National College of Art and Design

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The Nomadic & Stable

By

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Introduction

Technological development within the Twentieth Century has surpassed anything that could have been expected, being simultaneously the most creative and destructive in history. The aim of this thesis is to discuss present and future developments in technology within expanding urbanized societies, particularly in relation to two technological directions concerning man-machine interaction, an increased interaction which is considered normal and essential in today's mainstream man made habitats. These two fundamentally important movements are related to the continuum of man and machine merging and are not separated in relation to categories of human participation, they differ only in their evolutionary paths of man-machine fusion, due to the environments in which they exist and are used.

The first category, the 'nomadic' relates to the mobility of man in the urban habitat, with man on the move outside the realms of the 'stable', where the society in which he roams, has become technologically embodied and where objects of technology are becoming essential implements for survival.

The second is the connection of man with machine in the 'stable' environment- a subset of the urban habitat- with respect to electronic interaction in such areas as the home, office or any sphere of existence that is static.

Tracing the developments of these two progressions, it transpires that although similar in technological direction, different approaches are taken in their implementation, creating different evolutionary paths. Particular attention will be given to technological miniaturisation and interface which are two specific and essential factors concerning the possibility of progression of both the 'nomadic' and the 'stable', due to miniaturisation and interface being key factors allowing the progression and development of human and machine to a higher state of communication of which the 'nomadic' and the 'stable' are dependent.

Before discussing the dual directions of the 'Nomadic' and the 'Stable', certain questions must be highlighted and accessed.

Chapter 1

1.0 Present problems concerning miniaturisation and interface.

The future has imploded onto the present.

Gareth Brawyn (Rucker et Al., 1993, p.64-66).

Brawyn appears to express the view that present day technological developments are hitting a huge question mark in relation to mans ultimate use of these technologies. Too often, we hear the words 'electronic miniaturization' and 'interface' but present day technological advancements must be questioned in relation to such essential factors relating to the subject of man-machine interaction. Though technology has advanced exponentially, mans ability to harness and exploit it to it's full potential has not.

Focusing on electronic miniaturization and product development within this area, the future will encounter key points of non-progressive man-machine integration. The space between a products outer casing and inner components is getting wider due to the continual miniaturization of its inner electronics. Decreasing external size will almost certainly reach stagnation point, where any further progression will constitute a serious hindrance to human interfacing. Even at present our ability to interact with these tools is remaining static, progressing slowly, or just rearranging the interactive form of product as opposed to substantially improving man-machine interaction.

As an interactive tool how much better is a track ball as opposed to a mouse, or how much more sympathetic to the user is one software package compared to the next? The answer seems to be not a great deal. The situation shows an

increase in the rate of electronic technological development, yet the applications and uses of such technologies have not been exploited to the fullness of their potential. The interface between man and machine, whether it be a keyboard and mouse, T.V control pad, joystick or joypad, is limited, compared to the amazing possibilities offered by developing computer technology. Humanity has created a terrifically stocked kitchen of technological innovation, from which we can cook what ever we wish. Unfortunately we are at present cooking the most basic meals. Present developments in miniaturisation and interface- concerning man-machine communication in both the 'nomadic' and the 'stable'-are reaching a point where any further developments will mean choosing a path of technological integration into the human form. The irony seems to be that technology can further advance, yet if humanity wishes to take full advantage, fundamental decisions must be made concerning the very essence of humanity itself.

1.1 The Physicality of the 'Nomadic' consumer

Electronic miniaturization seems to be advantageous only when considering the mobility of the user. It is this type of interface use which offers the user large global communication and high information capabilities, whilst still allowing movement not only on a local social sphere but on a wider geographical scale, increasing the fluidity of social life. However , these mobile interfacing tools are reaching a point where miniaturization is no longer quite so advantageous. At present we see companies producing personal computers which can store 4 Megabytes of memory and fit snugly into the pocket of the user. Alas, a myriad of images abound, memories of a digital wristwatch of the seventies, housing a terrific miniature calculator that just didn't work, hardly worth attempting the calculation of 2 +3 and arriving at the sum of 6! The technological fashion statement of such an item left a depressing reminder to the wearer that 'small ain't such a big thing!' Any

smaller and the product defeats it's purpose, becoming obsolete. The downfall of a product heralded by a progressive decrease in size.

An interesting point arises in relation to the digital watch. As technologically simple as such an item has been, because of it's miniaturized form, human interface was still extremely difficult. Conversely, the alternative was to store more information on a technological implement whilst still maintaining an adequately miniaturized form. This form would not be too miniaturized, enough to enable maximum mobility and sufficient human interface ability. A perfect example was the Apple Newton the pocket sized computer of the Nineties. Despite a heavy promotional campaign by Apple, the PC just would not sell. The Newton was too little, too soon, and left the customer disappointed. (E. Pfeiffer, 1996, Comdex Exhibition) It is difficult enough to access high quantities of data within a stable environment, therefore the concept of putting large amounts of information on a micro personal computer fitting in one's breast pocket allowing mobility where in a fast moving urban environment seems to be a little taxing where human-machine interfacing is concerned. It is wonderful to have such access to the object, at almost any time. However, any notions of producing maximum use from the item in relation to interface is asking a little too much when considering the environment to which it is used.

Microsoft it would seem have realised the failings of complex, information filled- mobile PCs and are following a move in the direction of less expensive simpler machines. Where profit is the key to all industry, Microsoft are attempting to direct themselves away from the expensive, high powered micro-machines into the area of simpler PCs where simplicity at least allows ease of access, mainly due to the consumer having neither time nor inclination to access large quantities of information due to interface limitations. One wonders what Bill Gates meant when discussing the future of the PC, he said. "There will probably be some years where there will be no growth at all" in

Apple

Newton

Figure 1

micro computer sales in the next decade. (Gates, 1996, Comdex Exhibition) It would seem that these complex pocket-sized computers like the digital calculator watches are being tagged as mere gadgets and status symbols, aesthetically fine, functionally unsatisfactory.

