AESTHETICS OF A VIRTUAL WORLD: ETHICAL ISSUES IN
INTERACTIVE TECHNOLOGICAL DESIGN

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For my mother,
for her love and support.
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TABLE OF CONTENTS

DEDICATION. ........................................................... ii
ACKNOWLEDGEMENTS. ........................................... iii
VITA. ....................................................................... iv
TABLE OF CONTENTS. ............................................. v
INTRODUCTION. ......................................................... 1

CHAPTER

I. ETHICS AND TECHNOLOGY ........................................ 7

Part One. ................................................................. 7
Part Two. ................................................................. 8
Part Three. .............................................................. 11
Part Four. ................................................................. 23
  Simulation and Foundationalism ......................... 25
  Artificial Reality and the Mind-Body Split .......... 40

II. ETHICS AND AESTHETICS .................................... 57

Part One. ................................................................. 57
Part Two. ................................................................. 61
  Art before the Twentieth Century ....................... 61
  Art during the Twentieth Century ....................... 67
Part Three. .............................................................. 74
  Art and Technology ............................................. 74
  Postmodernism, Photography, and the Computer ... 80
Part Four. ................................................................. 100
  Interaction and Art into the Twenty-first Century . 100
III. INTERACTIVITY: AN ETHICAL AESTHETIC OF VIRTUAL
WORLDS ........................................ 114

Part One. .................................. 114
Part Two. .................................. 118
Current Trends in Virtual Reality. .... 118
Part Three. ................................. 154
Brecht and Aristotle. ................. 154
Part Four. ................................. 162
Applied Brecht. ....................... 162

CONCLUSION. .............................. 165

LIST OF REFERENCES. ...................... 178
INTRODUCTION

"Who shall conceive the horrors of my secret toil as I dabbled among the unhallowed damps of the grave or tortured the living animal to animate the lifeless clay?" —Victor Frankenstein, from Mary Shelley's (1816/1963) *Frankenstein, or the Modern Prometheus*

Victor Frankenstein, like Prometheus, the Titan before him who creates life, fails not in his pursuit of the creation of life. His creation breathes, thinks, feels. But, in his rush to realize the fulfillment of his desire to create a new species of "happy and excellent natures", he throws aside all aesthetic and ethical considerations. His methods are so tainted by the sources he uses in his "workshop of filthy creation" that he instead creates a monster hideous and repellent to human consciousness. He himself is repulsed by the ugliness of his own creation and flees from the responsibility of having created such a monster. It is both sad and ironic that the monster, whom Shelley allows to speak for himself over six chapters, is barred from human contact and forced into evil not by his inner nature but by the rejection of the man who made him. Had Victor Frankenstein made a beautiful monster, one that met the standards of human senses, or if
he had loved and accepted the true nature of the monster he had
created, the devastation the monster wreaks in the book could have
been avoided. Perhaps even Frankenstein’s dream of a happier life
might have been enacted.

One cannot resist viewing Frankenstein as a tale of moral
fiction uniquely germane to the ethical implications of the emerging
interactive technology called “virtual reality”. The recent film
version of Stephen King’s The Lawnmower Man can be seen as a
contemporary translation of Shelley’s tale. The production of virtual
reality implies both an unhappiness with reality as it is and a desire
for the creation of a humanly controlled reality, one in which we are
able to decide how and why we interact with the world. This desire
is an ancient one, repeated throughout history with various shades of
success and consequence. One can think of many other myths and
legends that might apply: Pygmalion, Pandora. Like Victor
Frankenstein, we may come to understand that the how and why of
our interaction with a virtual reality of our own making will mean
everything, not only to the success of that world, but to the
consequences of its use in the already existing one.

Just as the characters of Shelley’s Frankenstein, had to come to
terms with the product of Victor Frankenstein’s rash and misguided
interests, so future employers of virtual reality applications might be
forced to accept an aesthetic of development not particularly coincident with the expressed purposes for which the application is being used. The impact of technology on culture is an extremely powerful, symbiotic relationship. The fruits of virtual reality technology design may well pervade all areas of human-computer interface in the future. Various critical theorists, art educators, artists, and journalists, among them Morris Berman, Vesta Daniels, Donald Ihde, Beverly Jones, Doug Noble, Neil Postman, Howard Rheingold, Bruce Sterling, and Steven Wilson chart the military and corporate sources of the development of interactive technology, including virtual reality, and allude to the possible consequences of using that technology for a wide variety of other applications, such as science, entertainment, education, and art-making. Development of this technology has been based largely on assumptions about the requirements and priorities of a particular application for which the virtual reality environment will be used. This kind of approach to developing a new phase in human-computer interface that may well pervade all areas of use in the future brings with it numerous related and perplexing issues. A number of researchers (e.g., Delanda, 1991; Levidow & Robins, 1991; Noble, 1989) outline enormous problems inherent in accepting technology developed for military applications for use within other domains of applications.
Noble (1984) insists it was enormous military expenditure, after World War II, that fueled technological research in industrial and scientific activities. Research and development, science and technology policy, economic and industrial policy have all been shaped by military imperatives. These imperatives have been impressed through the use of technology on many aspects of contemporary culture. The image of virtual reality being promoted by this culture through the media is one of progress and omnipotence. It implies that the emotional and bodily limitations of human beings are mere hurdles over which our culture will be able to jump, once we have developed enough self-control through "cybernetic" control.

Levidow (1991) argues that a "military information society" is not a contradiction in terms because there is an inner connection between the two disciplines involved, even though the information society promises us greater freedom, while the military society suggests orders to be obeyed. The connection between them is "an internalized self-discipline, geared to making a system operate more effectively" (p.159). In both instances, computer simulation is the mediator of systems seeking total control over human qualities reduced to calculable, mechanical operations. Technologies such as virtual reality redefine those qualities through computer interface
metaphor. Levidow says:

Through infotech, military models of reality appeal to widespread illusions of omnipotence, overcoming human limitations, even as they conceal our relative impotence. (p.159)

What can be gained from the criticisms above is that the aesthetics of computer interactive technological design inherently involve tough choices and accepting responsibility for their impact. These choices entail the ability to resist accepting the dehumanizing metaphors already in place. Instead, evolvement of technological aesthetics should focus on actions and interactions that recognize and challenge those metaphors.

A number of theorists in diverse disciplines (sociology, cognitive psychology, the arts and design) are doing just that by concentrating on understanding and molding the nature of interactivity which underlies the design of virtual worlds. Interaction is the quality which will continue to have the most impact on the future of virtual reality. Interaction is an aesthetic quality of such art forms as happenings, installations, performance art and of course, theatre. In the past four decades, there has been a paradigm shift from art that controls knowledge to art that encourages an aesthetic in which the participant is actively involved in control over access to knowledge and the implementation and organization of that knowledge. This
interactive aesthetic is based on the desire to “abandon conceptual systems founded upon ideas of center, margin, hierarchy, and linearity and replace them with ones of multilinearity, nodes, links and networks” (Landow, 1992, p.2). It attempts to address the viewpoints of those who usually have been ignored - women, minorities, animals, children. It also insists on the importance of physical context. As Allucquere Rosanne Stone (1992) affirms:

No matter how virtual the subject may become, there is always a body attached. It may be off somewhere else - and that “somewhere else” may be a privileged point of view - but consciousness remains firmly rooted in the physical. Historically, body, technology, and community constitute each other. (p.111)

The process of making art with these technologies may provide opportunities for connection of unparalleled proportions both for artists and their viewers. But, the impact of these innovations will depend in a large part on how the people who are directly responsible for the development of these technologies think about the task at hand. The following chapters are an effort to make sense of the role ethics may play in the development of an aesthetic for emerging interactive technology, specifically, virtual reality.
CHAPTER I

Ethics and Technology

Part One

The relationship of humans and technology offers myriad examples of the impact of ethical issues on the design of technology in changing human culture. This view of the human-technological relationship, however, is not one that has been widely held. The pervasive view of this relationship has been based on a definition of technology that views technology as "tools", artifacts throughout human history that have served the purposes of their users. This definition of technology has been identified with instrumental theories of technology. In these theories, technology is seen as neutral, containing no value of its own. The ends to which it can be employed are not seen as contingent upon its design. The universality of technology is also an important component of these instrumental theories. The same technologies can be used in any social context, and like rational, causal propositions, are immune to sociopolitical concerns. Technology is there to be used and instrumentalism provides the framework for research into the costs
and consequences of its use.

Feenberg (1991), however, contrasts these theories of instrumentalism with those which deny the neutrality of technology:

Substantive theory, best known through the writings of Jacques Ellul and Martin Heidegger, argues that technology constitutes a new type of cultural system that restructures the entire social world as an object of control. (p. 7)

In choosing to use tools/machines, we make many cultural choices, the impact of which shapes our environment and our life. What Feenberg proposes, and what I wish to employ in looking at the aesthetics of interactive technology, is a critical theory of technology that proposes the possibility of transforming technology from within. He says:

Critical theory argues that technology is not a destiny but a scene of struggle. It is a social battlefield, or perhaps a better metaphor would be a parliament of things on which civilizational alternatives are debated and decided. (p. 14)

Part Two

Having defined what we take technology to be, we may now review arguments concerning the history of the relationship between man and tools. Feenberg’s definition is supported by cognitive psychologist, Merlin Donald (1991), who sees the evolution of human culture as enabled by both internal (biological) and external memory systems of cognition. Both these “storage” systems allowed first, apes
and hominids, and then, humans to move through four stages of culture: the episodic, the mimetic, the mythic and the theoretic. Humans were able to transcend the limitations of episodic memory of ape ancestry by "inventing" intentional representations through mimesis. Mimesis, "the ability to produce conscious, self-initiated, representational acts that are intentional but not linguistic" (p. 168) defined the second stage of human culture as mimetic. As Donald points out,

Toolmaking was probably the first instance of behavior that depended entirely upon the existence of self-cued mimetic skill. Tool manufacture . . . demands an ability to self-cue and reproduce or re-enact the scenario leading to the tool's manufacture in the absence of immediately present materials or even an immediate need for the tool. (p.179)

The invention of symbols was established during the mythic period of culture. Mythic culture developed narratives leading to the integration of knowledge and language. Donald states:

Mythic integration was contingent on symbolic invention and on the deployment of a more efficient symbol-making apparatus. . . . The social consequences of mythic integration were evident on the cultural level: narratives gave events contextual meaning. (p.268)

But, Donald claims, it is with the transition to theoretic culture, and the development of first, graphic invention, and then, external memory that the modern mind began to emerge. The evolution of
new methods of graphic representation signaled a shift to external memory devices: pictorial representation, cuniforms, lists, numbers, hieroglyphics, ideographs, and the phonetic alphabet. To this list we now can add electronic storage systems. This reliance on external symbolic memory representations allowed for the development of analytic thought and its most potent product, formal theory. What is different about theoretic thought is its predilection for prediction and interpretation. Though narrative gave mythic culture the ability to reconstruct the past, the development of theoretical thinking gave theoretic culture its power to construct the future. As Donald insists, theoretic analysis started the complete transformation of the mythic culture which preceded it. Theoretic analysis demythologizes the thing or event it investigates, and forces one to view that thing or event in an entirely new context. The context in which it was previously accepted as truth is also seen differently.

For our purposes in tracing the history of man's relationship with technology, it is important to understand that the move from what Merlin Donald (1991) calls "visuographic invention" (p.275) to the management of external memory devices to theoretic thinking skill was not a given of human nature but rather a structure dependent upon both symbolic invention and technological hardware. The hardware may not have been biological, but from the viewpoint of a natural history of cognition this does not matter; the ultimate result was an evolutionary transition just as
fundamental as those that preceded it. Once the devises of external memory were in place, and once the new cognitive architecture included an infinitely expandable, refinable memory loop, the die was cast for the emergence of theoretic structures. A corollary must therefore be that no account of human thinking skill that ignores the symbiosis of biological (internal) and external memory can be considered satisfactory. (p.357)

Memory representation is the single essential adaption underlying each of the three cognitive transitions in human evolution. Further, Donald's description of the "symbiosis of biological and external memory" is extremely useful in understanding the historical relationship of man and technology as one of interdependence.

The central point here is that human cognitive operations, and all the realms which are intricately bound up with and affected by those operations, have been utterly changed. Combined with interactive electronic media and global computer networks, the process of cognitive evolution that was propelled by earlier external memory systems is now changing.

Part Three

The discussion above gives us some general insight into the evolution of human cognition and its inextricable relationship to cultural development from archaeological time to the present. Nevertheless, a more specific description of how the relationship
between humans and tools/machines has changed through the agrarian, industrial and information revolutions is necessary to fully comprehend the notion of ethical embedding in technology.

It might be well to start this section with a quote from one of the first and most influential philosophers of science and technology, Francis Bacon. Though Bacon (1889) was an adamant proponent of invention and progress, he also understood the enormous impact technology has upon culture. He wrote in the Novum Organum:

> It is well to observe the force and effect and consequences of discoveries. These are to be seen nowhere more conspicuously than in those three which were unknown to the ancients, and of which the origin, though recent, is obscure; namely, printing, gunpowder, and the magnet. For these three have changed the whole face and state of things throughout the world; the first in literature, the second in warfare, the third in navigation; whence have followed innumerable changes; insomuch that no empire, no sect, no star seems to have exerted greater power and influence in human affairs than these changes. (p. 45)

Writing this before he died in 1626, and 150 years before what could arguably be the beginning of the Industrial Revolution, the publication of Adam Smith’s Wealth of Nations (Postman, 1992), Bacon was among the first to recognize the connection between technology and culture. Though others, from Marx to McLuhan, have since made that connection, it will be useful to review the history of that connection, that symbiosis, while searching it for ethical
embedding.

It is important to remember, however, that the transition from Upper Paleolithic culture to the early Egyptian was rooted predominantly in changes in the state of nature. Upper Paleolithic man was a hunter, but the changes in the animals and land caused by glacial ages brought about changes in how human beings managed to survive. The move from food-gathering to food-production was an essential response to this change. Neolithic culture, the origin of the agricultural-pastoral revolution, differed in its relationship to Nature. Though its characteristic tool, the ground-stone ax, supported the innovations, it was man's relationship with Nature that was the cause and consequence of them.

Human beings made themselves into active partners with Nature. . . . Husbandry, both vegetable and animal, certainly had a religious, as well as an economic, aspect to begin with; and the agricultural-pastoral revolution might never have been achieved if it had not been a religious revolution in one of its aspects. (Toynbee, 1972, p.48)

This kind of relationship between tools and man persisted in the various cultures appearing up until what we call the Industrial Revolution. Best described as "tool-using cultures", preindustrial cultures essential characteristic was that their tools were invented to do two things: to solve problems of physical life or to serve the underlying symbolic world in which the culture was based (Postmaa,
The transition from rooted Upper Paleolithic and land caused man beings managed reproduction was an origin of the relationship to Nature. supported the what was the cause

farmers with annual, certainly had a with; and the been achieved of its aspects.

The persistence in the the Industrial preindustrial were invented to serve the based (Postman, 1992, p.24). The level of technological sophistication in preindustrial cultures varied from culture to culture and depended, for the most part, not on the mere cumulative evolutionary effect of progressively more sophisticated levels of technology, but on the relationship of a given culture to its belief system. The building of the Pyramids is still considered a prodigious mechanical feat, while the Golden Age of Greece offered no technical innovations. Plato and Aristotle disdained what did not contribute to the life of reason, considered by both to be the highest goal of man. The good life consisted of the fulfillment of this goal. The intense involvement of man in problems of productivity and efficiency would not enhance the attainment of this goal. The Egyptians, on the other hand, saw their labor as integral to their religious system.

The Middle Ages is an example of a tool-using culture which was extraordinarily involved in the proliferation of technology. Windmills were invented in the late twelfth century, as were eyeglasses, corn mills, paper mills, and cathedrals. Postman (1992) describes the European Middle-Ages as an example of a tool-using culture with a very high degree of integration between its tools and its world-view. Christian theologians, such as Augustine and Thomas Aquinas developed a system of links between man and his tools that depended on the idea that all human enterprise be directed towards
the service of God. According to Postman:

... all tool-using cultures - from the technologically most
primitive to the most sophisticated - are theocratic, or if not that,
unified by some metaphysical theory. Such a theory or
metaphysics provides order and meaning to existence, making it
impossible for techics to subordinate people to its own needs.
(p.26)

During the Middle Ages, for the most part, technology did not
contradict the prevailing world-view. But, that was not to last. The
inventions of the mechanical clock and the printing press during the
Middle Ages are among the roots of the inevitable cultural changes
that led to modern times. The most influential of these technological
inventions from the past was the telescope. It allowed us to see
ourselves as a tiny part of a vast universe, instead of the stable
center of it, and of primary interest to God. In this way it attacked
the fundamental tenants of Judeo-Christian theology, and began the
continuing confusion about man's place in the universe, and
consequently, a confusion about ethical choices. Postman notes that
the men who propelled this transformation did not themselves
experience its legacy of doubt concerning the meaning of man's
existence. Copernicus, Kepler, Descartes and Newton were all still
men of their age and profoundly religious. Even Galileo, who went
much further in separating the intellectual and moral points of view
than any of them, viewed his work as a religious quest. It was man's

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knowledge he was questioning through his arguments against interpreting the Bible literally, not God’s.

The point here is that the predominant relationship of man and technology in Western culture before the Industrial Revolution was one in which the questions of good and evil could continue to be answered by the prevailing world-view. The ethics involved in the conception of preindustrial technology, including the telescope, emanated from a desire for truth, but a truth that supported the philosophy upon which those ethics were based. Despite the founding of this technology in a philosophy that was based on the integration of ethical and intellectual values, what grew from these sciences destroyed that integration. This fact reveals a great deal about the nature of the relationship between man and his tools.

Even a tool originally invented to incorporate the ethical views of a society, views that are considered positive and helpful at that time, may be used for other purposes, even purposes that may be detrimental to the preceding system of belief, but positive in terms of the new context in which it is used. Two examples will illustrate this point.

The first example is a general observation. The science of invention, especially advanced by Bacon, and which grew out of and destroyed the culture of the Middle Ages, gave to the majority of
people a tremendous chance for a better life. It may have destroyed their psychic security, but it offered them the possibility of a physical security unknown up until this time. The second example (Postman, 1992) is a specific one. It allows us to ponder if it is possible for man to take for granted his uppermost place in what he thinks may be the hierarchy of his relationship with the tools he has invented. The mechanical clock was invented in the Benedictine monasteries of the twelfth and thirteenth centuries to provide a regularity to the seven periods of spiritual devotion during the course of the monks' day. But, by the middle of the fourteenth century, the clock had moved outside the monastery walls and became an instrument of commercial enterprise. In 1370, King Charles V ordered all citizens of Paris to regulate their entire lives, most importantly their commercial and industrial lives, by the bells of the Royal Palace Clock. The churches were also required to regulate their clocks by the hourly palace clock, disregarding the canonical hours.

The paradox, the surprise, and the wonder are that the clock was invented by men who wanted to devote themselves more rigorously to God; it ended as the technology of greatest use to men who wished to devote themselves to the accumulation of money. In the eternal struggle between God and Mammon, the clock quite unpredictably favored the latter. (p. 15)

The Industrial Revolution, a phrase popularized by Toynbee, brought
an uneasy tension between man and his tools. In a petulant moment, early in *A Study of History*, Toynbee (1972) gives us a glimpse of the impact of that tension on history, man's thought about himself, more than 200 years after its inception:

Historical thought is among these foreign realms of thought in which the prestige of the industrial system has asserted itself; and here - in a mental domain which has had a far longer history than our Western Society and which is concerned not with things but with people - there is no assurance that the modern Western industrial system is the best regime under which to live and labor. (p. 30)

From 1765, with James Watt's invention of the steam engine, the Industrial Revolution brought hundreds of new inventions designed around principles which were in opposition to the traditional world preceding it. If the telescope had allowed man to see himself as only a small part of God's universe, the inventions of the eighteenth, and nineteenth centuries forced man into seeing himself as part of something in which God, perhaps, had no interest, but, in which man was bound to strive: economic life. These new principles had their origins in the scientific and philosophical theories of Bacon and Descartes and fulfilled the move started by Kepler to disassociate the intellectual and moral spheres They included objectivity, expertise, efficiency, standardization, measurement, and most of all, progress. But, though the machines upon which man depended were designed
primarily with these principles in mind. Those characteristics were
still thought to be best contained within machines, not man.
Technology was still a servant of man, though as Postman points out,
a "... presumptuous, aggressive, audacious, impudent servant(s). . ." (p. 48), but, a servant nonetheless.

An excellent example of the influence still exerted by the
traditional values of preindustrial culture on the technology of
Industrial society was the nineteenth century movement against
child labor. Technology was made to adjust to the requirements of
an ideology that valued humanitarian ideals above those of economic
expediency. Feenberg (1991) argues that this is an example of the
possibilities of taking a nondeterministic position in relation to
technology. Instead of assuming the principles of technological
design must follow the "technical and social criteria of progress", it is
possible for technological design to be transformed by other
emerging cultural values. Additionally, while it is true that culture
adapts to technological change, it is also true that the process is
reciprocal. Technology is changed as much by the contexts in which
it is developed as it influences those contexts.

This outlook will prove extremely helpful in examining the
relationship between man and technology in the age in which we
now live, and identify as the Computer Age. The prevailing
ideological assumption in technological design, and the ethic embedded in that assumption, is the primacy of progress, and its attendant qualities. We have begun to see ourselves as not only completely reliant on technology, specifically computers, but as computers ourselves. The description, early in this dissertation, of the evolution of human cognition as based upon the development of external memory storage and its symbiosis with internal memory, is one way in which we might seem justified in theorizing about our mental architecture based on a computational model of the mind. One such cognitive theorist, Johnson-Laird (1988), poses computational models as the ideal framework for understanding the workings of the mind. The power of the discipline, according to Johnson-Laird, resides in the theory of computability. "If an explanation is computable, then prima facie it is coherent." (p.26). In order to understand logic and thought, mental models are seen primarily as a way of understanding symbols. But, as Donald (1991) points out, however, this proposal fails to break out of the self-contained symbolic world and is not substantiated by the evolution of human cognition. Though the modeling process is useful in decoding an already existing language, it is not useful in understanding how it was invented in the first place. Johnson-Laird himself, admits towards the end of his book, *Computers and the Mind*, the limits of
computational models of cognition.

Each chapter of the endeavor (and the book) has its own remaining mysteries and puzzles - what mechanism, for example, is used to perceive the function of an unfamiliar object, to bring an associated idea to mind, to recognize a speech sound, or to acquire a grammar? At present, we have no satisfactory working models of any of these abilities. (p. 390)

Along with these limitations, the ethics embedded in computational models of cognition are problematic to the principles of critical theory of technology stated above. Those ethics are stated rather clearly by Johnson-Laird (1988) in a reply to Joseph Weizenbaum's moral criticisms of cognitive science and its use of computational models for certain projects in artificial intelligence. He says:

The moral issue has been sharply stated by Weizenbaum: 'however intelligent machines may be made to be, there are some acts of thought that ought to be attempted only by humans.' . . . During the decade since Weizenbaum delivered these judgments, the research to which he objected has not achieved the results he feared, and there are now projects in computer science to which he might object, such as those in the Strategic Defense Initiative. There are no grounds for singling out artificial intelligence for special opprobrium. Moreover, the quest to understand the human mind should be distinct from the question of how to treat human beings and from any attempt to supplant them. (p. 387)

Following the logic of the last sentence makes one wonder what ends Johnson-Laird sees as pertinent to understanding the human mind.
If the approach to ethics articulated in the previous quote sounds familiar, it is because the echoes of its underlying philosophy of the separation of moral and intellectual spheres has been occurring for decades. The repercussions of that division began with Kepler, Bacon and Descartes and are continually evident in almost every aspect of our culture. In addition, the universality of computer technology fosters the concept of its necessary inclusion in every field of human endeavor. The "driving problem" approach to computer technology design, as Frederick Brooks, the leader of a team of virtual reality researchers at the University of North Carolina at Chapel Hill, calls his research strategy, then allows a computer design interface developed for defense to transfer to educational purposes (Rheingold, 1991, p.39). The combination of these beliefs and their consequences erodes our faith in human judgment and human worth. Instead, we have begun to place our confidence in the machines which are unsurpassed in those qualities we have come to value most: efficiency, measurement, speed, objectivity, and innovation for its own sake. And in order to interact with those machines which have become so important in our culture, we have begun to think that we must think like them. Postman (1992) suggests the direction of this line of faulty thinking:

From the proposition that humans are in some respects like machines, we move to the proposition that humans are little
else but machines and, finally, that human beings are machines. And then, inevitably, . . . to the proposition that machines are human beings. It follows that machines can be made that duplicate human intelligence, and thus research in the field known as artificial intelligence was inevitable. (p.118)

To find this line of reasoning “inevitable”, is to disregard the role that meaning plays in communication. Meaning includes feeling, experience and sensation: the same dimensions that make up the original formulation of the term aesthetics by the German philosopher Alexander Baumgarten. The term did not refer only to art, but to all of human perception and sensation. It is in this realm that ethical decisions are made.

**Part Four**

Decisions about what is right or wrong are inextricably linked to a grasp of what is real and what is true. We approach an understanding of reality and truth through a variety of means. Philosophical thought has offered us various positions on whether attempts at making ethical decisions are based on stable or shifting grounds. Technology offers us countless means to reevaluate our perceptions of what reality and truth consist.

This attempt to suggest aesthetic frameworks for the design of an ethical interactive technology must include an unraveling of the
intricate connections among systems of ethics, the ontological and epistemological assumptions on which they are based, and the influence technology has had on those assumptions. Wooley (1992) cites two underlying issues in consideration of virtual reality as one of the "... 'Big Ideas' of the 1990s..." (p.6): simulation and artificial reality. Both issues involve the intrusion of questions concerning the nature of knowledge and reality into the creation of emerging technologies such as virtual reality and artificial intelligence.

Wooley describes the repercussions of ignoring these aspects of technology in a most persuasive way:

Technology is often presented as initiating change, some separate activity that every so often introduces the products of its efforts into the world for good or evil. The problem with such an attitude - held, it should be noted, by those who fear technology as much as by those who embrace it - is that it has nothing to say about origins. Technology becomes nothing more than the spark of inspiration, which is a fat lot of good if you want to make some sense of it and the world it is a part of. (p.40)

The design of present virtual reality technologies is intimately involved with the origins and long-standing goals of simulation and the development of artificial reality. Investigating these origins and goals may prove helpful in understanding the significance of their impact on ontological and epistemological assumptions. As stated above, these assumptions are the ground upon which we grapple with ethical issues. In attempting to construct an ethical framework,
then, for the design of virtual worlds, it is necessary to understand how it is that we have come to agree or disagree about what reality is and how it is possible for us to know about it.

