves and take control of the way in which our lives are left open to media manipulation. VR is not about escape or alternate realities in a cyberspace, it is about communication.

Chapter Two

Cyberspace - The Virtual World.

> Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, ...A graphic representation of data abstracted from the banks of every computer in the human system. Lines of light ranged in the nonspace of the mind (Gibson, 1984, p.51).

William Gibson's futuristic definition of cyberspace has served to become a fashionable explanation of the concept of Virtual Reality whereby computer data is presented in a three dimensional graphical computer generated abstraction and the user interacts with these "objects" or abstractions as though they were real, existing in a real space. This space, made visible through VR technology, the space in which the illusion of reality takes place is Cyberspace.

Virtual Reality, to be understood as a concept, pivots on the understanding of cyberspace, an alternative reality presented to our perceptory senses via computer generated techniques. To be there, either as a viewer or participant does not actually require physical presence and to do things does not actually change anything in the physical world.

Immersion in cyberspace as a definitive concept of simulation VR is discussed further when considering the simulator industry in Chapter Four. This discussion, for the moment, serves to both inform and highlight cultural aspects and considerations of perception on the subject of cyberspace.

Much as the cinema and photography were heralded as powerful new tools of representation and visualisation, especially in the last decade with the profile of presentation being increased through computer technologies which were culturally perceived as augmenting human reason, VR can be considered from this point of view as offering cyberspace as a powerful new medium of visualisation.

Virtual worlds or environments as provided by current

technology are far from realistic. However, they serve adequately to introduce the space in which they are created, that is, cyberspace to visual culture as a tool of representation involving and heightening our individual perceptions of technological imaging. As individuals involved in the interactive virtual worlds we become less susceptible to media manipulation as is often the case with other representational technologies.

> it seems as though the only way VR or any other imaging technologies can exist is if, culturally, we are comfortable with the notion of occupying artificially derived image spaces (Bleecker, 1992, p.12).

The idea of our consciousness extending into an artificial, non-existent space is certainly deserving of deliberation and the need for understanding to become at ease with the concept. However, all too often, airy rhetoric distracts and serves to diversify the true and simple concept of cyberspace proclaiming it as the threshold to a new era in human-machine evolution, breaking the barriers between the self and technology, allowing us not only to anthropomorphise with our computers but become part of them, existing wholly without our bodies, celebrating existence only identified as consciousness and intellect in a computer generated world constructed entirely of data, knowing none of this world's physical boundaries.

Unfortunately much of the academic considerations of cyberspace (such as *Cyberspace - First Steps* by Michael Benedikt) have proved pretentious often amounting to discussion on transcending physical existence and merging cultural values and traditions of this world with the virtual world shaping them to suit our needs or fantasies and living them out in a new world.

Inspirational and exciting as the concept may be of creating non-existent realities that we can realistically relate to, it is perhaps a little far-reaching to glorify and praise without offering serious critique and a touch of sensibility to what can often digress to an exaggerated, presumptuous blending of myth and science fiction. For example, the computer artist Nicole

Stenger in her contribution to Benedikt's anthology, *Mind is a Leaking Rainbow*, seems to fictionalise the potential f Virtual Reality technology and raises it to the level of an almost spiritual freedom;

> According to Sartre, the atomic bomb was what humanity had found to commit collective suicide. It seems, by contrast, that cyberspace, though born of a war technology, opens up a space for collective restoration, and for peace. As screens are dissolving, our future can only take on a luminous dimension. Welcome to the New World (Stenger, 1991, p.103 - 127).

In contrast to this fictional discourse often surrounding the central theme of cyberspace, later discussion in this paper offers a consideration of the Virtual Reality industry in realistic terms. Is it necessary or worthy of a concept born not only in the cold war but as much in the science fiction of William Gibson ? Such conjecture, while stimulating and communicative in relating the concept of cyberspace can only serve ultimately to obscure the necessity for explorative critique and understanding of the "politics of technorepresentation" (Druckery, Dec. 1991, p.9) in consideration of years of mass media manipulated and conditioned television, photography, etc.

This discussion is intended as explanatory and intends that the reader gains recognition of the fact that much vague theorisation and unresolved analysis serves to misinform ultimately on the subject of cyberspace, with discussion on the concept of reality included in the form of a short dose of "cyberpsychology." Little is being done to consider the technology and its simplicity in presenting us with an interactive and communicative tool capable of handling the vast amounts of data in present day computer based information systems. Ultimately the technology involved is the core issue unless we are willing to let VR join the ranks of mystification saturated media such as television. Sadie Plant aptly summarises our willingness to all too readily believe what we see on our screens as; "human perception is itself a mechanism which accepts its pixelled vision as reality" (Plant, 1993, p.16).

The principle idea of cyberspace lies in its consideration as a communicative platform. People will meet each other, speak and perhaps even touch in a common networked computer generated environment even though they may be many miles apart. Virtual buildings can be viewed by all and examined thoroughly without leaving the architect's office (Virtual Architecture is discussed in Chapter Seven).

Robert Jacobson, director of Worldesign, Seattle, a company specialising in building virtual worlds for business, entertainment and education discusses cyberspace as "televirtuality":

> the transmission of virtual worlds via high-speed telecommunications networks...like other digitised images, virtual worlds can be transmitted over the network (Jacobsen, 1992, p.44).

Such a system is envisaged as an ideal objective of the VR industry to be realised as software, the design of hardware and of course, the telecommunications networks improve, allowing users to communicate with others, access data and interface with virtual worlds when and where they like, just like making a telephone call.

In recent years we have welcomed developments in teleconferencing, business meetings via satellite linkup and the videophone. With this in mind along with, of course, widespread use of the telephone, it becomes easy to envisage computer generated meeting places as one of the near future's offerings in telecommunicative technological advancement.

Illus.1 & 2. Scenes of Cyberspace as depicted in *The Lawnmower Man* (1992) by Brett Leonard, one of the first "Virtual Reality movies". The film addresses the dangerous manipulative potential of the virtual reality medium where the central character is transformed upon "entering" Cyberspace from a simpleton to a super-human controlling vast amounts of data (with access to worldwide computer networks) with disastrous and tragic end-results.

Chapter Three

Cyberpunk - Science Fiction to Street Culture

Cyberpunk has become an all-embracing phrase. Those credited with its origins as a literary movement claim it never was intended that way, and was only a passing phase. However it is so much more evident in present day visual culture. It is so much more than a literary fashion statement, so much more than a description of the near future. Cyberpunk is a reflection of our culture, it is the way we see and is as much about the lives we live as the world we live in. Technology has come to shape our lives, visual technology becoming the way we see, computers the way we think. We strive to become closer to our technology, get inside our machines, understand them, misunderstand them, all in all, celebrate the confusion of the marriage of culture and technology, reflect it in our art, literature, fashion, music and technology.

The term "cyberpunk" has it origins in science fiction literature of the early 1980s, being used to describe a group of science fiction writers such as William Gibson, Greg Bear, Pat Cadigan, Rudy Rucker and Lewis Shiner. One of the earliest and certainly one of the most definitive cyberpunk novels was *Neuromancer* by William Gibson, in which the term and concept of cyberspace first emerged against the backdrop of a dark, intense, technocultural world where the barrier between man and machine has eroded, leaving the boundaries between real and virtual undefined and allowing mass media manipulation to go undetected as normality. The world described by Gibson and the cyberspace he evokes have had a profound influential effect in describing and explaining the emerging technologies and opportunities presented in the form of Virtual Reality today.

Such a world where anarchy, technology, self aware artificial intelligence and the thin line identity of what is human and what is not is portrayed by Ridley Scott in the 1983 cult film *Blade Runner*.

Cyberpunk as a literary movement itself owes much to the writings and style of J.G. Ballard and William Burroughs, the impressional effect adequately summarised as;

> myths of the near - future...techniques which collide withthe anarcho - liberation politics and streetwise mania of punk. Populated by self - designing systems and artifi-cial intelligences, simulated identities and cyborgs, metaverses and cyberspaces, terminal and consoles, prosthetic limbs and the complexities of com puter generation, microbiological life, and self - guiding systems, cyberpunk takes the shopping malls, cities, climatic changes, computer networks, designer drugs, viruses, multinationals, hackers and outlaws of the present in which reality becomes a simulated program, and identity a transient manifestation in cyberspace (Plant, 1993, p.14).

When writers such as Gibson write of the near future in their work, it is merely a thinly disguised representational version of the present. Gibson's evocation of a future tele-evangilist sect serves to exemplify;

> ...that VR, eyephones 'n' stuff, it's against Church law. It's been revealed...that virtual reality's a medium of Satan, 'cause you don't watch enough tv after you start doing it... (Gibson, 1993, p.263).

The near futures presented in books like *Virtual Light* (Gibson, 1993) and films such as *Until the End of the World* (Wim Wenders, 1991) may not be accurate in their fictional representation but certainly reflect a not too distant past that is mirrored in our present in the overall picture that they convey.

Cyberpunk has come to be a reflection of our world and the thought pattern of modern society in everything from environmental pollution, political conflict, tribalism, pre-millenial tension, gadgetry obsession, status symbols to total immersion in our own artificial world. Our world since the Industrial Revolution has gradually become more artificial, concrete, mass - produced and polluted. Living in such a world we have evolved with it, adapting and accepting, polluting ourselves

with our own pollution. Cyberpunk is a volatile reflection of the world we have built for ourselves. "Cyberpunk does nothing to persuade us that the world it describes is a good world, a better world, a desirable world at all" (Plant, 1993, p.15).

The world presented by cyberpunk, a world created by man, or more correctly, a world spoiled by man, is the world where the distinctions between man's natural identity has become increasingly more difficult to determine as he surrounds himself with the artificiality of his creations. Coupled with the tendency to mystify and glorify in our discourses on cyberspace as discussed in the previous chapter, the reasoning behind the tendency to fictionalise our technologies becomes a little clearer when they are perceived as improving an already ugly world. Gibson's cyberspace is now a reality (in VR) and the cyberpunk ethos is becoming more commonplace. An example of this is reflected in the speed at which products emerge only to be replaced as new developments determine newer more fashionable products all on a healthy background of consumerism and successful advertising.

Lewis Shiner, discussing the ethics of cyberpunk in a present day cultural perspective suggests:

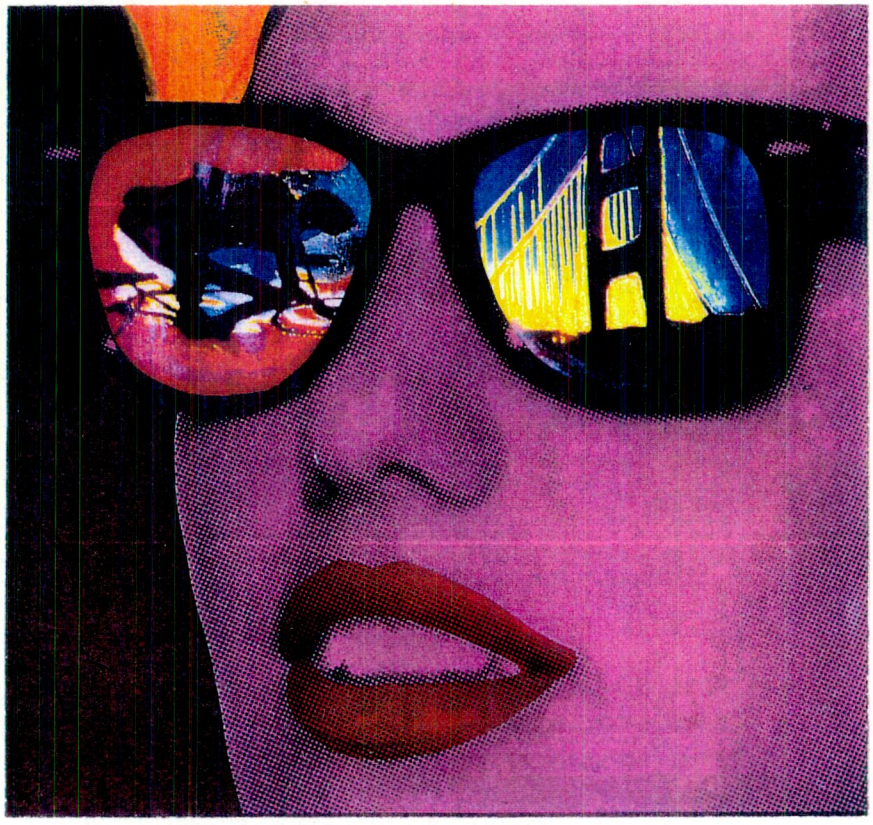
> At its worst, cyberpunk is a religion of technology. It believes that technology can solve any problem, and that the solution to the problems that technology itself causes is, in turn, still more technology. (Shiner, 1992, p.14)

A generation has grown up with tv and video games, a generation that no longer sees computers as posing a threat. Cyberpunk has gradually come to involve just what these people have grown up to be, products of the computer age, the MTV generation, people who identify with their friends, family and people around them about as much as they do with Nintendo or *The Terminator*. The phrase has come to encompass all that is associated with the information era, the computer age and vision culture.