Where even maintaining a static approach to size, mobility will still hinder interfacing. Simply put, for the next few years the consumer will still buy these technological fashion statements which will promise a little more than they did in the previous years, enhanced power and speed and a little more personalisation and style . However in the future, the present technological interfacing will no longer be adequate. The consumer will strive for more sympathetic interfacing tools to keep in toe with the ever-changing environment in which he roams and lives. What then is left to do - continue along the path of stagnant mobile units? Or could there be an eventual and possible reformation in man-machine development with relation to man's mobility within spheres of his ever expanding urban existence.

1.2 The Mentality of the 'Stable' user

The opposite to 'nomadic', the 'stationary' traces a different path of miniaturization and user interface. Electronic size has reached a point of little consequence when considering such static environments as that of the home, the office and so on, where because of the static nature of the environment, the requirements of mobility are of little consequence and are in fact disadvantageous. The larger the screen the better the visuals, control size is now based on comfort and maximum usability and the more generous the space between the audio points the purer the sound. Therefore it would seem that electronics in that of a stationary situation is allowed to flourish at will, where the drawbacks of miniaturization will play little part.

California is the worst example ....Individuals don't even meet on the sidewalk anymore...we live in this constant sort of fetal position where we are seated in a soft chair looking at the world through a glass square, be it the

windshield of a car or the screen of a television or computer. It's sort of constant, and we're in a little bubble.

(Lanier/ Biocca, 1992, p.157)

The development of technology in a stationary environment has moved in the opposite direction to the 'nomadic' man. Firstly, this type of man/machine interaction displays elements of the miniaturization of social relations as opposed to the miniaturization of the technology itself. Where the machine is enveloping the human participant, where the body is becoming secondary in importance to the individuality of the mind, which soaks information passively, reclusively from a window with a virtual view.

In "Cyberspace/ Cyberbodies/Cyberpunk this shrinkage in social participation and privatisation of many parts of social life is due to the fact that:

Close face to face social relationships, save those with kin and significant others within highly bounded locales, are becoming increasingly difficult to form. As patterns of both social and geographical mobility increase the fluidity of social life, they undermine the formation of strong social bonds…For many all that is left is technology. (Featherstone & Burrows., 1995, p.12),

The private retreat into television and video - primarily passive and non-interactive is being followed by such interactive technologies as the Internet, multimedia interactive CDs, computer games and so on. However the controversial issue is not based on the need for increased interaction with technology, the main concern is the reclusion from reality and the world outside the P.C. Present interactive material offer an incredible abundance of information and immense possibilities of communicating with other participants in far away places. Yet this information and communication is only given and received in a 2-dimensional format, where touch/taste/smell, tangibility and feeling have not as yet been simulated, therefore interaction (for the moment) with a hollow center. What then of us dependent on the machine? What then is the result? For many this would evoke such thoughts as

that Charles Dickens novel "Hard Times", where "fact" opposes "fancy". "Fact", the bombardment of information that structures minds into a sameness, a wealth of knowledge with no room for the fanciful individual freedom of natural thought that excites the imagination that runs through the infinite hallways of the mind.

To others it is a means to an end, or rather beginning, that global harmony and a fundamental understanding of mans nature of existence.

Electric technology does not need words anymore than the digital computer needs numbers. Electricity points the way to an extension of the process of consciousness itself, on a world scale, and without any verbalization whatsoever.

(Understanding Media. McLuhan.,1975, p.134)

Chapter 2

2.0 The Habitat of the 'Nomadic' and the 'Stable

Having outlined and explained, that technological progression relating to interface and miniaturisation- by that of the mobile user- is reaching a point of stagnation. Then whether it is ten or twenty years or even closer, technology and man existing in the real world has and will show certain very interesting patterns.

Mobility in mainstream society relates particularly to mans ability to function in the social structure of his surroundings. This is becoming increasingly urbanised it seems that for the future such a socio-structure will expand and be commonplace. These techno-orientated societies are man created, just as nature is deemed as having been the 'Creation of God'. Within nature, the human form and mind grew and changed because of the laws of nature and its evolution. Our environment evolved as did we. Similarly, we are evolving in the same way within our new social realms. The difference, it seems is twofold.

Firstly, our societies are becoming structurally and functionally unnatural. Secondly, we are not as influenced by nature. Man is beginning to choose his own evolution through the creation of his own environments and through the implementation of his ever-increasing knowledge of the fundamentals of nature itself. However, man's application of this knowledge is not attempting to mimic that of the natural due to the inability at present to do so. This being the case, societies have been built which have never before been part of man's existence. Man is creating such environments, which are expressions of his inner natural being, that nurtures the quest for increased knowledge and control of his existence. This being the case, if humanity wishes to exist within such a socio-structure, it too must evolve and change, just as the environment to which it is part is evolving and changing. Due to a