*Simulation and Foundationalism*

The preoccupation with simulation comes to us out of the encompassing obsession with allowing truth to be based upon the powers of the mind to represent reality. Webster's defines simulation as a pretense, an imitation, or make-believe.

Contemporary cultural theorists describe post-modern culture in this way. Baudrillard (1983) refers to simulation as "...master and nostalgia, the phantasmal parodic rehabilitation of all referentials, alone remains" (p.72). Jameson (1984) goes further in this bleak assessment when he says:

...we are [now] condemned to seek history, by way of our images and simulacra of that history, which itself remains ever out of reach. (p.66)

These contemporary views of the pervasiveness of simulation offer us some insight into the continuing problems we have with questions concerning what reality is and how we can be certain about it.

The attempt to simulate reality has long been regarded as one of more efficacious ways to comprehend something. Though the caves of Lascaux may indicate early hunters' need to simulate the hunt,
either to provide confidence or as a mystical assurance of the hunt's success, it must have been obvious to the hunter that unless he actually went out of the cave to hunt he and his people would not eat. The simulation pointed back to reality. At the most basic level, what Baudrillard and Jameson are lamenting is the incredible power simulation has acquired in contemporary life. The power bestowed upon a simulation, however, is not a new acquisition but has increased in importance as the uncertainty of an existence without a central meaning has developed. What is ironic, and perhaps sad, if one acknowledges other consequences of this development, is that it originates in the desire for certainty.

The desire for certainty has been a major stumbling block to many a philosopher since Descartes (1537/1968) decided

...to rid myself of all the opinions I had adopted, and of commencing anew the work of building from the foundation, if I desired to establish a firm and abiding superstructure in the sciences. (p.95)

Descartes put aside Plato's goal of discovering how ought we to live for the express purpose of legitimizing scientific thought. His goal was to attempt to discover what we know and how we know it. And though this might have been a reasonable search, in terms of science, Descartes had an underlying agenda, which has proved to be the source of continuing trouble.
The kind of perfection at which the Cartesian project aims is the perfection of epistemic safety. It concentrates on knowledge, not because of any special view (such as Plato held) about what we need to know and why we need to know it, but because knowledge means security from error. (Midgley, 1989, p.36)

In order to commence this project, Descartes insists on the representational nature of knowledge. The question for Descartes becomes whether or not we can be confident of the truth behind the representation. Though both the words representation and simulation may mean an image or likeness, simulation implies an element of falsehood or deceit. The representation of reality as a way of knowing has evolved into a barrier, a simulation, through which we can not pass. The simulation becomes the storehouse of knowledge, an end in itself. Like unspent wealth, knowledge accumulates within the simulation, accuracy piled on top of accuracy. But the reality behind the simulation remains hidden.

Descartes' relentless reliance on the mind's capacity alone for thought and reflection has left us with the persistent image of the rest of universe, including our own bodies, as existing unconnected to our mind and devoid of any kind of consciousness. Much of philosophical thought since then has been concerned with emerging from the Cartesian prison in which we have found ourselves. If we are to consider questions of ethics, we first must see our way clear of
Descartes' influence. It is important to remember that Descartes' initial premises were formed for the explicit purpose of establishing a foundation for the work of science. In preceding philosophies, the question of how one knows something was not seen as fundamental to understanding the truth of the reality underlying life. Rather, understanding the truth concretely and immediately from reality was seen as internal to that reality. As Edwards (1982) describes it:

From this "religiously" perspective, the fundamental, normative relationship between person and reality is, in its most general description, harmony. (p.163)

Though specific ideas about what constituted harmony were different for each culture, the recurring and crucial point about the relationship between human beings and reality, before Descartes, is the immediacy of that relationship. Unlike the Cartesian model, human beings were seen as an integral part of an active, knowledgeable reality.

But with Descartes, reality becomes external. We, as Cartesian beings who have to resort to our doubt that we exist to prove that we exist, find ourselves in an abstract universe, in which we can only exist if we answer the question, "Is it true?" According to Descartes, that question can only be answered by the mind's powers of representation because we are barred from knowing the world
(reality) through any other way. Concrete experience is not justifiable for the bodiless mind to which Descartes has diminished us. Descartes' influence, not only on the sciences, for which he originally began his *Meditations*, but on the whole of Western thought and culture, is immense, and has left us with a true fetish for accurate representation. This representation becomes the foundation upon which we are then, in the Cartesian paradigm, to build our belief and understanding of the world.

The obvious problems with this approach, ones that succeeding generations of philosophers have had to contend, are the insistence on certainty, known as foundationalism, and the mind-body dualism that has fostered continuing problems with the status of "other-minds". Simulation is directly connected to the former while artificial reality stems from the latter. The general consequence of the acceptance of the Cartesian paradigm and its attendant problems has been to separate thought from the rest of life, ostensibly a purifying measure, and one that will insure a correct path to knowledge. This consequence has led to the continuing belief that disciplined thought is only possible in science and other uses of thought and, therefore, language, such as that used to discuss ethical issues, is unqualified to be ranked as true knowledge. Various philosophers have attempted to work under these constraints...
towards the goal of bringing questions of meaning back into the foreground of philosophical thought while attempting to bring philosophical thought back into the center of all human activity.

Since Descartes, the products of doing philosophy were seen as contributions to a powerful universal thought-system, a devise grounded in the reason of the knowing subject itself, and reaching out to grapple it to all the objects that are to be known. This Descartes hoped could be provided by a special sort of disciplined clear thinking, framed on the model of mathematics. (Midgley, 1989, p.125)

Three philosophers who we may find particularly appropriate to our investigation are Bertrand Russell, G.E. Moore, and Ludwig Wittgenstein. All three claimed to have found the path for escape from the hermetically sealed container in which Descartes left us. That one, Russell, claimed to do so by the certainty of logic based on the science of mathematics, that another, Moore, claimed to have done so by a belief in what one might consider to be an aesthetic approach, and that the third, Wittgenstein, not only claimed, but was successful in escaping the container by realizing that it is not a prison, is completely apropos to this project. It is also important to note the connections of thought between these men and the milieu of their time. All wrote at the beginning to the middle of this century. all knew each other and each other's work. And all were
working in a time of great upheaval, in which the need for certainty came to a climax. "A reliable, scientific basis of knowledge was simultaneously being constructed and destroyed." (Woolley, 1992, p. 60)

Russell (1946) opens his widely read *History of Western Philosophy* with the following passage:

To teach to live without certainty, and yet without being paralyzed by hesitation, is perhaps the chief thing that philosophy, in our age, can still do for those who study it. (p. 14-15)

This passage epitomizes the direction in which Russell, Moore, and Wittgenstein wished to travel. Continuing to follow the methods outlined by Descartes, however, was a sure way of closing off any usable routes. According to Midgley (1989), Russell, Moore, and the younger Wittgenstein attempted to discover

... a single, universal, philosophical structure linking human thought to the world, an underlying pattern which would bring the two together at a deep level entirely remote from ordinary experience. (p. 139)

Russell never questioned the Cartesian paradigm, and so was limited by its search for certainty. For Russell, that search centered on the use of logic as a means of supplying a single, pure form of knowledge. Midgley (1989) makes the excellent and important connection between this obsession with certainty and the quest for
the idea of the quest for knowledge has gradually become transformed, concentrating more and more on safety rather than on substance. The search is increasingly conceived, not as an effort to understand something which is itself of great importance, but rather as the accumulating of information which is guaranteed to be correct, almost regardless of its content. (p. 128)

The practical and far-reaching consequences of this perspective were the enormous shifts of scientific and mathematical thought and influence. Like the corresponding liberation of art from the boundaries of its usefulness as a vehicle for religious or political ideas by the aesthetics of modernism, mathematics, during the same period, experienced a similar emancipation from its place as only a branch of science. Russell's and Alfred North Whitehead's *Principia Mathematica* attempted to base mathematics on a purely logical basis, hoping to create a complete and consistent system of pure knowledge (Wooley, 1992). Though this task, as such, was abandoned, the influence of this project is felt to this day in the emphasis on mathematical truth as a route into the fundamental truth of the natural world. Chaos theory, catastrophe theory, criticality, fractals, scientific simulations of many kinds and for many different purposes, all rely on the certainty of computation to “prove”
the rightness of what is being investigated. The computer visualization, usually a simulation in three-dimensional space, plays a most important role.

Doyne Farmer, a scientist working in the new field of Artificial Life, is involved in the exploration of biological complexity. Farmer divides his time between Los Alamos and the Santa Fe Institute. He is using The Connection Machine, a parallel computer designed to produce the kind of computing power necessary for 'real-world' or natural phenomenon. Farmer says about his work with computer simulations of artificial life:

Once we have such simulations, the ultimate hope is that they will give us a handle to develop theories, because over and over again in nature you see that unless you have some concrete, idealized system to which you apply your theories, you can't really make a good theory. You have to have something like that firmly in mind to which you attach your mathematical apparatus. (interview in Brockman, 1991, p.11)

This quote, arising from the need for certainty in an "idealized system" for the purpose of making a "good theory", almost directly parallels a quote from another computationalist, actually one of the first, Alan Turing.

Turing, the British mathematician, specified, though did not build, the "universal machine" which we now recognize as the prototype for the computer, in a 1936 paper entitled "On computable numbers."

Three years after this series of lectures on Wittgenstein at Cambridge, he was "to show that mathematics, and better be called a science, is not a science, but a form of life, and that Descartes' and some others' idea of certainty really was a fiction.

"You cannot be absolutely certain that there is no God," Wittgenstein reportedly said to stop you applying mathematics. It would be an illusion in any result at all. Turing finally said, "Here we have a "change your way of thinking" method of referring to here is a need for certainty, which is not what truly is. Both Turing and Wittgenstein according to Wittgenstein and the "common philosopher" following passage.
Three years after the publication of this paper, Turing attended a series of lectures on the foundations of mathematics given by Wittgenstein at Cambridge. In these lectures, Wittgenstein's priority was "to show that what is called a mathematical discovery had much better be called a mathematical invention" (Diamond, 1975, p.22). Though these particular lectures were about the philosophy of mathematics, Wittgenstein was attempting to show how unnecessary Descartes' and succeeding philosophers' unmeetable quest for certainty really was.

"You cannot be confident about applying your calculus until you know there is no hidden contradiction there", said Turing. Wittgenstein replied that all contradiction would do would be to stop you applying the calculus, because it would simply fail to work. It would not produce a wrong result, it would not produce any result at all. The two kept up this ding-dong debate until Turing finally stopped attending. (Wooley, 1992, p. 66)

Here we have an example of Wittgenstein (1967), attempting to "change your way of seeing" (sec.461). What Wittgenstein is referring to here is his insistence on releasing us from the grip of the need for certainty, for safety in our attempt to understand what truly is. Both Turing and Farmer, though separated by 50 years, are, according to Wittgenstein's vision of philosophy, captive to a "common philosophical pathology" (Edwards, 1982, p.139). The following passage are remarks Wittgenstein (1967/1971) made
concerning Frazer's *The Golden Bough* in 1931, but apply equally well to Turing's view of doing math, Farmer's view of doing science, and to the contemporary pervasiveness of using scientific visualization and simulation as proof for discovering unifying theories:

For us the conception of a perspicuous presentation is fundamental. It indicates the form in which we write of things, the way in which we see things. (A kind of "Weltanschauung" that seems to be typical of our times. Spengler.)

This perspicuous presentation makes possible that understanding which consists just in the fact that we "see the connections." hence the importance of *intermediate links*.

But in our case an hypothetical link is not meant to do anything except draw attention to the similarity, the connection between the *facts*. As one might illustrate the internal relation of a circle to an ellipse by gradually transforming an ellipse into a circle; *but not in order to assert that a given ellipse in fact, historically, came from a circle* (hypothesis of development) but only to sharpen our eye for a formal connection. (p.34-35)

Like Wittgenstein, I am not suggesting that we should not be open to what we find, but that we not force the material into an inflexible model. Today's computer simulation and tomorrow's virtual reality simulation run the risk of having to once again comply with the need for certainty and safety. Given their mathematical basis, they are expected to prove that we "know" something.

Wooley (1992) distinguishes simulation from mimicry or imitation. The difference is important in that it points up what he calls the essential mean of an important distinction. The danger of non-corresponding truth and values is not so. In other words, that your model of the real, you can make a computer simulation of the real world. (In)

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calls the essential meaning of simulation, that it is "... ultimately determined not by any particular author, but by the laws of mathematics" (p. 55). Wooley's distinction specifies the capability of simulation which is simultaneously its most problematic quality, its procedural limits. These limits are seen as practical limits, separated from ethical questions, by researchers involved in virtual reality, as evidenced in this quote concerning the use of fractals to make a computer simulation of the Rocky Mountains look more realistic.

The speaker is Frederick Brooks, the director of the Virtual Reality Lab at the University of North Carolina at Chapel Hill:

The potentials for misleading are very great in that kind of instance and the fractal mountains are a good clear visual image of an important distinction between realism and truthfulness. The danger of more and more realism is that you don't have corresponding truthfulness, you teach people things that are not so. In business scenarios, or war games, to the extent that your model of the business world or the war world is not real, you can make the mistake of teaching people very effectively how to apply tactics and strategy that won't work in the real world. (Interview in Rheingold, 1991, p.45)

Though this quote by Brooks substantiates the discussion about the limits of simulation above, the path it opens leads us effectively to our starting point. Brooks makes what Gilbert Ryle (1932) calls a "category mistake". He confuses truthfulness with knowledge. If, as he suggests, it is necessary to acquire data from the actual Rocky
Mountain landscape, data provided by military excursions or mining scouts, we would not necessarily have the truth about the Rocky Mountains. We would have a practical guide to what we need to know to "apply tactics and strategies" from a military or business point of view. We would still be seeing and understanding the Rocky Mountains through the worldview of the militarist or the entrepreneur. After having the experience of fighting a war in the Rocky Mountains, or blasting them to smithereens for their economic usefulness we may come to understand something about their truth, but the issue of the uses of knowledge is still at hand. As Midgley (1989) suggests:

Indeed, as both Kant and Ryle have suggested, practical knowledge, 'knowing how', is at least as fundamental a skill as 'knowing that', since - as we have noticed before - the mere possession of knowledge is empty unless it can be actively used. (p.116)

Here, Midgley seems to support Brooks' rather practical approach, but she goes on:

Among the many problems that we have about 'how to live', there is then, certainly one particularly awkward squad of difficulties which are concerned with how to think. They are problems about the way in which we should use the rest of our knowledge, about how we should relate its various parts and how we had better view knowledge itself. As Wittgenstein later put it, 'a philosophical problem has the form "I don't know my way about"'. (p.117)
To help us find our way about we can look to Wittgenstein's (1969) *On Certainty*. In this book, written in the last year and a half of Wittgenstein's life, he attempts to free us from the Cartesian paradigm of foundationalism. He uses G.E. Moore's *Defense of Common Sense* as an example of how not to answer the Cartesian skeptic, the doubter who demands to be answered by the Cartesian search for epistemological certainty. Edwards (1982) gives a helpful description of the profound difference in Wittgenstein's approach and Moore's approach to the problem of certainty:

... the dispute turns upon fundamentally differing relationships to philosophical argument itself. Moore is happy inside the philosophy created by the Cartesian revolution; he wants to restore order to the room, to set things in their proper places and fix them there, safe from skeptical hooliganism. Wittgenstein, on the other hand, sees the Cartesian enclosure as a trap, not a living room; he wants to escape, not straighten up his cell. (p. 172-3)

To try to argue, as Moore does, by philosophical ideology, that our fundamental assumptions about reality are true, is to yield to the Cartesian need for certainty, to the need for a foundation to justify our existence and the existence of the world of which we are a part. Wittgenstein refuses to do so and instead attempts to "persuade" the reader by building an alternative image, or picture, to the traditional Cartesian one. Though Wittgenstein's alternative "picture of the world" has been mistakenly understood as a position of relativism.
Wittgenstein (1969) sees this possibility and denies that his motive coincides with “pragmatism”:

421. I am in England. - Everything around me tells me so; wherever and however I let my thoughts turn, they confirm this for me at once. - But might not I be shaken if things such as I don’t dream of at present were to happen?

422. So I am trying to say something that sounds like pragmatism.

Here I am being thwarted by a kind of Weltanschauung.

(p.54e)

A Weltanschauung is a world-view, and here Wittgenstein (1967) is not suggesting that one world-view is more “right” than another, or that all world-views are equally correct. What he wants to do is to...

... put this picture before your eyes, and your acceptance of this picture consists in your being inclined to regard a given case differently; that is, to compare it with this series of pictures. I have changed your way of seeing. (p.461)

He is trying to show us an entirely different image of thought, so that we may no longer be captive to the Cartesian image. Once “shown” this other image, we may see our own way clear of the Cartesian insistence on rationality-as-representation, and like a prisoner freed from his cell will for the first time feel himself again a part of the world. In the following passage, Wittgenstein (1969) alludes to what he calls the “utterances” of the language-game:

508. What can I rely on?

509. I really want to say that a language-game is only possible if one trusts something. (I did not say “can trust

something”).

510. If I say “something (Ail me it is an is

I don’t same for Moo

It’s just hold of my tr

Uterances, for trust is a mode of a mediation between

trust. The utterance

reality; rather it is an action whereby one

(Edwards, 1982, p. 1

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Artificial Reality an

Computers are u
something").

510. If I say “of course I know that’s a towel” I am making an utterance (Aussagen). I have no thought of a verification. For me it is an immediate utterance.

I don’t think of past or future. (And, of course, it’s the same for Moore, too.)

It’s just like directly taking hold of something, as I take hold of my towel without having doubts. (p.66e-67e)

Uterances, for Wittgenstein, are the expressions of trust, and trust is a mode of action. He sees it as such because there is no mediation between trusting and the linguistic expression of that trust. The utterance is “not an abstract representation of some reality: rather it is natural expression (not representation) of the action whereby one takes hold of a particular form of human life.”

(Edwards, 1982, p. 183)

204. Giving grounds, however justifying the evidence, comes to an end; - but the end is not certain propositions’ striking us immediately as true, i.e. it is not a kind of seeing on our part; it is our acting, which lies at the bottom of the language-game.

(Wittgenstein, 1969, p. 28e)

We will return to idea of action as the link between the knowledge and meaning at the end of this chapter, but, first, we must allow Wittgenstein, and several contemporary thinkers, to aid us in escaping from the ontological portion of the Cartesian prison, mind-body dualism.

Artificial Reality and the Mind-Body Split

Computers are unique in that they are all, in a sense, simulations
of some ideal computer, a 'universal machine'. Everything a computer does can be seen as a simulation, except that many of the things it simulates do not exist beyond the simulation. What, then, is simulation? Is it just another form of imitation or representation, fiction for the computer age? Can anything be simulated - even reality and human intelligence? (Wooley, 1992, p.6)

In answer to the question "What is simulation?" one must, if one does not what to find oneself back in the proverbial Cartesian boat without a paddle, define simulation in terms that include its context, its uses, and our lived experience of it. Just because a simulation refers to something real, does not inherently make it a substitute for the real thing. And the mathematical basis of simulation must be seen not as the expression of "THE" truth, but the expression of "A" truth, one that works exceedingly well in a mathematical universe, but may not serve us well in the entire world of which mathematics is a part.

Artificial reality is distinct from simulation in that it does not try to replace an already existing reality, but attempts to offer up a humanly fabricated alternative reality. The fact that this definition corresponds to the original definition of the term coined by its "inventor", Myron Krueger, was brought home to a packed convention hall in Dallas, Texas at Siggraph '90, the annual Special Interest Group on Computing Graphics meeting which that year had 32,000 visitors. Krueger was a panelist on a discussion titled "Artificial Reality." Funded by a single university whose members include the Human Interface Group at Seattle, Warren Robison of the University of North Carolina pointed out Krueger's work, and Krueger himself, from the Chair, Bob F. What Krueger technologies to rely on, such as head-mounted displays, is now well-known as a breakthroughs funded in April 1989, when ran on the front page credit for coining the
32,000 visitors. Krueger, one of the first computer artists, was not
invited to be on the “Hip, Hype, Hope” panel on virtual reality, but
was a panelist on another panel entitled “Interactive Art and
Artificial Reality.” He was sitting in the audience of the former panel,
whose members included technologists such as William Bricken from
the Human Interface Technology Lab at the University of Washington
at Seattle, Warren Robbines from the Virtual Reality Lab at the
University of North Carolina at Chapel Hill, and that troubadour of
otherworldliness himself, Timothy Leary. A member of the audience
pointed out Krueger’s absence from the panel and any mention of his
work, and Krueger himself stepped “forcefully to the dais” (Panel
proceedings of Siggraph, 1990, p.10-25) and took the microphone
from the Chair, Bob Jacobson. Krueger pointed out that the panel’s
members represented “. . . orthodoxy that has been established”
(p.10-25). What Krueger was referring to was the trend in emergent
technologies to rely on more and more technological encumbrances,
such as head-mounted displays, data gloves, and data suits. Krueger
is now well-known as a pioneer of many of the technological
breakthroughs fundamental to what we consider as virtual reality.
In April 1989, when an article entitled “What is Artificial Reality?”
rang on the front page of the New York Times, Krueger was not given
credit for coining the term (Rheingold, 1991).
The mainstream or "orthodoxy" of virtual reality research to which Krueger referred, and its reliance on hardware encumbrances did not emerge from Krueger's work or that of Morton Heilig, another pioneer, but from academic, military and commercial research laboratories (Rheingold, 1991). Krueger says in the updated version of his book, Artificial Reality (1991):

Whereas the other early workers thought in terms of devices worn or held by sedentary operators, I was committed to unencumbered full-body participation in artificial experiences. While they saw artificial reality as the next step in computer graphics or as the solution to a particular problem, I envisioned it as a general computer interface, as a form of telecommunication, and as a medium of expression. (p.xv)

This difference in approach is exceedingly important in terms of what it tells us about the directions of interactive technological design and the thought systems in which it is being developed. Krueger's (1991) approach to inactuality is based on the idea of the computer adapting to the human. He says:

Humans are evolving slowly, if at all. On the other hand, computers are the most rapidly evolving technology in history. It seemed that study of the interface should focus on the static qualities of the human, rather than on the transient issues of computer technology. The computer should adapt to the human, rather than the human adapting to the computer. It was clear that the ultimate computer should perceive the human body, listen to the human voice, and respond through all the human senses. (p. xiv)

Krueger (1991) describes this as an "unencumbered" approach of "encumbe" medium of expression that does not mask our senses of consciousness. We are technologically fabricated beings that makes us an individual approach to "mainstream" approach that delivers to the partici...

The mainstream and development approach has predominately on the black and the separation of those concepts on "rationality as rep... (1664/1988) in Prin...

This notion of the human is the most certain thing in the world... (Part 1, 8, p.162).
Krueger (1991) describes his realization of this goal, "Videoplace", as an "unencumbering, environmental" (p.xv) artificial reality. Krueger's approach differs from what he calls the mainstream approach of "encumbering technology" not only in its intent as a medium of expression, but in its trust of the human body. It does not mask our senses or attempt to separate them from our consciousness. We are able to participate as a whole being in a technologically fabricated reality, bringing with us everything which makes us an individual. The experience differs greatly from the "mainstream" approach in which computer-generated stimuli is delivered to the participant's senses.

The mainstream approach, as it is being developed in research and development environments around the country, relies predominantly on the Cartesian paradigm of scientific investigation and the separation of mind and body which lies at the very core of that paradigm. This separation stems from the Cartesian insistence on "rationality as representation". According to Descartes (1664/1988) in Principles of Philosophy:

This notion of thought precedes that of all corporeal things and is the most certain, since we still doubt that there are any other things in the world, while we already perceive that we think. (Part 1, 8, p.162)
The idea that man is a thinking being, and can know everything about the world through only the cognitive perception of representations contains Descartes’ assumption of the separation of the mind and the body. The mind and the body, indeed, everything of the corporeal world other than “this thinking I”, are assumed to be entirely different entities. The only indubitable method of ascertaining the existence of these “bodies”, for Descartes, is to submit them to a logical four step method based on the separation of a thing into its parts. One is then able to reassemble these parts in a logical fashion by reasoning, and hence, understand their nature. The ability to affect this method substantiates man as a thinking being. It also divides him from his body. Man can think about his body, but is not his body. Descartes (1641/1968) says in the Meditations:

... it is now manifest to me that bodies themselves are not properly perceived by the senses nor by the faculty of imagination, but by the intellect alone; and since they are not perceived because they are seen and touched, but only because they are understood [or rightly comprehended by thought], I readily discover that there is nothing more easily or clearly apprehended than my own mind. (II, p.103)

According to Descartes, only man has the ability to think, and this ability separates him from the rest of the world, even from that part of the world which houses “this thinking I”, the body. This separation is what the final stage of consciousness, precisely in the

Bermann goes on to consequent reductionist therefore, underscores it to our advantage. different rationale his impetus for knowledge purposes of the acq before him, had ven the results of which “How?” became the (1637/1968) makes the

[My discoveries] knowledge that we instead of speculating can find a practical behavior of fire, bodies which suit different skills of all the purposes ourselves master.

In this quote, we can

Descartes makes bet
separation is what Morris Berman (1981) calls:

the final stage in the development of nonparticipating consciousness, that state of mind in which one knows phenomena precisely in the act of distancing oneself from them. (p.27)

Berman goes on to say the result of this distancing of nature and consequent reduction of its mysterious whole into distinct and, therefore, understandable parts is the supposed ability to manipulate it to our advantage. The manipulation and control of nature is a very different rationale for the accumulation of knowledge than the impetus for knowledge of the Middle Ages. Instead of teleological purposes of the acquisition of knowledge, Descartes, and Galileo before him, had very different reasons for their scientific inquiries, the results of which continue to affect our relationship to knowledge. “How?” became the important question, not “why?”. Descartes (1637/1968) makes this goal explicit in the Discourse of Method:

[My discoveries] have satisfied me that it is possible to reach knowledge that will be of much utility in this life; and that instead of speculative philosophy now taught in the schools we can find a practical one, by which, knowing the nature and behavior of fire, water, air, stars, the heavens, and all the other bodies which surround us, as well as we now understand the different skills of our workers, we can employ these entities for all the purposes for which they are suited, and so make ourselves masters and possessors of nature. (6, p.78)

In this quote, we cannot but clearly understand the connection

Descartes makes between knowledge and mastery. He compares the
utility of understanding and possessing nature to the comprehension already in place to utilize "our workers". "All the other bodies which surround us" included all of the natural environment, animals, and human beings whose existence, for Descartes, was justified by their skills in working.