Most importantly, what is identified when we speak of man meeting/merging with machine and interfacing with the

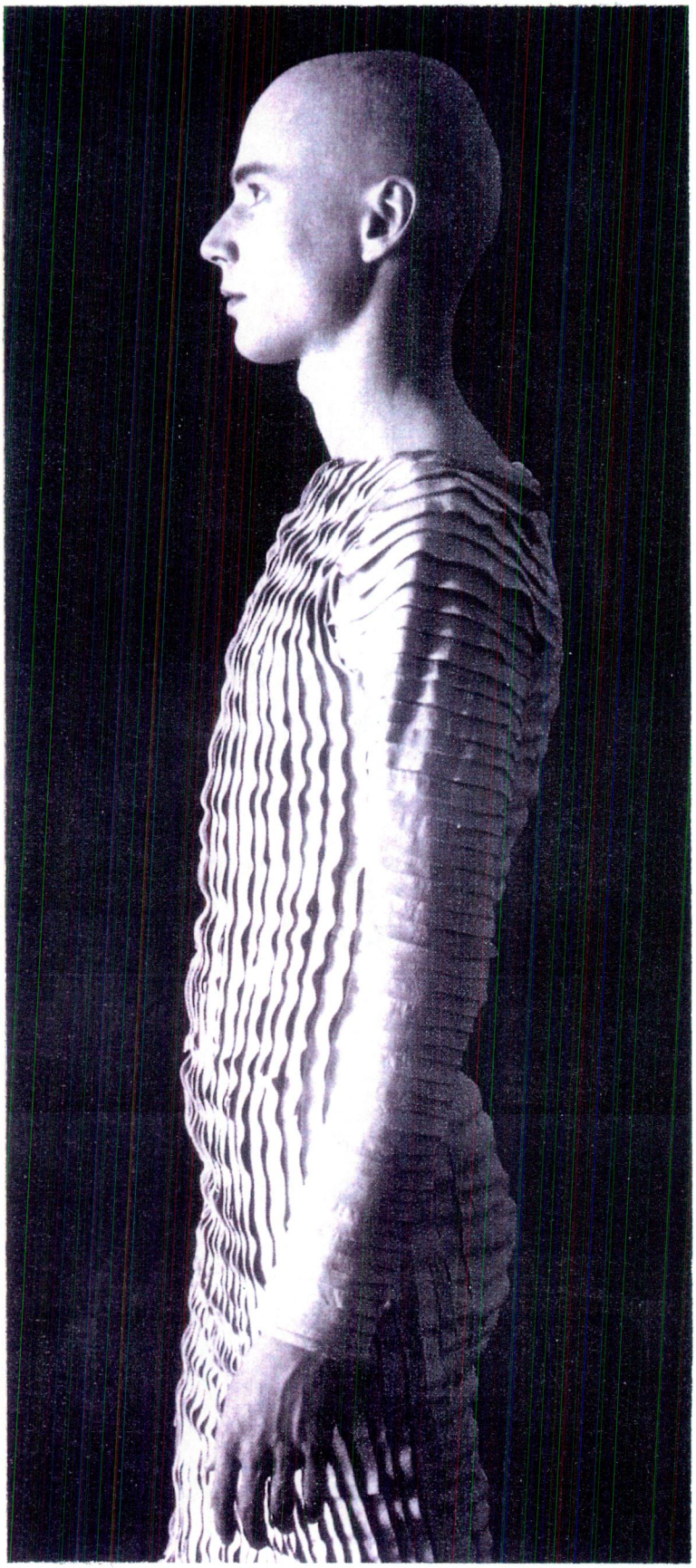
virtual world, is a clear need for cultural understanding and identity in the technology we are creating.

It is foolish to consider the pace of development as an indication that we no longer control it but instead we no longer realise the impact of technological visualisation on our psyche.

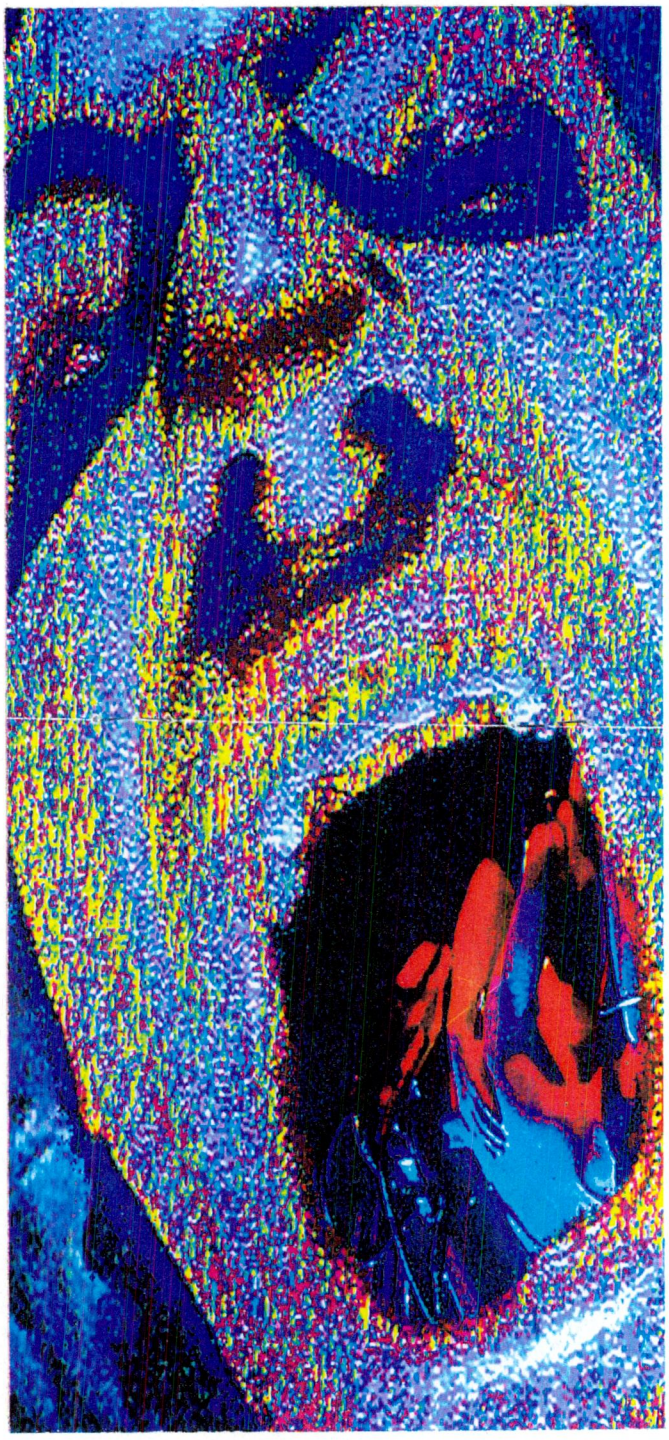


Illus.3. Virtual Light (1993) by William Gibson. The world portrayed in the novel is a corrupt, polluted, anarchistic world where high -tech corporate interests control the balance of power in a post-modern, post-industrial, cyberpunk society of the near future.

Illus.4. *Environmental Impact* by Finnish designer Rikka Paakunainen, a fashion piece based on cyberpunk influences and themes.



Illus.5. Corrugated Krishna by Helene Nystrom, another cyber-fashion piecebased also on modern social cyberpunk themes such as globalism, tribalism, environmental factors, etc.



Illus.6. Image from *Zooropa* (1993). Basing their recent music, image and themes on many diverse subjects from political unrest and unity in Europe to tele-evangilism and rasicm in the United States and addressing the concept of the world "as seen on tv", rock group U2 have in their *Zoo TV* and *Zooropa* projects ultimately communicated the essence of 1990s society in terms of cyberpunk visual culture.

Part Two

The Virtual Reality Industry

Chapter Four

The Virtual Reality Industry
A History of the Development of Virtual Reality.

Having discussed the placement of VR in its cultural environment, that is as a visual technology in a culture saturated with images to the point of dependency, let us explore VR's industrial development and establish an historical context on which to base a fuller understanding of VR.

To historically assess VR we are to consider its technological development as running parallel to the development of a cultural environment to which VR would easily assimilate. The three main historical roots of VR in discussing its techno-cultural aspects are namely : the military/aerospace industry, the computer graphics industry and the leisure/entertainments industry.

> The origins of virtual reality or virtual environment systems can be traced back to the aerospace defence industry, and it is interesting to note that almost every modern day military aircraft uses a display that utilises a virtual image. This is the head up display - HUD (Kalawsky, 1992, p.69.

Head Up Displays provide the pilot with a computer generated image that is projected onto a display in front of the pilot allowing him to see the essential images (such as weapon sighting) and flight information as an overlay on the real world. Essentially it is a virtual environment overlay of the real environment and by viewing both simultaneously, the pilots attention is kept out of the cockpit while still having crucial flight information relayed to him via the HUD. This technology began to emerge with the rapid advancements of jet propulsion and space flight development by the United States Airforce in the late 1950s and early 1960s. Advantageous as it may be to present data as an overlay on the real world, this system is not without its limitations mainly due to the fact that the pilot has to

look forward in order to view both the real (his environment) and the virtual (the Head Up Display data), therefore his information is not always visible to him and depends on where he is looking.

This problem eventually led to the experimental development in the late 1960s of Helmet Mounted Displays requiring the design of smaller technological and optical systems suitable for mounting on the pilot's helmet. This method had the advantage of presenting imagery wherever the pilot is looking.

Naturally for such a system to be of any value to the pilot, the information he sees must relate to the objects he sees overlaid with his data in the real world. To do this the position of the pilot's head is tracked and passed into the computer graphics generation system so that the virtual display can synchronise or be presented in "real-time" with the real world object.

In 1968 Ivan Sutherland proposed and developed a head tracking system allowing the user to view a computer generated room containing geometric objects, and to look around it at will. Many herald this development as the introduction of cyberspace and the first step in Virtual Reality as it has come to be recognised today, a quarter of a century later. Although Sutherland's work, for its time was far reaching (Scott Fisher, former director of the Virtual Interface Environment Workstation or VIEW project at NASA described the design and concept as twenty years ahead of its time and technology) its bulk rendered it impractical for use in aircraft application.

However, in the early 1970s a company called Polhemus developed a magnetic tracking system small enough for use in helmet mounted applications allowing the aircraft industry's development of what was to become virtual reality to continue.

As well as practical usage and development of such systems for application to actual aircraft flight, the military and aerospace flight training simulation industry also proved to be a significant and certainly in concept, a more relevant driving force in early VR development.

Traditional flight training simulators such as those manufactured by Marconi Simulation in Scotland, CAE in Canada,

NASA and British Aerospace, have for over thirty years, and continue to be, based on a system whereby a mockup cockpit is placed within a spherical dome onto which the simulation visuals are displayed via multiple projection systems, thus creating the sensation of being immersed in a 360 degree simulated environment. Such systems prove to be highly expensive and many alternatives to immersing the pilot in a virtual environment have been explored, the most promising of which has emerged as a "head mounted visually coupled system" (Kalawsky, 1992, p.70). It was the results of this development in the 1970s and 80s that has come to be currently recognised in the VR leisure periphery devices that have emerged in recent years, such as the VISETTE by W Industries.

The principle behind a Visually Coupled System intended that by wearing a helmet mounted display that presented a binocular image that the pilot would view as a three-dimensional virtual environment as seen from the cockpit. Through tracking the pilot's head position and orientation a suitable view is rendered in relation to where the pilot is looking.

Such systems have been greatly researched and developed in the last decade, indeed to such an extent that their promoters in the military research and development field claim that existing systems used in conjunction with weapon sighting, eye -tracking switch detection and night-vision aids far surpass existing commercial Virtual Reality technologies. It is clear though, that without the huge investments in the design and technological developments of the aircraft simulation industry and the powerhorse of the military, that VR would not be in the position of availability (be that political or technological) that we currently find it in.

Indeed, future cockpit and flight requirements are envisaged as being so advanced and complex that the virtual cockpit, or cockpit with rapidly comprehensible data presented in virtual or interactive form, are seen as the only logical step in answering and aiding the workload requirements of future pilots.