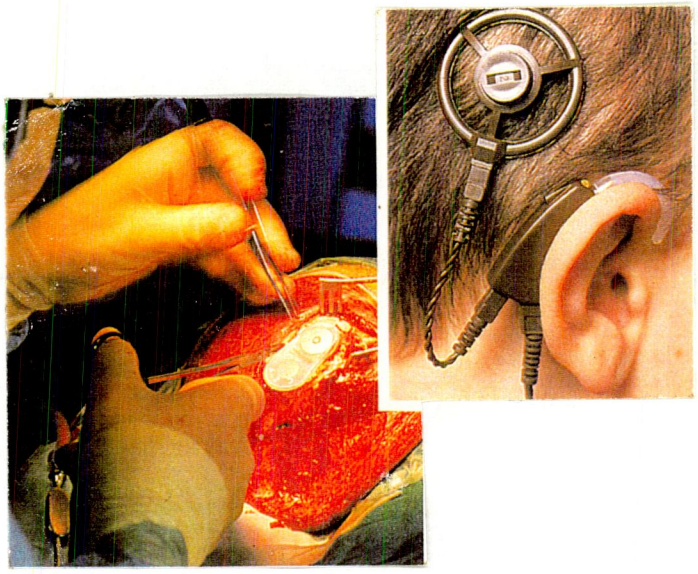
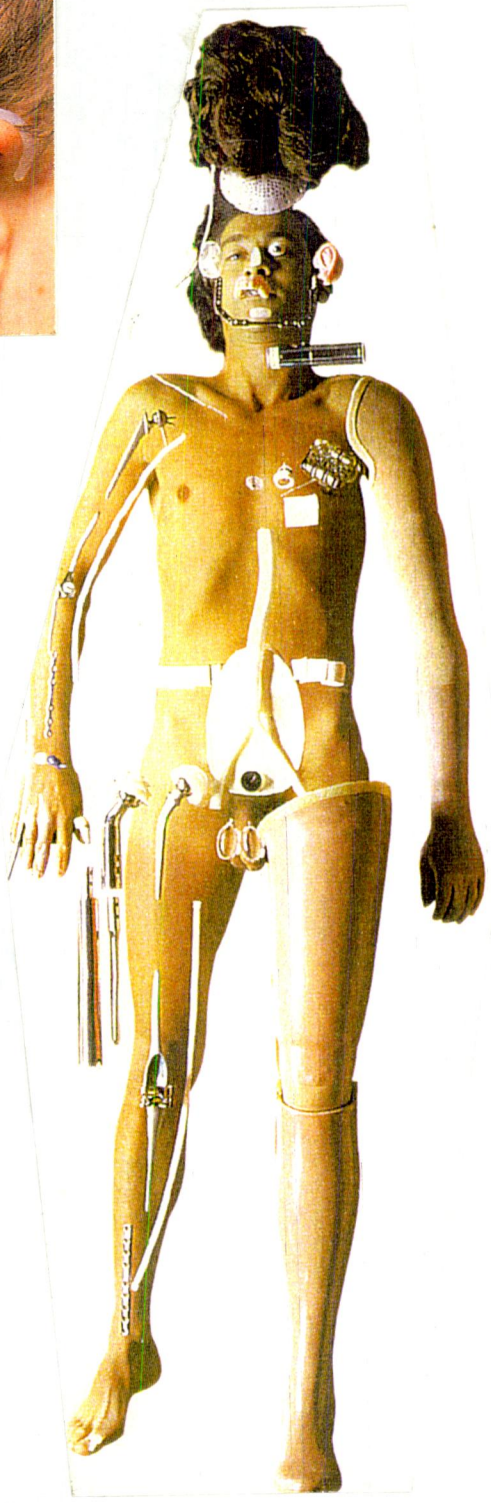


Figure 2



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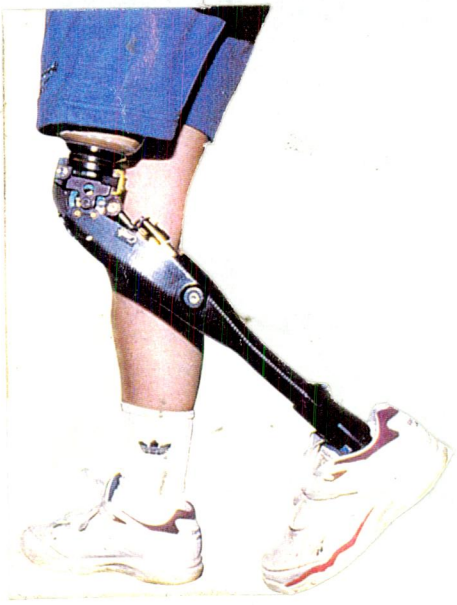


Figure 4

progressive movement of this environment away from the natural, then it is safe to assume that humanity will similarly shift, restructuring in accordance with the restructuring of its habitual society.

2.1 The Development of Physical in the 'Nomadic'

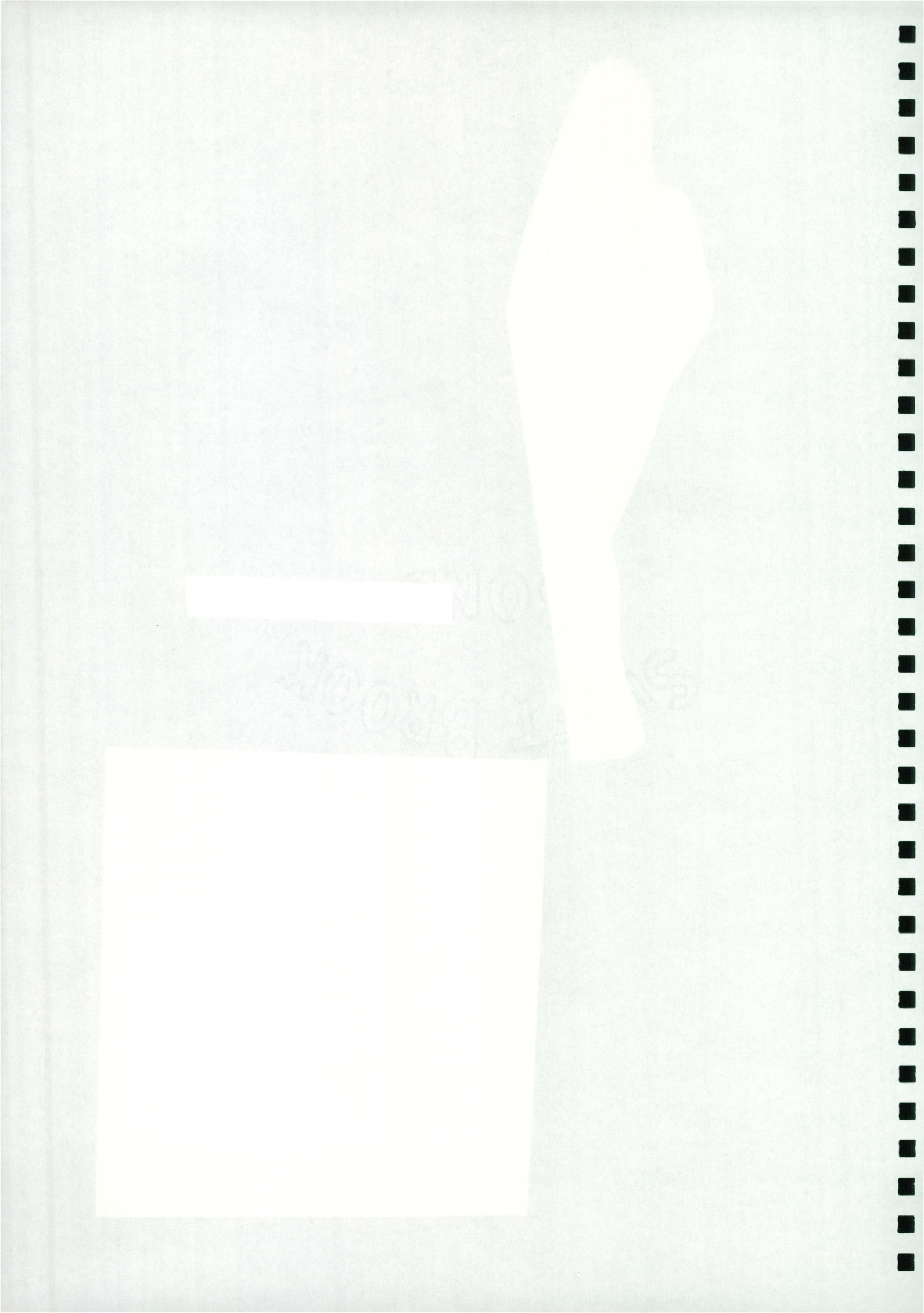
The computer is a cool tool, important human augmentation .... We're becoming cyborgs. Our technology is getting smaller, closer to us, and it will soon merge with us.