Berman (1989), in his erudite history of the body in Western civilization, *Coming to Our Senses* cites the relationship between animals and man as a telling indicator of how the people of the period of history in question relate to their own bodies:

... and that knowledge of this takes us directly into the Self/Other relationship, which in turn "unpacks" the culture in question, or the historical period being studied. (p.65)

With Descartes' "proof" of the mechanical philosophy, animals became automata, machines that could be used for a specific purpose, that of experimentation. Since the seventeenth century, the use of animals in experimentation has grown to a large scale business, numbering in the millions of animals per year in this country alone (Singer, 1975). And as Berman (1989) points out:

... animals are now regarded as laboratory tools, experimental "equipment," no more significant on an invoice or order sheet than test tubes or graduated cylinders. They are literally "stuff," and this is the nadir of the Self/Other relationship. . . (p.83)

Allucquere Roseanne Stone (1992) makes an equivalent connection between Cartesian mind-body dualism and the politics of power:

Because of the way that forgetting abounds and extracts a price from forgetting — those labor that act of forgetting offer us a different offering, a different perspective on the Cartesian paradigm of human and non-human minds. In the present, Wittgenstein's offering is an imperative to remind and attempt to answer that question that need for certainty always lead again to the conclusion that our language, the extensions of our mind, are not in the business of some reality. For some reason, but replaces

Here is one possible answer: a new natural, expressions.
A child has hurt his foot, and teach him to ask for compensation. But other child new pain-be
"So you are say..."
Because of the way power works, it is important to remember that forgetting about the body is an old Cartesian trick, one that extracts a price from those bodies rendered invisible by the act of forgetting - those on the lower end of the social scale by whose labor that act of forgetting is made possible. (p. 620)

The later Wittgenstein proves to be enormously helpful in offering us a different vantage point from which to view what is in the Cartesian paradigm the necessity of separating our bodies from our minds. In the previous section on foundationalism, we found Wittgenstein's offerings of an alternative image to the traditional Cartesian one based on rationality-as-representation. It is imperative to remind ourselves that Wittgenstein does not try to beat Descartes, and the whole inherited Cartesian tradition, by attempting to answer the need for Cartesian certainty. Answering that need for certainty as if it was a relevant question would then lead again to the concept of thought representing reality. And again our language, the external proof of our thought, and according to Descartes, our existence, would then be interpreted as merely reports of some reality. For Wittgenstein (1953), language does not refer to sensation, but replaces it:

Here is one possibility: words are connected to the primitive, the natural, expressions of the sensation and are used in their place. A child has hurt himself and he cries; and then adults talk to him and teach him exclamations and later, sentences. They teach the child new pain-behavior.

"So you are saying that the word 'pain' really means crying?"
On the contrary: the verbal expression of pain replaces crying and does not describe it. (sec. 244)

Wittgenstein is putting before us an image of an entirely different view of the connection between internal and external, between the mind and the body. Wittgenstein shows us the possibility of our language being the embodiment of our sensation, thereby allowing us to imagine the possibility of the oneness of mind and body. Our "utterances" of pain do not represent our pain, they are the pain.

What Wittgenstein accomplishes in his later work is to offer us a way to think about meaning that does not rely on the Cartesian assumption of the separation of knowledge and meaning. He also gives us the chance to see ourselves as part of the world, not as the primary source of knowledge. We are able to understand or make sense of ourselves through communication with others. Once we understand that we are part of what we had considered to be the external world, we no longer have to build an intellectual superstructure that must stand in for the world, one that we rely on to answer our questions about how and why to act in the world.

Wittgenstein offers us the possibility to comprehend meaning through the use of language, if we understand language as a particular kind of action.

Once we have seen our way clear of the interrelated Cartesian problems of founda subsequent necessity by rationality, we are struggling with the dilemmas. As Wittgenstein has put it, "We must learn to think about our thinking about the world." (Malcolm, 1958).

If we follow Wittgenstein's analysis of knowledge as inextricably bound up in the contemporary culture, we may come upon two questions.

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problems of foundationalism and mind-body dualism, and the
subsequent necessity of building another reality apprehended only
by rationality, we find ourselves again in the world, but still
struggling with the means to consider, if not answer, ethical
dilemmas. As Wittgenstein himself said:

What is the use of studying philosophy if all that it does for you
is to enable you to talk with some plausibility about some
abstruse questions of logic etc., and if it does not improve your
thinking about the important questions of everyday life?
(Malcolm, 1958, p.30)

If we follow Wittgenstein's lead and begin to think of meaning and
knowledge as inextricable threads woven through everyday life, we
may come upon two extreme interpretations of how then to utilize
this new view in our search for ways of thinking about ethical
questions.

Wittgenstein has had enormous influence on contemporary ethical
thought. Both Midgley and Edwards cite what may be called
relativism and realism as two distinct reactions to that influence in
contemporary culture as well. Edwards sees both responses as still
bound up in the Cartesian paradigm of reality as representation.
Midgley, however, sees both reactions as extreme positions along a
possible continuum. Realism, as defined here in terms of ethical
matters, allows judgment of thought and action to be based on a
single form of life, in most cases, that of the one with which we are most familiar. Relativism, on the other hand, insists on the validity of multitudinous possibilities of judgment of thought and action, each within the particular form of life in which it exists.

Numerous examples of both extremes immediately come to one’s mind from current issues discussed within the broadcast and newspaper press. What Midgley (1989) suggests is that both extremes are misreadings of Wittgenstein, and extremely unhelpful when dealing with ethical matters:

The notion that a ‘form of life’ could be a sealed, exclusive circle containing a set of ideas that are wholly fixed and harmonious with each other is unreal. Everybody lives in many such overlapping circles, and conflict and development is always going on within all of them. (p.236)

Edwards suggests two alternatives to these extremes. Both are intrinsic to a particular understanding of Wittgenstein’s later thought. One, pragmatism, drops the Cartesian-Kantian notion of representation completely and instead emphasizes human action as a direct means of answering needs and desires. Edwards (1984, p. 225-229) cites the pragmatism of James and Dewey as examples of this alternative. Midgley (1989) seems to me to be another proponent of a pragmatic philosophy when she says:

The circles [author’s note: this refers to the circles discussed in the immediately previous quote by Midgley] do not supply the infallible authority for which we pine to resolve our dilemmas.
They only provide a setting, a context, a usable tradition, a set of conceptual tools. We are much better off with these things than without them... (p. 237)

This very practical version of Wittgenstein's thought is helpful indeed when faced with ethical questions, but another alternative exists. Edwards' interpretation of Wittgenstein's ethical vision is a more profound and encompassing one. It also mirrors the vision of emerging ethical aesthetics being developed in this dissertation, one that finds support in both Terry Eagleton's critique of the Western history of aesthetics and ethics, and contemporary feminist moral theory.

Edwards centers his alternative of Wittgenstein's ethical vision around the difference between notions of individual and universal morality. Edwards (1982) insists that from the eighteenth century on, "ethics has been obsessed by problems of will" (p. 238). How to act becomes a question only to be answered by reference to principles based on true moral knowledge. The discovery of this true moral knowledge is in turn based upon our access to truth, in general. That access is assured, according to the Cartesian paradigm, by reliance on rationality-as-representation. Ethical choices then become another instance of testing for the truth. The individual being or individual situation, with all its particular needs, becomes
merely another occasion for the triumph of the will. The purpose of making an ethical choice becomes to follow moral principles, based on fundamental truths, not to address the particular needs of a situation or being. The other becomes an object upon which we exercise our will, in this case the pursuit of ethical correctness.

Edwards notes Wittgenstein's need for a different attitude towards ethics, one that sees the world not as an occasion for the exercise of one's ethical will, but as the direct response to an understanding of individual needs. Edwards describes this response as deriving from looking at the world not as a riddle to be solved, as one looks at it through the scientific view, but as a miracle. He interprets the later Wittgenstein as developing this approach to ethics. It rests, Edwards says, on an ethical sensibility that produces wonder and humility, not scientific curiosity. Wittgenstein (1965), in his *Lecture on Ethics*, says:

> And there, in my case, [whenever I want to fix my mind on what I mean by absolute or ethical value] it always happens that the idea of one particular experience presents itself to me which therefore is, in a sense my experience par excellence. . . . I believe that the best way of describing it is to say that when I have it I wonder at the existence of the world. (p.9)

He adds, three pages later, "The truth is that the scientific way of looking at a fact is not the way to look at it as a miracle" (p.12). This ability to look at the world as a miracle has fundamental ethical significance. It produces individual realities that Edwards describes as

> . . . matter of deciding of one's life and in morals because in morals because attention, to find individual one co

This interpretation describe contemporary Gilligan's (1982) groundbreaking seminal book on woman

*Voice*, contemporary philoseph Merhabib, 1988; Freid Meyers, 1988; Stocket on care, responsibility a

justice derived from the (1982) own words, the acknowledgement of a

. . . in woman's men
development may pl development in which which creating and becomes a central role and moral theory like twentieth century, the human connection.
significance. It produces profoundly different ethical responses to individual realities than does the Kantian notion of a universal ethic.

Edwards describes the former moral life as a

... manner of deeper and deeper penetration into the vicissitudes of one's life and lives of ones fellows; love is the central concept in morals because it names that capacity to go even deeper in attention, to find more and more reality to wonder at in whatever individual one confronts. (p.238)

This interpretation of Wittgenstein's ethical vision could also describe contemporary feminist moral theory. Based largely on Carol Gilligan's (1982) ground breaking empirical research and consequent seminal book on woman's developmental theory. *In a Different Voice,* contemporary philosophers and theorists (e.g. Adler, 1988; Benhabib, 1988; Freidman, 1988; Kastzeinstein and Latin, 1988; Meyers, 1988; Stocker, 1988) propose a conception of morality based on care, responsibility and relationship in contrast to the morality of justice derived from the philosophical tradition of Kant. In Gilligan's (1982) own words, the far-reaching significance of the acknowledgement of a "care perspective"

... in woman's moral thinking suggests that the study of women's development may provide a natural history of moral development in which care is ascendant, revealing the ways in which creating and sustaining responsive connection with others becomes a central moral concern. The promise in joining women and moral theory lies in the fact that human survival, in the late twentieth century, may depend less on formal argument than on human connection. (p. 32)
The idea that the ethic of care and responsibility might be extended, cries to be extended, to the political sphere, to our social life as a whole is affirmed by feminist political theorists, such as Katzenstein and Laitin (1988). They explain that although the fundamental morality of the care perspective derives from the conviction that responsibility is owed to the contextualized individual and not to abstract principles of justice, that conviction includes ideas about the political sphere:

Central to this conviction was the belief that the private and public spheres could not be set apart. To foster mutual caring and responsibility in the private domain required the exercise of political power on the public stage. To achieve responsibility and caring in public life demanded that values learned and exercised in personal relationships and family life had to be transported into public arenas of authority. (p.263)

This notion of the necessary relationship between public and private spheres is echoed in both Edwards interpretation of Wittgenstein and Eagleton’s delineation of the “ideology of the aesthetic.” As Eagleton (1992) asserts:

The aesthetic is preoccupied among other things with the relation between particular and universal; and this is also a matter of great importance to the ethico-political. (p.413)

It is the actual needs and desires of individual beings that render them at the same time different from other beings and similar. To have the right to participate in these differences respec
t Edwards and Eagleton’s polis is gone. Eagleton having... failed to take... politics, of the quest for happiness and seren

As Eagleton explains, the political goal of recognizing others as individuals is necessary as one’s own. Both towards and again, understand the history of aesthetics. This connection impact on how technol

have the right to participate with others in the process of having these differences respected is what the ethico-political is about. Both Edwards and Eagleton make the point that Aristotle’s idea of the *polis* is gone. Eagleton (1992) critiques modern ethical thought as having

... failed to take Aristotle’s point that ethics is a branch of politics, of the question of what it is to live well, to attain happiness and serenity, at the level of a whole society. (p.413)

As Eagleton explains, and I contend, in the development of the political goal of recognizing and taking responsibility for the care of others as individuals with needs and desires as important and necessary as one’s own, ethical values in the aesthetic tradition work both towards and against that goal. It is imperative that we understand the history of the connection between ethics and aesthetics. This connection has had, and will continue to have, great impact on how technology defines and is defined by culture.
 CHAPTER II

Ethics and Aesthetic

Part One

The history of the ethical assumptions found in the art-making process and how these assumptions have effected the aesthetic qualities of art is the subject of this chapter. The chapter will be divided into two parts: the first will begin with a broad view of the relationship between ethics and aesthetics and then, attenuate into a more specific look at ethical assumptions embedded in the use of technological advances in the arts, and corresponding representations of technology in art. This first part will end with a discussion of what is felt by many to be the predominant aesthetic of the day, postmodernism, and its relation to photography as compared and contrasted with computer technology in art making. The second part will concern what this dissertation proposes as the primary informing aesthetic of the next century, interactivity. It will include origins and models of interactivity in the arts, as well as developing and current examples. The central point I would like to make is that in making aesthetic choices artists have assumed certain ideas about the purposes and va.
changed over time a internal and external primary impact on an art of any particular in terms of judgment conceptually with both involvement in the a understand the conse

The idea of judgment involving our entire possibilities. Those choices consistent with our account of accountability of our existence as social, in (Midgley, 1991, p.23) knowledge. As stated and unreachable limits advance the possibility separation of moral and for decades. The rep. Bacon and Descartes
the purposes and values of art making. Those assumptions have changed over time and have come from various sources, both internal and external to the art making process, but they have had primary impact on what was communicated by the art and about the art of any particular time. Ethics and aesthetics both can be defined in terms of judgment. It is this partnership that allows us to grapple conceptually with both areas of thought at once. But, it is their active involvement in the artmaking process that will allow us to understand the consequences of that partnership.

The idea of judgment in ethics is an all-encompassing function. Involving our entire being, it is the way we choose among many possibilities. Those choices commit us to paths which are more less consistent with our nature and the rest of our lives. The accountability of our judgments is “part of the condition our existence as social, integrated, affectionate, language-using beings” (Midgley, 1991, p.23) and touches on questions about the nature of knowledge. As stated in the previous chapter, setting an artificial and unreachable limit for knowledge was a project undertaken to advance the possibility of modern science. The result was the separation of moral and intellectual spheres that has been occurring for decades. The repercussions of that division began with Kepler, Bacon and Descartes and are continually evident in almost every
aspect of our culture. This separation also influenced our thoughts about judgment and its place in making ethical choices. This same separation had enormous influence over judgment involved in aesthetics. It is the aim of this chapter to trace ideas about the purposes and values of art through the history of aesthetic judgments made by artists and their viewers. These judgments will be found to have been made in concert with value assumptions.

Judgment in aesthetics can be taken to mean the evaluation of specific properties of a work of art, as well as an evaluation of the general quality of it. Though the history of issues referred to by the term *aesthetic* is as long as that of ethics, the term itself did not appear until the German philosopher, Alexander Baumgarten, coined it in 1750 to refer to a special area of philosophy. Taken from the Greek word for "sensory perception", it signaled a shift of attention from things to perception of things (Eaton, 1988) and a shift from thinking about separate qualities of a particular art object to underlying philosophies of art. It is this newer sense of the word on which we will rely. Limiting the description of artistic activity to choices about particular qualities of works of art, such as the use of light, line, form, shape in a particular time period would leave us with less than half the story.
The underlying philosophy of art that has been the most influential in thinking about aesthetics was Kant's (1790) outline of the characteristics of aesthetic judgment in his *Critique of Judgment*. Battersby (1991) contends that during the nineteenth century, Kant's notion of the aesthetic attitude as a "disinterested" withdrawal from all material and use-value was developed

... to an extreme. The aesthetic was equated with a particular attitude of mind: with a blanking out of moral, social and political considerations ... and with an indifference to bodily dictates and needs. (p.37)

But even though Battersby rejects Kant's notion of 'disinterestedness', she goes on to say:

there is no way of escaping the necessity of judging aesthetically... Even to give priority to political, ethical or utilitarian value judgments over aesthetic judgments is, in effect to opt for a particular variety of aesthetic value (p.38).

This dialectical consideration of aesthetics is one that is echoed by Eagleton (1991), and with which I agree. To judge aesthetically is to compare values, and those values emanate from the totality of the judge and his context. In order to move from the extreme interpretation of Kant's notion of aesthetics to more contemporary views, such as Battersby's, Eagleton's and my own, contemporary critics (e.g., Berger, 1972; Gablik, 1991; Lippard, 1990; Wolff, 1982) suggest that aesthetics, like knowledge, has had to go through a
period of relativism. The objectivity of judgment in aesthetics, the values on which those judgments are based, and who makes those judgments, have been taken into serious consideration. Wolff (1982) says:

[T]he demonstration that knowledge (including science) is interest-related, that the practices of scientists are in one sense arbitrary, and that knowledge has a 'provisional nature', has been widely accepted among sociologists of knowledge. Relativism has become respectable as one position within the society of knowledge... But more recently... the problem of truth has emerged in a particular form in the sociology of art - namely, in terms of the question about true or valid art. (p.33)

Though I would argue that art is still in this period of relativism, the final part of this chapter will concern where this period of relativism might be leading art in the future. The first part will attempt to characterize how ethical judgments effected the aesthetic qualities of art before and during the twentieth century.

Part Two
Art before the twentieth century

Plato had a great deal to say about the social effects of art and the social role of artists. For Plato, the nature of moral knowledge is the Good, an abstract standard that is eternal and un revisable. Beauty, too, conforms to an eternal, fixed standard. These ideals of goodness and beauty. 'Forms' representations. As the capacity of judgment must apprehend the everyday existence of extreme difficulty with ethical knowledge (cf. contemporary Athens, the last group to have no real social role in art), though mimetic poet's purpose is not to do not truly understand squanders the opportunity through imitation, reasons, though poet's own portrayal of characters (cf. 1992).

While there is much the enormous power impact on both artists, disagreements between
and beauty. 'Forms', have a reality apart from their everyday representations. And, according to Plato, if one is to exercise the capacity of judgment based on knowledge, not opinion, then one must apprehend these 'Forms'. This banishment of the Good from everyday existence and knowledge by Plato's theories implies the extreme difficulty with which only a few people are able to ascertain ethical knowledge (Sorell, 1992). In Plato's depiction of contemporary Athens, artists, poets, and painters would be among the last group to have access to such knowledge and therefore have no real social role in his Ideal state, The Republic. He argues that though mimetic poetry has the same subject matter as ethics, the poet's purpose is not one of ethical instruction. Instead, the poet does not truly understand the ideals of goodness and truth, but squanders the opportunity for instruction on merely entertaining through imitation. Painters and paintings are criticized for the same reasons, though poetry is said to be particularly dangerous because of its portrayal of characters in emotional conflict (Hursthouse, 1992).

While there is much in Plato with which to argue, his theories on the enormous power of art in the ethical realm have had a huge impact on both artists and philosophers to follow. For our purposes, disagreements between Platonic and anti-Platonic positions, such as
those developed in the seventeenth and early eighteenth centuries by Lord Shaftesbury (Sorell, 1992), exemplify wherein the symbiosis of ethics and aesthetics lies. The fact that the aesthetic qualities of art are powerful means of communicating moral feeling is not doubted by Plato or his critics. What is at issue is to what uses those aesthetic qualities are put. And in choosing those uses, artists exercise judgment that ranges over a realm that includes the ethical and aesthetic. Plato did not trust the judgment of artists, but others have.

Aristotle rejects Plato’s view that particular objects resemble a Form which exists in another transcendent world. For Aristotle, we are able to perceive the ‘universals’ of things because they exist in this world as the essences of the objects we perceive. And since they exist in our world we can know them by sense perception and emotion as well as reason. The best use of representation of reality, for Aristotle, involves the conveyance of universal truths about what a certain type of person will or will not do through the representation of action and life, i.e. happiness and misery. And here, Aristotle becomes the authority and reference point for hundreds of years of describing and assessing works of art in similar terms - as for instance, expressing, or conveying, or capturing, or representing, ‘human’ truth(s). (Hursthouse, 1992, p.258)

Plato and Aristotle's continuing debates between these two approaches of viewing the essential qualities of art. In the twentieth century, these two approaches have become dominant forms of artistic expression:

Features of an aesthetic and an ethical approach to the art of our time:

1. Aesthetic approach: focus on the beauty, clear and exact representation of the objects we perceive, emphasizing the emotional and intellectual aspects of art. This approach is often associated with modernism and formalism.
2. Ethical approach: focuses on the moral and ethical implications of art, emphasizing its role in shaping human behavior and society. This approach is often associated with romanticism and humanism.

These are, of course, not mutually exclusive categories, and many works of art might fall into either category, depending on the context and interpretation. However, understanding that these two approaches have different underlying assumptions is crucial for appreciating the complexity of artistic expression.
Plato and Aristotle established the initial rounds of what has been a continuing debate between the intellectual and emotional approaches of visual expression, and their associated aesthetic qualities. In the history of Western art, from Classic Greek art to the twentieth century, there appears to be seven major shifts between these two approaches, cycling slowly at first, and then more quickly between the two extremes. The aesthetic qualities of these two dominant forms of expression can be described in the following ways:

Features of an intellectual or classic approach are: an emphasis on design and composition; a cool, analytical approach to the subject; the use of rules; an emphasis on neat, clean arrangements and proper proportions; and an excellence of realistic drawing. Aspects of an emotional or romantic approach to art are: an active and colorful interpretation of the subject; the required participation of the viewer; violent movement; distortion; bright and vivid colors; a strong interest in nature; and a personal approach to the subject. (Brommer, 1981, p.72)

These are, of course, generalizations of descriptions of qualities that might or might not exist together in works of art considered to fall into either category. What is important for our discussion is that it might be possible to tease out of this compendium a way of understanding that, in making aesthetic choices, artists have assumed certain ideas about the purpose and value of art making.
My point is not that one or the other of these categories of expression is more suited to or reliant on ethical thought. Placing Post-Impressionism in the classical/intellectual column, for instance, leaves us with a profound dissatisfaction in placing Gauguin's *Where Do We Come From? What Are We? Where Are We Going?* there along with it. The point is exactly the opposite. Ethical judgment can *always* be assumed when discussing aesthetics of a particular time because aesthetic choice is based on assumptions about the purposes and values of art during that time. Until the late nineteenth century, art’s capabilities for ethical thought were utilized consistently. And though much thought developed around the idea of the necessity for separating the two kinds of judgment, ethical and aesthetic, in the eighteenth century (i.e. Kant), it will be shown later in this chapter that the need to isolate the aesthetic from other considerations, in order to better understand and make use of its most vital characteristics, was undertaken for the purposes of reuniting it with other integral concerns of human experience, such as ethics.

The seven major shifts of expression from intellectual to emotional qualities in Western art before the twentieth century are roughly from Classic Greek art to Christian Gothic art, to art of the Renaissance, to Baroque, to Neoclassicism, to Romanticism, to Impressionism, to Expressionism. Classic Greek art emphasized representation understanding narratives of order tightly to the humanity’s place toward perfection of order of the Renaissance the Baroque emphasis understanding of rules of composition for order in a passionate revolt by the political attempted to define Romanticism. Impressionism perception and Post-Impressionism stark insistence on poverty, and the "bourgeois" culture being swung by
representation and the ideal proportion of beauty for better understanding of the Good. The more natural and expressive narratives of Gothic painting and sculpture bonded viewer’s more tightly to the glorification of the Church. The intense interest in humanity’s place in God’s universe was demonstrated by the perfection of order and balance as embodied in physical proportion of the Renaissance. The dramatic, highly charged value contrasts of the Baroque engaged the viewer in an emotional, empathic understanding of God. The reliance on ancient Classic themes and rules of composition and design of Neoclassicism conveyed the need for order in a politically chaotic world. The color, content, and passionate revolt of Romanticism was against the confines imposed by the political and social hegemony of the academy, and Realism attempted to discard the confines of both Neoclassicism and Romanticism. The uniquely new analytical approach of Impressionism attempted to elicit a truer understanding of perception and thus a more complete understanding of reality, while Post-Impressionism included a broader interest in content. The stark insistence of Expressionism on images of pain, fear and poverty, and the ‘ugly’ exuded their personal dissatisfaction with “bourgeois” culture of the time. The reader may now be dizzy from being swung back and forth between centuries, and so we must
move on to the twentieth century where things swing so quickly that the vertigo becomes an aesthetic quality.

According to Jacques Barzun (1973), the twentieth century begins with the last decade of the nineteenth century, because it is included in the quarter century 1890-1914 that is “the formative period from which all our present ideas and attitudes are derived” (p.47). And if, again according to Barzun, the purpose and value of art rose from a means by which the moral tenants of religion were communicated, as they were in the Medieval period, to a religion itself in the nineteenth century, then the quarter century period between the nineteenth and twentieth centuries was one in which art vied simultaneously for the position of destroyer and redeemer, or as Barzan himself so succinctly puts it: “What art promise[d] is the modern equivalent of the program contained in John Hayward’s seventeenth century best-seller, Hell’s Flames Avoided, Heaven’s Felicities Enjoyed” (Barzan, 1976, p.74).

Art During the Twentieth Century

The aesthetic qualities of the art of the twentieth century are bound up with the destruction of traditional aesthetic qualities; beauty, harmony, totality, appearance, but, the destruction presumes the purposes of building up a new world. Looking back from the distance of almost one hundred years, it is easier to see the annihilation and re-creation of the old world, as inseparable from the significance that the painters of that time gave to architects of a particular dimension, safeguard a dimension obfuscated by abuse of qualitative in humanism, had been seen to continue the foundations in either aesthetic underpinning.

What, for the moment, is New for the purposes of the contemporary artist is the taking responsibility is still unfolding.

The two overall aspects of the century, “art for art’s sake” that can be viewed as both political and spiritual vertigo, promised
annihilation and rage evidenced in the art of the early part of this
century, and its parallel desire to produce a better, transcendent
world, as inseparable aspects of a continuing drive to substantiate
the significance the arts have for our lives. The poets, writers,
painters of that time period were both demolition agents and
architects of a propulsion desperately engineered to liberate and
safeguard a dimension of human life. That dimension was often
obfuscated by abuses of its powerful sensitivity to what is
qualitative in human experience. This twofold enterprise can be
seen to continue throughout the twentieth century and has its
foundations in eighteenth century philosophical thought, and the
aesthetic underpinnings of both Neoclassicism and Romanticism.
What, for the modernists, was a full scale attack on tradition by the
New for the purposes of protecting that sensitivity, is for
contemporary artists a reminder that, like it or not, the process of
taking responsibility for the power that comes with the making of art
is still unfolding.

The two overarching ethical themes of the art in the twentieth
century, “art for art’s sake” and “art for society’s sake” (Gablik, 1984)
can be viewed as artistic solutions to the immense economic, social,
political and spiritual alterations of this time period. Though the
vertigo, promised in the section above, from the constant changes in
styles, movements, doctrines, and forms of art certainly has
increased as the century has progressed. It is possible to expose these
changes as having one or another of the two themes as their
underlying resolve.