Aside from the aerospace industrial development of the visual technologies that ultimately laid the foundations for the VR industry lies the computer graphics industry. It too was

originally funded heavily by the military but has come into its own in the last fifteen years or so with the introduction of the home computer and the rapidly advancing overall computer market, as a powerful industrial force no longer dependant on its original sponsor.

Like VR, computer graphics imagery has been with us a little longer than most of us think. In 1951, *See It Now*, a popular American television show, presented a computer graphics display generated by the Whirlwind computer built by MIT (Massachusetts Institute of Technology) in 1949.

One sequence showed an animation of a bouncing ball that gradually slowed down and lost height as though it were real, while another displayed the flight trajectory of a rocket in flight from data telephoned live from the Pentagon.

In consideration of our earlier discussion on the presence of imaging technologies as visual cultural forces especially in the last decade, it is quite interesting to learn that all this happened over forty years ago helping to establish the cultural climate we have today regarding mass media imaging, perception and presentation.

The 1980s saw a huge growth in the computer industry and today, the only continuing growth in the industry lies in the computer graphics segment. Indeed, this segment is often used to market and boost sales in the hardware computer segment. Interestingly, artists working with computer imaging often have lists of hardware and software that they make use of that are longer than their artistic statements themselves.

Gantz and Manchover compiled a study on the worldwide computer market in 1991/1992 and their findings with reference to the computer graphics sector are summarised in the following :

> In 1991, the worldwide computer graphics market was at 37 billion dollars and it is expected to double by 1996. Its three largest sales segments were design engineering (31%), graphic arts (25%), and science and medicine (23%). While the revenues generated by the computer market as a whole dropped by 9%, the computer graphics industry grew almost 10%, and that is despite the recession (Manovich, 1992, p.3).

4th Wave is considered a top VR market research organisation having carried out extensive research into the size and shape of the VR marketplace and industry under the direction of Dr. John Latta. He predicts that the non-military virtual reality industry will be worth almost 500 million dollars within the next three years, five times greater than current estimates on its present revenue (Corliss, 1993, p.64).

Around the same time that Head-Mounted Displays emerged in research laboratories in the late 1960s, a radical new perception on Virtual Reality emerged with the work of Dr. Myron Kreuger who created interactive computer environments without making use of head mounted displays or gloves, indeed no prosthetic or periphery tools of interaction are used in his interfaces. He regards his design work as an art form and its context as such in relation to VR as a medium for the artist is discussed in Chapter Six. Many consider Kreuger as one of the fundamental founding figures in the principles and concept of VR. In fact, he coined the phrase "Artificial Reality" in his doctoral thesis in 1974 (published in 1983 by Addison Wesley as *Artificial Reality*) entitled *Computer Controlled Responsive Environments,* becoming one of the first to realise the importance of a computer interface that is responsive to the movement of the user. He explains his objectives as;

> My approach was based on unencumbered full-bodied participation. So I did things like sensory floors - you'd walk around and the computer would *watch* where you were standing. The goggles and data suit are just a less classy way of doing it (Jones, Aug. 1991, p.37).

In 1970, Kreuger conceived the VIDEODESK, one of his first user responsive interfaces. It consisted of a ceiling mounted camera viewing the user's hands resting on a desktop. The hands appeared on the computer screen over the application allowing the user to touch menu items much as one would with a standard menu - driven mouse operated computer desktop system interface today. This brought the user literally "hands - on " interacting with a computer generated environment.

Kreuger's work pursues the goals of virtual reality in a

very different way to what has become conventionally familiar allowing responsive natural interaction with the data and environment generated by standard computers. Speaking on the creation of VIDEODESK, Kreuger outlines its advantages, especially its creative and communicative values:

> The biggest benefit of VIDEODESK is apparent when the image of the user's hands is displayed over the same screen information on a remote colleague's screen. The remote colleague's hands could also appear on both screens. Both colleagues can use their hands to point at the information exactly as they would if they were sitting together at a table looking at a piece of paper. This is the paper replacement application that head mounted VR does not have at the moment. It is realisable with today's technology and does not await any scientific or technological breakthroughs (Kreuger, 1992, p.62 - 63).

It is worth noting that for over twenty years Kreuger has worked and explored an idea that has only just begun to resonate with the public at large. For that reason alone he is worthy of consideration as a key figure in writing the history of Virtual Reality, his down to earth approach and high regard for the human element in his work being a clear indication of the need to use VR in a practical way.

In 1984 Jaron Lanier, a key figure in VR circles, gaining high profile media attention as a public spokesman and promoter of all that is associated with VR, founded the first company with Tom Zimmerman (the inventor of the Dataglove) to commercialise virtual reality technologies as they came on-stream. VPL (Visual Programming Language) Research Incorporated was founded on Lanier's belief that computer programming language was, and still is, abstract and unnecessarily complex. He aimed at producing a visual type of programming language that could be manipulated in a computer generated environment or virtual reality.

Zimmerman came to VPL having explored a glove device originally conceived to play computer generated musical instruments. However, with Lanier, they created the Dataglove allowing users for the first time to see their hand interacting

three-dimensionally with the computer generated interface. VPL was formed to develop and create practical applications and products for the emerging market and industry and within a few years had commercialised all the now standard elements of virtual reality products, producing the Eyephones headset, Dataglove and Datasuit, a full body version of the Data glove, which still has not achieved widespread use even though it offers the most fully immersive VR experience to date.

VPL as a research and development company at the forefront of virtual reality for industry enjoyed working with clients ranging from the Advanced Robotics Research Centre to toy companies such as Mattel, with whom in 1989, they produced the Powerglove, a low-end version of the Dataglove for children. It was originally intended for educational use, but ultimately reached the market as a computer based interactive toy. Perhaps it will still educate.

However VPL, for all its successes ran into difficulty with finances unable to meet the "preposterous requirements" (Sheff, 1993, p.12) of their investors Thomson CSF Ventures, with whom they had been dealing since 1988. One such requirement in meeting loans was to put up their patent portfolio (apparently worth several billion dollars) as collateral. Early in 1993 VPL went into bankruptcy and Thomson filed a suit seeking transfer of title to the patents, and succeeded.

Lanier is currently working on several VR projects including one called "Medical Media Systems" at Darthmouth University exploring medical applications of Virtual Reality. He also hopes to release a series of musical recordings played on virtual instruments through the Point Records label. Obviously Lanier has much to offer both in progress and potential to the virtual reality industry on all levels.

However, it was another field of development that finally allowed people to grasp the ephermal computer generated environments of VR, that of the entertainments industry. Myron Kreuger offers a practical viewpoint on the subject of technological origins coupled with their social application;

> If you are going to be practical, you talk about entertainment. If NASA had invented television, we'd be talking

> about the uses of television for medicine and education, they would never you know, get around to talking about sitcoms and soap operas (Jones, Aug. 1991, p.38).

Of course, arcade VR or even the projected home VR systems owe their introduction and founding on years of military simulation research along with a combination of rapid advancements in computer imagery and imaging devices.

Unfortunately the initial hype and media attention addressed at this sector has perhaps served to damage more than promote VR as a whole, building it up to be something that it falls short of, diverting attention from more practical and suitable, though less "photogenic" applications. The next chapter discusses the practical or realistic side of the VR industry in more detail. For the moment, let us briefly trace the events and developments that helped bring about what proves to be the VR industry's biggest money earner, namely Arcade VR.

If one is to parallel the impact that VR potentially has on modern culture to the impact that the cinema, a century ago, had on the way we look at things and perceive our world, it is interesting to note that both media, when introduced to the public, began in the entertainments arcades.

From an investment point of view, it certainly has proved profitable. In the U.S. alone, video games generate 5.3 billion dollars a year, about the same as the film industry (Corliss, 1993, p.65).

One of the key players in entertainments VR is W INDUSTRIES, based in Leicester in the UK. Founded by Dr. Jonathan Waldern in the late 1980s, the company's VIRTUALITY products are synonymous with the image, hype and public perception of VR.

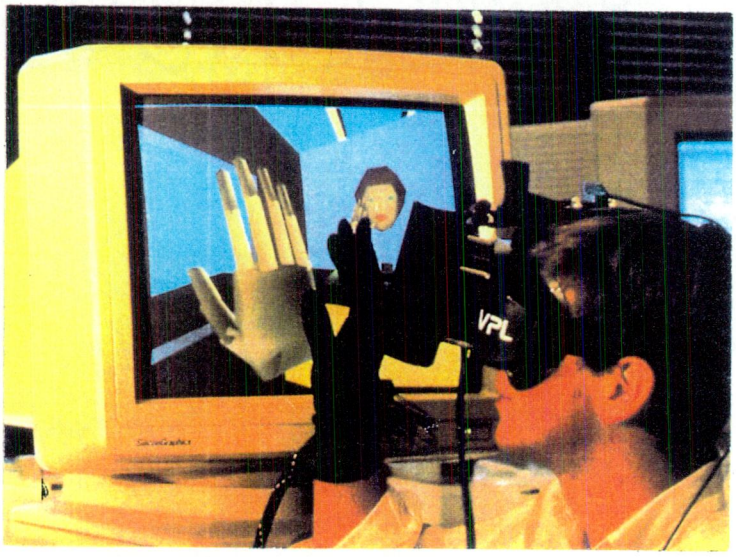
Waldern began his doctoral research on artificial intelligence and artificial reality just over a decade ago, his work culminating in producing important experimental research on the psychological impact of artificial environments on their users.

The Virtuality Entertainments System, officially launched in London early in 1991 is based on three core product components; EXPALITY, ANIMETTE and VISETTE.

EXPALITY, a multi-media computer processor system generating and storing the large amounts of data required for the simulated virtual worlds of which use is made by the Animette software system. ANIMETTE produces the aural and visual effects experienced by the user via the VISETTE, the core user interface of the entire VIRTUALITY system. The VISETTE comprises a headset designed to accommodate a wide range of users and contains a stereoscopic liquid crystal display system and a quadrophonic sound system both lending to the user's illusion of being immersed in a world where you hear and see as you would in the real world (even if you happen to be battling prehistoric dinosaurs or flying Harrier jump-jets).Other companies such as Kaiser Electro-Optics California have developed products such as the VIM head-mounted display with a view to producing low cost attractive VR products for use in Arcade and commercial VR

While playing *Dactyl Nightmare*, or any of the games offered on Virtuality may prove an interesting distraction, it is crucial, in order to gain a fuller sense of what Virtual Reality potentially can and is offering, to realise that it is not the overnight sensation of the entertainment arcades world, but is a product of years of high investment research and development in fields of application far from the arcade games and will ultimately and eventually remain so as its establishment gains more strength in an ever increasing number of applications.

Illus.7. VIDEOPLACE interface display by Dr.Myron Kreuger

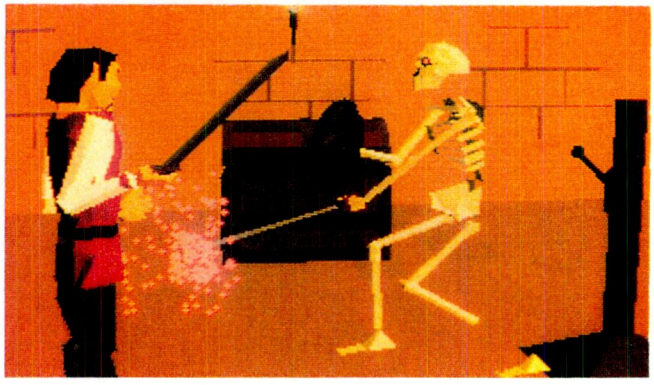


Illus. 8. Top. VPL Virtual Reality Interface. Product Design by IDEO, San Francisco

Illus. 9. Bottom. VPL EYEPHONES and DATAGLOVE in use.

Illus. 10. VPL Datasuit, Eyephones and Datagloves in use offering the most complete immersive experince of Virtual Reality that is currently available.

Illus. 11. & 12 VIRTUALITY arcade VR system by W Industries
Illus. 13. VIRTUALITY user about to don the VISETTE head mounted visual interface



Illus. 14 &15. VIRTUALITY games sytem in use and a typical VISETTE display.

Illus. 16. VIM (Virtual Immersion) Head mounted Virtual Display system by Kaiser Electro-Optics, California.

Chapter Five

The Virtual Reality Industry
The Present State

> A key problem in discussing VR is that one finds oneself talking almost entirely about potential, rather than actual, applications (Minkowsky, 1991, p.5).