(Branwyn, 1993, p.64-6).

Moving away from the all human system, this category is concerned with the aesthetic manipulation of the body surface through cosmetic surgery, muscle grafts and animal or human transplants. We see a trend of using such instruments to enhance and increase social reaction and relations, becoming aesthetically acceptable in a new environment, humanity feels more comfortable to exist within it. This striving for artificial aesthetic enhancement of the human body within our new and real environments is a product of the artificiality of social behaviour, which in turn is spawned from this nouveau environment.

The acceptance of the natural self is becoming substituted, rejected for cosmetic enhancements, whose aim it is to increase extroversion and confidence. The fact is that like one's mobile phone or filo-fax, aesthetic enhancement gives the consumer the benefits of interaction and mobility within such societies, whose mental expression is becoming as artificial as the physical.

Figure 5



Many studies have demonstrated for example, that attractive people fair better in all situations. They make more friends and money, have sex with more partners. Similarly, attractive people tend to have accelerated career paths and even get lighter jail sentences.

I wanted a glamorous life and decided to equip myself with the tools to achieve it.... Now I can cross a street wherever I want because male drivers will always stop to look at my figure. I call the shots and relish my power.

(Blair,1997,p.58)

Words from Cindy Jackson, aged 41, who holds the record for plastic surgery operations, having had more than 20, redesigning herself from head to toe. This epitomises how people will be tempted to use aesthetic manipulation in future.

Beneath the surface of the body, we see more fundamental alterations and enhancements of the functioning of the inner body. Here we have a range of alterations to replace organic functions, such as biochip implants, upgrading senses and prosthetic additions, allowing the body (like a machine) to be disassembled and reassembled with a high degree of functional specification. This type of man/machine interaction relates directly to maintaining the human body within the realms of reality, improving and enhancing the body structurally within its natural environment. However the relationship between miniaturization and machine interface in these instances is that only a small percentage make use of these enhancements. The 'essential', is related to detailed, intricate human-machine integration due to necessity as oppose to choice, situations relating to life or death situations as well as enhancement of senses and body functions to level of or/ near to general human capability and social acceptance.

If one considers the present integration of electronics into the human form, whose applications are based amongst such 'essential' internal artifacts as pacemakers, cochlear implants and prosthetic limbs, then despite being based on the 'essential' and morally sound reasons for man-machine integration, should it not progress to the consumer.

Just as cosmetic surgery had moved from the 'essential'- e.g. skin restructuring due to deformation resulting in social unacceptance-to mere aesthetic consumeristic enhancement

Then it seems that a social acceptance of computer prostheses will occur and filter to consumer. This assumption seems more than possible, realising that as time passes we become more passive and understanding of our environments technological embodiment, hence a progressive death of technophobia.

The idea of linking a human to a machine is achievable. Our entire body works through a complex system of electrical impulses. Nerve fibers, insulated by a fatty substance called "Myelin", transmit electrical instructions from the brain to the muscles. Myoelectric limbs rely on amplifying these signals and turning them into actions. Mechatronic researchers are developing an intelligent artificial hand by linking it to a learning computer that can scan and read the brain activity with great precision. Therefore, electrical impulses in the human body show an important connection between man and machine.

A miniaturised telephone receiver within the inner ear would be acceptable to mainstream opinion, then, maybe a tiny computer screen placed directly on the retina, and you would never be alone with a radio modem hard wired to your cerebral cortex.