The "dehumanization" of art that took place in the early
decades of this century was very much a response to the
artist's spiritual discomfort in capitalist and totalitarian
societies alike. As Kadinsky put it, "the phrase 'art for art's
sake' is really the best ideal a materialist age can attain, for
it is an unconscious protest against materialism, and the
demand that everything should have a a use and practical
value." (Gablik, 1984, p.21)

The move away from representation to abstraction was the main
component of what, for many artists, in the early period of
modernism, amounted to "an aesthetic theology" (Gablik, 1984).
Artists turned inward for transcendence and spirituality in
individual meaning:

(Malevich went so far as to claim he saw the face of God in
his black square, and Theo van Doesburg declared that "the
square is to us what the cross was to the early Christians." )
This notion of the artist as the last active carrier of spiritual
value in a materialist world remained attached to all
abstract art until the end of Abstract Expressionism. (p.21)

Berleant (1992), in a particularly persuasive essay, describes the
introduction of abstraction as the foundation for the theoretical
doctrine of formalism in which "that which is recognizable, realistic,
and lifelike became on principle unessential and indeed, distracting"
Yet he sees this development as one side of a constant dynamic moving in the direction of an integral connection between artistic experience and the world outside of art. In the more recent trend of the last several decades in which the range of what we have been willing to accept as art has been extended, he sees a questioning about our relations with the art object and our ideas about those relations:

A challenge has been laid down in particular to ideas and practices that codify the separation of art from life, like the disinterested attitude for regarding art, the removal of art from practical uses, and the deliberate deletion of all nonartistic associations from artistic products. (p.417)

Berleant sees the parallel between isolating the object and disengaging our perception of it from practical associations as "an excessive reaction to the earlier subservience of the arts and the discovery of an aesthetic mode of experience" (p.417). It was not a coincidence that Kant's notion of disinterestedness in his critique of aesthetic judgment coincided with Baumgarten's naming of the new area of thought.

The emphasis on formalism may be viewed as an attempt to reconnect art with its capacity for what is qualitative in human experience. This capacity was almost lost through the myriad exploitations art had undergone in the past. The possibilities for art
being disconnected from this kind of value still exist. The two most
challenging cultural experiences of this century have been the rise of
industrial and electronic technology and the increasing rise of
democratization embodied in capitalist form. Both have offered
renewed possibilities for abuses of the power of art. Both have been
central issues in aesthetic theories calling for involvement in social
change.

Through the twentieth century the most virulent attacks on the
whole notion of art for art's sake and the most powerful examples of
aesthetics connected to value outside the world of art have come
from Marxists (Gablil, 1984). Whether the specific theory is from
Soviet socialist realism, anti-realist positions, such as Bertold Brecht
or Walter Benjamin, or French Structuralist Marxism, all have in
common the ultimate objective of struggling to transform a particular
society's dominant values. This trend would include the Dada and
Surrealist movements. Both these movements had members who
were overtly Marxist in their politics (Sim, 1992). Two of the most
influential thinkers, respectively, in dramatic aesthetics and the
aesthetics of the visual arts are Brecht and Benjamin. The objective
of Brecht's (1957/1964) theories of 'epic theatre' is to deliberately
break the illusion of reality created on stage so as to make plain the
social forces behind a dramatic situation. Walter Benjamin's
(1936/86) prophetic art through the recognition of mechanical reproducition, art according to production or work

The Marxist struggle between ideology and science is the only partial explanation. If
one tries to conceal it, it will reveal those contradictions in autonomy for the
relationship between art and life.

I do not rank art and science, nor have a quite the same ideology. ... Arts and
average or mean knowledge in science. Knowledge (in what it gives) is the specific relationship of art, not one of ideas. The relationship of art is to 'make something with words'. ... is the idea of rebirth, the washing, from within, the alludes. (p.20)
prophetic inquiry into the undermining of the authority of art through the replacement of the fine art object by means of mechanical reproduction has at its source the analysis of the value of art according to political criteria.

The Marxist structuralist position, deriving largely from the French philosopher, Louis Althusser, gives another approach to Marxist aesthetics. According to Sim (1992), Althusser differentiates between ideology and science, describing ideology as the domain of beliefs and science as the domain of knowledge. The former offers only partial explanations of the way the world and society work and tries to conceal its internal contradictions, while the latter works to reveal those contradictions. Althusser (1971) argues for a relative autonomy for the practice of art and a dynamic relationship between art and both ideology and science:

*I do not rank art among the ideologies, although art does have a quite particular and specific relationship with ideology... Art (I mean artistic art, not works of an average or mediocre level) does not quite give us a knowledge in the strict sense, it therefore does not replace knowledge (in the modern sense: scientific knowledge), but what it gives us does nevertheless maintain a certain specific relationship with knowledge. This relationship is not one of identity but one of difference... [T]he peculiarity of art is to ‘make us see’, ‘make us perceive’, ‘make us feel’ something which alludes to reality... What art makes us see... is the ideology from which it was born, in which it bathes, from which it detaches itself as art, and to which it alludes.* (p.203-4)
If this sounds more like an argument for the separation of art and reality, it is interesting and instructive that it comes from an aesthetic that insists on the subservience of aesthetics to politics. Just as, in the insistence on the isolation of the art object in the aesthetic of formalism, one can perceive a striving to protect the powerful, qualitative aspects of art, so, in the preceding passage of Althusser’s, one can detect a similar motive. In Structuralist Marxism and in Brecht’s and Benjamin’s vigorous denials of Marxist credentials of social control (Sim, 1992, p.446), one discovers the realization that what is most valuable in art cannot be subsumed into a particular ideology, or science.

Contemporary Marxist critic, Terry Eagleton (1990), insists that in the various manifestations of postmodernism, one finds both defenses and antagonisms towards the integration of art and life, aesthetics and value:

... the case for the defense of postmodernism might go roughly as follows. Postmodernism represents the latest iconoclastic upsurge of the avant garde, with its confounding of hierarchies, its self-reflexive subversions of ideological closure, its populist debunking of intellectualism and elitism. If that sounds a little too euphoric, one may always try instead the case for the prosecution, drawing attention to postmodernism’s consumerism, hedonism, and philistine anti-historicism, its wholesale abandonment of critique and commitment, its cynical erasure of truth, meaning and subjectivity, its blank reified technologism. (p.373)

He sees these defenses as postmodernism’s mechanism for mythologizing and ideological contradictions because...

The avant garde aesthetic is one that stinks; beauty is a White European Majority; beauty is the mirror over to the part.

Eagleton views mirrored in modernism, ethico-political and world, and universal. Art has disabled us from extending this value, in other words, one...

Part Three

Art and Technology

In looking at the...
He sees these descriptions as applying simultaneously to postmodernist manifestations. For Eagleton, this is so because of contradictions between economics and culture:

The avant garde's response to the cognitive, ethical and aesthetic is quite unequivocal. Truth is a lie; morality stinks; beauty is shit. And of course they are right. Truth is a White House communiqué; morality is the Moral Majority; beauty is a naked woman advertising perfume. Equally, of course, they are wrong. Truth, morality and beauty are too important to be handed contemptuously over to the political enemy. (p.372)

Eagleton views the contradictory nature of contemporary aesthetics mirrored in modern ethical thought. Both the aesthetic and the ethico-political are preoccupied with the relation between particular and universal. And modern ethical thought, according to Eagleton, has disabled us from seeing "the need, method, or possibility of extending this value (love) to a whole form of social life" (p.413). In other words, one way to transform the limits of our ethical thought to include the right of all and every sentient being to have his or her difference respected, is to transform the aesthetic.

Part Three

Art and Technology

In looking at the realm of the aesthetic, artmaking would appear to
be a common ground in which we can review centuries of ethical ideologies contained within that realm. Specifically, what has been the role of artmaking in exploring the ethical ideas embedded in technologies? It will be helpful to look towards both the uses of technology by artists and the changing representations of technology as an inherently good or evil force in society.

Since the development of Western perspective during the Renaissance, there have been three other radical departures in technology used by artists: the invention of lithography, photography (and film), and electronic media. Each of these technological inventions has provided artists with a corresponding shift in their view of the artist's role in society. With each shift came reciprocal changes in representations of technology by artists.

For the artists of the Renaissance, from Masaccio on, the use of scientific perspective provided the ultimate example of a technical system that revealed visual truth. The precision and harmony of perspective, with its unified and coherent spatial canon, corresponded to the ideals of the Renaissance artist. It supported his notions of art as a vehicle for expressing "symbolically a new idea about man's place in the scheme of things and man's control over his own destiny" (Clark, 1970, p.66). The example of two opposing representations of technology, one, "good", the other, "evil", can be found in the world of art.

The invention of the Last Supper is a moral structure and a statement. "One of the devices of perspective can be seen in the connection between Michelangelo and da Vinci who knew the harmfulness and sadness of it" (Pitt, 1992, p.26).

Perspective is the key. The invention of perspective makes possible the duplicate pantomime of the engraving, then of the photograph. It allows artists to display, to invent, to create, the same way many places, cities.

The important thing to note is not the mechanical device but to a very scientific development of technology as in the case of Daumier, and Bl...
found in the work of Leonardo da Vinci. The perspective of "The
Last Supper" is not only a compositional technique, but exists as the
moral structure restraining the psychological chaos caused by Christ's
statement. "One of you will betray me?" DaVinci's use of the science
of perspective can be read as an example of the Renaissance ideal of
the connection between the spirit and science. However, it was also
da Vinci who kept his design for a submarine a secret, believing that
its harmfulness as a tool would not find favor with God. (Postman,
1992, p.26)

Perspective granted the artist a means of reproducing reality.
The invention of printmaking granted the artist mechanical ways to
make duplicate pictorial records. The use of woodcut, then
engraving, then etching, and most of all lithography, made it possible
for artists to distribute their work simultaneously to many people in
many places, cheaply, and in vast quantities.

The importance of this to human society can hardly be
overslated: It has possibly had greater effects than any
mechanical discovery since the invention of writing, as it is
basic not only to our knowledge of the past and the present
but to a very large number of our modern technological and
scientific developments. (Ivins, 1943, p.142)

The use of printmaking in disseminating images that represented
technology as inherently evil can be found in the work of Goya,
Daumier, and Blake. The early 1900's saw the glorification of
technology in the art of the Futurists while the Dadaists "... joined in the systematic subversion of the machine as an artistic force" (Burnham, 1986, p.233). The Bauhaus was fully committed to the needs of technological culture and mass production. Walter Benjamin (1969), in his ground breaking essay of 1936, "The Work of Art in the Age of Mechanical Reproduction" outlined the profound ideological changes in art caused by the use of the mechanical reproduction of printmaking and photography, in this way:

The concepts which are introduced into the theory of art in what follows differ from the the more familiar terms in that they are completely useless for the purposes of fascism. They are, on the other hand, useful for the formulation of evolutionary demands in the politics of art. (p.28)

Benjamin's inquiry is primarily concerned with the third major shift in technologies used by artists: photography and film. He suggests how these technologies have removed the aura of the fine art object, thereby separating art from the authority of the ruling class and rendering useless art's capacity for authoritarian control.

Photography and film release the images of art from the preserve of authoritarian control. They no longer, in themselves, have power. They are able to exist as valueless. John Berger (1972) in his remarkable little book, based on the BBC television series *Ways of Seeing*, echoes and expands on Benjamin's thesis. The idea that the only real benefit of television and film, is to grant the cultured minority the art world's narrow ownership. Those concerned:

If the new language would through its penetration into areas where we have personal experience, it would alter our experience of seeing... trying to understand active agents. This ideological threat to the art object's loss of value, technology by artists' interactivity, and in the artistic uses of the most potent capability...
only real benefit of mechanical reproduction, including photography and film, is to grant the masses the opportunity to appreciate art as the cultured minority once did is a delusion. It is buttressed by the art world’s narrow concerns over questions of copyright and ownership. Those concerns miss the point of the larger issue involved:

If the new language of images were used differently, it would through its use, confer a new kind of power. Within it we could begin to define our experiences more precisely in areas where words are inadequate... Not only in personal experience, but also the essential historical experience of our relation to the past: that is to say the experience of seeking to give meaning to our lives, of trying to understand the history of which we can become active agents... What matters now is who uses that language for what purpose. (p.33)

This ideological theme is continued in artist’s use of computer technology. When the computer is used primarily as a vehicle for presenting past media in an electronic form, it has no artistic or ethical value. The use of photography and film by artists contributed to the art object’s loss of aura and authority. The use of computer technology by artists is replacing the art object with the concept of interactivity, and in doing so, extend Berger’s speculation concerning the artistic uses of reproducible imagery and power. For one of the most potent capabilities of computer technology involves the
"dispersed authorship" (Ascott 1984, p.10) of interactivity.

Interactive multimedia, virtual reality, and telecommunications are three examples of emerging interactive electronic media which may have the capability to expand and amplify the viewer's participation in the creative process. The power of creating meaning is shared between the artist and the participant. Art critics, even those who have been involved in promoting art based technological advances, such as Jack Burnham (1986), have described the results of the use of electronic technology by artists as "mediocre to disastrous" (p.232). But artists who are heavily involved with the electronic revolution characterize their labors differently. Roy Ascott (1990) describes the process of what he calls telematic projects in which he has been involved as one in which:

The issue of content in the planetary art of this emerging telematic culture is therefore the issue of values, expressed as transient hypotheses rather than finalities, tested within the immaterial, virtual, hyperrealities of dataspaces. Integrity of the work will not be judged by the old aesthetics; no antecedent criteria can be applied to network creativity since there is no previous canon to accommodate it. (p. 246)

That the issue of content in today's art is the issue of values is the subject of the next section. But, though today's art cannot be judged by old aesthetics, the question of values has always been embedded in the artmaking process.

Postmodernism.

What's the deconstruction of postmodernism?
A deconstruction of "postmodernism" (p.29, no.3 (1993))

The statement that "postmodernism":

has usurped the meaning that W.

issues that may have moved from the "centre interests" (p.30).

The "centre interests" are now to be, at present, at the center of
Postmodernism, Photography and the Computer

What's the difference between the Mafia and a deconstructionist?
A deconstructionist makes you an offer you can't understand.


The statement "Today photography is at the center of postmodernism" (Barrett, 1990, p.133) communicates a different meaning than Woodward's (1988) statement. "... photography has moved from the margins toward the center of the artworld's interests" (p.30). Inspecting that difference will raise a number of issues that may assist us in discussing whether or not the computer has usurped photography's position in postmodern discourse, whether or not the computer is a post-modern medium, and if so, how the computer has gone beyond photography as a postmodern medium.

The "center of postmodernism" and the "center of the art world's interests" are not the same center. That photography may be proved to be, at present, the most utilized, exhibited, sold and written about medium in the artworld, is not proof that the photographic image is at the center of postmodernism. What is integral to the myriad
concepts, philosophical positions, and theories that define postmodernism cannot be said to be synonymous with the interests of the artworld, nor can those theories be said to revolve around a center. There is something inappropriate about using the word 'center' and 'postmodern' in the same sentence. Other concerns issuing from postmodernism and the image, photographic or otherwise, may contribute to resistance in allowing photography to accept a role of the prima donna in postmodernism.

Nevertheless, the argument that photography has played a major role in the development of a postmodern aesthetic is a strong one, though much of its power is linked to postmodern ideas based on reactions to modernism. In contrast, there exist a number of definitions of postmodernism which include the viability of any medium, including photography, to engender new and unique additions to that aesthetic (e.g., Baudrillard, 1983; Benjamin, 1969/1986; Foster, 1986/1990). The argument that postmodernism has everything to do with technology and post-industrial culture is forceful, and needs to be looked at in more detail.

In order to approach any understanding of the propositions above, it seems advisable to first come to some comprehension of what appears to be the operative word in the discussion so far - postmodernism. What is it? Where did it come from? Where is it going? The computer unaddressed discussion will center on a focus of technology, space, postmodernism.

It becomes much more difficult to specify exactly what to refer to as the different debates and their boundaries, at least using it to denote tendencies, etc...

Similar difficulties arise with the postmodernism.

The discourse of postmodern aesthetics, in the "reaction" to the "age", the other has repercussions of the impact.

Though the subject of technology and chapter, it will be...
is it going? The vastness of such an undertaking might well engulf us, leaving our particular questions about photography and the computer unaddressed. To ensure that they are addressed, the discussion will center around postmodernism and its relation to uses of technology, specifically photography and the computer.

In attempting to describe the more recent uses of the term postmodernism, Hebdige (1988) says:

It becomes more and more difficult as the 1980s wear on to specify exactly what it is that 'postmodernism' is supposed to refer to as the term gets stretched in all directions across different debates, different disciplinary and discursive boundaries, as different factions seek to make it their own, using it to designate a plethora of incommensurable objects, tendencies, emergencies. (p.181)

Similar difficulties arise when discussing technology's relationship to postmodernism. What role has technology played in the rise of a postmodern aesthetic? According to Hal Foster (1990), the critical discourse of postmodernism has taken two paths: the one has been a "reaction" to the industrial and post-industrial age or "information age", the other has been a "resistance" to the hegemonic repercussions of those ages.

Though the substance of the issues surrounding the relationship of technology and culture have been addressed within the first chapter, it will be helpful to reestablish a position in regarding them.
Ihde (1992) prevails:

Virtually every area of praxis implicates a technology. From burial to eating and working, the use of artifacts embedded in a patterned praxis demarcates the human within his or her world. To reverse the usual equation, the technological form of life is part and parcel of culture, just as culture in the human sense inevitably implies technologies...human activity from immemorial time and across the diversity of cultures has always been technologically embedded. (p.20)

Ihde combines two aspects of postmodern thought, pluralism and multiculturalism, into the term “pluriculturality” to distinguish the impact technology has had on those developments. He insists that pluriculturality will serve as way of deconstructing the illusion of neutrality associated with all technologies and defines it as:

...the distinctively postmodern form of the multicultural. It arises in and through image-technologies...Its very appearance mimics aspects of the multistable. Image technologies are exemplified by a series of technologies including television, cinema, and also computer VDTs with both word and number processing as well as graphics, photography in all its forms, etc. Each of these image technologies has the capacity to ‘reproduce’ or ‘produce’ “images.” (p.165)

Ihde cites one of the early uses of photography in the now 100-year-old National Geographic magazine as an example of the ability of image-technology to transfigure cultural subject matter. “To bring another culture before one is not a one-way relation. It is an inter-

relation, even at the moment of reproduction” (p.165) interculturality seems to be a crucial moment of interaction and knowledge imparted (p.165) neutral. Moreover, the long history of interculturality appears to be a crucial moment of the modern.

What Ihde and Norman, 1992: Postmodernism and the postmodern about photography, postmodernism, and photography, as a limited vantage point in a wider context that includes technologies and interculturalism. It may also be true that photography and the postmodern are resistance. Additionally, Ihde’s approach may be considered a new art form by the artist (e.g., Binkley, 1992). Ihde has made comparisons between the effects of colonization and the effects of marginalization by the use of technology. The two are very similar. He may help to review...
relation, even at the seemingly trivial level of magazine reproduction" (p.166). This was but an early example of the constant interculturality seen daily on today's television. He suggests that the knowledge imparted through any of these image-technologies is not neutral. Moreover, he characterizes pluriculturality as belonging to a long history of intercultural exchanges that have existed at each crucial moment of the history of knowledge explosions.

What Iade and other cultural theorists like him (e.g., Noble, 1984; Norman, 1992; Postman, 1992; Zuboff, 1988) offer to our questions about photography and the computer is a broader view than our limited vantage point in the art world can give us. It is from this wider context that we are able to perceive the interrelation of image technologies and the postmodernism of late twentieth century culture. It may also assist us in assessing the integral relationship of photography and the computer as partners in the postmodernism of resistance. Additionally, though photography is now accepted as an art form by the art world, it was not always so. A number of writers (e.g., Binkley, 1990; Csuri, 1974; Legrady, 1990; Lovejoy, 1980) have made comparisons between the difficulty photography had with marginalization by the art world long after its inception, and parallel difficulties electronic technologies are presently experiencing. It may help to review some of the most pressing reasons for the earlier
situation in photography, before we move onto arguments concerning the computer's place in the postmodern discourse.

Walter Benjamin's essay "The Work of Art in the Age of Mechanical Reproduction", mentioned in the preceding chapter, more than any other piece of critical writing, created a formulation for opening areas of discussion about photography to areas other than whether or not it met established criteria of art of the time. Though the article was written in 1936, it was not published in English until 1969. Lovejoy (1990) outlines two interrelated reasons why photography was not accepted into the mainstream of art until the sixties. The first reason, she claims, had to do with the identification of photography with the Machine Age, "with its alienating loss of human connectedness" (p.258). Negative reactions in the art community intensified because of photography's essential undermining of the existing function of art which revolved around the historic means of representation. Photography could produce an exact replica of what might take an artist days to paint. The second reason was that this "original" could then be reproduced endlessly. Both capabilities of photography threatened what Benjamin called the "aura" of the art object. Both the value of the specialized skills of the artist and the value of a unique original were called into question. Since the Renaissance the emphasis on the hand skills of the "great artist" became not only a criterion of authenticity but also a criterion of art production, the "aura" was one of being based on a unique practice - not reproduction.

The social function of art also changes as a commodity. Art becomes not only a commodity but also a social signifier. The value of the artwork is not just in its art historical value but also in its social value in society.
the "great artist" were emphasized. Gradually this position evolved into the cornerstone of the new theology of Western high art: the artist as genius, constantly pushing the limits of innovation and progress. Photographers, such as Edward Steichen, Alfred Stieglitz, and Laszlo Moholy Nagy developed new aesthetic criteria on which to judge the impact of photography. But it was not until the sixties that the true impact of photography was felt in the art world.

Benjamin (1969/1986) identified the central contribution photography made to the cultural change that was to come. He stated:

Mechanical reproduction emancipates the work of art from its parasitical dependence on ritual. To an even greater degree, the work of art becomes the work of art designed for reproducibility. From a photographic negative, for example one can make any number of prints; to ask for the "authentic" print makes no sense. But the instant the criterion of authenticity ceases to be applicable to artistic production, the total function of art is reversed. Instead of being based on ritual, it begins to be based on another practice - politics. (p.33)

The social function of art begins to take precedence over its function as a commodity when the reproduction or copying of originals becomes not only possible but desirous. Though the commodity value of the artwork is decreased by copying it and disseminating it, its social value is increased. It becomes a means of communication,
in which the cultural sphere is broadened and enriched to again include the art world. The rifts between the cognitive, the ethico-political and aesthetic domains are given an opportunity to begin to heal.

Jurgen Habermas (1990), denies the completeness of such acts of "deconstruction" when undertaken under the influence of postmodern thought. For him, the "project of modernity" is still to be completed in the name of modernity. He accuses the postmoderns of repeating the same mistakes made by the surrealists in attempting to "blow up the autarkical sphere of art and to force a reconciliation of art and life" (p.61). According to Habermas, the surrealists, and others before them, such as Schiller and Baudelaire, gave new legitimacy to the exact qualities of art they were attempting to dissolve. Their radical attempt had backfired because they did not understand that shattering the cultural sphere of art by negating all the structures developed heretofore, everything scattered. Or, as Habermas himself puts it, "Nothing remains from a desublimated meaning or a destructured form; an emancipatory effect does not follow" (p.62). Their second and more consequential mistake, again according to Habermas, is based on their misunderstanding of the communication process which needs a cultural tradition covering all spheres - cognitive, ethico-political, and aesthetic. Attacking only one sphere is not disassociate himself constantly seems suggestions. One the second mistake nor immediately to illuminate a life discussed in a far. It is then possible to perceive the world.

Though Habermas technology in post suggestion clues to concerning photography engages every critic repertoire is true. what Habermas said "art". Characterizing sufficient nation a photography in being postmodernity".

Within that au
one sphere is not enough. Habermas seems constantly at pains to
dissociate himself from the postmodernists. Nevertheless, he
constantly seems to be offering them enormously helpful
suggestions. One suggestion by Habermas is based on learning from
the second mistake of the surrealists. If an aesthetic experience is
not immediately framed by the expert's judgment, but instead used
to illuminate a life-historical situation or a life-problem, it can be
discussed in a language other than that of the aesthetic expert-critic.
It is then possible for that experience to not only change the way we
perceive the world, but the way we understand it, and judge it.

Though Habermas does not refer specifically to the role of
technology in postmodern thought, one can extrapolate from this
suggestion clues to discerning answers for our initial questions
concerning photography and the computer. That photography
engages every critical or theoretical subject in the postmodern
repertoire is true. But, in its reliance on the image, it does so from
what Habermas so clearly distinguishes as the "autarkical sphere of
art". Characterizing the sphere of art as an independent and self-
sufficient nation allows us to discern what may be the limits of
photography in being able to contribute to the "project of
postmodernity".

Within that autonomous nation of art, photography has been
enlisted as a major combatant in the battle to “deconstruct” modernism. It’s copying processes have assisted in art’s dispersal, what Crimp (1980/1990) calls “its plurality” (p.131). He makes a distinction between plurality and pluralism:

Pluralism is, as we know, that fantasy that art is free, free of other discourses, institutions, free, above all, of history. And this fantasy of freedom can be maintained because of every work of art is held to be absolutely unique and original. (p.131)

The “plurality of copies”, then, aids in the democratization of art. The existence of countless exact copies of an artwork allows it to be seen by countless viewers and defends it from only being defined by its commodity value. These same viewers are encouraged to participate in the interpretation of, for example, the ambiguous narrative photographs of Cindy Sherman. Questions about the nature of authorship of these works is called into question by the feminine stereotypes she assumes, as are the social and sexual positions of the viewer. The collage photographs of Barbara Kruger exhibit the eclecticism of postmodernism in their visual quoting and appropriation. Postmodern considerations of plurality, democratization, subjectivity, and irony are met through the uses of photography by various contemporary artists, as well as by the process of photography itself.

Legrady (1990) or video image and like its photograph called pixels, each modular units with digital image totally... it describes rather the physic sequence of nutr. structure is one algorithms through visual form. (p.4)

He notes a concure possible future” [p.2 the real world for it. The computer image what could be.

The preceding does well for one of pain computer only as in more complex, fastest image maker does the computer’s unique and
It is in the commun
Legrandy (1990) leads us a comparison between the photographic or video image and the digital image. While the digital image looks like its photographic counterpart, it is made up of discrete elements called pixels, each having a definite value. That combination of modular units with specific mathematical values is what makes the digital image totally controllable:

... it describes not the phenomenon of perception but rather the physical laws that govern it, manifesting a sequence of numbers stored in computer memory. Its structure is one of language: logical procedures or algorithms through which data is orchestrated into visual form. (p.267)

He notes a concurrent difference in terms of "verifiable past and possible future" (p.267). Because of the photograph's dependence on the real world for its substance, it automatically refers to the past. The computer image, whose origin could be totally fictive, refers to what could be.