A gap exists between the concept of Virtual Reality and its current practice realised in the development and implementation in a variety of uses of present VR configurations and technologies. It is difficult to detach oneself from the radical visions of VR and its powerful potential and come to realise that the dreams promised using the form of entertainment, communication, education, training, task performance and even art (this deserves a different consideration though) are still realistically years from full realisation as more profitable corporate interests require immediate attention if VR research and development is to continue.

The media attention has given us the impression that the technologies are well established and suitable for commercial exploitation. However, little has changed since Sutherland (see previous chapter) identified the problems of immersion in a virtual environment in the late 1960s. Our demands for the high speed computation, quality display, advanced sensory tracking, etc. have placed demands on the current technologies building up expectations that far exceed the present possibilities.

In assessing VR from a techno-industrial viewpoint there are many definitions of VR; from simulation to a consideration of all that is virtual or artificial, to networked communications. All these areas place different demands on what we expect our technologies to do. It is important to rationalise the current state of VR and collaborate and standardise our ideas, parameters and direction while the industry is still young and still falling short of the promises given by its promoters.

We find it all too easy to assume that current, widely

available and more conventional man-machine interfaces are superceded with virtual environments. This may prove true for many applications and already improves upon existing interactive techniques for some. However, there are some tasks where the conventional interface not only proves cheaper but also more than adequate for the task at hand. Of course, on the other hand, some tasks demand the creation of a virtual environment and the current technologies offer this opportunity. Remote task operation in dangerous environments, such as bomb disposal or handling of radioactive materials, serves as an ideal task example.

Therefore, zeal should not cloud our vision when dealing with VR applications. There is a need for its benefits to be assessed and related to the application at hand in order to identify where traditional interface design and use falls short and where VR can provide a solution.

In order to gain an understanding of the current state of the VR industry let us briefly examine and assess the problems that need resolving in the design of the VR system components.

> The current equipment is a continuation of a long tradition of computer science - make the user adapt and deny that there is anything to adapt to (Kreuger, 1992, p.54).

Position:

To interact with the virtual environment, the user's position in the real world requires tracking. This in turn allows the user to treat his virtual representation in the virtual environment as a projection or reflection of himself in that environment as though it was a real place.

The most popular tracking mechanisms such as those in the Head mounted systems (VISETTE by W industries or Eyephones by VPL) or Boom Systems (manufactured by Fakespace in California) make use of are based upon magnetic sensing and have been produced and developed by companies such as Polhemus for over twenty years. However, their limitations lie in their range, resolution susceptability to interference from other magnetic sources, which also prevents them from

being placed close together. For future applications requiring better overall positional sensing these issues will have to be addressed.

Another method of tracking movement and position involves optical tracking, derived basically from the video camera and a simplified form of which was first demonstrated in Myron Kreuger's VIDEODESK. While these systems offer higher resolution and potential for improved development, their expense and human factors issues play a large role in making them unacceptable, unless refined.

Movement:

While the headmount display and tracking devices allow you to look around the graphics world that you have been introduced to, you are prevented from as a result of the technological and design limitations. For example, to move in the virtual world, by donning an interactive glove and pointing, you "fly" to where you wish to go. In essence, your finger no longer is a finger and you no longer are behaving naturally.

While many tout the often super human abilities that these computer generated illusions lend to, they also mark an important step we take in the assumed powers we endow our "physical" selves with (remembering that physically we don't exist in a virtual world). It clearly underlines a need for rationalisation on the psychological and associated physiological side effects of changing the way we perceive our interactive bodies and abilities with our environments, no matter how illusory they may be.

At the very least, devices of interaction such as the Dataglove can, in use, prove to be frustrating. The glove is suggestive of an ability to touch and grasp objects in a natural manner, yet to grab an object, a virtual object, you place your hand through its surface and close your fist, proving to be a sensationless device.

The glove is ultimately an unnaturally interactive tool open to user's misinterpretation without adequate practice and training, making the first initial experiences of VR quite uncom-

fortable for some requiring often intricate hand gestures (pointing to fly, cocking the thumb to control speed, raising fingers to accept , etc.) that may have to be performed simultaneously.

The gloves work on a gesture recognition tracking system that employs optical fibres to determine the hand's position and permit the computer to recognise the assigned gesture command. Use of this device not only clarifies its potential, but the need for its improvement as gestures can often come close to, but not quite be the desired command. Certainly, along with resolution improvement a method of sensory feedback would make considerable advances in improving interaction via the glove interface.

Touch:

Such a prototype was developed in 1992 by Airmuscle Ltd. and the Advanced Robotics Research Centre (ARRC) in the UK under the name "Teletact II." The project produced a glove capable of exerting grip forces and receiving reactive stimuli to produce the illusion of touching and feeling an object in virtual space. Again, this is an indication of the advances being made in VR research and development, but it is important to realise that the industry still remains at large a research and development industry, with much work still to be carried out before widespread commercial realisation is possible.

Real-Time:

A primary concern with VR interfacing is its real-time ability or image update rate. When there is a noticeable delay in response to the user's movement, a common argument put forward is that eventually, faster computers will result in shorter graphics response time. This, unfortunately has been the argument for over twenty years and a point that often goes unnoticed is that while computers have become faster, the interface has not. This is not just the problem of sensors and their resolution for it is essentially the software that matters and the problem lies in collaborating the two, that is; combining the physical

design of the interface with the computational ability of the software.

"Windowing" was a concept of desktop computer interfacing introduced to us in the 1980s, allowing us to move "objects" in the form of computer graphic pictograms about on our computer screen, much as we would place files in various directories and filing cabinets when organising standard office data. "Windows" brought the virtual office onto the flat screen and has proved to be a phenomenal success. However even with the opportunity given to interact with such systems on a three-dimensional basis with VR, it still takes as long to move objects, open files and execute commands, the problem being the software we interface with.

In recent years, companies such as Dimension and Sense8 have specialised in producing software specifically for use in VR technologies. It is a central and crucial element of interaction that for too long has been pushed aside and is probably the single most important element in the virtual reality concept. Without the software, the hardware is useless and real time interaction can never be possible. While traditional software packages have boasted user-friendliness or end results as determinant factors in their marketing and sales successes, an extra element comes into play with VR. That is, time. What good is a virtual reality, three - dimensional sculpting tool to a designer if he cannot see the results as he produces them? VR is about immediate interaction and eventually, the curiosity and gadgetry will lose their appeal, revealing that immediacy is the central element in VR applications, from communication to entertainment.

> Making the experience immediate is not a peripheral issue. It is as central to virtual reality as the frame rate is in film. One does not show slides and call it a movie. (Kreuger 1992 p. 57)

Vision:

A direct hardware problem related to real time programming lies in the display technologies of the visual images. Most head mounted displays consist of a twin Liquid Crystal Display

(LCD) unit with limited resolution (normally 360 x 230 pixels). While this is suitable for the low polygon complexity models generated by current computer graphics systems, improved realism in the virtual worlds will require a resolution far higher than that deemed acceptable today.

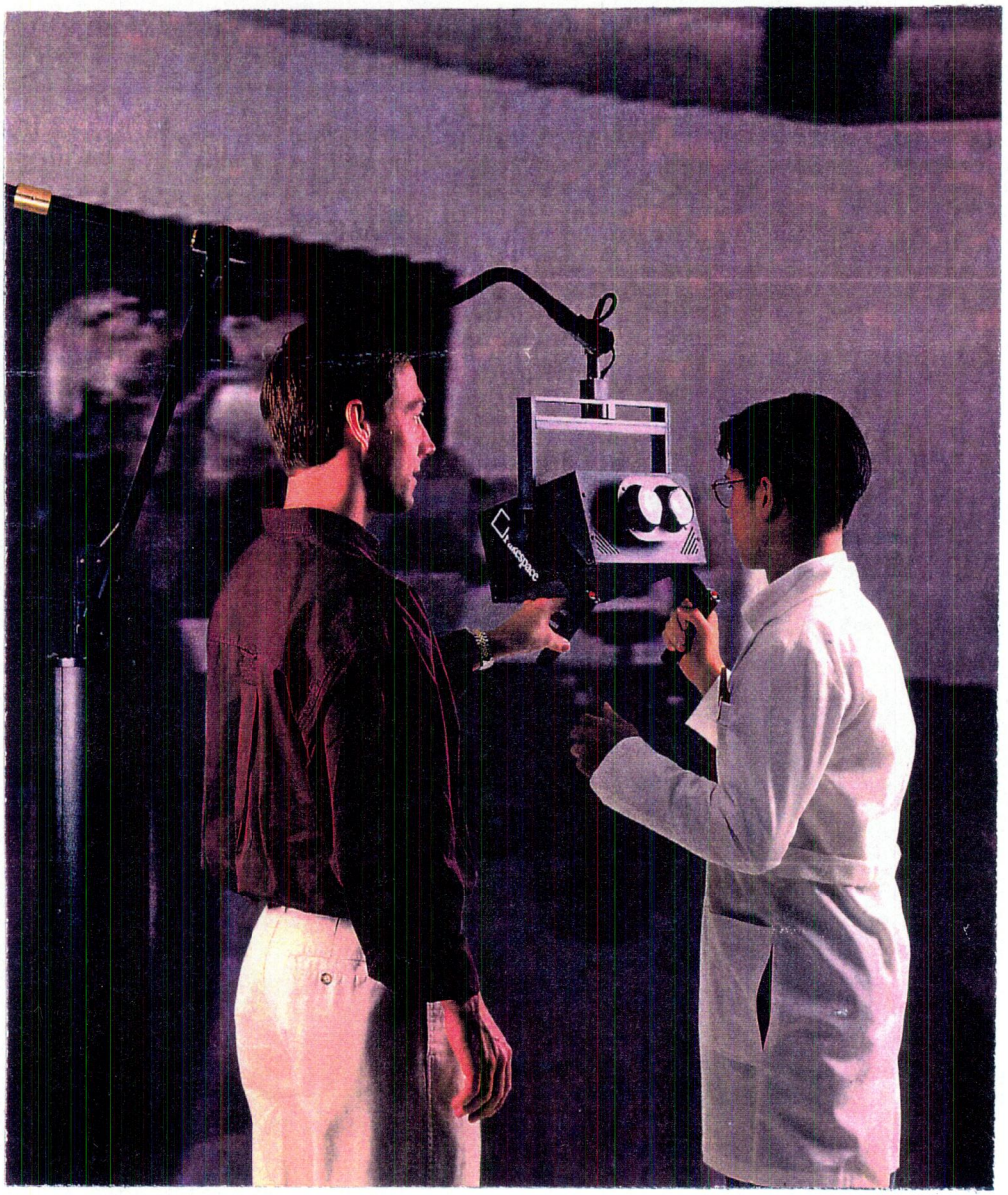
Charles Grimsdale, managing director of Division, speaking on combined improved software with LCD technology recommends a minimum resolution of 640 x 480 pixels, which would allow for sharper images and improved realism. However, he importantly notes the need for a greater volume of research exploring the human perceptory system in relation to artificial environment displays (Grimsdale, 1992, p.14 - 22).

One of the downsides of the otherwise advantageous media attention given to VR is the impression that a mature VR industry exists. It exists in name and concept as do many of its proposed applications. A VR industry is emerging but its current high profile does not justify its reality. What is emerging from the various conferences, publications and bodies of research on VR from those involved, is a set of demands outlining the need for specific research relating to human factors, ergonomic and design issues on the use of VR along with continuing product and technological improvement and development.