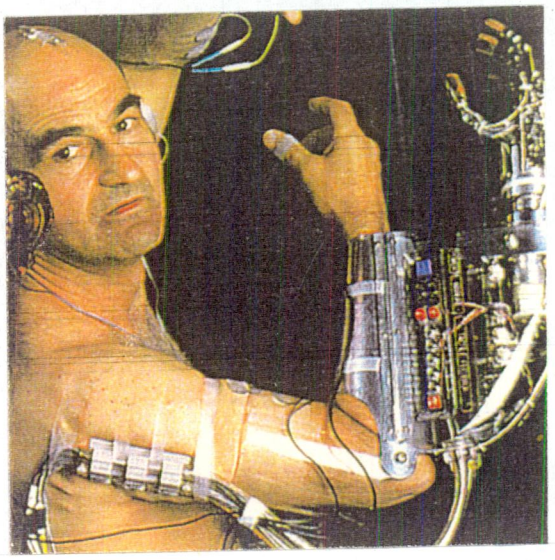


Figure 6

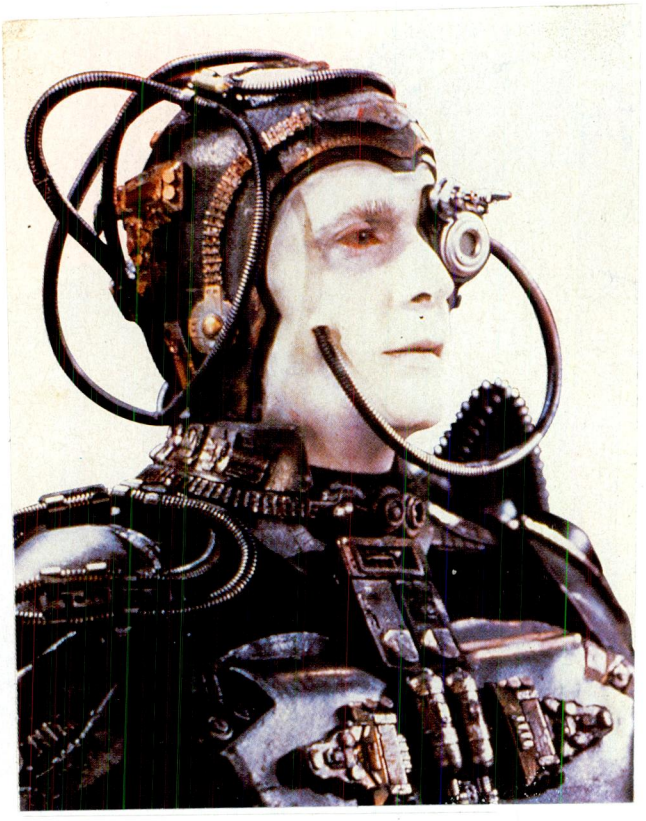


Figure 7

(Blair, 1997, p.57)

Due to miniaturisation and a craving for enhanced interface, humanity is and will progress further toward integration with the machine. Is it correct to picture a future of intricate electronic circuitry penetrating the membrane of our skin, the cold metal fusing with the meat into one hybrid form? Apparently it is already occurring and further progression is inevitable. However these images do not tell the full story of the future of man-machine integration. Through further developments in the manipulation of miniaturised structures, machine integration would reach the point of rearranging and transforming the internal structure of the human body. This would not only create a totally new perception of aesthetic and functional detailing concerning the future of man-machine integration, but would highlight a closer link between technology and nature than would ever have been imagined.

2.2 Envelopment of Mental in 'Stable' Environment

William Gibson, author of the cyberpunk bible Neuromancer, was inspired by the intensity of the existing human/ machine relationship to imagine a future where people positively looked forward to becoming cyborgs. It came from visiting a video arcade.

When I looked into one , I could see from the physical intensity of their posture how rapt these kids were. It was like a closed system … you had this feedback loop , with photons coming from the screen into the kids eyes, the neurons running through their bodies, electrons moving through the computer.

(Gibson, 1984, p.57)

Therefore interactive technology in the stationary, and to an extent the nomadic system, is proving to be the latter, even in its' now embryonic stage of development. Some would claim that by using these new media of communication, we are beginning to create new virtual communities, new

forms of social relationships, new disembodied modes of interacting and, for some, the infancy of cyberspace itself.

Within the stationary environment, the social behavior of the human user is showing a willingness to relent to the interactive environment of the computer. As oppose to that of the mobile, humanity is reducing the functionality of the physical self to the point of maximum sensory interaction, where that which is physical plays a minor role, a role to be undertaken only when necessary, the satisfactory feedback which the participant receives is absorbed into his/ her consciousness. It is here that the work is done, absorbed into the files and directories of the mind, processed and outputted with as minimum physical feedback as possible-revealing an ever tightening loop in interaction-the maximum is saved for the mental whose importance in this instance outstrips the physical self.

The users hunger to encompass more harmony with the environment of the P.C. is beginning to create more vivid interaction through the use of co-ordinated multi-media systems. It is here in the stationary that virtual reality will take an increasingly strong footing, spelling a possibility of total immersion of the human consciousness.

The term Virtual Reality was first defined by Jaron Lanier, former head of VPL Research Inc. in California as:

> a real or simulated environment in which the perceiver experiences telepresence.

(Steuer, 1992, p.76,)

A system which gives a feeling of being involved in an environment, Virtual Reality combines the senses of touch, visual and audio, to create a multi-media experience. Donning headphones, eyephones, data-gloves and data-suit, the human body is surrounded with a sense of sight, sound and touch to bring the analogy of technological envelopment in a stationary environment to more real and physical being. The virtual state in which the user is immersed, termed cyberspace in certain fields, continuously changes and reconfigures according

to responses of bodily movements. This technology at present is quite crude and its realism is inadequate, nevertheless it is improving dramatically as we approach the next century. With the inevitable progression of this technology, it seems only natural to assume that in time there will be a further integration of the human self into the artificial inner world of the machine.

Chapter 3

3.0 Nanotechnology- Real or Synthetic

Italian physician Luigi Baglivi (1668-1707) was the first to conclude that the human body is a collection of mechanical devices; the lungs are bellows, the teeth are scissors, the bones act as levers, rod plates and joints, while our cells are miniature fuel burning engines.

Discoveries in both engineering and biochemistry show how right Baglivi was, and have led to such new sciences as biomimetics, which study how natural materials and structures can be used in other contexts. Bone for example is constructed with an outer layer concealing a light inner structure, and is a hundred times tougher than synthetic ceramics due to its unique combination of calcium for hardness and collagen for elasticity.

Hair, arteries, tendons and ligaments all score well in terms of strength and toughness. Interestingly, their main components are simple proteins - keratin, collagen and elastin. Their success is given in the way the molecules are arranged to give each material a structure that is almost certainly more advanced than many of today's synthetic substances.

Technological advancement represents the first major step toward a more general capacity for molecular engineering which would enable us to structure matter atom by atom. Modern technology is based on that of ancient tradition. Our ancestors grasped stones containing trillions of atoms, splintering from them chips containing trillions upon trillions of atoms to make axeheads. In the present we cook up pure ceramics and steels, but we still shape them by pounding and chipping. We take silicon in its' most pure state, cook it and slice it into tiny pieces, making patterns on its' surface using minute stencils and beams of light. The product being the microchip, fantastically small compared to axeheads. Though these microcircuits are exquisitely smaller than anything that preceded it, they too contain trillions of atoms.