The preceding description of the computer image might serve as well for one of painting. When comparing the camera and the computer only as image technologies, the computer emerges as a more complex, faster postmodern machine. The computer as an image maker does not fulfill its capabilities or truly differentiate the computer's unique contribution to the postmodernism of resistance. It is in the communicative and interactive possibilities of the
computer that postmodernism may resist both the hegemony of modernism and the profound cynicism of the postmodern.

Jacques Barzan (1973) compresses a plethora of possibilities of the functions of art, and hence options for the role of the artist, into three positions:

Art better than life (a truer reality, a divine realm)
Art for a better life (revolutionary art)
Art for a natural life (spontaneous, primitive, improvisatory, disposable art) (p. 132)

For Barzan, the first two positions are primarily of the classics, while the last position is predominantly the contemporary answer.

Artists have seen their role change drastically from the time of the Renaissance until now. Since then, artists have attempted to combine a passage to the future with an understanding of the past and a recognition of the present. The role of the artist today appears to be open not only to questions of usefulness, but questions of value. Suzi Gablik (1984) puts the point most succinctly when she says, “One of the things that seems to separate postmodernist from modernist thinking ... is the rejection of any serious concern about art’s moral center” (p. 74). If modernism was originally about the freedom of the individual, and a reaction against the materiality of the capitalist and totalitarian societies of the early part of this century, what part of society’s values? Either continuing forms of capitalist society completely overtake the artist or looks to society for confusion and purposes.

Pluralism is one lovechild of modernism getting its fill. In the 1980’s, we find our unresolved concerns besieged by all this. Everything becomes a matter of taste. Even so, we succeed in making a totally open thing.

As we now addressing a clearer. The modernist dream of the individual artist. Answers for the possibility individual and culture of which he speaks that is better than life”, or the Renaissance or the.

appears to offer a new meaning in its use, not in the placement of the exclusive pr
century, what part does the pluralistic aspect of today’s art play in society’s values? Even artists who seem to be tackling those continuing forms of power today, come close to being seduced, if not completely overtaken, by a cynicism that results in despair. The artist looks to society for an answer, and finds only the same confusion and purposelessness. Gablik (1984) goes on to say.

Pluralism is one way the dialectical contradictions of modernism get erased. Now, as we advance into the 1980’s, we find ourselves surrounded by all the disorder of our unresolved intentions - at the same time we are besieged by all that is possible, ... the danger is that when everything becomes art, art becomes nothing. For how can we succeed in forming a concept of something which is so totally open that all attributes apply to it equally? (p.34)

As we now advance into the 1990’s, certain issues have become clearer. The modernist credo was built on the idea of the genius of the individual artist forging a revolutionary path for society. Answers for the postmodern artist may lie within the needs of the culture of which he or she is a part. Society is no less in need of "art better than life", or "art for a better life" than it was in the Renaissance or the 1920’s. If the pluralism to which Gablik refers appears to offer a concept of art and the artist’s role as functionally meaningless in its generality, it may instead be interpreted as a shift in the placement of the process of making art. Art can no longer be the exclusive province of the artist at which the viewer merely gazes,
nor can it be the dispenser of an established canon of knowledge to which the viewer assents. The making of art must include the viewer as a participant and recognize the value and necessity of that communication. Only then will the artist find a meaning in "art for a natural life." This art assumes the appearance of improvisation and disposability because its meaning does not exist within the art product. Its meaning is found within the interactive process of communication between the artist and the participant.

In 1968, Charles Csuri organized an exhibit called, "Interactive Sound and Visual Systems" at the Hopkins Hall Gallery at Ohio State University. In that same year, the exhibition, Cybernetic Serendipity, organized by Jasia Reichardt at the Institute for Contemporary Art in London, England, took place. This latter exhibit, though placed in prestigious surroundings, was not well received by the art world (Csuri, 1974). Csuri cites a number of reasons for its lack of acceptance.

... from the threat of technology and the economic structure of the New York-London-Rome art establishment to an instinctive recognition that many of our basic institutions and conceptions of man are changing. (p. 559)

Csuri, who designed one of the first, if not the first, artistic application of computer graphics, considers his 1970 demonstration of the real-time animation program on an IBM 1130 system in the Manhattan IBM shop (1987). He says:

Real-time computer can be visually an object. This kind of participant and the computer as a process. The second stage takes place... almost artificially. It is not simply entertaining wizardry, but a new kind of wizardry, new beings with whom one can argue with.

One can argue with this has been included at the attitude by those in the computer. His description of it as a medium, not the postcard, but the postcard continue to talk about the point. The
Manhattan IBM showroom to be an interactive installation (Goodman, 1987). He says:

Real-time computer art objects are an intellectual concept which can be visually experienced rather than a finalized material object. This kind of computer art exists for the time the participant and the computer with the CRT display are interacting as a process. The art object is not the computer or the display, but the activity of both interacting with the participant. (Csuri, 1974. p.566)

Binkley (1989) describes two stages of interactivity unique to computers utilized in art. First, the computer itself is conceptually active, unlike all the other media of the past. It has the ability, through mathematical logic, to manipulate conceptual objects. The second stage takes place as the artwork becomes

...almost anthropomorphized so that we can interact with it. It is not simply active, putting on a performance of entertaining wizardry, but it recognizes us as sentient beings with whom dialogue is possible. (p.20)

One can argue with Binkley in several ways here. But, his statement has been included at this point because it exemplifies a common attitude by those in the artworld when theorizing about the computer. His description of interactivity involves the artist and the medium, not the possibilities of communication with others. To continue to talk about the computer only in terms of art making is to miss the point. The point about computers and art is that in using a
computer in any way, in any sphere of life, cognitive, ethico-political, or aesthetic, is to be engaged in all three. Csuri (1974), writing sixteen years before Binkley, makes this point clearly when he says:

One can only comment in broad generalities about the future of computer art. We live in a profoundly changing world. Old structures and values are eroding while we still grope for new ones to take their place. We have massive social problems and we desperately need more synthesis of knowledge to solve them. For several decades our educational trends have been pointed toward producing experts in ever-narrowing areas of interest. Perhaps the time has come to reverse this trend and begin to build bridges of understanding between disciplines. A modern renaissance man capable of generalizing and transferring insights in several directions is sorely needed in both science and art. In the disarray and confusion about our basic institutions there is emerging a new consciousness of a holistic approach to meet the needs of mankind. (p. 570)

Csuri’s work as an artist involved with technology ranges from his computer animation film, *Hummingbird*, made in 1967, through his development and administration of the Advanced Computing Center for the Arts and Design at Ohio State University to his continuing artistic involvement with computer imagery. Like Myron Krueger, his involvements with technological media have presaged many of the developments in the electronic art environment, and yet when asked about the connection between aesthetics and ethics in present day interactive technology, specifically virtual reality, he says:

Virtual reality’s primary appeal seems to be that it is a different presentation format which uses innovative technology to deal with effects over sophisticated great econ and film. More difficult seems to be the statement of how to expand experiences art is a road to path out a complicated reality will aesthetics of the Rembrandt case that it is the point when matter? (17, 1993)

In answer to Csuri’s questions, the seeming relation between current aesthetic and ethical concerns might help to look at examples of interactive multi-media and video-based on the computer example being developed.

Wilson (1991) concludes that telecommunication
to deal with information. However, the novelty and special
effects overshadow the attempts to make virtual reality a
sophisticated art object. It is an entertainment medium with
great economic potential for a mass audience. Virtual reality is
also moving in a direction which includes aspects of theatre
and film. However, theatre and film as art forms are made
more difficult by including a role for interactive participants. It
seems to me multimedia has failed to provide a clear
statement of "good and bad" esthetic principles. Now we ask it
to expand its range to include realtime tactile and other body
experiences. As it now stands, the meaning of virtual reality as
art is a relative one to be determined by any participant. The
path out of post modern esthetics will be even more
complicated than working with a traditional medium. Virtual
reality will simply feed into the adolescent, self-involved
esthetics of our time. How will we decide who is the Picasso or
the Rembrandt of interactive art or virtual reality? Is it the
case that this is no longer the question? Have we reached the
point where such questions are truly relative and do not
matter? (Csuri, personal communication with the author, June
7, 1993)

In answer to Csuri, and others who are profoundly disappointed with
the seeming relativism and the lack of aesthetic "standards" of
current aesthetic notions surrounding interactive technology, it may
help to look at individual projects using telecommunications and
interactive multimedia. Both are forms of interactive technology
based on the computer as their facilitator, and both offer many
examples being explored by artists presently.

Wilson (1991) lists six rationales for choosing art events involving
telecommunications: internationalism, real-time interaction,
anonymity, multi-person simultaneous interchange, access to information archives, and commentary on cultural aspects of telecommunications. A number of these rationales would appear to encourage the postmodern interests of shared authorship, plurasculturality, distribution of knowledge and power, interactivity, and connectedness. In using the technology itself to comment on cultural changes generated by those technologies, artists involved in telecommunications are not only commenting on its effects but involving themselves in the directions in which it may develop. This direct involvement by artists in the evolution of a pervasive technology is an example of what Habermas suggests as the only way to go about re-formulating culture: acting as a agent of change in all spheres of culture. And telecommunications is now pervasive in all spheres of intellectual, economic, political, and social activity.

A particular project that seems to embody many of the traits of postmodernity, as well as notions that challenge the efficacy of isolated art events is a hypermedia/telecommunications work entitled Think about the people now (Think about the media now) by Paul Sermon of Great Britain. The work has two separate elements of interactivity. The first involves a hypermedia program which allows the viewer to explore and navigate in various ways through the large collection of text information, film footage, and sounds. As in most interactive programs, it is possible to choose different directions at each point or node of the program. This is not only to access more information but also to provide over which events the viewer is involved in conversation with people about the piece, for example in reactions to the piece. In this case, it was the event reported by the television news program Remembrance Day, in which a man was found and set himself on fire at the site of the former location of the concentration camp and travel around while the television cameras captured his footage. The paths through the hypermedia program were available through the use of a joystick which permitted the viewer to walk.

According to Sermon,

In a sense, one could say that the program is not designed to provide a linear narrative of the events, but rather to allow the viewer to explore the relationships and implications of the events, and to make their own interpretations. The program is designed to be a tool for reflection and for the exploration of personal and collective memory.
sounds. As in most hypermedia programs the viewer/participant is able to choose different paths through the information by selecting at each point or node which direction he or she may want to continue, either to access more information or for increased interest. In the second interactive part of the work, computer network connection is provided over which the viewer/participant is able to engage in conversation with people in other countries concerning their reactions to the piece. The content of the piece concerns an actual event reported by the media in December of 1990; during a Remembrance Day ceremony a protester covered himself with petrol and set himself on fire shouting, “Think about the people now.” With the use of a joy-stick, the user can start at Westminster Tube Station and travel around Whitehall through animated scenes of video footage. The paths often cross over allowing the user to change paths. Diagrammatic information and newspaper coverage is always available through the selection of icons appearing throughout the walk.

According to Sermon (1991):

In a sense, one may never discover the event that takes place at 11 a.m. during the two minutes silence. However, they may hear an ambulance go past or hear someone else mutter some horrified words. Through the users cause and effect of decisions made, they could find themselves in any one of the sixty-four positions around Whitehall including the choice of setting fire to themselves. The
accountability of the user's position within the Whitehall environment during the incident represents the conflicting perceptions of the event. The cause and effect nature of the program lends itself to the concept of social construction, each user has the potential to carry out this task. (p.124)

This work was singled out because of its reliance on utilizing the full capabilities of the computer. The nonlinearity of the hypermedia program calls into question our faith in the narrative, which as Lyotard (1984) claims, "is the quintessential form of customary knowledge" (p.18). He defines postmodernism as "incredulity towards narratives" (p.xxiv). He posits one explanation for this as the conflict that has always existed between science and narrative because of science's use of other means to legitimate itself. This explanation is significant. If, as a postmodern culture, we are losing, have lost faith in the means of narrative to transmit knowledge and meaning, and only trust the methods of science to do so, then the use of hypermedia and similar non-narrative processes are essential in recreating a faith in the possibility of judgment. Hypermedia offers the viewer an opportunity to decipher their own meaning in what they find, and encouragement to judge for themselves what connections to make between knowledge and meaning. This gift of authorial control assumes a trust in the abilities of the participant by both the generator of the work and the participant. Trusting in

ourselves to judge we are one that, as a culture,

Presently available and telecommunication of image making and chance to actually process information and learn consumption. Those computer can advance resistance and into the ourselves. The inter

dominant mode of communication a role similar to those absolutely necessary

Part Four

Interaction and Art

If there is one piece we might base one's holistic intimate involvement often named unique the possibility of e
ourselves to judge well is a value that has been seriously eroded and one that, as a culture, we cannot do without.

Presently available computer technologies such as hypermedia and telecommunications extend the notion of art making beyond that of image making and into the realm of life making. They offer us a chance to actually practice making judgments based on a form of information and learning that is not already coded for our tacit consumption. Those qualities are essential in considering how the computer can advance postmodernist thought past the state of resistance and into the maturity of taking responsibility for ourselves. The interdisciplinary use of electronic media as a dominant mode of communication in this culture will offer the artist a role similar to those of the past, but peculiar to the present, and absolutely necessary for the future.

Part Four

*Interaction and Art into the Twenty-first Century*

If there is one primary informing aesthetic quality which one might base one’s hopes for the art of the twenty-first century and its intimate involvement with technology, it is interaction. As the most often named unique quality of technological art, interaction offers the possibility of encompassing both ethical and aesthetic demands
of making art in the twenty-first century, blending those demands into action. Interaction provides opportunities for the recognizing of the falseness of separating the subject and object, the realization of the interdependence of all life, and the acceptance of our responsibility of our role as artists in building what Gablik calls “a cultural context of empathy”. The causes and consequences of not comprehending the need for commitment to this change are most persuasively argued by Morris Berman (1981) in his powerful and extremely influential book, *The Reenchantment of the Universe*:

Western industrial society will probably be remembered for the power and failure of the Cartesian paradigm... Cartesian dualism, and the science erected on its false premises, are by and large the cognitive expression of a profoundly biopsychic disturbance. Carried to their logical conclusion, they have finally come to represent the most unecological and self-destructive culture and personality type that the world has ever known. (p.301)

This dissertation speaks to the growing pervasiveness of technological media as the overwhelming form of communication in the latter part of this century and the next, hence, the emphasis on interactive technology. What specific technologies will inform the aesthetic of the future is open to argument and will depend on whether or not we, as a culture, become consciously involved in directing the development of those technologies. Interactive multimedia and telecommunications are the most developed and accessible interactive this dissertation will least accessible interwritten and talked about.

Existing within visual significance, interaction is integral constituent of the past four decades and is limited to, land art, communication and painting and sculpture. Ethical choices involve both above, as a philosophy for the support of such criticism. Art still exists on the place, is precisely to the medium, the art of the future.

One example of such disciplines, and includes Sherk's (1991) *A Link* linked network of with programs and e...
accessible interactive technologies in the present. Chapter Three of this dissertation will speak specifically to the least developed and least accessible interactive technology, but fast becoming the most written and talked about: virtual reality.

Existing within varying structures and on numerous levels of significance, interaction, as an aesthetic, however, has long been an integral constituent of the arts. Many artists working through the past four decades and today in various media including, but not limited to, land art, performance, installation, media art, electronic communication and technology, social involvement projects, and even painting and sculpture, are basing their aesthetic decisions on the ethical choices involved with the idea of interactivity, as defined above, as a philosophically guiding principle. But even with the support of such critics as Lucy Lippard and Suzi Gablik, value-based art still exists on the margins of social change. As Gablik suggests, it is precisely to the margins that we must look if we wish to predict the art of the future.

One example of art that exists on the margins of a great many disciplines, and incorporates technology, nature and culture is Bonnie Sherk's (1991) *A Living Library*, an international electronically linked network of indoor/outdoor culture-ecology parks integrated with programs and curricula called Life Frames. Sherk was the
Founding Director and President of The Farm, a project that existed from 1974 to 1980. The Farm was a “social art work” which involved extensive land transformation, community involvement and education, the interrelationship of different species, the relationship of art and agriculture, and the juxtaposition of technological and nonmechanized forms. (p.225-226)

Shek considers this an early Life Frame and a prototype for the development of A Living Library. Another example would be Brad McCallum’s (Gablik, 1991) collaboration with homeless individuals on carts and temporary shelters specifically designed for their needs. McCallum considers these his sculptures, even though he gives the carts away to the homeless person for whom it was constructed.

Both these works embody the aesthetic of interactivity, one on a more global level and one in a very individual form. Both involve a motivation for artmaking that is not centered on self-interest and both involve interactions that are positive and affirming of the participants.

But in talking about interactivity as an aesthetic quality of technological art, we begin to see the impossibility of separating the idea of interactivity as an aesthetic quality from an ethical philosophy, or to put it in more Wittgensteinian terms, making technological art is choosing interactivity. And to go further in this prophetic mode, one might say that making art in the twenty-first century is making that work, such as the late twentieth century, a symbol of the technological culture that draws sustenance, a symbol of the technological culture.

Other contemporary examples include Benedikt, 1992; Craven, Lovejoy, 1990; Wiessner, 1989. The relationship to technology, the engagement in research, Kwinter (1992) in his book Incorporations, in the future scientists, philosophy for a new way:

One of the aims is to overlap “social art work” with the “art of the future” and rationalize in a way that increasingly integrates into the generalized life.
century is making interactive technological art. That is not to say that work, such as McCallum's, is not a viable form of artmaking in the late twentieth century because it is not mediated by technology. The opposite is true. McCallum's work exists within the context of the technological present. Within that present, a shopping cart, certainly a symbol of the enormous distance between twentieth century human beings and the natural environment from which they draw sustenance, also becomes an actual home for people whom this technological culture have rendered homeless.

Other contemporary artists and art theorists (Ascott, 1991; Benedikt, 1992; Crary and Winter, 1992; Jacobson, 1992; Jones, 1991; Lovejoy, 1990; Wilson 1990) describe this culture's inextricable relationship to technology, in a similar manner, but characterize engagement in reactions to those aspects in various ways. Crary and Kwinter (1992) introduce their mammoth compendium called Incorporations, including essays by contemporary artists, architects, scientists, philosophers, theorists, engineers, and journalists, in this way:

One of the aims of this book, then, is to outline the ways in which overlapping "biotechnic" arrangements have throughout the twentieth century brought about continuous transformations of a "lifeworld." Though the same relentless process of modernization and rationalization continue today unabated, they have become increasingly inseparably linked to the positive production of such generalized lifeworlds or ambient milieus as sites of invention.
and transformation. Neither human subjects nor the conceptual or material objects among which they live are any longer thinkable in their distinctness or separation from the dynamic, correlated, multipart systems within which they arise. Everything, and every individual emerges, evolves and passes away by incorporating and being incorporated into, other emerging, evolving or disintegrating structures that surround and suffuse it. Indeed, incorporation may well be the name of the new primary logic of creation and innovation in our late modern world. (p.15)

There is an irrefutable similarity in this description of "incorporation" to what has been referred to previously in this dissertation as "interactivity". Others (Gutarrí, 1992; Varela, 1992) describe a similar discontent with our formative cultural origins and call for a change in our understanding and thinking. The French writer, Félix Gutarrí (1992), referring to "... a vast expansion in the fields of technoscientific and aesthetic investigation..." (p.16) suggests an alternative to the more frequently utilized aesthetic positions:

Rather than joining the fashionable crusades against the misdeeds of modernism, or preaching a rehabilitation of worn-out transcendent values, or indulging in the disillusioned indulgences of postmodernism, we might instead try to find a way out of the dilemma of having to choose between unyielding refusal or cynical acceptance of the situation. (p.16)

There is wide agreement on what the problems in contemporary aesthetics are and from where they emanate, but finding "a way out... of the dilemma" is not so simple. Baggage of existing aesthetic traditions, the struggle to recognize elements of experience that aesthetic judgments, we conclude, have no aesthetic value.

What does the emphasis on constantinnately named as "interactivity" and "art, have to offer the route out of the dilemma that we find ourselves, caught enmeshed in concepts: formalism in modernism and postmodernism with the kind of Ellulian and decided." (Feenberg, 1995)

Technology proposes an alternative viewpoint within, and interactively creates points of reference that offer most occasions for the development of aesthetic sensibility.

If we review the problems described in Chapter 3, it is clear that interactive technological innovation occurs within a context of aesthetic values. Before moving on...
of the dilemma" is not easy going. We tend to bring with us the baggage of existing aesthetics. In our formalist positions we can recognize elements of relativism; in our political or ethical value judgments, we concede those judgments as a particular kind of aesthetic value.

What does the emerging aesthetic quality of interactivity, constantly named as the most richly endowed aspect of technological art, have to offer the art of the future? It may provide us with a route out of the double bind (Bateson, 1972) in which we find ourselves, caught endlessly between supposedly opposing aesthetic concepts: formalism and relativism; intellectualism and emotionalism; modernism and postmodernism. But, more importantly, it provides us with the kind of forum introduced in Chapter One as "a parliament of things on which civilizational alternatives are debated and decided." (Feenberg, 1991, p.14) This critical theory of technology proposes the possibility of transforming technology from within, and interactivity is the aesthetic quality which offers the most occasions for that transformation.

If we review the ethical vision of care and responsibility described in Chapter One, we may begin to see the processes of interactive technological art as supportive or not supportive of this vision. Before moving on to the Third Chapter, in which specific
recommendations for the development of an ethical aesthetic for the newest, and perhaps the most influential technology, virtual reality are made, it would behoove us to ask: How does this ethical vision exist today in the aesthetic process of technological art? Examples of projects, such as Paul Sermon’s interactive multimedia piece or Bonnie Sherk’s Living Library were discussed earlier in this chapter, but it may do well to review several other projects involving interactive technology available today, with the express purpose of detecting signs of this emerging ethical vision.

The following examples are drawn from artists whose work predominately involves interactive multimedia and telecommunications. They range from hypermedia programs, available to individuals sitting down in front of one computer, to networked pieces available to participants across the globe. At the time of this writing, there is a media blitz occurring on the subject of interactive technology and the environment and issues from which it emerges. Within the space of a few months, cover articles on the various aspects of what may be called “Cybertecture” were published in magazines, such as Time (Feb. 8, 1993), no less, to the Columbus, Ohio alternative paper Alive, (Feb. 18, 1993). Cybertecture is described by Elmer-Dewitt (Feb. 8, 1993) as: “... a way of looking at the world that combines an infatuation with high-tech tools and a
disdain for conventional ways of looking at them” (p.59). Dewitt quotes a number of other’s definitions, but all involve an integration of technology, art, music, and a countercultural attitude.

The four artists or collaborative groups discussed here are not meant as examples of this counterculture. Their ideas, however, and ideas of artists like them, have influenced that culture’s notions about art and technology. In turn, cyberculture has made an impact on the emergence of interactivity as a pervasive aesthetic.

Life on a Slice

Life on a Slice is the overall title of three computer-based hypermedia programs presented for the first time at the 1991 ACM Siggraph exhibit Tomorrow’s Realities. Both “Risk My Shadow Kissing Yours” and “The Geisha Snail and the Phosphorescent Samurai” are structured in fairly traditional hypermedia format, in which a binary tree structure is used to offer the participant various choices within the work. “Risk My Shadow Kissing Yours”, by Hans Reiser, also uses the structure of a lyrical poem, each line giving the user an icon-word choice of two possible next lines. The user’s image is incorporated into the piece by video camera and interacts with the on-screen image. The user’s image touching an icon activates the possibility of another path, and another line being added to the poem. The user, the artist through the mediation of the computer
together create a poem, realizing the meaning of the title, in which the risk involved is in allowing the Other, in this case the user (or perhaps the artist) the intimate intercourse of composing a poem.

The second of the hypermedia pieces included, "The Geisha Snail and the Phosphorescent Samurai", by Beverly Reiser, is a fable-like narrative in which the user/participant assumes the role of the protagonist through the incorporation of video, and is charged with the determination of the texts, graphics, sounds, and story ending.

Reiser (personal communication, April 1, 1993) says about the work:

On the aesthetic side, the piece is about a metaphorical reality. It gives you the right to make choices. It stems from a view of life, that no matter what circumstance you are in, there is usually some choice. The way things ultimately end depends on your choice. As opposed to random choice, or as opposed to: you can pick anything and it all turns out badly. It is just the way life goes, you choose, but you don't have all the the information. You choose based on the slice of information, partial information, not the whole picture. The main difference in this aesthetic is that it is discursive. As you soon as you have a discursive art form, there is no longer a vertical hierarchy. It is a fundamental difference.

"The Town of Doubt", by Marjorie Franklin (ACM SIGGRAPH, 1991), and the third piece included in this trilogy allow lack of narrative structure to aid in unsettling the user/participant. A town with streets that can be virtually walked down, and houses that can be virtually entered is available to the user by use of the Mandala software. The artist

The town demo, excessive simplification lead to doubt and realiza the three piece. of the Other in our not thinking through extensive way. M to involve "TV." Seen and pie is strong. The use forward to the next creativity is solicite

The Electronic Cafe

Established in the interactive telecommunication center in Monica, California. San Francisco, Oakland, Fe, Chicago, Pittsbr Seoul, Managua, Bar project of Sherrie L
software. The artist says about her piece:

The town demonstrates that a search for reassurance through excessive simplicity - a simple moral code, a simple society - can lead to doubt and ambiguity. (p. 18)

The three pieces address three interwoven ethical issues faced by our twentieth century culture, the responsibility of choice, the place of the Other in our lives, and the doubt and ambiguity activated by not thinking through complicated moral issues. All three pieces attempt to involve the user/participant in an attractive and, perhaps, seductive way. Most of us cannot resist a chance to see ourselves on "TV." Seen and participated in concurrently, the impact of the pieces is strong. The users begin to relish their involvement, looking forward to the next time their opinion, their participation and their creativity is solicited.

The Electronic Cafe

Established in 1987, Electronic Cafe International (ECI) is an interactive telecommunications project originating out of Santa Monica, California and networked with Electronic Cafe affiliates in San Francisco, Oakland, Santa Cruz, California, New York City, Santa Fe, Chicago, Pittsburgh, Vancouver, Toronto, Paris, Berlin, Japan, Seoul, Managua, Barcelona, and Budapest. This is the most recent project of Shertie Levinowitz and Kit Galloway (1992), who have
been involved with telecommunications since their 1977 Satellite Arts Project with NASA. They say about their work:

We're building human networks on an international, cross-cultural, multidisciplinary scale. These networks consist of people who are getting to know each other and the technology that maintains their relationship. . . . They're trying to creatively animate that technology by engaging in new types of conversation.(p.259)

Using Amiga computers with audio and video capabilities, videophones, color still-frame videophones, video projectors, video capture boards, modems, computer printers, fax machines, and multiple telephone lines, Rabinowitz and Galloway see the Electronic Cafe as a cultural community center. Participants in a ECI event are able to exchange still-frame video images and computer graphics, share and audio teleconferencing, two-way drawing and writing in shared-screen presentations, exchange computer files, programs, electronic mail, and images, text and "talk" via real-time computer. Rabinowitz and Galloway use the word integration to define the aesthetic of ECI. They are interested in integrating technology into society by making it readily accessible to everyone. They equate this with the integration of distinct cultures and communities, as well as the integration of the arts and the general public. They say:

If the arts are to take a role in shaping and humanizing emerging technological environments, individuals and arts constituencies must start to imagine art on a much larger scale of creativity.