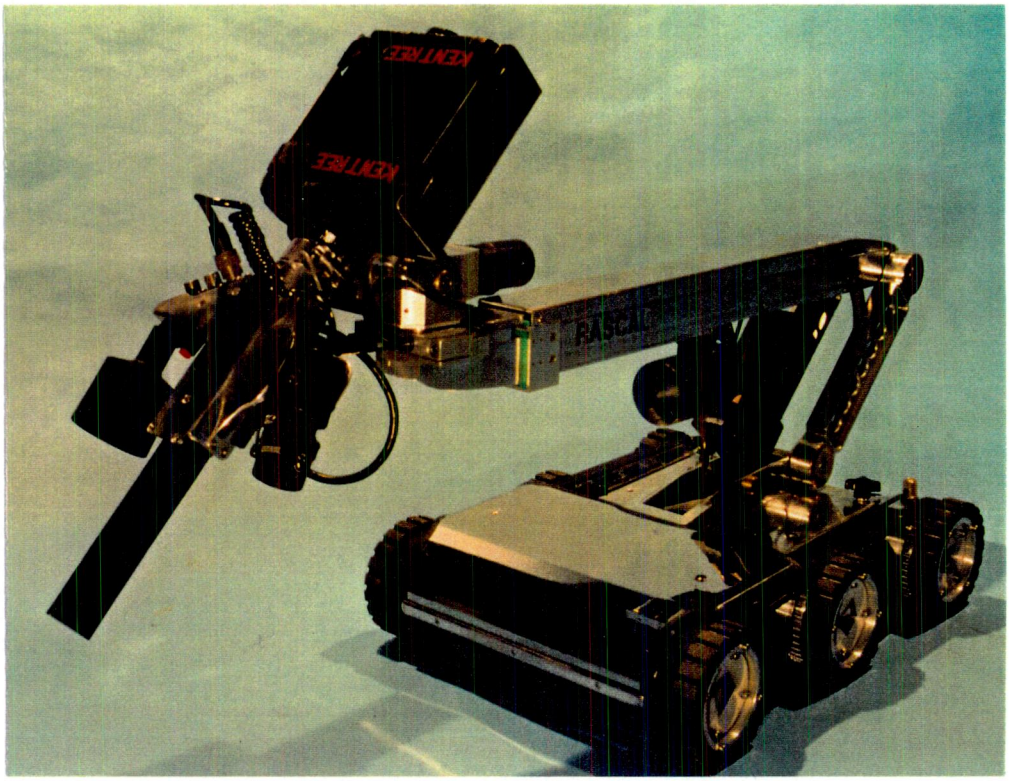
Of course, it is being used in public environments already from design studios to amusement arcades but that is not to say the development is complete. What these applications do suggest, is that ultimately, a VR tool could exist to do the specific task proposed but only after a large investment of time, research and of course, funds.

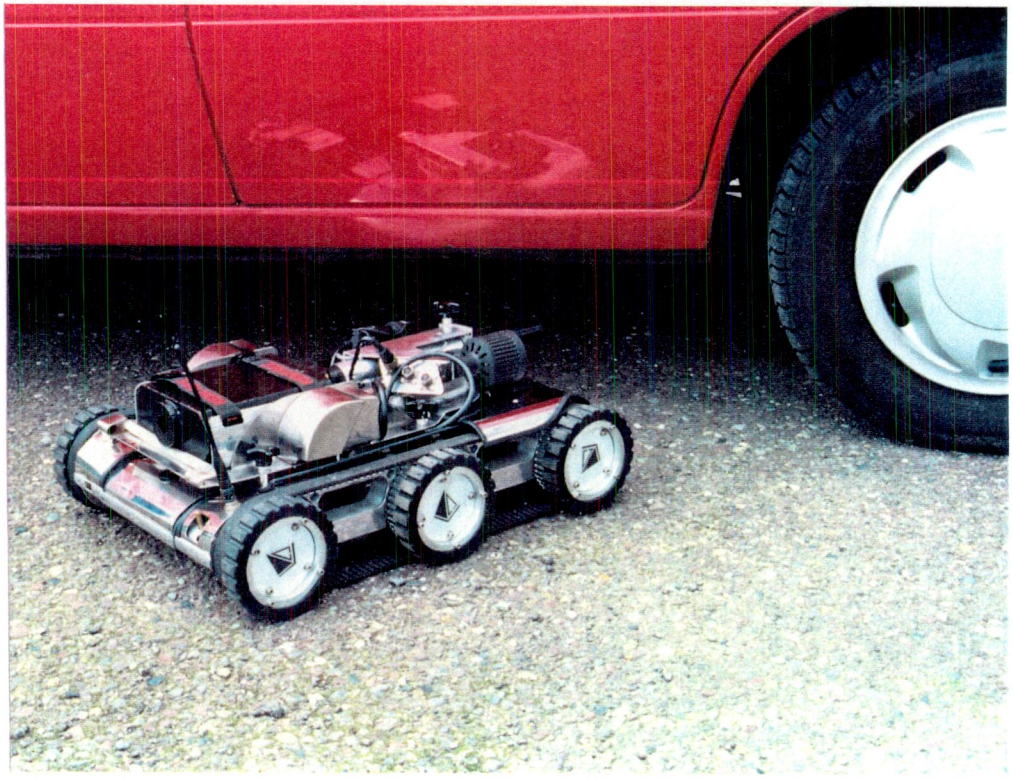
Certainly, the field of VR would receive a powerful boost with the introduction of replies to the technological demands being pursued. At the moment, VR serves to emphasise the difference and distance between a money-making industry and a promising field of research and development.

What exists, in the main, is a research industry and until the work of the corporations, universities and research bodies currently assessing the worth and quantifying the benefits of VR is complete, then so it will remain.



Illus. 17. Virtual Reality Display system. A boom-mounted display unit by Fakespace, California.





Illus. 18. A practical application of VR technology is envisaged in control and feedback interfaces for Remotely Operated Vehicles such as RASCAL, a miniature bomb-disposal robotic vehicle by Kentree Ltd., Co. Cork, Ireland.

Part Three

Virtual Reality
Art and Design

Chapter Six

Technology and Imagination.
Virtual Reality in Computer Art,
An Artistic Platform in Virtual Reality

Digital imaging and the creative tool that is computer graphics have started to change the way images are both made and seen. Computer graphics makes possible exciting new forms of creative expression and communicates in a way that no representative technological medium, from the photograph to the freeze frame of the film has done before.

Of course, working with computers to communicate an experience and create a work of art is not without its critics, and it will take some time before artists learn to use the medium as a means through which they can execute a style and express an identity. At the moment too much attention is placed on the medium and too little on the essence of the work itself. Computer generated art on the whole still remains identifiably "computer generated" in title, so much so that this fact alone tends to overshadow the piece.

However, just as cameras presented both a threat and a promise in the form of a new medium, depending on one's view, to the art and tradition of subjective expression, computers and the canvas they give us in the form of VR and its cyberspace present a similar threat that will ultimately be overcome through artists understanding, exploring and expressing themselves through this technology. Ultimately, VR amounts to a new artistic medium with the potential to transcend the traditional boundaries of others That have gone before from the picture frame and the cinema screen to the need of the viewer for cultural and representational understanding. VR goes further in involving the artist, the subject and the viewer on an interactive, and in many ways, a highly communicative level.

> It's completely logical that after a decade of personal computers that technology and imagination should come together. Everybody feels so liberated by the computer

> to do things and, on the other hand, constrained because it demands that you do what it can do. VR fictionalises that. Virtual reality removes the operating system from your direct experience (Druckery, 1991, p.7).

VR allows the artist a more fluid transition from imagination to realisation. It allows one to show more of what one thinks and how one visualises rather than talking about it. Its communication is more immediate. Virtual Reality for the artist or visualiser can be so much more than a case of "what you see is what you get". As an artistic medium, even in its current state, it has the power to "bring" you to a place, see, hear and touch the objects (virtually) about you, in other words, experience the alternate reality that the artist has created.

Professor Michael Heim of the Department of Philosophy, California State University, in his recent book *The Metaphysics of Virtual Reality*, cites the technology as a powerful new medium for the artist:

> Creating a new layer of reality demands our best shot, all our curiosity and imagination...Behind the development of every major technology lies a vision. The vision gives impetus in the field even though the vision may not be clear, detailed, or even practical. The vision captures the essence of the technology and calls forth the cultural energy needed to propel it forward...Perhaps the essence of VR ultimately lies not in technology but in art, perhaps art of the highest order. Rather than control or escape or entertain or communicate, the ultimate promise of VR may be to transform, to reform our awareness of reality. (Heim, 1993, p.55-59).

His argument supports that being discussed, that is the ability to capture the minds eye through VR and establish an experiential awareness between the artist and the viewer through the artists work communicating it on a level that all art aspires to and gaining a valuable insight into experience. To support this, Heim draws a comparison with Richard Wagners *Parsifal,* an opera intended by its composer to be a total work of art involving the viewer through its drama, vision and sound and ultimately allowing ones conscious level of awareness to be brought to a higher communicative level of reality and

sensitivity. Such was the intention. However, to discuss VR as a medium let us consider some of the work that has been done with it, both by artists and museums.

In July 1992, the Jack Tilton Gallery in Manhattan, New York exhibited a one month show entitled *Through The Looking Glass : Artists' First Encounters with Virtual Reality,* in effect producing the first commercial exhibition devoted to VR as an artistic medium.

Pieces included *Angels* by Nicole Stenger (who is also discussed in Chapter Two) a powerful visual piece (computer generated, but shown on a video recording) portraying a fall from the serenity of Eden into the confusion of Hell, inspired by John Milton's *Paradise Lost.*

German artist, Peter Weibel exhibited a piece entitled *On Justifying the Hypothetical Nature of Art and the Non - Identicality Within the Object World.* This piece had earlier been exhibited at the Galarie Tanja Grunert in Cologne and composed a full room installation whereby viewers became interactively involved in the visual make up of the piece by stepping on various sensors in the form of large polkadots on the room's floor. By activating these sensors various images ranging from pieces of furniture to the letters of the alphabet appeared, distorted, stretched or disappeared again on the large video screen covering one wall of the dimly lit room.

In 1987, computer graphic artist Mick Mullican began working on his project *The City*, a computer generated image of a large, surreal and hauntingly empty city. It was the first piece of computer generated art to be exhibited at a major central museum, when in 1989, it went on show in New York's Museum of Modern Art. Generated by computer and stored on video, viewers were given a visual tour of Mullican's creation.

Then in 1990, *Five Into One* was commissioned by the French Ministry of Culture. The piece is a VR version of *The City* allowing viewers when first exhibited at Le Fresnoy in Tourcoing, France in 1991, to "move" at will via a joystick and head mounted display through Mullican's city. The piece was also exhibited in the Tilton show in New York.

Myron Kreuger has pioneered VR video and computer

installations as interactive art since the early 1970s. His best known work VIDEOPLACE allows the viewer's movements to be followed by a video camera, processed by a computer and output to a wall sized video screen, the end result being a creative computer generated interactive mirror of sorts where the viewer sees an image of himself on screen and his movements trace responsive abstract colourful waves and scribbles on the computer generated background. Kreuger's work is based on interactive communication via visual technologies. His experimentation proves that people easily identify with images of themselves or part of themselves on the computer screen, be it to paint graffiti, play volleyball or simply tickle another image, all possible through his interactive installations.

Kreuger's work does not simulate a reality as many virtual reality pioneers and programmers foresee as their goal, yet with his work , the artist and user can still "enter" a computer generated space without knowledge of programming or operating a computer. He explains quite simply;

> ...the way I see it is that rather than put you all in this other world, I take the attributes of that other world and put it into this one (Jones, 1991, p.38).

Museums have also shown a favourable response to the advantages offered by computer imaging and Virtual Reality.

The Seattle Art Museum has developed an interactive system called VIEWPOINT allowing museumgoers the benefit of accessing information on any work listed by the museum, view the work through digital imaging, providing a high quality scanned and detailed representation of the work or perhaps be taken on a virtual tour "moving" at will through the museum while being informed on objects on show. Another option of the VIEWPOINT system allows one to hear native American Indian folklore or enjoy the benefit of an audio - visual glossary of over 150 art and cultural terms.

Some of the projects and proposals in development by various museums are not only visionary, but valuable. Whole exhibitions can be stored in computer memory along with details of work not currently shown providing valued

information on past exhibitions and collections not on show thus extending the museum space into virtual space.

For example, already in London's National Gallery an interactive computer system called *The MicroGallery* provides visitors with instant access to a 4,000 page electronic digitised catalogue of the gallery's collection. Users can, with the assistance of touch sensitive screens, obtain information on both the museum and its collections presented in the form of digitised computer images along with a pre-recorded voice over.

Ruth Perlin, director of Education Resources at the National Gallery of Art in Washington has collaborated with a computer imaging company, AXS/Optical Technology Resource in producing a video-desk record of high quality computer scanned images of some of the gallery's collections. She enthuses on the interactive and communicative elements offered by such explorations in the application of visual technologies;

> I'm concerned with bringing our audience marvellous images in a way that meets their needs. This technology, to my mind, is very promising because it's so flexible, so adaptable. How wonderful for learners of all ages to be able to say,'This fascinates me', and be able to follow it. (Dery, 1993, p.79).

By "storing" artistic treasures using digital imaging technologies, then experiencing them through a computer screen, while it may not be the real thing, or it may not be art in virtual reality, it does allow people access to a much larger world of art than is currently available to them emphasising again the powerful communicative element of computer imaging from viewing a masterpiece to looking around a virtual gallery. Sketchbooks, paintings, manuscripts and precious objects all could be seen without the threat of loss or damage or even the need to travel. Imagine the pleasure of experiencing the beauty of a priceless art object such as the Book of Kells, turning its pages and experiencing its splendour without the possibility of harming a single page yet still appreciating its artistic worth while the real object is kept safe from harms way.