Technology	Function	Molecular example(s)
Struts, beams, casings	Transmit force, hold positions	Microtubules, cellulose, mineral structures
Cables	Transmit tension	Collagen
Fasteners, glue	Connect parts	Intermolecular forces
Solenoids, actuators	Move things	Conformation-changing proteins, actin/myosin
Motors	Turn shafts	Flagellar motor
Drive shafts	Transmit torque	Bacterial flagella
Bearings	Support moving parts	Sigma bonds
Containers	Hold fluids	Vesicles
Pipes	Carry fluids	Various tubular structures
Pumps	Move fluids	Flagella, membrane proteins
Conveyor belts	Move components	RNA moved by fixed ribosome (partial analog)
Clamps	Hold workpieces	Enzymatic binding sites
Tools	Modify workpieces	Metallic complexes, functional groups
Production lines	Construct devices	Enzyme systems, ribosomes

Figure 8

Therefore with the progression of newer, more powerful technologies, these so called microcomputers will seem huge by comparison. This new technology will handle individual atoms and molecules with control and precision. This new field of development is called Molecular Technology or Nanotechnology because molecules are measured in nanometers (a billionth of a meter). The engineers of this new technology will build nanocircuits and nanomachines, which will have the ability to structure, restructure and interchange molecules at an atomic level. At present biochemists dream of building these machines. When biochemists need complex molecular machines they still have to borrow them from an organic cell. Nevertheless, advanced molecular machines will eventually let them build nanocircuits or nanomachines as easily and directly as engineers now build motor engines to tiny electronic circuits. The same principles will apply to molecular engineers as to today's engineers. Complex machinery will be built using protein molecules as motors, bearings and moving parts, which will themselves be able to handle individual molecules.

The first steps have been taken within the fields of genetic engineering and biotechnology. Excluding the possibility of worldwide destruction, technology will develop whether we like it or not. Advancements in Computer Aided Design and Stereo Lithography will speed developments in molecular tooling, hence moving us closer to the immense possibilities of such a technology and "a promise to bring changes as profound as the Industrial Revolution, antibiotics and nuclear weapons all rolled into one massive breakthrough."

(K.E Drexler,1992, p.21)

What then will these profound changes offer?

3.1 Developments in Nanotechnology

Whilst some of our crucial nanotools are still only dreams and operating at this scale is like trying to be a surgeon in boxing gloves, our microscopic tool shed is daily becoming stocked with instruments that allow us much needed

molecular dexterity in the progression of making nature ours. We have started on a path that will ultimately encourage the husbandry of all atomic arrangements and their material results. With the technology already provided by nature and its subsequent supercharging by humanity, biological computers become a distinct possibility. Some believe the full synthesis of Nanotechnology and the human will occur by 2014. Whether this is the case, is of little consequence, the intrigue is based more on its definite occurrence and implications.

Looking into the next century we could see the first reliable nanobots that could neutralise cancer cells. The nanobots could be hypodermically injected into a patients blood in vast numbers. Sequentially controlled from outside the patient with acoustic signals- pressure waves providing orientation data in the same way G.P.S. are used to orient a person on Earth- the cancer cells could be found, the nanobots released killing the entire growth.

(Platt, 1996, www.)

The air around a nano-object can be considered as the macro field of interaction; with engineering and programming of this air can be made into transparent and receptive "Utility fog". The concept for this fog was laid down by Josh Hall to devise a way of avoiding whiplash suffered in car accidents. The notion that nano-doctored air will be able, in a split second, to solidify and cushion us from dangerous impacts. Once this approach is achieved and according to technologists there is no insurmountable problems, then it will be possible to conjure objects or fluids from thin air.

(Regis, 1992, p.218)

In the face of Nanotechnology unassisted evolution is dead; it was too slow and made too many mistakes. The much debated discussion in relation to human physical and social development is about to go into overdrive, as behavior and genetic coding is joined by the machine code influence. Nano-engineers might grow new, faster motor bypasses causing our consumption of information to be greatly increased, thus catapulting humanity further into the future and a more intricate connection to the technology.

A further speculation of the implementations of nanotechnology was taken by Charles Platt's futuristic scenarios

An asteroid is being reworked by preprogrammed nanoscale robots to create a fully equipped space habitat for space colonists. The robots were sent out on a conventional rocket that crash landed on the preselected asteroid. After the nanosystems used indigenous carbon and metal to make billions of copies of themselves, they set to work converting the asteroid. When human colonists arrive, they will find comfortable residence ready and waiting. Since this initiative began in 2050, almost 5 million people have relocated to the asteroid belt. Already we are seeing a new generation that has never seen life on Earth

(Charles Platt, Wired scenarios, www)

The most fascinating aspect of such a scenario is the proposed ability of man , through instruction and construction of these nanoscale machines to create new inhabitable environments, taking hold of the very building blocks of nature to create whatever form is wished.

It is at this point the distinction between real and virtual becomes highly blurred. If we achieve total control of nature, nature ceases to exist, a casualty of the high speed collision with technology. Nature, or what was once nature becomes artificial and artefactual, just as virtual reality is artificial.

3.2 Complete Envelopment in Virtual Reality

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. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights…..

(William Gibson, Neuromancer, P.73)

Cyberspace is viewed by Gibson as a completely virtual world that is seen and experienced as if it were real. Individuals connect into the world with jacks that attach directly into the human neural system. They travel through this world and interact with other people in the form of virtual people, with computers that manifest themselves as virtual people, with data that take visual form in this virtual world. Many people will be able to explore a virtual world together.

In present day virtual systems, the images, sounds, and even to an extent tactile response are simulated and played for you so that your senses experience what would be experienced if what was before you were in fact real. This becomes a rather cumbersome and complicated process, especially when one considers touch and smell. In Gibson's future world of cyberspace, you connect your 'organic' neural system into a system that bypasses your sense mechanisms- eyes, ears, tongue, nose, skin- directly stimulating your neural system to create an experience.

Randal Walser, one of the champions and researchers at Autodesk's virtual reality laboratories, enthuses:

We're talking about a whole new universe. People will enter cyberspace to work, to play, to exercise, to be entertained. They will enter it when they wake up in the morning and will have no reason to leave it until the end of the day.

