

# Aesthetics of a Virtual World

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**D**iscussing virtual reality with another artist recently, I was asked, "What do ethics have to do with aesthetics?" I might have dismissed the question as coming from someone whose roots are strongly attached to the modernist tradition. He does not grasp, I might have said to myself, that things have changed—that now, in this period considered by many to be postmodern, aesthetics is no longer regulated to a matter of form or style, but once again encompasses a philosophical stance towards the artmaking process. With that response, however, I would have missed an opportunity to develop an answer to another central question about virtual systems—what the aesthetics of virtual systems have to do with ethics. My one word answer to both questions is: "Everything." The longer answer is less presumptive, more inquiring, and the subject of my ongoing research and this paper.

In my interviews with various artists, educators, cultural theorists, computer researchers and software/hardware developers, questions about the ethics of virtual systems often materialize as ambiguous but pressing matters. Substantial worries concerning virtual sex, political and corporate domination, military uses, and mind-numbing, violence-oriented entertainment continue to indicate the possible directions in the development of virtual systems. Ethical questions, after all, involve judgment. How should we act? The idea of judgment in ethics is all-encompassing—it involves one's entire being, for it is the way we choose among many possibilities. Those choices commit us to paths which are more or less consistent with our nature and the rest of our lives. The accountability of our judgments is "part of the condition of our existence as social, integrated, affectionate, language-using beings" [1] and touches on questions about the nature of knowledge. On what do we base those actions? How can we know if the knowledge on which we base those actions is true?

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. Historically, philosophical thought has offered us various positions on whether ethical decisions are based on stable or shifting grounds. Current technology offers us countless means to reevaluate our perceptions of reality and truth. Consequently, it is necessary to briefly unravel the intricate connections among pertinent systems of ethics, the ontological and epistemological assumptions on which they are based, and the influence technology has had on those assumptions.

## HISTORICAL ASPECTS OF ETHICS AND THEIR IMPACT ON TECHNOLOGICAL DESIGN

Two underlying issues consistently emerge in writings about virtual reality: simulation and artificial reality [2-5]. Rather than viewing these two issues as relatively new, and only con-

nected with current technology, it is more helpful for our purposes to understand the design of present virtual-reality technologies as habitual involvements with goals that have been sought for centuries. The emphasis on simulation and the development of artificial reality can be traced directly to the late sixteenth and early seventeenth centuries when Kepler, Bacon and Descartes set an artificial and unreachable limit for knowledge, specifically undertaken to advance the possibilities of modern science. Investigating these origins may prove helpful in understanding the ontological and epistemological assumptions of the designers of today's virtual systems—since these assumptions are the grounds 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 we have come to agree or disagree about what reality is.

One of the effects of setting an unreachable limit for knowledge was the separation of moral and intellectual spheres, which has been occurring for decades. The repercussions of that division are evident in every aspect of Western culture. We have combined this misplaced need for epistemic certainty with the design of machines built to obligingly fill that need, and subsequently have eroded our faith in human judgment and human worth. We have begun to place our confidence instead in these machines, which are unsurpassed in those qualities we have come to value most: efficiency, quantification, speed, objectivity and innovation for its own sake. And in order to interact with the machines that have become most important in our culture, we have begun to try to think like them. Postman 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 [6].

To find this line of reasoning "inevitable" is to disregard the role that meaning plays in communication. Meaning includes

### ABSTRACT

The author explores the emerging aesthetics of interactive technologies—such as virtual reality, multimedia and telecommunication—and the inherent commitment artists must assume in accepting responsibility for the impact of these aesthetics. By examining connections between ethics and aesthetics throughout Western history, the author attempts to transform the aesthetics of virtual worlds to impact ethical thought. She lists six factors integral to responsible aesthetics in virtual systems: interface, content, environment, perception, performance and plasticity.

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feeling, experience and sensation—the same dimensions that inspired the original formulation of the term “aesthetics” by the German philosopher Alexander Baumgarten. Aesthetics did not refer only to art, but to all of human perception and sensation. It is in this realm that ethical decisions are made. Haraway, however, sees possibilities in

refusing an anti-science metaphysics, a demonology of technology, and so . . . embracing the skillful task of reconstructing the boundaries of daily life, in partial connection with others, in communication with all of our parts [7].