The concept of networked galleries and computer based

platforms for artistic expression offers a world of opportunity for the artist and for some the chance to shrug off the existing traditions and boundaries of other media.

In 1991, Wolfgang Staehle founded *The Thing* in New York. *The Thing* is primarily a centrally accessed computer providing a networked gallery for computer artists and has been described by Staehle as "an attempt to step out of galleries, museums and alternative art spaces and establish an independent art forum" (Dery 1993 p.80)

The Thing provides a vehicle for both exhibiting and discussing the work of computer artists and stands out, questioning the validity of traditional methods of art and its communication. It is envisaged that with the advent of VR becoming commercially available as an interactive computer based communicative medium that the whole experiential element of the work of artists involved in creating digital image databases will become all the more accessible and worthwhile.

Jeffrey Shaw, director of the Institute for Image Media at the Centre for Art and Media Technology in Karlsruhe, Germany offers some valuable insight on the nature of the relationship between the artist, viewer and the interactive experience of the piece in the light of the prospects offered by current and evolving imaging technologies, namely VR:

> The traditional activity of art has been the representation of reality - manipulating materials to create tangible mirrors of our experiences and desire. Now with the mechanisms of the new digital technologies, the artwork can become itself a simulation of reality - an immaterial dig ital space which we can literally enter. Here the viewer is no longer consumer in a mausoleum of objects, rather he/she is traveller and discoverer in a latent space of audio visual information. In this temporal dimension the interactive artwork is each time restructured and recreated by the activity of its viewers - each person becomes raconteur and auto - biographer of the artworks many possible forms (Shaw, 1992, p.65).

Of course, argued rationally, imitation is never the real the real thing, a three dimensional computer generated object image may not express what a sculpture can and a painting may

never be replaced by a photograph. Each form of representation and expression has its own rules of communication that other media do not. Therefore to consider virtual reality and the medium of a computer generated space in which artistic expression could be realised as representative, intuitive, communicative, and interactive, an understanding is required to make full use of VR as a means to complement and enhance what Michael Heim describes as "the power of art to transform reality." (Heim, 1993, p.62). This understanding should allow the artist to explore what the medium has to offer. One artist describes it as a "brave new world" (Em, 1992). Computer based art especially visualisation of realities in VR needs to be evaluated as progressive and certainly not quantified by traditional methods. All artists should realise the value of tradition but tradition and traditional methods should evolve along with the cultures and realities of the world around it and become representative of the new ways of thinking and seeing that they have always placed so high a value upon.

Much as the role of the designer needs a deeper understanding of the strains and threads running through recent histories and modern cultures in order that he/she may place a value on their work and understand their place in the broader picture on which they are working, the artist too has demands that realise that there is more to what they do than the tools they use and often more in the essence of what they try to communicate than in the medium through which they execute it. Virtual Reality is for many an ill-fitting suit into which we still need to grow, but it is important to note that some of its key figures possess a creative aspect that in many cases inspired the work they have done in developing the field of VR. Brenda Laurel, for example, author of *Computers as Theatre* and editor of the key VR text *The Art of Human -Computer Interface Design* is also a formally trained actress, a video game designer and holds a Ph.D. in Interactive Fantasy. She is currently on the design of virtual worlds in a project entitled *Virtual Coyote* at the Banff Centre for the Arts in Alberta, Canada. Jaron Lanier, former head of VPL, is an accomplished musician, much of his interactive devices originated from the concept of playing virtual musi-

cal instruments, instruments incapable of being real yet create music that can be heard.

Virtual Reality technology makes the use of existing medium of computer graphics much more flexible and intuitively representational. It allows a smooth transition from the reality of a world as seen through the eyes of the artist.

Every year SIGGRAPH (Special Interest Group in Computer Graphics) holds what is probably one of the largest professional conventions in the United States, with annual figures of attendance in recent years reaching as high as 30,000 people. Each year it features "the best of the best" in innovations and developments in the computer graphics industry. In 1991 SIGGRAPH exhibited VR officially for the first time and graphic art assumed a whole new perspective in the eyes of the industry. Besides the computer generated graphical illusions from the special effects team on *Terminator 2* (using a technique of computer generated animation called "morphing" to produce lifelike fluid animation sequences such as a human figure that appears to consist of molten metal) were exhibits ranging from photorealistic interior images of Le Corbusier's Ronchamp Chapel to the Theatre of Tomorrow, a VR stand providing for many attending the conference and exhibition their first experience of "being" in a place that does not exist.

> All those years we've been told that art and science will be reconciled at the world's end...And that computers are the death of life and the enemy of imagination. What I think I saw at SIGGRAPH, was computers finally finding a way to scratch an itch in human creativity that neither art nor science has yet reached (Hayman, 1991, p.24).

Importantly, the element of creativity and communicating through visualisation creates for many the realisation of the value of experiencing what before could only be imagined. Flighty as it may sound, VR caught the imagination of those at SIGGRAPH allowing users to walk, for example, through a four - dimensional hyberbolic dodecahedron, a shape that should only exist as a mathematical formula and it appears that its creative and communicative element is by far one of its most

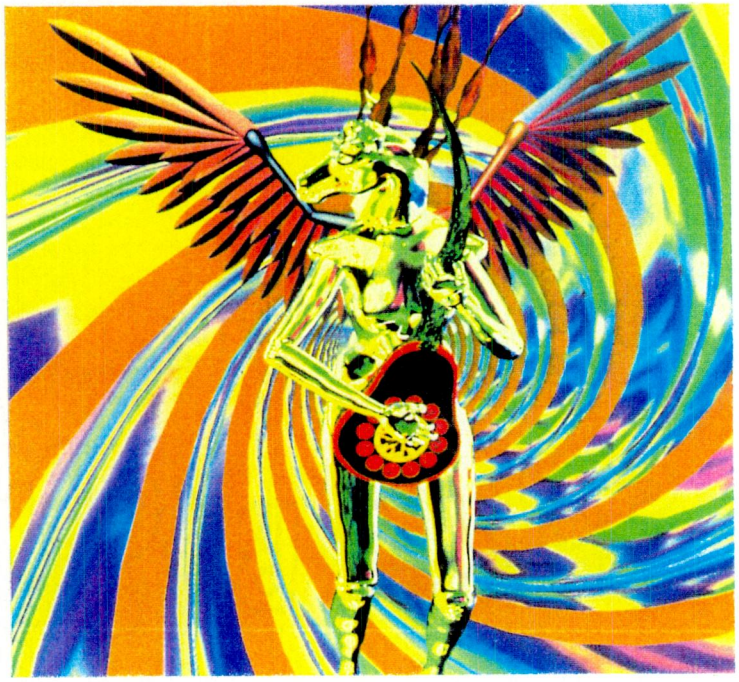
appreciated and successful characteristics.

In the 1992 SIGGRAPH convention the interest in VR was even greater, with 24 VR exhibitions and the official theme: *Insight Through Images* . Interestingly, on the note of the implications of visual technologies and in considering the deep root it has taken in modern culture, this fact alone was perhaps unwittingly admonished in the theme of SIGGRAPH '93: *The Eye of Technology* . The very fact that artists, graphic designers, photographers, film makers and animators have, as a collective force outnumbered the software engineers and computer scientists for the last three years at this convention is indicative of the growing interest in VR and computer graphics in the art and design world, with perhaps its greatest potential lying there.

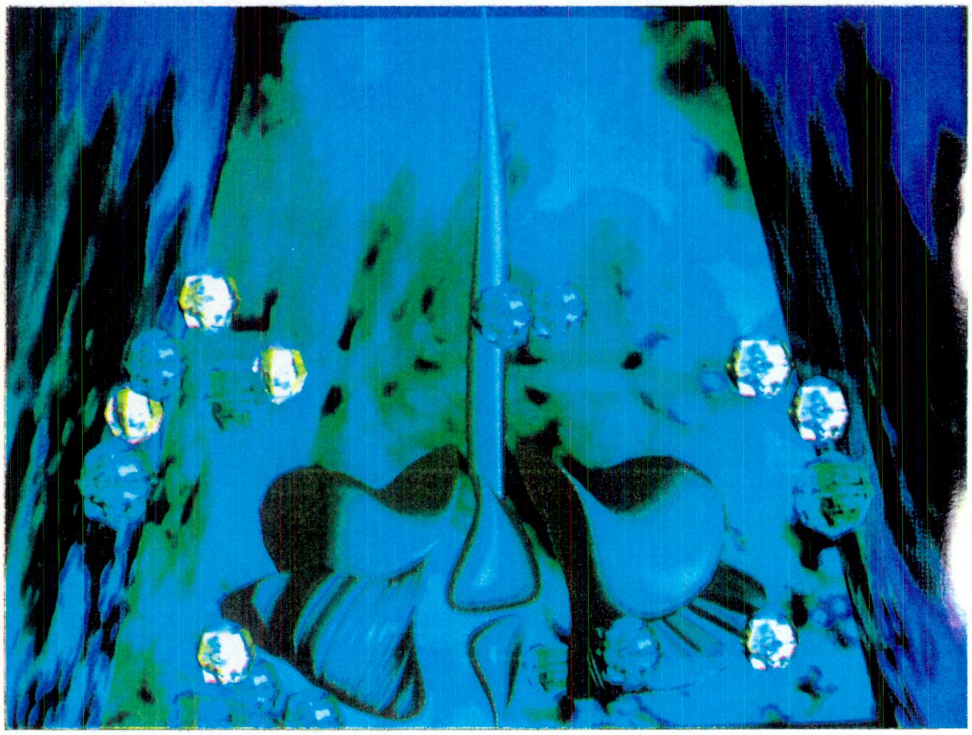
Perhaps computer-based art should not be perceived as eschewing traditional values but rather aspiring to the representational tradition of art in a manner reflective even in its execution of the issues and realities it portrays. In this way, VR can offer a means of representation that other media cannot. To summarise in the words of Nancy Paterson, a Canadian artist who exhibited an interactive installation, *Bicycle TV* in Expo '92:

> In exploring the creative potential of virtual reality systems...(we) have the opportunity and obligation to address related issues such as physical control and psychological manipulation in the electronic age (Paterson, 1992, p.165).

To realise the visualisation that VR and computer imaging offers in so many aspects of artistic communication the need is apparent for not only a cultural and historical understanding of the implications of VR, but a perspective that is independent of traditional ways of looking at things and reflective of the many ways we see things today that without the technologies could never have been shared and seen.

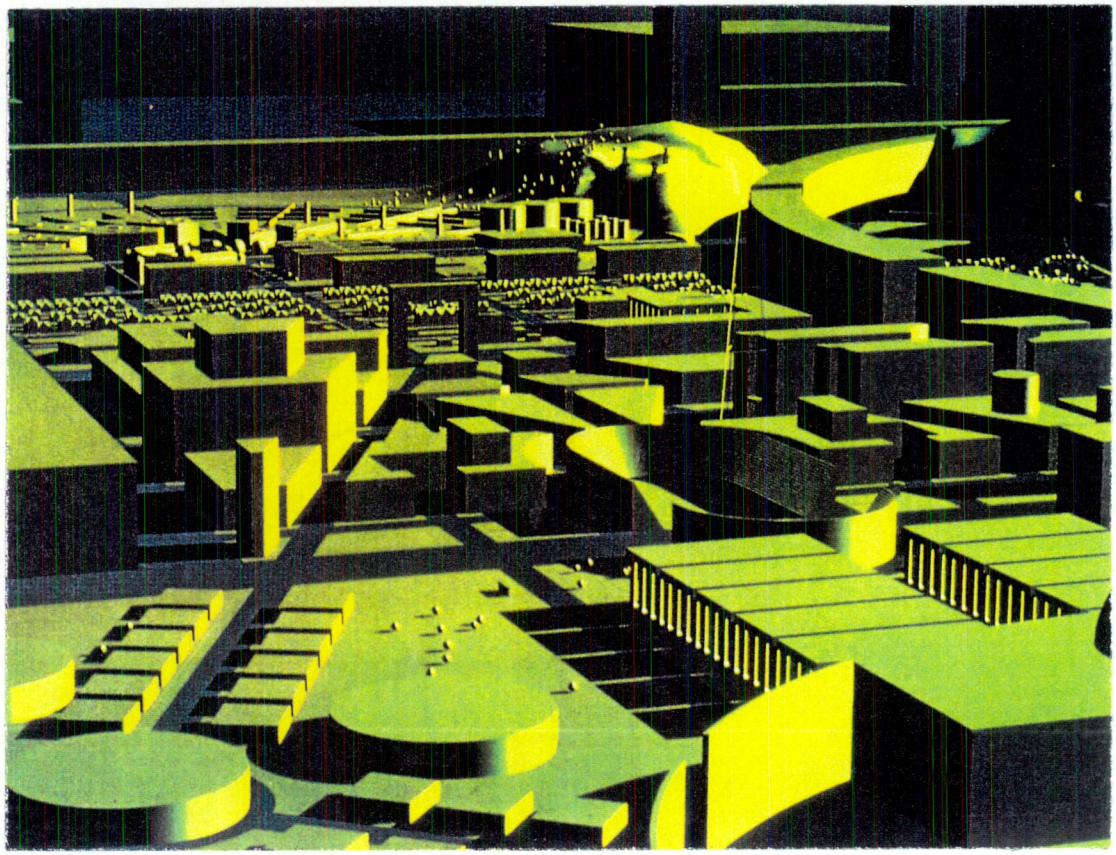


Illus. 19. Virtual image by Warren Robinett, University of North Carolina one of the leading research centres on Virtual Reality. As an indication perhaps that one of VR's greatest potentials may lie in applications in the art world ranging from Virtual art to Virtual Museums and gallaries, much of their work has started to explore these applications.