(Holtzman, 1994, p.207)

The most interesting and intriguing question about virtual reality is what in actual fact is it? Virtual reality should not exist in three-dimensional space, physical form, or real time. 'There is no there.' It only exists in some hard to define place called Cyberspace inside a computer. This cyberspace seems to be an analogy to what already exists within the physical of the human self. The mind or consciousness is defined as the core and most central essence of the physical self, which in turn is a subset of the physical reality. It is this core which gives control and reason within the 'real' world. Our physical being, down to the finest, most fundamental point, is merely a very intricate organic computer, it differs only in that which is housed within. That inner self can move between two states of existence, the conscious and the unconscious, natural reality and ones own personal virtual reality. Therefore the differences between cyberspace and that imagination of the self are twofold - firstly we do not have any conscious control over the unconscious. In the state of dream, we wander recklessly from one image to the next, no order, no pattern, no control only emotionally, jumbled images of information and data stored from conscious experiences. Cyberspace seems to promises such control and order that is lost in dream. Secondly, we are the only real participant in our unconsciousness surroundings, any other dweller is merely a virtual simulation of conscious state, in both body and mind. Cyberspace promises more, if we consider the human consciousness as being similar in function to that of the 'mobile', using a collection of implements connected together into one structure called the physical body, allowing movement in real time. Conversely, the conscious is allowed to travel from the real to the surreal, with one essential difference from computer simulated virtual reality- disembodiment is unnecessary. Therefore it follows that the human body, as an intricate computer, houses the facilities for individual cyberspace.

Having determined already that electronic and artificial implants are and will become the norm in the social structure of the mobile man.

Then why should it not follow into the stationary, where the stationary and mobile are often one in the same being. Hence man-machine integration will develop within the stationary, where the environment would have two exits, one leading to the real world outside, the other a virtual one inside a P.C.

Conclusion

The dual progression of the 'Nomadic' and the 'Stable' have been described thus far as categories of movement relating to the evolution of man and machine in increasing techno-orientated societies. Each movement is a product of the individual human participant in the region of the urban.

A futuristic assumption of the developments of both categories and their separate integration of technology has shown certain interesting patterns in relation to implementation of the machine in each situation. The futuristic speculation concerning both movements was based on existing and emerging technological developments which will have definite effects on both.

The categories themselves were chosen due to their strong footing in present socio-structures and the approach and their present status in relation to man-machine interaction.

Before discussion into each category was undertaken, certain points concerning present day technological advancements in human and machine interfacing needed to be addressed. From this examination it was concluded that if man wishes to take full advantage of the ever-increasing potential of the machine, a re-assessment of present methods of interface need to be addressed, leading to a re-assessment of the physicality and very essence of the human self. Progressing from this, the categories of the 'Nomadic' and the 'Stable' were highlighted and examined individually with particular attention paid to present applications of technological miniaturisation and interface in each instance. The 'Nomadic' category relates to the present day mobility of the individual in the spheres of expanding urbanised habitats and the increasing need of technological implements to exist in such surroundings. Miniaturisation of technological tools in this instance are essential, giving mobility and fluidity to the individual in the urban environment. Such objects are continuously being updated, functionality and quantity of information

being of utmost importance due to the expanding technological embodiment of the urban which constitutes the development of these implements. However it was found that mobile interfacing tools are reaching a point where miniaturisation is no longer so advantageous due to the problems of interface caused by size limitations. Technological interfacing in the area of the stationary traced a different path of miniaturisation and user interface. Where quantity of information has become an important requirement in the 'Nomadic', the 'Stable' user is concerned more with quality information feedback. Due to the nature of the 'stable' environment mobility is not a requirement, thus miniaturization of technology is not an issue. The technological problem is related to the quality of interface between the user and the machine, and the striving of the 'Stable' user to incorporate more, which creates the miniaturization of social contact due to an increased willingness to interact and immerse the self in the medium of the machine.
These examinations showed, in both instances, why integration of technology will become highly possible and persuasive to humanity.

Firstly, the aim of the 'Nomadic' user is to incorporate maximum use of the machine to navigate and exist within an environment which is itself machine based. If this use is hindered and rectification is only possible through integration, then the 'Nomadic' user may eventually choose integration.
In the instance of the 'Stable', this has become a region of escape from the real into the surreal, the user is becoming increasingly enticed by the offerings of technological expression which is allowed to flourish and envelop the human participant into a reality determined by user specifications. Navigation is also necessary in this instance and full mobility can only be given through integration.
The habitat of the 'Nomadic' and 'Stable' is one in the same, an urbanised environment where technology plays an increasingly important role. This socio-structure is expanding, hence the machine continues to thrive within it. Due to our societies becoming structurally and functionally unnatural,

humanity will need to evolve and adapt to maintain an existence in this habitat. Artificial Selection deems it to be so!

Existing in this environment the 'Nomadic' progression has already shown a willingness to adapt, through body reconstruction and artificial aesthetic enhancements. The physicality of humanity is evolving to cope with the increasing artificiality of it's social dwelling. The need for such augmentations is a resultant of a striving for social acceptance and interaction, which is proving to be difficult in expanding urban societies, where the inhabitants are becoming as artificial as the habitat.

An acceptance of the machine is occurring due to humanities existence within an environment whose foundations are built upon it and bases itself on its further development. The acceptance of one's environment leads to an acceptance of what it offers . Due to the future possibilities of physical integration of a machine into the human, then in time it seems that humanity will relinquish its connection to nature in favour of the machine

The stable environment, as already stated is a sub-existence of the urban, sheltered from the urban. An existence which shows elements of reclusion, hiding within a structure which promises an escapism from the real into the surreal, through the use of the machine to simulate experiences which arouse the senses that are connected to the inner self of the individual. It is this connection, which technology promises to improve upon to the point of total immersion of the self into the world of the machine.

difference, nature would no longer exist due it's control by humanity.

Both categories of social development relating to the 'Nomadic' and the 'Stable' can be termed as dual expressions of each human individual. The 'Nomadic',the expression of the self, using the implements defined by nature and connected as a whole, named the body. It is the body which allowed the mobility in the habitual environment of nature. It structured itself in accordance to natures selection and evolved thus.