George Coates Perf

Extremely visual, George Coates Perf actors, artists, music by George Coates. computer interaction performance. It is reviewed, and admired Sho, and Actual Sho. creative, collaborative how twenty-first century makers should go a. article written by C. “bad advice” for me include:

1) Insist that...
George Coates Performance Works

Extremely visual, and tending towards grand opera in style.

George Coates Performance Works is a large changing troupe of actors, artists, musicians, dancers, performers, and electronics headed by George Coates. The 3D-projection, aural sound, and real-time computer interaction experimentation is not just set design for this performance. It is the performance. The troupe is widely known, reviewed, and admired for such pieces as Invisible Ske: a Virtual Sho, and Actual Sho. Coates sees himself as a facilitator of all this creative, collaborative wizardry, but has very definite ideas about how twenty-first century directors, performers and performance makers should go about making their aesthetic decisions. In an article written by Coates (1990), he lists 22 items of what he calls "bad advice" for makers of twenty-first century live art. They include:

1) Insist that play be respected as a noun not a verb.
2) Avoid the use of emerging technologies for other than their intended purposes.
3) Be certain of the value of all activity.
4) Reject new paradigm thinking and its insistence on co-equal values and multiple realities.
5) Never silence a judging mind.
6) Ridicule optimism for its naivety even though it frightens the existentialists.
7) Avoid serious meditation on the value of unfamiliar
aesthetics in contemporary art. . .

16) Allow symbols, archetypes and dreams to constitute an alternative language of meaning but ghettoize their value to the fringes of experience through the linguistic designations, avant-garde and experimental. (p.87)

Performance Works is housed in an abandoned church on McAllister Street in San Francisco. Coates describes the significance of this as:

Having abandoned the pulpit for the programmed network feed, consensus realtors lost interest in actual space and created an opportunity for performance artists to reclaim them as emporiums of live art. (p.87)

Coates' "laws of bad advice" for performance draw us into thinking about specific recommendations that might be developed for the design of interactive technology as a performance medium. The next chapter will address current interactive technological design of the most performance-based technological medium, virtual reality, and attempt to cultivate aesthetic choices for this new medium based on an ethic of care and responsibility.

Interactivity

Part One

Seattle - I am encased underwater shaped fish gliding that appears before I feel in my hand. the world says, "You are towards one of the disintegrates. This not only taken about have done contribute guide, "I'm just going a while, finding it about how much I underwater room I angry, cartoon-like netting, and thereb
CHAPTER III

Interactivity: an Ethical Aesthetic of Virtual Worlds

Part One

Seattle - I am moving slowly in what seems to be a glass encased underwater environment. There are seven or so simply shaped fish gliding to and fro. I seem to be able to manipulate a net that appears before me by pushing the buttons on the wand I can feel in my hand. A voice from somewhere outside this underwater world says, "You can try to net the sharks." I maneuver the net towards one of the sharks as it swims by, and immediately it disintegrates. This is not what I expected to have happen, and am not only taken aback by it, but dislike the fact that something I may have done contributed to the disintegration. I tell my disembodied guide, "I'm just going to swim around with the sharks." I do this for a while, finding it extremely calming and fun. I am just thinking about how much I am enjoying this experience, when the underwater room I am in disappears and is replaced by a large, angry, cartoon-like face. "Game over". it growls. I have lost by not netting, and thereby disintegrating, enough sharks.
This is only one of the various virtual worlds designed by the scientists, researchers, programmers, artists, and others involved in virtual reality research sites in this country. This one exists at the Human Interface Technology Lab at the University of Washington in Seattle and is an example of a fully immersive virtual reality system. These systems usually employ a head-mounted display that provides visual, spatial and auditory cues to a computer fabricated environment, as well as a glove, or hand held control devise, to move through the virtual space with interactive correspondences to head, and other body movements. As of mid-1992, it is estimated that only 300 fully immersive virtual reality systems, existed in the entire world (Pimental & Teixeira, 1992, p.243). That number hardly seems to justify the enormous amount of verbiage expended recently towards this technology, some of which was mentioned in the previous chapters. If one projects, however, what may happen with virtual reality systems based on the rise of personal computers, and the pervasiveness of computer related activity in today's world, the possibility of an staggering growth rate for virtual reality by the end of the century does not seem farfetched. Over 100 million personal computers have been built and distributed in just over the ten years of their existence. Each year, 20 million more are built (Pimental et al, 1992, p.242). Projections for the growth of the virtual reality industry range...
industry range widely. Rheingold (1990) asserts near the end of his
book that we are very near a breakpoint in the quality of virtual
reality system design, and

... in the coming years, we will be able to put on a headset, or
walk into a media room, and surround ourselves in a responsive
simulation of startling verisimilitude. (p.388)

This viewpoint is in contrast to Wooley's (1992) comments that
Rheingold is overly optimistic about virtual reality systems'
capabilities to provide a virtual world indistinguishable from the real
one. Other researchers (Pimental et al, 1992; Laurel, 1992) admit
that the ability to provide a completely immersive virtual
environment is perhaps forty to fifty years away.

These projections are based on the assumption that virtual reality
technological design will continue its push towards two encompassing
biases. The first of these biases is the emphasis on representational
simulation of reality as a determiner of truth. The second bias is the
production of an artificial reality designed to minimize, or even
exclude, the perceptive qualities of the actual, physical, human body.

This chapter will profile current trends in the design of virtual
reality systems, and discuss those trends as they relate to the
aesthetic of interactivity. How these current design trends work
towards or against an aesthetic of interactivity that fosters an ethic
of care and responsibility will be assessed, as well as specific theories of dramatic interaction by two of the most influential dramatic theorists in Western culture, Aristotle and Bertoldt Brecht. With its emphasis on interaction, immersion, and the involvement of all the senses, virtual reality easily lends itself to discussion as a performance medium. Theorists such as Brenda Laurel (1991) and Joseph Bates (1990) are involved in the development of interactive interface design and the underlying structure of virtual worlds. Aesthetic criteria, specifically dramatic theory, serves as a basis for their work. Brenda Laurel (1991), in her book “Computers as Theatre”, says,

Thinking about interfaces is thinking too small. Designing human–computer experience isn’t about building a better desktop. It’s about creating imaginary worlds that have a special relationship to reality - worlds in which we can extend, amplify, and enrich our own capacities to think, feel, and act. (p.32)

Laurel’s suggestions about applying aspects of dramatic theory to interactive forms is a good one. The kind of dramatic theory that is applied and on what philosophy it is based, however, may make a vast difference in the imprint made on those emerging interactive technologies. The chapter will close with specific suggestions for the evolvement of virtual worlds based on Brechtian notions of dramatic interaction and an aesthetic of interactivity that fosters an ethic of care and responsibility.

Part Two

Current Trends in Virtual Reality

It could be argued that virtual reality human–computer interface design, in particular project is, as it is often manifested in educational dissertations, and with all the potential here. It can be argued that virtual reality human–computer interface design opens to include further the phrase “humanizing the interaction between the user and the computer interface is the fundamental tenant that is that technology enables and empowers people. The circuit of the computer ends in itself. For the discussion as a major
Part Two

Current Trends in Virtual Reality Design

It could be argued that what this chapter should concern itself is virtual reality human-computer interface design. Certainly that particular project is one that fits well into the thrust of this dissertation, and will be discussed as one important area of concern here. It can be argued, however, that the interface between humans and computers is only a portion of what will affect the aesthetic of building and using virtual worlds. The design of the human-computer interface is a vital part of a larger circle of activity that opens to include further interaction with other humans. The use of the phrase "human-computer interface design" limits the notion of the interaction between the human and computer as being complete. It does not describe what this dissertation hopes to encourage as a fundamental tenant of technological design. That fundamental idea is that technology exists to assist people in fulfilling the needs of people. The circular direction of interaction is incomplete unless it sees the computer as a mediator in human communication, not as an end in itself. For that reason, interface design will exist in this discussion as a major area of concern under the general heading of
interactivity.

Discerning the importance and possibility of the emerging aesthetic of interactivity for use in the ethical design of virtual worlds requires a detailed look at a number of factors involved, including interface design. These factors can be identified as including, but not limited to: interface, content, environment, perception, plasticity, and performance. In order to critique whether present virtual reality design trends work towards or against the values proffered by the aesthetic of interactivity, as defined in the previous chapter, it will be helpful to submit these trends to an examination that is structured around the factors listed above. This list was constructed out of the factors emphasized by present virtual reality design trends, and the factors which are felt to be integral to the project undertaken by the emerging aesthetic of interactivity. The following paragraphs will examine each of the listed factors in terms of their capacity for furthering the project of interactivity. In general, what will be looked for are possibilities of opening up a multimodal information exchange and the potentiality in each factor for distributing control, contextualizing judgments coupled with encouragement of concern or caring for the needs and desires of others as if they were our own. These descriptions, then, will be used for critiquing present trends in virtual reality design and making recommendations.

Interface. As a compendium to developing an interface has changed software through the concept that includes the user’s experience.

An interface is a properties of the balance of She also suggests making hard to accomplish (p.4). These remarks about virtual reality of interface that between humans

Content. The idea that virtual world of the underwater world, on one level, sharks. Since not
making recommendations for its alteration, if need be.

*Interface.* According to Brenda Laurel (1990), editor of *The Art of Human-Computer Interface Design*, the most complete compendium to date of ideas concerning this subject, the concept of interface has changed from one that only included the hardware and software through which the human and computer communicated to a concept that includes the "... cognitive and emotional aspects of the user's experience as well" (p.xi). She adds:

An interface is a contact surface. It reflects the physical properties of the interactors, the functions to be performed, and the balance of power and control. (p.xii)

She also suggests that one of the reasons why interface design is so hard to accomplish is that it is "interdisciplinary and highly political" (p.4). These remarks by Laurel, one of the pioneers in thinking about virtual reality design, are extremely applicable to a definition of interface that considers contexts in which the points of contact between humans and computers are developed.

*Content.* The content of a virtual world can be defined as what that virtual world purports to be about, its meaning. In the example of the underwater shark filled world given above, the content of the world, on one level, would always have to be about netting enough sharks. Since netting automatically disintegrates them, the meaning
of our relationship to the sharks can only be one of dominance and destruction. Meaning can be derived, however, from a combination of content and the context in which that content exists. The “angry god” face that appears and announces that the game is over because not enough sharks were netted provides the context of the world. This is a game and the user has limited control. This context is one in which the author of the software program has given the computer the most control of this world. This world’s meaning exists in the hierarchy and dominance demonstrated by the consequences of not netting the sharks.

**Environment.** This would include the space in which the world exists and all the identifying physical qualities of that world. In what relationship the participant was engaged in the world would be in some ways determined by the environment. How changeable by the participant is the environment, how infinite, how limited? How much of it does the participant determine?

**Perception.** How close or far away to what we think of as human perception: sight, touch, smell, hearing, kinesthesia does the world allow us to come and how much control do we have over those perceptions? How much does our involvement in the virtual world depend on “amplifying” or manipulating our senses?

**Performance.** How and why do we interact with and in the virtual world? On what do our behavior affect others? How in what way does our behavior affect others? Is it an open or closed world?

**Plasticity.** How much of the world? How much participant back?

Contemplating any issues involved in any recommendations for...

In looking at present account for where it is being made? Two place must be acknowledged, a period in which much still being developed, as viable options in this period is extreme experimentation as and we want virtual reality
virtual world? On what does our behavior depend and does our behavior affect others in the virtual world, or outside of it? In what way does our behavior affect the virtual world, or the actual world? Is it an open or closed system?

_Plasticity_. How moldable, flexible, pliable are the characteristics of the world? How much does it push back? What does it give the participant back?

Contemplating any one of these six areas will necessarily bring up issues involved in any of the other five, and in doing so, one may successfully engender enough thought to assist us in developing recommendations for an ethical aesthetic for virtual worlds.

In looking at present trends in virtual reality design, one has to account for where it is being made, how it is being made, and why it is being made? Two conditions under which this exploration takes place must be acknowledged. The first condition is the present period in which much of the actual technology of virtual reality is still being developed. Some of the possibilities discussed do not exist as viable options in the virtual reality environment, yet. However, this period is extremely important. Knowing the incredible impact technologies have on our lives, we might best use this period of experimentation as one in which we seriously consider how and why we want virtual reality to affect our lives. The second condition,
connected to the first, and under which this exploration must operate, is the recognition that the line between the uses of virtual reality for art and other uses is not strictly drawn. This has everything to do with the pervasive nature of computer technology. Virtual reality technology is being developed, among other places, at scientific visualization labs at universities, at virtual warfare labs, at military installations, at mass-media cyberspace communications system labs in the heart of the industrial-business complex, and in home entertainment technology labs in Hollywood (Rheingold, 1991). Artists are sometimes involved in its development, but what is initiated at any of these sites impacts development of the others.

The recommendations below are suggestions emerging from the idea that artists will influence the development of virtual reality technology through their involvement with this medium in any capacity. The virtual reality art object can be defined as the impact that art will have on the development of this medium for any purpose. These two conditions coincide with Jurgen Habermas' comments discussed in Chapter Two and reiterated here concerning the importance of reaching into all spheres of human activity in attempting to affect cultural change. According to Habermas, cultural change can only be brought about by the communication process which involves a cultural tradition covering all spheres - cognitive, ethico-political, and so on.

Military application

With that in mind, the discussion of current applications, since those are the areas to cultivate it. The technology were a research scientist who had been at the (Advanced Research Projects Agency, Research to develop). The mainstays of current Hellig's Sensorium. Krueger's responsibility contained many other systems, but, it was generated from which that was able to virtual reality system.

If SIMNET (S) project, Distributed...
ethico-political, and aesthetic. Attacking only one sphere is not enough.

Military applications

With that in mind, it is appropriate to start this review with a discussion of current trends in military applications of virtual reality, since those are the applications that have had the resources available to cultivate it. Though two of the pioneers of virtual reality technology were more artists than scientists, it was a computer scientist who had the connections to receive funding from ARPA (Advanced Research Projects Agency) and the office of Naval Research to develop the first head mounted display (HMD), one of the mainstays of current virtual reality interface technology. Morton Heilig’s Sensorium and stereoscopic devises of 1962, and Myron Krueger’s responsive environments (Rheingold, 1991) of 1974 contained many of the explorations found in today’s virtual reality systems, but, it was Ivan Sutherland’s head mounted display (HMD), generated from within the established scientific research community, that was able to gain enough monetary support to expand into the virtual reality systems available today.

If SIMNET (Simulation Network) was the military’s initial thrust into virtuality for war gaming and interactive training, the newest project, Distributed Simulation Internet, will go much further in its
push towards synchronization of the entire industrial-military complex. According to Bruce Sterling (1993), "seamless" networked simulation is what the future of military virtuality is about. "The seams between reality and virtuality will be repeatedly and deliberately blurred. Ontology be damned - this is war!" (p.94). At present, tank crews and pilots in simulators interact on the networked virtual battlefield of SIMNET. High levels of realism encourage users to train as if they were really out in the field (Reveux, 1992). But, according to Sterling (1993), the Distributed Simulation Internet is to be far advanced in its breadth and scope as a strategic asset, and its ability to coordinate a highly trained military power. The emphasis on connection figures highly in providing "seamless simulation." As Sterling points out,

Most of the means of human perception in modern vehicles of war are already electronically mediated. In Desert Storm, both air pilots and tank crews spent much of their time in combat watching infrared targeting scopes. Much the same goes for Patriot missile crews, Aegis cruisers, AWACS radar personnel and so on. War has become a phenomenon that America witnesses through screens. (p.95)

One of the most recent projects of the Distributed Simulation Internet is a fully interactive, network-ready digital replica of the "Battle of 79 Easting". The actual battle took place in the desert of southern Iraq between untested US tank troops and eight year Iraqi veterans during the first time in late 1990.

... an enormous, hideous, headlong speed, and terrible mechanical sensation that flesh was there. That is what one really sees in "79 Easting," a complete and unmitigated rationality over and above.

This passionately w"
veterans during the "Desert Storm" war. The battle took all of twenty-two minutes, and the Americans won. Demonstrated for the first time in late 1991 at the Interservice/Industry Training Systems and Education Conference (I/ITSEC), The Reconstruction of the Battle of 79 Easting is in Sterling's words:

... an enormously interesting, interactive multimedia creation. It is fast and exhilarating and full of weird beauty. But even in its sleek, polygonal, bloodless virtuality it is a terrifying thing to witness and to comprehend. It is intense and horrific violence at headlong speed, a savage event of grotesque explosive precision and terrible mechanized impacts. The flesh of the real young men was there inside those flaming tank-shaped polygons, and that flesh was burning.

That is what one knows - but it's not what one sees. What one really sees in "79 Easting" is something new and strange: a complete and utter triumph of chilling, analytic, cybernetic rationality over chaotic, real-life, human desperation. (p. 96)

This passionately written and profoundly terrifying quote introduces us to the aesthetic of military virtual technological design. If we submit this, and other examples of virtual reality being developed for military use, to an examination structured around the six factors listed above, we find that the military research agenda meets many of the demands for generating what looks like an interactive style, but falls disastrously short in terms of substance. Submitting The Battle of 79 Easting to a critique based on the six factors outlined above aids us in seeing its shortcomings as an example of a virtual
reality aesthetic based on care and responsibility, though it appears to have many of the qualities emphasized in current interactive technology. After all, the world of 79 Easting is not completely closed, it is networked. It is possible to change the parameters, perhaps as Sterling (1993) suggests, give the Iraqis infrared targeting scopes, the lack of which contributed greatly to their loss. But, inevitably, it is a closed world. The outcome required is to destroy the enemy and win the battle. The parameters of the environment, interface, and perception may be changed and offer varieties of choice in their use, but the performance, plasticity, and content factors offer the participant a one directional way of knowledge, and therefore, no chance of gaining further insight into other alternatives for behavior, other than to blast the virtual tanks into smithereens. The participants are offered extremely limited information about their virtual counterparts in this deadly game, and consequently their performance options are limited. Their behavior is dictated by this lack of knowledge. In fact, their performance interaction, as dictated by the strict performance parameters of this virtual world, offers absolutely no chance for even attempting other strategies: negotiation, for instance, or surrender. Similarly, the plasticity of the medium is constrained by the outcome. In the virtual world of 79 Easting, the Americans always win, and win only by destroying more underwater world of Lab, this world’s not no other kind of balance, it does not encourage true reciprocal interaction, even permitted, to act actions. This virtual world within it has no end, it has no effect on the real world, and no hopes to accomplish anything, no matter what the consequences.

It is extremely closed world based on development in the growth of terrorism. Edward had all unstable, dangerous, controlled by technology.

Seen in this light, conflict the US response to Syria’s assumption of ‘rules of engagement’ actions of a state distinguish ‘civil’. The realization that
by destroying more tanks and the men inside them. Like the virtual underwater world developed by the Human Interface Technology Lab, this world's meaning is about control and dominance. It allows no other kind of knowledge to interfere with this preferred meaning. It does not encourage or permit the user to participate in any kind of true reciprocal interaction. The participant is not encouraged, or even permitted, to offer input behavior other than the prescribed actions. This virtual world is a closed system, implying that effects within it have no effect on the actual world. That this virtual world has no effect on the actual world is, as Sterling points out, untrue. It hopes to accomplish the task of training soldiers to win battles, no matter what the cost to human lives.

It is extremely interesting that this incredible preference for a closed world based on the systems analysis approach to technology development in the military is one of the causes of the growth of terrorism. Edwards (1989) connects the military's assumption that all unstable, dangerous, politically unfavorable situations can be controlled by technical means. He says:

Seen in this light, terrorism and guerrilla war, the major forms of conflict the USA has had to face since World War II, are a logical response to systemic closure. They are a refusal to fight by the 'rules of engagement', to accept the fixed set of entities and actions of a systems discourse. Their randomness, their failure to distinguish 'civilian' from 'military' targets...are all marks of the realization that the military microworld is a closed system.
Games and Entertainment

The first experience most users will have with virtual reality will be an arcade based system such as the Battletech Center from Virtual World Entertainments which is modeled on SIMNET. Though other content oriented virtual reality programs exist, such as sports related ones, the majority of arcade virtual reality games revolve around the war model. The primary behavior is to challenge the computer or to challenge other players in networked environments. Taking cues from the military prototype, the goal is to win. Behavior and consequently, content, meaning, environment, plasticity and perception are limited to prescribed parameters.

Location-based movies, such as Backdraft or Star Wars, are descendants of 3-D movies, and provide no individual control or personal interaction, but reinforce the feeling of shared reactions. IMAX theatres and the even more involved theme-park virtual reality entertainment centers backed by the movie industry are examples of the trend towards a total immersion experience that, nonetheless, limits the participant's involvement to a passive one. Seven theme park sites are proposed for virtual reality representations of Star Trek's starship, the Enterprise. The first one will be available for willing and paying customers to enter within a year. As described

Backed by Paras and co-developed, futuristic "virtual environments, shot food: You catch in virtual reality reality that the transporter

Work on virtual area of content, how (AI), such as Joseph. This research revolves text based character theories of dramatic eventually used in this project using interaction (Laurel) recommendations in and constraint as interaction. We with interactive technology (Multiuser Dimensional virtual text-based and realtime dramatic i
year. As described by Deveaux (1993)

Backed by Paramount Pictures, and Edison Brothers Stores Inc., and co-developed by Horizon Entertainment, these centers will be futuristic "virtual malls" with virtual reality rides, games, environments, shops and even Star Trek food stalls. (Klingon fast food: You catch it, you eat it.) Visitors will be able to interact with virtual reality representations of the bridge, the holodeck, and the transporter room. (p.39)

Work on virtual reality development is being advanced in the area of content, however, by researchers in Artificial Intelligence (AI), such as Joseph Bates' "Project Oz" at Carnegie Mellon University. This research revolves around the attempt to model the behavior of text based characters using knowledge representation structures and theories of dramatic interaction. These text tests are to be eventually used in virtual worlds. Brenda Laurel has collaborated on this project using her interpretation of Aristotelian dramatic interaction (Laurel, 1991; Rheingold, 1990). Laurel's recommendations include the emphasis of enactment, engagement, and constraint as useful for designing "satisfying" human-computer interaction. We will be looking in depth at this approach to interactive technological design later in this chapter. MUDs (Multiuser Dimensions), such as Lucasfilm's Habitat, are examples of virtual text-based (and sometimes both text and image-based) realtime dramatic interactions on the Internet, the "loose amalgam of
computer networks teaching all over the world" (LaQuey, 1993, p.1). MUD's can take the form of an adventure game, a party, or any other number of human interactions. One can play one's self, or "incarnate" into a character. Usually documents explaining the rules of the MUD are available for newcomers, though many MUDs are able to incorporate self-constructed additions (Rheingold, 1991). Rheingold points out that Fujitsu owns Habitat and is the principal funder of Bates' Project OZ. He says:

It seems clear that they are planning to converge their telecommunication, immersion, and game technologies sometime in the future. (p.309)

How open will the interaction of these systems be? How driven by the satisfaction of the user will they be as compared to priorities of a different sort? It is not hard to make comparisons with the rise of commercial network television? Rheingold verbalizes a particularly pertinent question when he asks:

... will there be a defacto monopoly built into the constraints on the kind of realities accessible through the mass market gadgets in which everybody will be forced to buy either Sony or Fujitsu brand reality? (p.311)

As Stone (1992) makes explicit with her comparison studies of phone sex workers and computer scientists and engineers working on virtual reality systems, representing the body through limited communication channels in both pursuits requires codification of the performance be environment parameters? codes?

Medicine Science

A visit to the Grap (UNC), NASA Ames Research Technology Lab at the one a helpful understanding for which virtual reality variety of interface options can interface options can desktop systems, part 1992). A fourth category rarely found in research art enviroaments, and Trends in this category education and art. Do Through a 3-D environ be UNC's efforts to be "Volumetric rendering" information than X-ray...
"... cultural expectations as tokens of meaning" (p. 616). How much of the performance behavior, and hence, content, plasticity, and environment parameters will be limited to suit these preconceived codes?

**Medicine Science, Business, and Architecture**

A visit to the Graphics Lab at the University of North Carolina (UNC), NASA Ames Research Center, or the Human Interface Technology Lab at the University of Washington, Seattle, will give one a helpful understanding of the medical and scientific applications for which virtual reality technology is being developed, and the variety of interface options presently available for use. These interface options can be categorized into three broad sections: desktop systems, partial immersion, and full-immersion (Reveaux, 1992). A fourth category, responsive environment systems, are rarely found in research centers such as these, but are available as art environments, and for educational and museum-oriented use. Trends in this category will be discussed in the next two sections, education and art. Desktop systems allow the user to navigate through a 3-D environment on a monitor. An example of this would be UNC's efforts to build virtual reality medical imaging tools.

"Volumetric rendering", for instance, allows physicians to gain more information than X-rays or ultrasound by being able to display
different layers of soft and hard tissues in the skull using different layers of transparency.

Partial immersion systems allow users visual interaction with a monitor with addition of 3-D glasses, and possibly head-phones for audio. Input devices, such as a DataGlove from VPL Research, Inc., a joystick, or a specialized mouse, provide manipulation of the virtual reality world in the monitor in real time. An example would be NASA Ames' use of 3-D sounds that provide important distance and position cues of objects in relation to the participant. Initial tests have indicated pilots using this simulation experiment were able to more quickly locate and evade other nearby aircraft through their enhanced ability to link out-the-window positions with the virtual sound of the aircraft. (Pimental et al, 1992)

Full-immersion systems and total immersion systems are characterized by the use of head gear, gloves and body suits that allow the user a three hundred and sixty-degree sphere of virtual 3-D space. Examples of this kind virtual reality interface abound in the three research sites mentioned above, as well as in other research sites and commercial development companies around the world. This is the virtual reality interface technology that the media finds most fascinating. From the outside, the use of head mounted displays (HMDs), or boom tracking devices, that enclose the participant's field of vision. A number of expensive HMD's, or boom units, can be used in a virtual world on a single position. The participant appears to be in a rich virtual environment. Elecronic devices are sometimes built into equipment for on-the-spot evaluation.