Illus. 20. A virtual image from *Angels* By Nicole Stenger, an exhibit in *Through the Looking Glass : Artists' First Encounters with Virtual Reality* held in July 1992 in the Jack Tilton Gallery, Manhattan.

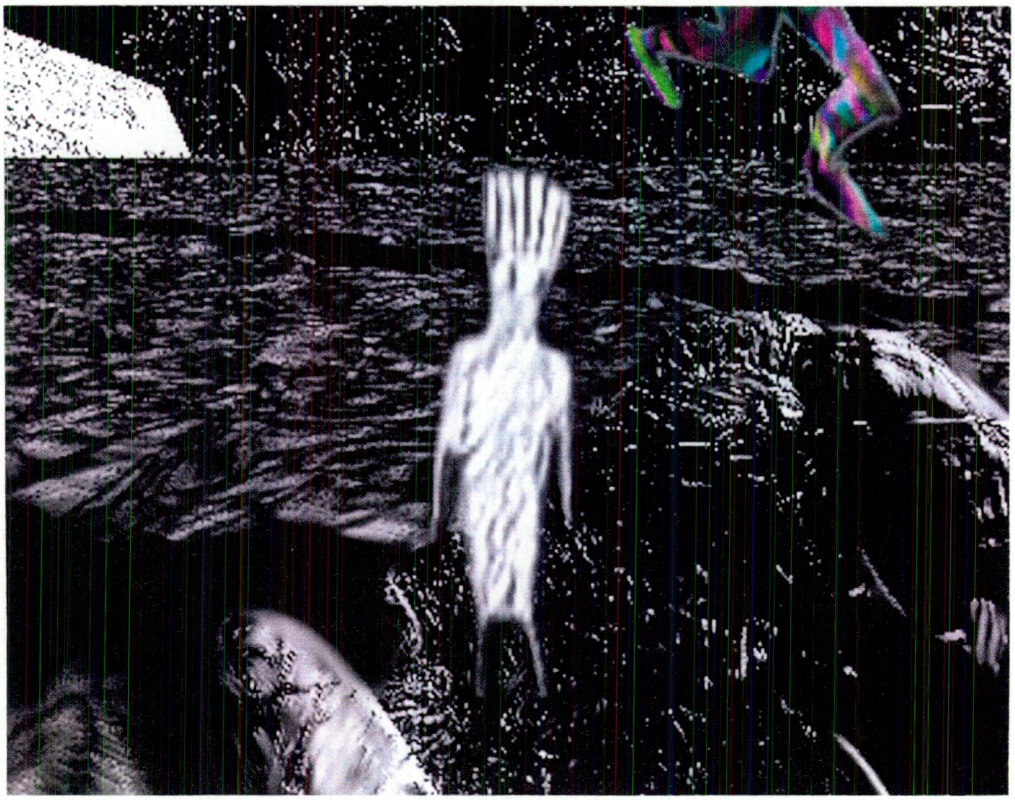
Illus. 21. Interactive installation *On Justifying the Hypothetical Nature of Art and the Non-Identicality Within the Object World* by Peter Weibel.

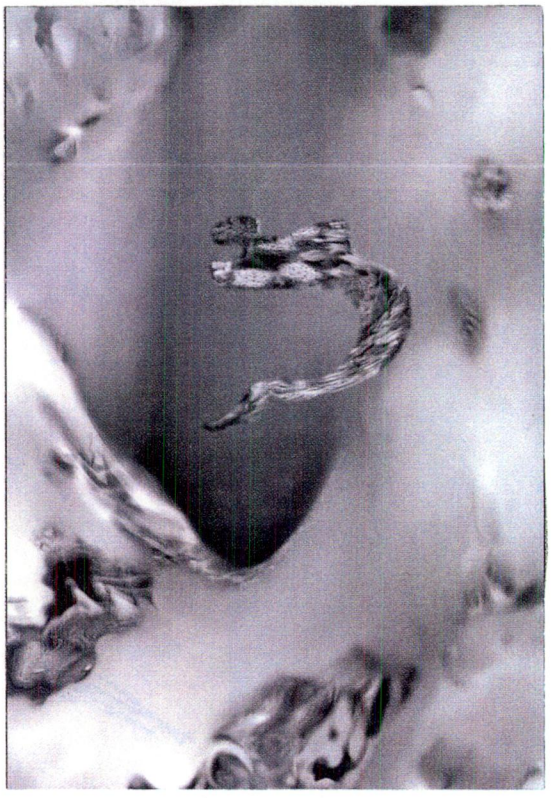


Illus. 22. Image from *Five Into One*, originally *The City* by Matt Mullican.

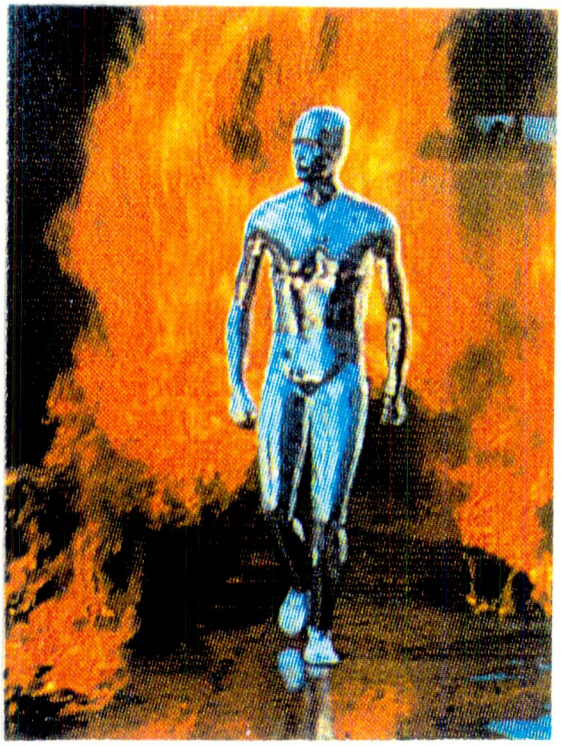
Illus. 23. Top Image from *Painting The Town* (shown also in the Jack Tilton Gallery) by Myron Kreuger

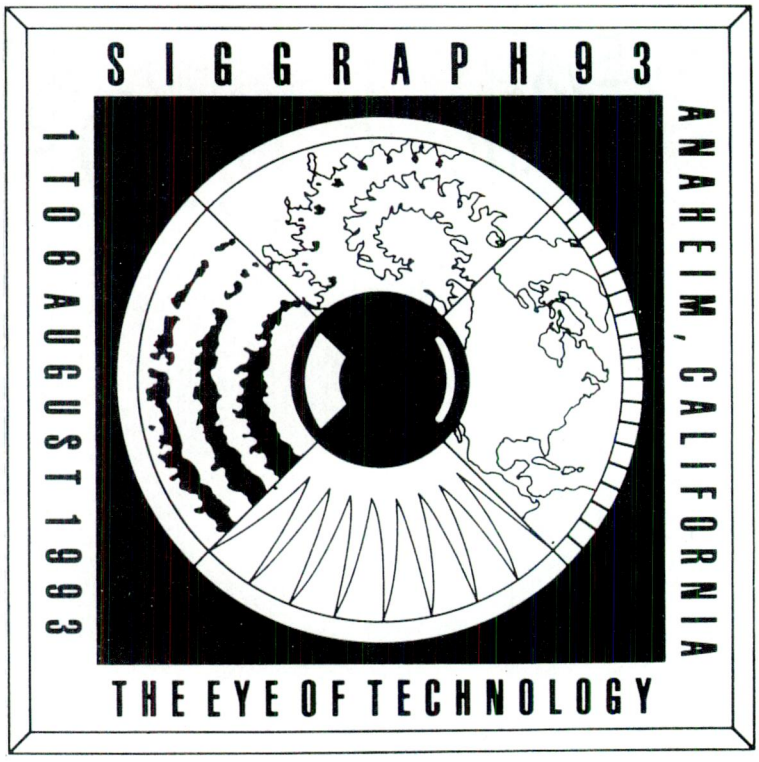
Illus. 24. Bottom. Dr. Myron Kreuger-"My approach was based on unencumbered full-bodied participation" (p.30).





Illus. 25 Top. Art in Virtual Reality. *O Brave New World* by David Em, an image from a virtual world created by the artist.
Illus. 26 Bottom. *Wombo*, a piece created in VR, also by David Em. He describes it as "a meditation on fertility" (Em, 1992, p.90-91)





Illus. 27.Top. "morphing", a computer animation technique was used to create this character in the film *Terminator 2*

Illus. 28. Bottom. Logo for the Siggraph '93 (Special Interest Group on Computer Graphics) convention.

Chapter Seven

The Techno-Cultural Essence of Design for and in Virtual Reality.

Virtual Reality imaging has given us the opportunity to see things in a way previously unseen by the human eye. It has provided the imagination with a powerful, representative, communicative and highly visual tool.

> If you suddenly wanted to make the planet three times larger, put a crystal cave in the middle with a giant goat bladder pulsing inside of that and tiny cities populating the goat bladder's surface, and running between each of the cities were solid gold railways carrying tiny gerbils playing accordians - you could build that world instead of talking about it! (Stewart, 1991, p.46)

Clients, through VR equipment or standard computer interfaces have not only been able to move and view at will every aspect of an architect's design proposal or a designer's product concept, but have also, due to the fact that such representations are computer data-based, been presented with a complete interactive and self-adjusting data construct. For example, changing the lighting or air conditioning systems of a building can be viewed in full effect without ever being constructed.

The advantages of Computer Aided Design especially when presented with the visualisation capabilities of Virtual Reality are indeed powerfully impressive, but let us consider further the place of design in and for VR, and the capacity in which the designer operates in light of a cultural and historical assessment of the principles and concept of Virtual Reality.

In cyberpunk discourse, the ultimate in human evolution is seen as transcendence of the body or human existence and becoming pure consciousness when interfacing with the data constructs of the virtual world. The "meat" of the body, seen as useless, is discarded and the mind becomes one with the machine.

In more realistic, less science fictional terms, Virtual Reality has come to mean the fusion or crossover of the research industries of visualisation technologies and the science fiction of Gibson, emerging as the hardware on the forefront of a cultural force reflected in all aspects of modern techno-industrial society. One immediate and obvious role for the designer in the VR industry has been to put a "face" on the interface, to design the products and technologies that allow the user to experience Virtual Reality. However, there is more to this than meets the eye, especially in the central role of design in the VR industry.

A closer study of the implications outlined in the earlier discussion on visual culture and the uneasy marriage of man with technology helps to highlight a few of the necessary considerations required for understanding when designing for or with VR. Virtual Reality goes beyond being a product of visual culture, it could well be the embryonic state of a new cultural understanding of the technologies we create. It could become, if treated and developed properly a method of visualisation that changes the way we consider current technologies and their implications. VR could provide a new way of looking at ourselves.

Before undertaking any creative task related to the artificiality of VR one must understand not only the intention of the end result, but the necessity for awareness of our relationship with technology. To design the artificial and to work towards creating artificial environments, the designer needs to reflect a need for cultural comfort with the artificiality he is creating. Working with the ideals of VR, understanding its cultural placement, its historical origins and the complexities of its relationship to presenting and visualising images, the designer gains a fuller sense of the potential behind his work, realising his importance as a techno-cultural evolutionary stepping stone.