The 'Stable' expression of the individual can be termed as the sub-conscious contained and sheltered within the human form, a sub-set environment of the real. It is part of the human individual which is the recluse, only truly becoming active when the body is nearest the state of stability, in sleep the sub-conscious becomes truly active, in the very essence of the self wandering immersed in an individual state of personal cyberspace, in the part of the body in some hard to define place called the mind.

If such assumptions can be made concerning the progressions of the 'Nomadic' and Stable which has shown to be 13expressions of the individual human expressions upon an urban society which is an increasing technologically structured environment. These two expressions are directly related to human being as a whole.

The 'Nomadic' and 'Stable' participants are essentially two separate technologically related movements whose directions are not necessarily split socially but in the realities in which they exist. The mobile and stable man are one and the same. However the worlds to which this being can belong is becoming more separately defined yet are in the future merging closer together to become one, just as the physical body is one with the mind, so too our natural reality will be unified with our virtual reality.

In the concluding chapter, future areas of development were discussed concerning both the 'Nomadic' and the 'Stable'. If Nanotechnology is to come through, its impact particularly on the 'Nomadic' would be overwhelming. The aesthetic restructuring of the human form would be in essence, as natural as the product of nature yet as artificial as mankind chose. The choice would be influenced on what would give the human form the most mobility and the artificiality of the real, for the real structure will be chosen by humanity.

In the stable environment, future developments of virtual reality would allow total immersion of the consciousness into the environment of Cyberspace, a freedom from the physical which has no place in the surreal.

Humanities growing control over mind and body, where one is dependant on atomless bits, the other on bits of atoms. It is at this point in real and virtual time that individuality is lost. From that moment when two individuals become disembodied, immersed together in the consensual hallucination of cyberspace, the collective is begun and minds unified into one. And what of the physical individual? Does this too become a unified form Where the atom-less bits of the collective mind are contained in the bit of an atom, allowed to form and reform into one physical form. Just as each individual atom structures into a collective individual called the human body. Why should the human individual not structure into a collective unit?

In Indian mythology, there is a religious analogy explaining transcendance of the spirit into a collective harmony,

Indras Net is an infinite connection of pearls which reflect each and every other pearl to perfection.

A pearl is a real object, its reflection is virtual.

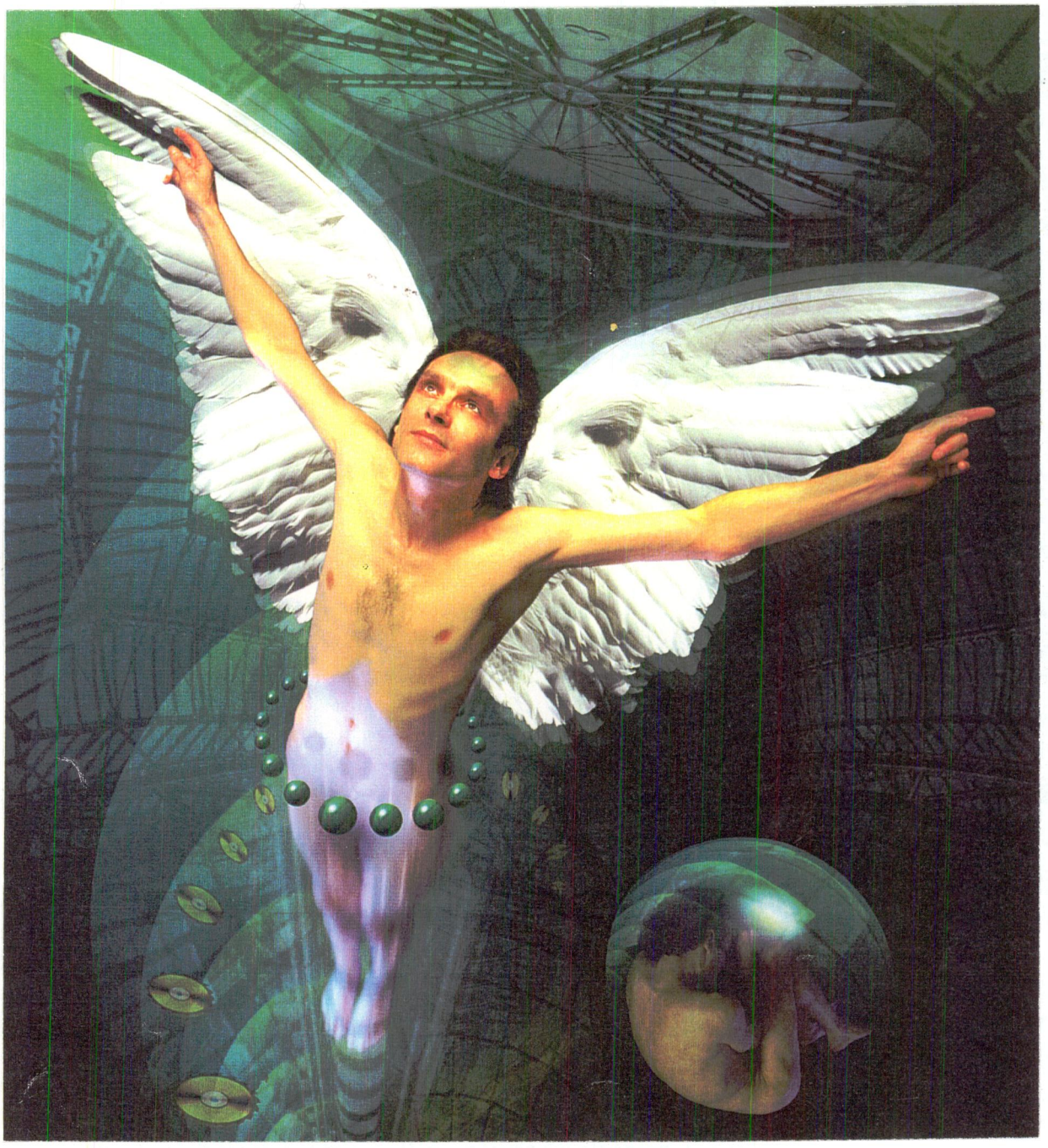


Figure 9

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