The stereoscopic illusion is created by using one of the eyes to view an image on the left and the other eye to view an image on the right. The images are alternately flashed onto a screen or a special tracking boom. An example of this newest effort, the VPL, includes, along with their usual video and audio symbology, a device called a "boom" that creates the virtual reality environment. The boom allows the participant to "fly" through the virtual world.
participant's field of vision accentuate the isolation of the participant in a virtual world. For observers not wearing the presently rare and expensive HMD's, or not able to watch the changing contents of the virtual world on a connected large screen monitor, the virtual reality participant appears to exhibit behavior unrelated to the actual surroundings. What the participant is seeing is a computer generated three-dimensional environment that changes as it corresponds to the participant's movements inside that fabricated environment. Electromagnetic movement-tracking technology is sometimes built into the HMD, which also holds stereoscopic glasses and 3-D surround sound headphones.

The stereoscopic glasses use infrared signals to synchronize the left and right images with liquid-crystal shuttered lenses. A 3-D illusion is created for the participant by displaying slightly offset images alternately in both lenses. Some HMDs are attached to a tracking boom. An example of this configuration is NASA Ames latest effort, the Virtual Environment Workstation (VIEWS). It includes, along with glove-like input units, speech recognition, an audio symbology generator, gesture-tracking devices, and computer-based video equipment, a hand-maneuvered display. The freedom of the boom allows the participant to enter and exit virtual reality quickly and easily. Used at NASA Ames for mission-oriented
applications for computational fluid dynamics. *Space Station Freedom* and future planetary exploration, the VIEWS system allows the user an ease of use and a bridge with the actual surrounding reality. This ability of a virtual reality participant to recall oneself to the needs of the actual surrounding reality connection is an important one to remember when we begin discussion of recommendations for an ethical virtual reality design.

Another full immersion interface, but one with an added capability is telepresence. This involves utilizing the virtual reality interface of HMD or tracking boom, and a navigation and control interface to simulate presence in a real-world remote location. An example of this would be NASA Ames work with telerobotics and telecommunications. External repairs on *Space Station Freedom* will be made by robots connected by virtual computer control to the crew in the cockpit. Other applications include analyzing tissue samples that host plague viruses, or upgrading a transoceanic cable using a robotic deep sea probe (Reveaux, 1992). UNC’s GROPE-III system, an example of this configuration, was proposed originally in the early 1970’s by Frederick Brooks as a molecular docking tool for chemists attempting to design effective drugs. This particular program allows the biochemist to feel the force field surrounding the molecules using a manipulator arm as a force feedback simulation.

Architecture, planning, reality applications for problems” have been Interface Technology. This includes creating an airport. The model is between opponents and presented. One of the more at UNC is a virtual image superimposed was developed for an great deal of theoretical reality has emerged in Benedikt’s (1991) includes a number of space. Later in this presented.

Visual spreadsheets, virtual prototyping is really, that has been thinking about virtual
Architecture, planning and design have been using desktop virtual reality applications for some time. One of UNC's main "driving problems" have been architectural walkthroughs. The Human Interface Technology Lab is working on a virtual model of Seattle. This includes creating a virtual third runway for the Seattle-Tacoma airport. The model is planned as assistance in resolving conflicts between opponents and supporters of the addition (Deveaux, 1992). One of the more aesthetically interesting interfaces being developed at UNC is a virtual display that allows the user to see the virtual image superimposed on the real world. This particular image display was developed for architects to use as a location based design tool. A great deal of theoretical thinking concerning the design of virtual reality has emerged from the field of architecture. Michael Benedikt's (1991) influential edited book, *Cyberspace: First Steps* contains a number of essays devoted to the possibilities of virtual space. Later in this chapter, one of the Benedikt's "proposals" will be presented.

Visual spreadsheets, information and money management, and virtual prototyping are a few of the business applications now being developed. There is a computer programmer's phrase, a warning really, that has been around for some time. It is as apropos to thinking about virtual reality applications as it has been about any
previous computer mediated activity. The phrase is “Garbage in, garbage out.” In reviewing concerns about the veracity of virtual reality models for such applications as medicine, science, business, and architecture, that particular phrase carries a great deal of weight. Emphasizing the open and variable aspects of the six factors listed above should encourage a healthy skeptical view of the infallibility of the virtual reality simulation’s results, but the accuracy of the data and on what biases that accuracy is founded will make enormous differences in those results. According to Bob Jacobson, formerly of Human Interface Technology Lab, and now owner of World Design, Inc., an information design company which includes virtual reality as the outer limit of their available enabling technologies:

The biggest negative down the road is when these worlds are fairly valid, when they have a veracity that can’t be discerned from the real material world, or when people come to believe in them, like some people believe in TV, and mostly falsehoods, but falsehoods are very subjective, when bad data is presented, data that doesn’t incorporate reality, either it is a mistake, a glitch that gets in, or it’s deliberate sabotage by just using the medium to make a pitch. And you can’t tell the difference between what’s real and what’s not. (Bob Jacobson, tape recorded interview with the author. Seattle, Washington, February 2, 1993)

If the development of full-immersion virtual reality continues as expected, interface devices, such as HMDs and datagloves, will generally become a trend in medical immersion. There, may iterate Myron mainstream or "act the human should adapt to the computer". A found a haven in a.

Education and

It may do well. Noble’s (1989) essay, education, the mill.

This cultivation systems is the at the heart of ‘think’ and ‘pressing’ such pressing. A crippling over into a staging scenarios are weapon system and legitimate corporate capi

If Noble is correct, technological med
generally become lighter, less expensive and more unobtrusive. The trend in medical, scientific, and business uses is towards full-immersion. There are associated problems with this direction. We may iterate Myron Krueger’s (1990) comments above concerning this mainstream or “orthodox” approach as being based on the idea that the human should adapt to the computer. He disagrees, insisting, “The computer should adapt to the human, rather than the human adapting to the computer” (p.xiv). This approach is one that has found a haven in art applications and some educational ones.

**Education and Art**

It may do well to start this section with a quote from Douglas Noble’s (1989) essay on the technological agenda links between education, the military, and business:

This cultivation of cognitive resources for advanced technological systems is the new cognitivist agenda for the schools, and it lies at the heart of new corporate demands for employees who can ‘think’ and ‘problem-solve’, ‘reason’ and ‘learn’. . . Motivated by such pressing needs for their wares, public education leaders are tripping over themselves to transform the schools, unwittingly, into a staging ground for playing out militarized scenarios. These scenarios are shaped by the requirements of advanced military-weapon systems, by ‘cognitive researchers’ need for laboratories and legitimation, and by new ‘intellective’ requirements of corporate capital in a militarized information economy. (p. 35)

If Noble is correct, and I think he is, and the push for newer technological media that emphasizes learning research is a result of
an agenda initiated by military and business interests, and not educators, then the closed system aesthetic described above is one that is being brought into the arena of education. As stated previously in this dissertation, it is imperative for educators to inaugurate programs of interest in the understanding of technological media specifically for influencing its direction. Much of the open system design in virtual reality is presently being developed under the direction of, or assisted by, artists, and it would behoove educators to look closely at the nature of these virtual reality systems and their underlying priorities.

It is particularly intriguing and encouraging that even within the larger military industry oriented virtual reality research sites there are people who are working towards the development of a virtual reality aesthetic that encourages an interactivity of reciprocity. Two such people are Chris Byrne and Suzanne Weghorst at the Human Interface Technology Lab. Byrne is presently a Research Associate at the Human Interface Technology Lab, but is also serving as the Acting Director of Education. She is currently pursuing her doctorate in Industrial Engineering, while working on the development of an educational project involving the collaboration of the Human Interface Technology Lab virtual reality resources and several Seattle area high schools. Weghorst is a Research Scientist at the Human Interface Technology Center of the University of Washington.

Though the Human Interface Technology Center’s mission is to create practical, economical, and user-friendly computer-based systems, it is clear that we need to explore the aesthetic and experiential aspects of these systems. The purpose is “to transform our workspace into a more comfortable, enjoyable, and efficient place to work.”

In this context, the human factors research and development of the Human Interface Technology Center is relevant. The center’s mission is to create practical, economical, and user-friendly computer-based systems. However, it is clear that we need to explore the aesthetic and experiential aspects of these systems. The purpose is “to transform our workspace into a more comfortable, enjoyable, and efficient place to work.”

Applications. She works on research projects that focus on user-centered design, with the goal of improving the usability and user experience of human-computer interaction. She is also involved in the development of virtual reality systems for educational purposes.
Human Interface Technology Lab. She holds a M. A. in Psychology from the University of California at Riverside and a M.S. in Computer Science from the University of Washington. As one of the founders of the Human Interface Technology Lab, she is Coordinator of Human Factors Research and Biomedical Applications.

Though the Human Interface Technology Lab’s stated overall purpose is “to transform virtual world concepts and research into practical, economically viable technology products” (Washington Technology Centers, 1991), both women are extremely cognizant of the importance of keeping in mind more holistic and inclusive goals for their projects. Weghorst’s interest is in generic applications that emphasize multiple frames of reference. For her, virtual reality design that allows the participant to include virtual reality in the actual environment is preferable to an immersive environment. An example of this would be the see through display mentioned above being developed at the University of North Carolina for architectural applications. She visualizes future applications engaged in art therapy that target the needs of special populations. Her argument with the encumbering interfaces of HMDs, gloves, and body suits is less a philosophical one, and more a practiced view from the experience of human factors. According to her, it is not a “fluid” interface. She is also concerned about possible health risks of which,
as of yet, we are unaware.

Byrne is predominantly interested in a holistic approach to education. She emphasizes the possibilities of virtual reality for opening up education to all kinds of learners, particularly those who traditionally have done poorly in educational environments that emphasize linear and linguistically supplied learning. Byrne finds interaction that offers as much control as possible to the participant to be most effective. Most importantly, she feels it is essential for the participant to know exactly from where the objects, environments, and characters in the virtual reality world generate. Otherwise, the participant has no access to an alternative knowledge about the virtual world and may begin to accept the virtual world as the only possible simulation of reality rather than a computer-generated fabrication by particular people or institutions. Her interface preference is full-immersion, in order to take full advantage of the three-dimensional capabilities of human perception, but she insists it is important to keep ethical priorities in mind:

Technology and ethics are incredibly intertwined. The best answer to what ethics has to do with the development of virtual reality is to offer it to a wide range of populations. Once they have access, then critical conversation can ensue. I don’t subscribe to the technology is inevitable theory. (Chris Byrne, personal communication, Seattle, Washington, February 2, 1993)

Byrne’s virtual reality project involving three Seattle high schools is a test of implementing building and using studied. Everett High School, literally building the well-equipped computer Swivel3D software. be converted to the file format. Once convert students, will be able School students. Byrne group of at-risk students Technology Lab to build world about AIDS.

Another approach student populations are creating their own world. This project is directed with Carl Eugene Loo, Telecommunications and Creative Enquiry in the University. Studio A
a test of implementing these ideas. Two high schools will collaborate on building and using a virtual world in which electron clouds can be studied. Everett High School’s Art Department will be in charge of literally building the world from scratch, since they have access to a well-equipped computer lab with 16 Macintosh LCs and Macromind’s Swivel3D software. This particular software outputs images that can be converted to the Human Interface Technology Lab’s virtual reality file format. Once converted, the world made by Everett High School students, will be able to be participated in by Ranier Beach High School students. Byrne is initiating another project with a small group of at-risk students who will be invited to the Human Interface Technology Lab to both build and participate in a virtual reality world about AIDS.

Another approach to offering virtual reality accessibility to student populations and allowing participants to be involved in creating their own worlds is the Discover Virtual Reality project. This project is directed by the Studio Arts division of the Resident Associate Program of the Smithsonian Institution in collaboration with Carl Eugene Loeffler, artist and, currently, the Project Director of Telecommunications and Virtual Reality located at the Studio for Creative Enquiry in the College of Fine Arts at Carnegie Mellon University. Studio Arts, headed by Joanne Gigliotti, hopes to install
virtual reality and telecommunication systems into twenty-four inner-city schools in the Washington, D.C. area. Loeffler and his staff of fifteen graduate and undergraduate CMU students have been asked to design the applications. As Loeffler (1993, February) explained, however:

When we first started thinking about the project, it was sort of like, 'What sort of Star Trek experience are we going to build for this public?' and then we started thinking, you know, this is how we work, and social critique is a lot of our process, and we got a lot of dialogue that, it would be pretentious of us if we built these three worlds here at CMU from our point of view, and hand them over to this public and say, 'here's some virtual reality, go and discover it.'

Part of the impetus for designing more open systems for this project came from the Discover Virtual Reality Project Assistant Director, David Goldberg, an artist and computer programmer from Howard University in Washington, D.C.

Loeffler cites his Telecommunications and Virtual Reality Project as among the first, if not the first, virtual reality production environment to exist in an art department in the United States. Other projects in which he and his staff are working are the Networked Virtual Art Museum and a Networked Virtual Funhouse. The Virtual Art Museum is what Loeffler considers to be a truly public art form, since anyone who has access to the Internet can add virtual art pieces to the museum. The Virtual Funhouse, one of the most spatially complex connected to Carnegie Mellon University.

Though the role of entering the Funhouse participant.

The New York Times, "It Art Yet?" on the year. It reviewed First Encounters with Manhattan, citing its the medium to be shown. Myron Krueger was artificial reality in phrase he has coined found nowhere in the realized use of the responsive environment to explore without physical compromises, actions, and voice, the use of user-wr
most spatially complete virtual reality environments existing, was connected to Germany for a time so that both participants there and at Carnegie Mellon University could interact together in real time. Though the role of specific characters must be taken on when entering the Funhouse, most of the behavior is left up to the participant.

The New York Times ran an article entitled "Virtual Reality: Is It Art Yet?" on the front page of its Arts and Leisure section last year. It reviewed the exhibit, "Through the Looking Glass: Artists' First Encounters with Virtual Reality", at the Jack Tilton Gallery in Manhattan, citing it as "what may be the first exhibition in this medium to be shown in a commercial gallery" (Section, 2, p.1). Myron Krueger was included in the exhibit, and a photograph of his artificial reality installation, Videoplacce was given a half page. The phrase he has coined for his work, "artificial reality", however, is found nowhere in the article. Krueger's work is by far the most realized use of the fourth category of examples of virtual reality, responsive environments. These environments offer the possibility to explore without the encumbrances of technology that demands physical compromise from the participant. Participants' movements, actions, and voice trigger reactions in a real physical space without the use of user-worn peripherals. The reviewer (Hagen, 1992)
compares the present fascination with virtual reality by artists with the excitement generated by the invention of portable home video equipment in the sixties. He says:

At that time, critics and theorists pontificated in similar terms about the radical transformation of society that the new technology would foster. Looking back on those idealistic visions, a cynic might argue that the most profound result of the invention of the Portapack was “America’s Funniest Home Videos.” (p.19)

Seen in the light of the Rodney King verdict, one has to wonder from what planet the reviewer has been teleporting his articles. If the reviewer missed much of the significance of what he was seeing, Janine Cirincione (1992), the curator of the exhibit and director of Tilton Gallery did not. In her curatorial statement, she puts forth a number of questions the new technology raises. She asks:

How will artists use advanced technology in the near future, as it becomes affordable and accessible? What kinds of virtual worlds will artists build? How will networked interactivity influence the ways in which we relate to each other? How will artists humanize technological media to go beyond the seduction of the machine into the poetic? And finally, what value will we place on the role of objective reality when illusion becomes more credible and fiction more ‘real’? (p.9)

A number of the pieces in the exhibit were presented as sketches or proposals due to the difficulty of acquiring access to equipment.

Cirincione and two others, artist and author, Brian D’Amato, and Michael Ferraro with Blue Sky Productions have started a nonprofit corporation called SoL association was due, obtaining access to equipment to generate a critical component of digital technology”.

The Art and Virtue of Banff, Alberta, Canadian institution long recognized as an advanced professional collaborative ten week and Media Arts program the investigation of artistic into what, by 1992-93, with a five year plan Television and Video Research will share the ten base:

1. Establish an (p.5)
2. Contribute knowledge (p.9)
3. Advance a project of artistic communication for the Arts, Banff 1993)
corporation called Softworlds Studios. The formation of this association was due, in part, to respond to the difficulty for artists of obtaining access to equipment, and, in part, to their desire to generate a critical context for artist’s use of the “interactivity and digital technology”.

The Art and Virtual Environments Projects at The Banff Centre in Banff, Alberta, Canada is a collaborative project undertaken by an art institution long recognized as Canada’s leading institution for advanced professional training in the arts. Originated in a collaborative ten week residency project of the Centre’s Art Studio and Media Arts programs in 1991, the Centre’s commitment to the investigation of artist’s relationship to new technologies has grown into what, by 1993-94, will be a full-fledged Media Arts Department with a five year plan for new media research. Three programs, Television and Video, Audio, and Computer Applications and Research will share three principles on which its research will be based:

1. Establish an original artist-centered paradigm for research
2. Contribute knowledge to society
3. Advance a particular socio-cultural vision for network based artistic communication. (“New Media Research at the Banff Centre for the Arts. Banff Centre for the Arts Communication, April 14, 1993)

The Centre’s Art and Virtual Environments Project, begun in the
summer of 1992 and continuing through October 1993, selected eight
groups of artists from a general Call for Proposals put out by the
project in 1991. Artists travel to the Centre from anywhere from
two weeks to two months to complete a wide assortment of virtual
reality projects, using the technical resources available at the Banff
Center.

One pair of artists chosen for the project includes Brenda Laurel.
Her project with Rachel Strickland, the videographer, is called
Virtual Coyote. Awarded a doctorate in Theatre from Ohio State
University, Laurel's dissertation topic was Interactive Fantasy.
Laurel has been looking at dramatic interaction as a model for
interactive technologies for over seven years. Her bias has been
towards the more traditional Aristotelian notions of dramatic
interaction, but lately this has been changing. About her work on
Virtual Coyote, she says:

And in virtual worlds it's just the same (as in multimedia). If I
can't put my images in there, then interactivity is constrained to
the world of changing form and structure. And you never get to
introduce content. But content is what it's about. (Interview in
Morgan, 1992, p.86)

Her notions about activity have shifted, also. Part of this shift has
come from "hours and hours in kindergarten watching kids", and this
has suggested other alternatives for modeling virtual reality
behavior, such as the creative assertion.

They're in and out, seamlessly. They show them little doors,
they can stub stub stub ambiguity that's there. There's an app
that optimizes them.

Another artist is
and dancer, Diane
and collaborator on a
The artists hope to
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interests are in a
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behavior, such as the way children move so easily in and out of
creative assertion. Laurel (1991) says:

They’re in and out of role-playing and world-asserting
seamlessly. There’s no mode shift for them. When you give
them little doodads like rocks they can put dresses on or potatoes
they can stab stuff into, they go nuts. There’s a level of
ambiguity that’s necessary about these toys, these little props.
There’s an appropriate level of fuzziness about them that
optimizes them for children. (p.290)

Another artist included in the Banff Project is Marcos Novak. He
and dancer, Diane Gromala, and designer, Yacov Sharir, are
collaborating on a piece entitled, Dancing with the Virtual Dervish.
The artists hope to provide both interaction and participation
between the artist and public through chance created by the virtual
space. The dancer, wearing goggles and gloves, will interact with
computer-generated objects that the audience is controlling. What
the audience sees and controls and the dancer perceives will be
projected. The entire performance will be broadcast live through
teleconferencing to sites in Austin, Banff, and the Santa Monica
Electronic Cafe. Novak is Assistant Professor in the Department of
Architecture at The University of Texas at Austin and a doctoral
candidate at the University of California at Los Angeles. His research
interests are in algorithmic composition, cyberspace, and the
relationship of architecture to music. Concerning the relationship of
ethics to the virtual reality interactive aesthetic, Novak says:

It is important to me maintain difficulty, and to require judgment. Even though I am speaking of making an aesthetics of processes, I’m not speaking of an aesthetics or an ethics of a machine that makes paintings for me. What I’m talking about is an amplifier of certain kinds of activity. With the amplification comes increased responsibility. The access to information is good, but it’s only good if it allows people not only access, but also encourages connection and association and pattern-making. (Novak, taped interview with the author, March 23, 1993)

Novak, like a number of artists involved in the development of virtual reality, see the open system as the most ethical aesthetic approach, a far cry from the military version from which so much of virtual reality development has come.

Two artists involved in the Banff Project who approach virtual reality environments from a musical composition background are Will Bauer and Steve Gibson. Their collaborative project is called Objects of Ritual and emphasizes the virtual reality participant’s amplified ability to create for themselves an experience from the structured symbols, both verbal and non-verbal, offered within the environment. Bauer’s expertise and degrees in programming and musical composition has led him to develop a virtual motion responsive environment system called GAMS. This system will be used to produce Objects of Ritual. Different everyday objects will appear in head mounted displays to different participants, while voices and sounds ritualistic motions will allow the participants to hear the sounds, which may be

Gibson, who has a background in electronic music and is a magnificent amalgamator of virtual reality and the physicality that the human can offer, observes that the expression for virtual reality projects is "experience" (Bauer, 1993). The two things are unique, but we are that rather than once we are more involved in techn...
voices and sounds encourage responding to those objects with the ritualistic motions associated with those objects. Hand-held wands will allow the participants to engage large samples of Gibson's sounds, which may be built into larger compositions of sounds. Gibson, who has a doctorate in music composition, has composed magnificent amalgams of digital sampling and computer sequencing. A fundamental issue for their involvement in this collaborative virtual reality project is that art is essentially "not a thing, but an experience" (Bauer, personal communication, 1990). He says:

The two things that we like to explore, and I wouldn't say we are unique, but we certainly are in the minority in the VR art field, is the physicality of it, and incorporating the human body. Realizing that the human body is far more sophisticated than any current technology, in terms of what it can do, and its capability for expression for dance or performance art, we try to work with that rather than ignoring it entirely. . . Also, the social aspect, we are more interested in the social aspect of cyberspace and developing a sense of communion. (Bauer, taped interview, May 10, 1993, Banff, Alberta, Canada)

Their hope is that participants in the virtual environment will emerge to find that the actual experience of the total environment can only be composed, and perhaps understood, by communicating to each other individual experiences of that environment. Bauer's and Gibson's work is an excellent example of the move by artists involved in technological media to cultivate an aesthetic of
interactivity that insists on the contextual involvement of the participants to validate content.

There are, however, theorists who insist that laws about the nature of the artificial or illusory spaces of virtual worlds can be developed. One such person is Michael Benedikt, an architectural theorist, editor of *Cyberspace: First Steps* and author of the essay “Cyberspace: Some Proposals”. This essay, in Benedikt’s own somewhat tongue in cheek description, “... dared to lay down the Ten Commandments of virtual reality” (Benedikt, taped interview with author, March 23, 1993). Benedikt’s (1991) purpose in this was the sorting out of which axioms and laws of nature ought to be retained in cyberspace, on the grounds that humans have successfully evolved on a plane where these are fixed and conditioning of all phenomena (including human intelligence), and which axioms and laws can be adjusted or jettisoned for the sake of empowerment. (p.119)

Bendickt sees his work as contributing to the general evolution of “the information-age culture through the computer” (p.209), rather than virtual reality technology specifically. He outlines in the article seven principles which identify contingencies between physical space and cyberspace. The principle he himself finds the most profound of the seven is the Principle of Indifference. It states:

... that the felt realness of any world depends on the degree of its indifference to the presence of a particular “user” and on its resistance to phenomenological life exists whether we decide to accept this principle or not. cyberspace, our own realities, as a dream.

Benedikt admits that he has not fully deployed cyberspace as a critical theory (Tischler, 1993) of development and possibilities”, one chapter of this book is not a deconstruction or perhaps a cure on which civil society is based.

According to Feis, the importance socia...
resistance to his/her desire. The principle is based on a simple phenomenological observation: what is real always pushes back. (p. 160).

As he goes on to explain, the Principle of Indifference also infers that life exists whether or not you are there. Benedikt considers this principle essential for true participation in virtual realities. Without this principle

... cyberspace would rapidly devolve into countless roll-your own realities, each as amenable to manipulation and as personal as a dream.(p. 161)

Benedikt admits at the conclusion of this essay that he does not fully address the “less-than-salutary political and economic effects of a fully deployed cyberspace” (p.209). This particular principle is one that has enormous potential for encouraging participation in what critical theory (Feenberg, 1991) defines as an “ambivalent” process of development of technology suspended between different possibilities”, one that will insure what was described in the first chapter of this dissertation as

... not a destiny but a scene of struggle. It is a social battlefield, or perhaps a better metaphor would be a parliament of things on which civilizational alternatives are debated and decided. (p.14)

According to Feenberg, this ambivalence is characterized by the importance social values inherently play in the design, and not
merely the use of technical systems.

With this in mind, as well as our promise to examine specific theories of dramatic interaction by Aristotle and Bertolt Brecht, the rest of this chapter will be devoted to adding to this "parliament of things", this discourse about the design of technology. As stated before, with its emphasis on interaction, immersion, and the involvement of all the senses, virtual reality easily lends itself to discussion as a performance medium. Brenda Laurel's earlier suggestions, and many of the current design trends from the military and entertainment areas of research and development rely heavily on Aristotle's model of dramatic structure, a choice that necessarily limits the environment in which a truly interactive technology may emerge. Both Aristotle and Brecht developed theories of dramatic interaction that had enormous influence on subsequent Western ideas about theatre. Our aim here is to view carefully the significant tenants of each theory and make a case for relying on Brecht's theories as more suitable for designing a virtual world that demands the involvement of the participant(s) and hence, their access to a powerful form of knowledge and communication. Those limiting aspects of Aristotelian dramatic theory are in contrast to a theory of drama developed in reaction to it, that of Bertolt Brecht, the great German poet and dramatist. The world views upon which each

theory is based are
the design of interactive
the social values that

Part Three
Brecht and Aristotle

"Plot, then", said one who is aroused in the plot and acts spectator's capacity to

Aristotle consid
theory is based are also in contrast. The world view upon which the design of interactive technology is based has everything to do with the social values that technology will encourage.

Part Three
Brecht and Aristotle

"Plot, then", says Aristotle (1932), is the first principle, and as it were, the soul of a tragedy" (VI.15). For Brecht (1957), however, the soul of what he calls epic theatre is the narrative. Instead of the action of a play forming the structure of the tragedy, a structure in which the audience finds itself increasingly embedded as the play progresses, Brecht insists on narrative. Brecht often includes a narrator who talks directly to the audience about the action of the story and its meaning. Characters, too, comment on their actions in a variety of ways. Instead of implicating the spectator in a stage situation, Brecht wishes to turn the spectator into an observer, but one who is aroused to some action in real life. For him, involvement in the plot and action of an Aristotelian drama only wears down the spectator's capacity for action where it counts, in the real world.