The ultimate interface is the human body. Designing to augment human ability and reason requires a knowledge of the broad issues that paint the full picture of what VR is, from the cyberpunk ethos to the research and development industry, in order to successfully create for, and communicate in, the

experiential human-computer gap of cyberspace. This is where the designer enters the picture, in that gap between culture and its technologies, designing a simulation that amends our belief in what is real.

The twentieth century has at least shown us how long it takes for technological advancement, from concept to realisation of potential (the telephone, for example) to impress fully upon the consciousness of the general public. The logical intermediate stages of technological advancement have become increasingly shorter. In the space of a few years or even a few months, due to the combined forces of consumerism and progress, perfectly efficient products become dated. This rush of fashionable technology has tended to misinform and disillusion. Rather than understand the ever increasing amount of products we surround ourselves with, we tend to fictionalise these objects, letting them provide us with identity and escape from the mundane realities of day to day life. The objects we create are a way of avoiding the complexities of life. A sleek, clean, efficient, well-designed, fashionable object has become the source of comfort and release, offering excitement and promise. This is certainly the case in our initial mass media perceptions of Virtual Reality. Superficially, we have taken the products and treated them like any other, channelling them through the same lines of representation along with television, computer imaging, satellite link-up, hi-fi sets, etc.

This only serves to emphasise to those responsible for the realisation of VR, the need for cultural and historical understanding, clarification and simplification of the concept.

Design of the Invisible:

Designing a product such as the EYEPHONE by VPL (see illus.8 & 9 p.36) deserves consideration unlike that given standard imaging and visualisation technological products. When designing such products for public interfacial use, normal considerations include the "user friendly", unrestrictive, functional aspects ensuring that the product is easy to use, fashionable and as uncomplicated as possible. The most important factor is ,

however, the end result. When watching a television set, the technology stays right where it should, sitting before us. However, the logic of technology is confronted with VR products. While their appearance may be technological, their function involves a much higher degree of participation, so much so that the technology in effect becomes "invisible" and the virtual world presented is all that remains. The television set does not "disappear" regardless of the world it portrays. With VR, the technology assumes a lower and intended rank as the world it portrays ultimately results in the technology "disappearing" once activated. This is the ideal design goal for many involved in creating VR interfaces, that is, in essence, designing a product that becomes "invisible" allowing its cultural, perceptive component to remain highly visible.

So far, we have considered the external components of the design factor in VR in relation to a deeper understanding of its implications, but what of designing the realities presented through VR and the requirements for understanding design in a virtual environment ?

Virtual Reality presents the designer with a three-dimensional modelling capability that can be explored in real-time. However, he is also given a unique world that does not necessarily follow the same rules of the real world. It is at this point that the potential in the fusion of technology and imagination becomes apparent.

Virtual Architecture as a discipline, differs to its traditional counterpart in that its limitations could possibly be endless. At its very simplest, designing environments in virtual worlds involves designing communicative, consensual meeting places, but the potential for an extension of space and design within it in an unconstrained manner could easily see the emergence of a new perspective on human spatial awareness and design for such environments much like a new approach or way of thinking required for a new artistic medium.

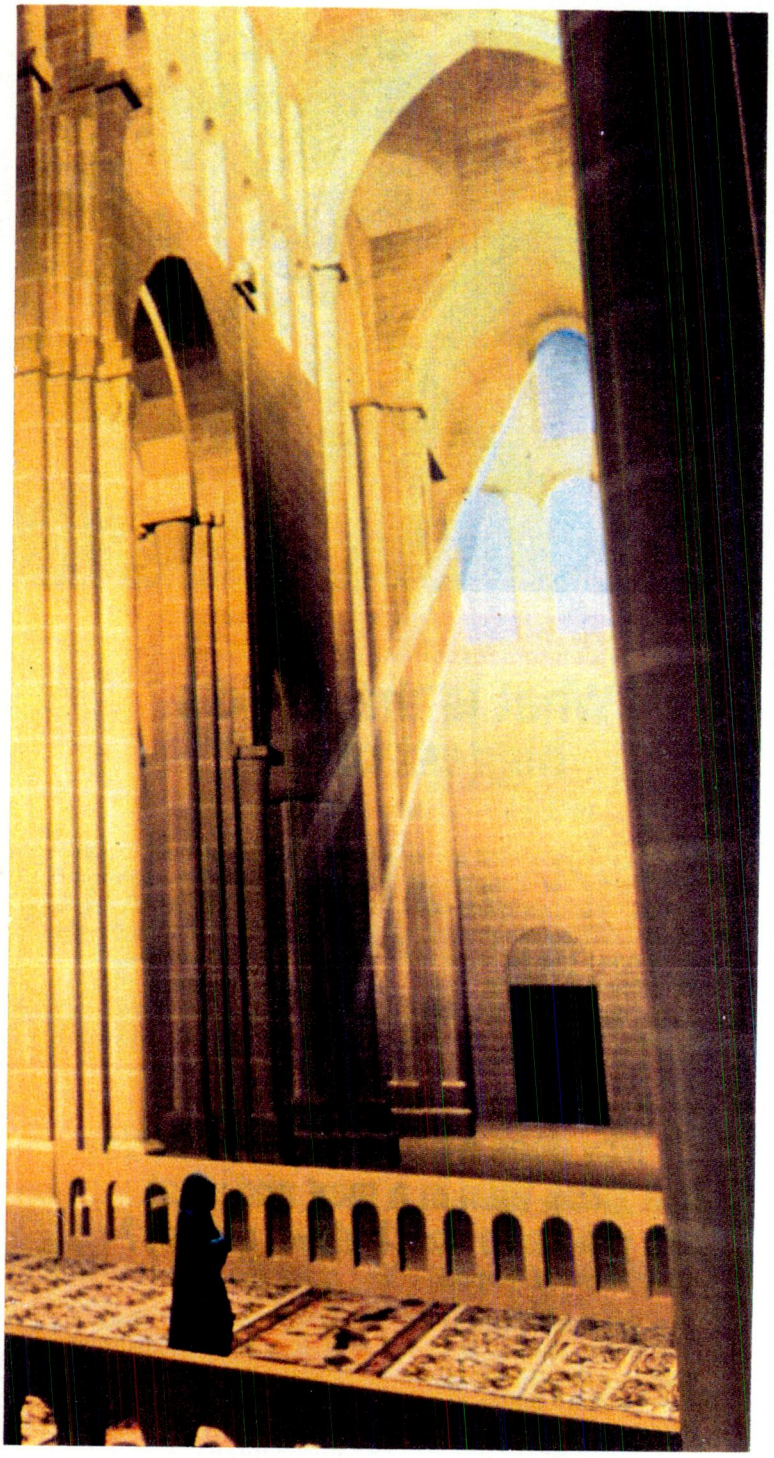
The idea of Virtual architecture as an extension of the discipline into Virtual Space is an interesting one and like those opposed to computer imaging as a means for artistic expression, it is not without its critics who lean towards a classical tradition

in the arts. However, its advantages, not just for creative expansion, are admirable.

For example, a computer based library accessing vast-databases of research and information from all over the world could seriously be envisaged as a virtual building, offering an exciting opportunity for creative and unlimited expression in the design of an ultimate house of learning open to an ever increasing number of operators and as familiar (and impressive) an experience as using a normal library.

Virtual environment design combines the skills of architecture, computer aided design, imaginative visualisation and understanding of the manipulation of data in a computer generated environment and will require as much cultural understanding of its implications along with its advantages, as is required of all those working in and with VR. Virtual Spaces offer the opportunity of a permanent space in which to store data in a similar environment to those of the physical constructs of today's world. In the previous chapter we noted how virtual galleries offer solutions to many problems, particularly that of space requirements and exhibition planning. Other possible objectives of designed virtual environments could provide a non-spatial, cost-cutting, neutral and experiential territory open to all through the human-machine interface of VR.

Illus. 29-34. Virtual Real Estate. Virtual Architecture could allow clients to view potential buildings while they are still on the drawing board or even be commisioned as virtual pieces in themselves.



Illus. 35. Virtual Reconstruction. Another outlet of Virtual Architecture is exemplified in this virtual reconstruction by IBM of the 11th-century Abbey of Cluny.

Conclusion

Virtual Reality and the Communicative Value of Understanding VR in terms of Visual Culture and its Relationship with its Visualisation and Representational Technologies.

> When the world is made more artificial, the subjective experience of it is more noticeable (Druckery, May 1991, p.9).

The theoretical and cultural applications of Virtual Reality have hardly been realised, which is not surprising, considering that we have already failed to fully grasp the dimensions of our cultural relationship with previous representative technologies such as video, television and computer graphics. VR generates an amount of controversy and speculation on this relationship, much more than video or desktop image manipulation techniques have ever done.

VR as a visualisation product differs in its potential offering, in that the user is no longer a spectator, but a participant. Modern culture tends to assess technology in terms of its physical components, its "gadgetry" so as to speak. Virtual Reality demands a different perspective. Being involved in a virtual world is more experiential than looking at a television or computer screen. Here, the technology is not perceived in the same way as others, instead the character has been reversed and we are in an environment, we are on screen, we are interfacing with our technology, except the technology has been given its correct role and the cultural factor of visualisation in the system has been realised. In other words, creating the virtual interface is creating the bridge between the culture and the technological tools of modern society.

With Virtual Reality, we are compelled to participate in the interactive space it offers, has done more to raise the issue of our involvement in the images we see than other means of techno-representation which leave us firmly fixed as spectators.

In the analysis of "design of the invisible" in the previous chapter we see how VR increases our involvement in the data world with which we interact by "disappearing", effectively cutting itself out of direct visibility and awareness as a physical product when in operation and thus increasing our awareness of the virtual environment allowing us to perform our tasks or enjoy the experience with a heightened sense of efficiency and performance. For once, if technology has come to determine what it means to "see" in modern culture, we have the opportunity to look at the world in a more sensitive way. VR has provided us with an opportunity to question the nature of media representation (and can go further indeed to question all forms of representation of reality. However, here we do not attempt to draw any conclusions or address the deeper philosophical issues of modern perceptions of reality and its social implications).

For example, the theatre of war presented to us in the Persian Gulf in 1991 to justifies the truth in the fact that we are gradually losing our ability to deal with imaging systems, leaving us vulnerable to manipulation and propaganda. The "bomb-cam" offered us an eerie "death's eye view" that ultimately merged mortality with technology as we sat watching television, indifferent to the reality of what we were seeing.

Virtual Reality as a mature, fully fledged experience for human and computer interaction is made possible by the work first started in the military simulation test-beds and by people such as Ivan Sutherland, gradually emerging as visually coupled systems and finally evolving into VR as we recognise it today, despite the fact that the technologies involved are still considerably limited in providing us with true Virtual Reality. While the technology may eventually give us an ideal Virtual Reality, it cannot come to fruition without popular recognition and cultural absorption.

The reason why we hear and see so much of VR today is because the paths of modern culture and technology have crossed. It is at this junction that one find the place of design in VR where the designer aims to capture the essence of the techno-cultural relationship and embody this in the virtual worlds and products created.

It is disappointing to think that we seem to have no control over the technologies we create and the technologies that we see the world through. The fact that these technologies are fictionalised and glorified is evidence that we fail to understand their purpose in aiding our daily lives in communication to visualisation.

We have seen how each modern visual technology from photography to the television screen offers contradictory cultural implications. The same can unfortunately be said of Virtual Reality. On one hand it offers a method whereby human visualisation skills are made more intuitive, communicative and representational, but on the other hand, without a proper sense of its value and place in modern society, such a tool of representation becomes a manipulative tool of misrepresentation.

What is required therefore is an understanding of how VR offers us an individual opportunity for identity in the use of image-based technologies, rather than our traditional approach of taking what we see for granted. By perhaps becoming aware that one can individually participate, create and control the images and cyberspace environments to suit oneself, the concept of seeing these technologies for what they are really worth to each of as individuals is clarified in that we are invited to draw our own conclusions and control the level to which such technologies enter our lives. In making use of VR technologies one is drawn to form one's own conclusions on its worth and how we relate to it. Technology does not just happen, we make it happen and with VR we come to realise through its artificiality that what you see is not always what you get. It is important to realise that we do not have to accept what we see as truth and we have an opportunity to communicate and experience this with VR in worlds of our own design and artistic expression. In other words, we have the chance to do something with Virtual Reality rather than have it do something for us.

Its value lies in all that it offers to aiding, improving and changing communication. The boundaries between artificial and real and the involvement factor in participating in an artificial world will hopefully increase our awareness of communication and participation in the real world refreshing our cultural relationship with the visual technologies we create.

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