Aristotle considers the art of tragedy as consisting of the three basic parts: plot-making, character delineation, and thought-and-language. These means allow the playwright to develop not only the
tragic form of the drama, but the veracity of the play on which the emotional involvement of the spectators depend. Aristotle’s purpose is to achieve “the most lifelike reality” (XVII.2). The more realistic the plot and action, the more the spectator is able to share the experience, be convinced that what he is seeing is absolutely possible, “naturally” (VII.3) so, and unalterable. One scene should follow another in a linear development, growing out of the predetermined fate of the characters. Man is thought of as a “fixed point” (Brecht, 1957, p.37).

Brecht built what he called Epic theatre around the idea that Aristotle’s insistence on the spectator’s emotional involvement with the play was not only unessential but harmful to the spectator’s understanding. In his Epic theatre, however, “… the spectator was no longer in any way allowed to submit to an experience uncritically (and without practical consequences) by means of simple empathy with the characters of a play” (p.71). This theatre forces the spectator to make decisions, it gives him a “picture of the world” (p.37). “He is made to face something through argument” (p.37). He is “brought to the point of recognition” (p.37) by being able to stand outside and study “the object of inquiry” (p.37), the human being. Instead of “man as a fixed point” (p.37), Brecht thinks of “man as a process” (p.37). Each scene exists for itself. Montage and jumpcuts, both cinematic techniques, are used against the fusion of characters’ actions and setting” (p.37). In this way, the spectator is made to understand what he is watching. Brecht calls for a process of “Verfremdung.” - estrangement.

“The production team, whether it is the actors or the spectators, is put through a process of estrangement to put them through a process by which something is taken out of them, something to its complete opposite, something to its complement. This is similar to Aristotle’s theory of “knowledge” (XI.2) which arises from the investigation made by natural men.
both cinematic techniques, develop the narrative in a curvilinear movement, rather than in a straight line. Here Brecht is working against the fusion of the elements of theatre, “words, music and setting” (p.37). In order to truly allow the spectator the chance to understand what he is viewing, and be clear enough to act to change it, Brecht calls for the “radical separation of the elements” (p.37).

The process of fusion [in dramatic theatre] extends to the spectator who gets thrown into the melting pot too and becomes a passive(suffering) part of the total work of art. Whatever is intended to produce hypnosis, is likely to induce sordid intoxication, or creates fog, and has to be given up. (p.38)

Brecht later developed the epic theatre into a central concept called ‘Verfremdung’, - estrangement, alienation, or disillusion, in English. 

“The production took the subject-matter and the incidents shown and put them through a process of alienation: the alienation that is necessary to all understanding” (p.71). For Brecht, alienation means the process by which one is able to see through the illusions of something to its contextual truth. On the surface, this may sound similar to Aristotle’s description of the kind of understanding he finds necessary: “Recognition... is a change from ignorance to knowledge” (XI.2). “But, of all recognitions, the best is that which arises from the incidents themselves, where the startling discovery is made by natural means. Such is the Oedipus of Sophocles” (XVI.8).
Brecht takes Aristotle on directly when he says,

When something seems 'the most obvious thing in the world' it means that any attempt to understand the world has been given up. What is 'natural' must have the force of what is startling. This is the only way to expose the laws of cause and effect. People's activity must simultaneously be so and be capable of being different [Italics added]. (p.71)

Brecht is unwilling to accept the idea of fate, so important in Greek drama. While he agrees with Aristotle in describing the startling quality of true recognition accompanying knowledge, he will not submit to accepting the unalterableness of what he finds. He is committed to the idea of change brought about by the acquisition of knowledge.

Aristotle and Brecht wish to bring the spectator to an understanding or knowledge, but their divergent world views direct them to disparate models of dramatic interaction. Aristotle wants the audience to recognize, with the characters of the play, the naturalness or unalterableness of the character's fate. The emotional and physical affect, what we think of as empathy, upon the spectator watching Aristotelian drama is integral to the aim of dramatic theatre. Brecht wishes to prod the viewer into action by allowing him to recognize the sheer lunacy of what he is witnessing and the alterability of those actions.

The epic theatre's spectator says: . . . - That's extraordinary, hardly believable - It's got to stop - The sufferings of this man appall me.

Brecht saw that their concepts of drama are particularly helpful in virtual reality. It is three major interuniversal/particular, principles of drama: the universal, and the particular, but emphasis on innovations are not a communication of stress the element argument." (p.37). dialectical thought, a galaxy of significations. Landow. 1992, p.3)
each of the three interconnected con
man appall me, because they are unnecessary... (p.71)

Brecht saw the major ends to which he and Aristotle developed their concepts of dramatic interaction as "... changes of emphasis as between the dramatic and epic theatre" (p.37). These concepts are particularly helpful in guiding us towards an interactive aesthetic for virtual reality. It is helpful to consider these ends as existing in three major interconnected concepts: pleasure/instruction, universal/particular, and catharsis/the need for action. Aristotle's principles of dramatic structure emphasize the concepts of pleasure, the universal, and catharsis. Brecht's principles include these concepts, but emphasize the linked concepts of instruction, the particular, and the need for action. Brecht's attitude towards his innovations are not "absolute antithesis but mere shifts of accent. In a communication of fact, for instance, we may choose whether to stress the element of emotional suggestion or that of plain rational argument." (p.37). The developing interactive aesthetic eschews dialectical thought, preferring what Roland Barthes describes as "... a galaxy of signifiers, not a structure of signifieds..." (Barthes in Landow, 1992, p.3). In other words, it is more helpful to think of each of the three areas as interconnected nodes in an web of interconnected concepts each with its own story to tell.

Aristotle accepted the Greek notion that the fine arts have no end.
beyond themselves. For him, the reasons for our pleasure in producing and watching drama "...spring from two causes, each of them lying deep within our nature" (IV.2). The first is the instinct of imitation which he considers as issuing from our primal pleasure in learning. We first learn by imitation. The second cause for pleasure, according to Aristotle, is the instinct for harmony and rhythm. Brecht acknowledges both causes, but, in addition, finds the need for a more contemporary explanation:

For when we look about us for entertainment whose impact is immediate, for a comprehensive and penetrating pleasure such as our theatre could give us by representations of men's life together, we have to think of ourselves as children of a scientific age. Our life as human beings in society - i.e. our life - is determined by the sciences to a quite new extent. (p.183)

Brecht recognizes our insatiable need to know as integral to our maintaining a life worth living in the face of a science built upon production.

If we want now to surrender ourselves to this great passion for production, what ought our representations of men's life together to look like? What is that productive attitude in face of nature and of society which we children of a scientific age would like to take up pleasurably in our theatre? (p.179)

The connected concepts of the universal and the particular are viewed differently by Aristotle and Brecht. Aristotle describes the poet and the historian as differing not in their style of writing, but in what they express.

He calls poetry "...the particular. We understand something.

The 'historical event' (nor will they be background); on the contrary, manipulated by us (not by them): it is the meaning to see what they bring upon himself:

The real causes of starvation, ecological change. For Brecht gives one the power

We need a type of feeling, insights, particular historical action takes place thoughts and feelings. (p.190.)

This is very different in pleasure in tragedy. The

universal fate that
what they express. For him, poetry expresses the universal, history into the particular. We gain pleasure from the satisfaction of understanding something common to people of all times and places. He calls poetry "... a more philosophical and higher thing than history" (IX.3). Brecht takes issue with this judgment, when he says:

The 'historical conditions' must of course not be imagined (nor will they be constructed) as mysterious Powers (in the background); on the contrary, they are created and manipulated by men (and will in due course be altered by them); it is the actions taking place before us that allow us to see what they are. (p.190)

Fate, or the gods, can not be blamed for all the evils which man brings upon himself by his own actions. If one is able to understand the real causes of poverty, war, slavery, cruelty, murder, abuse, starvation, ecological disaster, one may be able to take action for change. For Brecht context is all important. The knowledge of it gives one the power to change:

We need a type of theatre which not only releases the feelings, insights and impulses possible within the particular historical field of human relations in which the action takes place, but employs and encourages those thoughts and feelings which help transform the field itself. (p.190.)

This is very different from Aristotle's explanation of why we find pleasure in tragedy. That pleasure is based on the acceptance of a universal fate that comes, he says, from the purgation of the
emotions of fear and pity, what we have come to define as catharsis:

Such an effect is best produced when the events come upon us by surprise; and the effect is heightened when, at the same time, they follow as cause and effect. The tragic wonder will then be greater than if they happened of themselves or by accident, for even coincidences are most striking when they have an air of design. (p.70)

It is the desire for change, what postmodern terminology calls "empowerment", that drives Brecht towards a dramatic theory that refuses to immobilize the viewer with a cathartic experience. Brecht wants to place the viewer in a powerful position. All of Brecht’s directives are based on his desire to "...leave the spectator’s intellect free and highly mobile" (p.191). In this state, the viewer is able to clarify his thoughts and decide what action should be undertaken.

These two disparate worldviews underlie very differing approaches to the idea of designing a virtual world. Like myth, theatre, film, and the visual arts, virtual reality is an attempt to understand ourselves, understand our place in the universe. Our reaction to that understanding, that knowledge, may vary according to the ideas upon which the environment in which we come to that understanding is based. Brecht’s theories of dramatic structure are vehicles for the imparting of knowledge, a means of understanding the context in which that knowledge is developed, and the encouragement to act on that knowledge. These ideas and others like them provide a rich technology.

Part Four

Applied Brecht

If virtual reality provides a cultural paradigm for participants to take part in then it is imperative that a new aesthetic based on a much deeper understanding of how dramatic responsibility can be built into the work. This critique current theory and practice of artists, architects, and designers.

That virtual reality is an encompassing environment for artists and architects to work in all segments of society, the environment itself is an ever changing and growing one.
them provide a rich source for building a truly interactive technology.

Part Four
Applied Brecht

If virtual reality is to play a role in the emergence of a new cultural paradigm of interaction, one whose agenda encourages the participants to take responsibility for their actions and their world, then it is imperative that we begin to develop an interactive aesthetic based on those goals. What recommendations have we gleaned from the preceding few chapters? Certainly Brecht's notions of how dramatic structure can encourage participation and responsibility can be applied to the factors that we have used to critique current trends in virtual reality development. Suggestions of artists, architects, and educators have enlarged and enriched our discourse.

That virtual reality systems must be open systems, not closed, is an encompassing recommendation that can be made across all six factors of interface, content, environment, perception, performance and plasticity. That access to the technology by all kinds of people, in all segments of society is another inclusive recommendation. Distributed access involving telecommunications will provide a wide
range of contextual interventions to impede any monopoly. From Brecht, we have learned that an environment that is not completely immersive, one that provides us with reality checks, pointers to physical reality with its messiness and jumble of perception, environment, content, and behavior, is one that ultimately will be the most creative and productive where it counts most, not for ourselves only, but for the desires and needs of others in the real world. Simultaneously allowing the participant as much freedom in defining his world, developing tools, contributing his own sense of content will in turn offer the participants a confidence in the importance of their particular involvement in determining the future of our relationship with technology.

Earlier we outlined the possibilities for each of the factors in opening up a multimodal information exchange and the potentiality in each factor for distributing control, contextualizing judgments, coupled with encouragement of concern or caring for the needs and desires of others as if they were our own. These descriptions were used for critiquing present trends in virtual reality design. Here, they are used for making recommendations for their use.

**Interface.** Perhaps Myron Krueger's ideas on responsive environments have been on the right track all along. As an interface, they seem to solve many of the problems that immersive environments generally will direct, our ability to make in our ability to make.

**Content.** The content defined by the participants in their physical real engagement.

**Environment.** By the participants.

**Perception.** Ultimately under the control of the virtual world should, and how our behavior in it, should be made transparent.

**Plasticity.** The metaphor, but, it should also be pushing back is at part.
environments generate. Ultimately, the interface must reflect, since it will direct, our sense of wholeness as physical beings, and our trust in our ability to make judgments.

**Content.** The content of a virtual world must be able to be defined by the participants, its meaning then reflecting the context of their physical reality. Knowledge should take precedence over engagement.

**Environment.** The environment, also, must be able to be molded by the participants. Together, they will map meaning on the world.

**Perception.** Control over the participant's perceptions should be ultimately under the direction of the participants.

**Performance.** How and why we are interacting with, and in, the virtual world should be made clear. On what our behavior depends and how our behavior affect others in the virtual world, or outside of it, should be made manifest. The consequences of our behavior in the virtual world and their consequences in the actual world should be transparent.

**Plasticity.** The virtual world should be moldable, flexible, pliable, but, it should also push back. What should be the cause of that pushing back is the actual, physical reality of which virtual reality is a part.
SUMMARY AND CONCLUSION

The Art and Virtual Reality Project of the Banff Center in the mountains of Western Canada is located in, arguably, the most magnificent spot in all of North America. In this most sublime of natural settings, one feels a certain sense of unease in reviewing the implications discussed previously in this dissertation of yet another human developed mechanism for fabricating an alternative reality. One imagines the difficulty Mary Shelley might have had contemplating the conclusion to her book about a monster and its creator while she sat on the shores of Lake Geneva in the mountains of Switzerland. Or, perhaps, Banff is the perfect place in which to ponder this newest tool. Will it be used to illuminate our understanding of our place in this profoundly vast and amazingly beautiful universe, or will it be used to further muddy that understanding? To restate the problem initially set out in the introduction of this dissertation: what kind of impact will the current trends in the design of interactive technological systems, such as virtual reality, have on the wide variety of applications for which their use is forecast, and what kind of impact will these altered applications have on our culture through its values in mind. We do not present technologies and tools has affected communication technology and global computer and network technology.

The relations one in which the passage to questions of global or immediately previous the integration of time and a consequent for and a consequent for humans on their
applications have on culture. In order to answer that question, we have developed the following approach.

Summary

The critical theory of technology has allowed us to understand the human-technological relationship as one that enormously affects culture through its symbiotic exchange of values. Critical theory also offers us possibilities for transforming the values of technology from within. We do not have to acquiesce to the values embedded in present technological design. It is possible to encourage and direct the development of other values by designing technology with those values in mind. Historically, the symbiotic relationship of humans and tools has affected human cognition. The advent of new communication technology, such as interactive electronic media, global computer and fiber optic networks will continue to do so.

The relationship of humans and technology has changed from one in which the prevailing world view, and its established answers to questions of good and evil, were supported to one in which the immediately previous world view was destroyed. The destruction of the integration of ethical and intellectual values was a both a reason for and a consequence of this increasingly dependent relationship of humans on their tools. The separation of the ethical and intellectual
sphere has been occurring for centuries and was begun by the project of science as envisioned by Kepler, Bacon, and Descartes, and then, continued by Kant. The prevailing ideological assumption of that view of science was the primacy of progress and its attendant qualities: efficiency, measurement, speed, objectivity, and innovation for its own sake. Machines proved to be exemplars of these qualities and, consequently, the abilities of human beings that most closely matched them began to be more highly valued. The repercussions of this evaluation have been to erode our faith in the realm of human attributes and abilities which constitute feeling, experience, and sensation. It is in this realm that ethical decisions are made. These are the same dimensions that make up the formulation of aesthetics.

Ethical decisions are based on assumptions of what is real and what is true. Effecting ethical change from within technology demands understanding the origins of those assumptions. The design of present virtual reality technologies is intimately involved with the origins and long-standing goals of simulation and the development of artificial reality. The preoccupation with simulation comes to us out of the encompassing Cartesian obsession with allowing truth to be based upon the powers of the mind to represent reality. That this is the only possible method for acquiring true knowledge is insisted upon by Descartes and his followers and is linked inextricably to their insistence on reality, one that is for the world, one about how and why obsession has led only possible in some language, such as be ranked as true development of intelligent research and development predominantly on and the separation that paradigm.

With the help the Cartesian primacy as inextricable this offers us the possibility language, if we... This comprehensive turn, permits a the one elaborates
their insistence on the separation of mind and body. It is this insistence that sees the need for the development of an artificial reality, one that is an intellectual superstructure that must stand in for the world, one that we must rely on to answer our questions about how and why to act in the world. The consequences of this obsession has led to the continuing belief that disciplined thought is only possible in science while other uses of thought and, therefore, language, such as that used to discuss ethical issues, is unqualified to be ranked as true knowledge. The mainstream approach to the development of interactive technology, as it is being developed in research and development environments around the country, relies predominantly on the Cartesian paradigm of scientific investigation and the separation of mind and body which lies at the very core of that paradigm.

With the help of Ludwig Wittgenstein, we are able to escape the Cartesian prison, and begin to think of meaning and knowledge as inextricable threads woven through everyday life. Wittgenstein offers us the possibility to comprehend meaning through the use of language, if we understand language as a particular kind of action. This comprehension of the relationship of meaning and knowledge, in turn, permits a more profound and encompassing ethical vision than the one elaborated by Kant. It provides a different attitude towards
ethics, one that sees the world not as an occasion for the exercise of one's ethical will, but as the direct response to an understanding of individual needs. This response is derived from looking at the world not as a riddle to be solved, as one looks at it through the scientific view, but as a miracle. The later Wittgenstein develops this approach to an ethical sensibility that produces wonder and humility, not scientific curiosity. It also mirrors the vision of emerging ethical aesthetics being developed in this dissertation, one that finds support in both Terry Eagleton's critique of the Western history of aesthetics and ethics, and contemporary feminist moral theory based on an ethic of care and responsibility for individual needs and desires.

Though the fundamental morality of the care perspective derives from the conviction that responsibility is owed to the contextualized individual and not to abstract principles of justice, that conviction includes ideas about the political sphere.

In the development of the political goal of recognizing and taking responsibility for the care of others as individuals with needs and desires as important and necessary as one's own, ethical values in the aesthetic tradition work both towards and against that goal. It is imperative that we understand the history of the connection between ethics and aesthetics. This connection has had, and will continue to have, great impact on how technology defines and is defined by culture. Assumed certain ideas. Those assumptions, various sources, but they have had the art and about that separated me judgment involved.

To judge as emanate from the she exists. In or Kant's notion of like knowledge, in period of relativism be likened to the attempting to forget needs of the time modernism, by taking Modernism set in traditional aesthetics but, the destruct
defined by culture. In making aesthetic choices, artists have assumed certain ideas about the purposes and values of art making. Those assumptions have changed over time and have come from various sources, both internal and external to the art-making process, but they have had primary impact on what was communicated by the art and about the art of any particular time. The same paradigm that separated meaning and knowledge had enormous influence over judgment involved in aesthetics.

To judge aesthetically is to compare values, and those values emanate from the totality of the judge and the context in which he or she exists. In order to move from the extreme interpretation of Kant’s notion of aesthetics to more contemporary views, aesthetics, like knowledge, has had to go through a period of relativism. This period of relativism, which has been christened postmodernism, can be likened to the period of adolescence. Like an adolescent, attempting to forge an individual personality, one that truly fits the needs of the time, aesthetics has rebelled against its predecessor, modernism, by taking on any and all values, trying each on for size. Modernism set its aesthetic standards on the destruction of traditional aesthetic qualities; beauty, harmony, totality, appearance, but, the destruction presumed the purposes of building up a new world. Looking back from the distance of almost one hundred years,
it is easier to see the annihilation and rage evidenced in the art of
the early part of this century, and its parallel desire to produce a
better, transcendent world, as inseparable aspects of a continuing
drive to substantiate the significance the arts have for our lives. As
we now advance into the 1990's, certain issues have become clearer.
The modernist credo, which, to the generation before it, looked as
rebelliously adolescent as postmodernism looks to the present day
modernist, was built on the idea of the genius of the individual artist
forging a revolutionary path for society. Answers for the
postmodern artist, as for the modernists before her, attempting to
mature from this necessary period of adolescence, into a period of
responsibility, lie within the needs of the culture of which he or she
is a part. Society is no less in "art for a better life" than it was in
the Renaissance or the 1920's. If, for some, the pluralism of the
postmodern period appears to offer a concept of art and the artist's
role as functionally meaningless in its generality, it may instead be
interpreted as a shift in the placement of the process of making art.
Art can no longer be the exclusive province of the artist at which the
viewer merely gazes, nor can it be the dispenser of an established
canon of knowledge to which the viewer assents. The making of art
must include the viewer as a participant and recognize the value and
necessity of that communication. Only then will the artist find a
meaning in "art for a better life." Within the art object, the proper
meaning is found between the artist who makes those artworks
and the audience who makes those works their own. The process of
questioning of status quo in aesthetics, the pluralism of the moment
in the arts, and the role of art in the public sphere are all part of
the modern period. Modernism is the recognition that our time, in
our own time, with our own attitudes, we must judge ourselves to judge
ourselves as one that is a cultural tradition.
meaning in "art for a natural life." This art assumes the appearance of improvisation and disposability because its meaning does not exist within the art object. The art object no longer exists as an appropriate or helpful vessel of meaning for this culture. Its meaning is found within the interactive process of communication between the artist and the participant. The objectivity of judgment in aesthetics, the values on which those judgments are based, and who makes those judgments, have been taken into serious consideration. This period of what may be considered an adolescent questioning of standards of judgment set down by now the establishment of modernism, is, in reality, a necessary part of the adolescent process. Like any adolescent, it is only through questioning authority, that we may be able to meet the actual needs and address the actual problems of the culture of which we are a part. Modernism's answer was appropriate for the particular needs of the time in which it developed. We, who are its sons and daughters, must find an answer appropriate for the extreme needs of our own time. If we are to move past this adolescent period of relativism, we must begin to trust in our ability to judge. Trusting in ourselves to judge well is a value that has been seriously eroded and one that as a culture we cannot do without.

Presently available computer technologies, such as hypermedia
and telecommunications, extend the notion of art making beyond that of image making and into the realm of life making. They offer us a chance to actually practice making judgments based on a contemporary form of information and learning that is not already coded for our tacit consumption by the established powers. It will remain free from prior codification and open to the input of those who will benefit most from a chance to communicate their needs and desires only if we involve ourselves intimately in the development of these technologies. By intimately involved, I mean, at the level of feeling, experience, and sensation, that same level at which both aesthetic and ethical decisions are made. Involvement at this level is essential in considering how the computer can be used to advance postmodernist thought past the state of resistance and into the maturity of taking responsibility for ourselves. The interdisciplinary use of electronic media as a dominant mode of communication in this culture will offer the artist a role similar to those of the past, but peculiar to the present, and absolutely necessary for the future.

If there is one primary informing aesthetic quality which one might base one's hopes for the art of the twenty-first century and its intimate involvement with technology, it is interaction. As the most often named unique quality of technological art, interaction offers the possibility of encompassing both ethical and aesthetic demands of making art into action. Interdependence of role as artists in the responsibility. Art at which the of an established c

In attempting most performance-bureaucracy, we have realized that design have worked responsibility. Cur cur corporate, and enterprising bias representational simulation. The second bias is the minimize, or even, physical, human be and art perspective interactivity and it

If virtual rea
of making art in the twenty-first century, blending those demands into action. Interaction provides opportunities for recognizing the falseness of separating the subject and object, for realizing the interdependence of all life, and accepting the responsibility of our role as artists in helping to build an aesthetic of care and responsibility. Art can no longer be the exclusive province of the artist at which the viewer merely gazes, nor can it be the dispenser of an established canon of knowledge to which the viewer assents.

In attempting to cultivate aesthetic choices for the newest, most performance-based interactive technological medium, virtual reality, we have reviewed whether current trends in virtual reality design have worked towards or against the ethic of care and responsibility. Current trends emerging from military, science corporate, and entertainment research push towards two encompassing biases. The first of these biases is the emphasis on representational simulation of reality as a determiner of truth. The second bias is the production of an artificial reality designed to minimize, or even exclude, the perceptive qualities of the actual, physical, human body. Trends being developed from some education and art perspectives are based on the emerging aesthetic of interactivity and its accompanying values.

If virtual reality is to play a role in the emergence of a new
cultural paradigm of interaction, one whose agenda encourages the participants to take responsibility for their actions and their world, then it is imperative that we begin to develop an interactive aesthetic based on those goals. Recommendations for this development were offered from the influence of Brechtian dramatic interaction, as well as suggestions of artists, architects, and educators now engaged in enlarging and enriching the discourse surrounding it.

Conclusion

The recommendations in the last chapter are offered as possible answers to the problem this dissertation addresses, that is, what kind of impact the current trends in the design of interactive technological systems, such as virtual reality, will have on the wide variety of applications for which their use is forecast, and what kind of impact will these altered applications have on culture. The recommendations made here provide a direction in virtual reality technology that works toward an aesthetic of care and responsibility, a direction that is counter to current established trends. Talking to various artists who are involved in this technological media indicate that different aesthetic concerns and preoccupations from the recent past are afoot. No longer concerned with isolation, but with community, today's interactive technological artist attempts to facilitate an extension of technology, of the individual interactive, and how we are an integral part of the world around us.

Like Vitruvius' possibility to help us learn how much we truly value our work. We expect that individual self-meaning for one's profession is the force in this era. We acknowledge this.

The more we develop consciousness of the area of active research influence in computer science and philosophy, the more we have remained that cultures have
facilitate an environment in which participation in directing the uses of technology is encouraged. No longer concerned with the greatness of the individual artist, but with collaborative involvement, today’s interactive technological artist realizes that in isolation we may find how we are ourselves, but that only in relation to others and the world around us do we find why we are ourselves.

Like Victor Frankenstein, we may learn how much weight the possibility to soar entails. And like Victor Frankenstein, we may learn how much that physical weight with all its connections is worth. We escape our physicality at great risk not only to our individual selves, but to the community of selves that provides meaning for our physicality. If virtual reality is to exist as a positive force in this society, we, who are involved in its development, must acknowledge the responsibility of that task.

The most pressing need for further research in the development of interactive technology, including virtual reality, is in the area of aesthetics and ethics. This dissertation has incorporated research influences from areas outside the established canon of computer science research and development, such as dramatic theory and philosophical and social criticism. These influences, however, have remained within the Western cultural context. Certainly, other cultures have much to offer this undertaking, and given the import
of technology to a global culture. Further research involving notions of performance-oriented dramatic interaction from these cultures is essential to encouraging a true global community.

One of the Victor Frankensteins responsible for the initial development of virtual reality, Morton Helig (1992), was not a scientist, but a filmmaker, whose pioneering work on "immersive environments" was ignored until recently. And perhaps, more than any of the other people involved in its initial development, he is aware of its import. He says, at the end of a recent article about the development of virtual reality,

In fact, the great religious leaders have always understood that it is our capacity to feel and respond that provides the final goal of human existence. We cannot define the need to feel in terms of human power, because now we know that our powers are limited. We cannot define the need to feel in terms of reason, because, ultimately, even our reasoning powers are limited. We may have to define it as our ability to feel, to have compassion, to love, and to offer adoration to God, if you will. That in turn, may provide us with a kind of power we little understand, but which is extremely important, in the balance of the universe. (p.305)
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