In so doing, according to Haraway, we will take “responsibility for the social relations of science and technology”[8].

## ETHICS AND AESTHETICS

In working with and becoming involved in the aesthetic development of virtual systems, we, as artists, are either accepting or rejecting, stabilizing or altering our assumptions about the necessity of our human judgment and worth. As we make aesthetic choices, artists have assumed certain ideas about the purposes and values of artmaking. Those assumptions have changed over time and have come from various sources, both internal and external to the artmaking process, but they have had primary impact on what was communicated by the art and about the art of any particular time. Both ethics and aesthetics can be defined in terms of judgment. It is this partnership that allows us to grapple conceptually with both areas of thought at once. However, it is their active involvement in the artmaking process that will allow us to understand the consequences of that partnership. The separation of moral and intellectual thought has also influenced our judgment in ethical choices, as well as our judgment in aesthetics.

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 Baumgarten coined it in 1750 to refer to this special area of philosophy. Taken from the Greek word for “sensory perception,” it signaled a shift in attention from things themselves to perception of things [9], as well as a shift from thinking about separate qualities of a particular art object to underlying philosophies of art. It is this final sense of the word on which we will rely—limiting the descrip-

tion of artistic activity to choices about particular qualities of works of art, such as the use of light, line, form or shape in a particular time period, would leave us with less than half the story.

The underlying philosophy of art that has been most influential in thinking about aesthetics in Western culture is Kant’s outline of the characteristics of aesthetic judgment in his *Critique of Judgment* [10], which can be viewed as a direct descendant of Descartes’ position. Battersby 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 [11].

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 [12].

This consideration of aesthetics is one that is echoed by Eagleton [13], and is one with which I agree. To judge aesthetically is to compare values, and those values emanate from the totality of the judge and his or her 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 [14–16] suggest that aesthetics, like knowledge, has had to go through a period of relativism. The objectivity of judgments in aesthetics, the values on which those judgments are based, and who makes those judgments have been taken into serious consideration. Wolff says:

The 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 [17].

Though I would argue that art is still in this period of relativism, the most striking thing about technologically me-

diated artmaking is its potential for moving beyond this period into one in which aesthetic decisions will contribute to an ethic of care and responsibility. The focus of this much shared optimism about making art with current technology is a concept even an American arbiter of acceptance, *Newsweek* [18], has dubbed the “interactive” aesthetic—a year or so after this term became accepted in art circles. But what are the preeminent characteristics of an interactive aesthetic and what ethical issues could they possibly affect? Once again, in order to begin answering these questions, we might find it more helpful to view some of the historical tissues of a whole body of ideas based on interaction, rather than envisioning this “newaesthetic” as only connected to current ideas and technology.

It was not a coincidence that Kant’s notion of disinterestedness in his critique of aesthetic judgment coincided with Baumgarten’s naming of this area of thought. This emphasis on formalism may be viewed as an attempt to reconnect art with its capacity for communicating the qualitative aspects of human experience. This capacity was almost lost in the myriad of exploitations art has undergone in the past. The possibility of art being disconnected from this kind of value still exists. 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 abuse of the power of art. Both have been central issues in aesthetic theories calling for involvement in social change.

Throughout the twentieth century both 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 [19]. Whether the specific theory derives from Soviet socialist realism, anti-realist positions such as those of Bertolt 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 includes the Dada and Surrealist movements, both of which had members who were overtly Marxist in their politics [20]. 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 theories of “epic theatre” [21,22] is to deliberately break the illu-

sion of reality created on stage so as to make plain the social forces behind a dramatic situation. Benjamin's prophetic inquiry into the undermining of the authority of art by mechanical reproduction of the fine art object has at its source a political analysis of the value of art [23].

Contemporary Marxist critic Terry Eagleton insists that in the various manifestations of the contemporary post-modernist aesthetic, he finds both defenses and antagonisms of the integration of art and life, aesthetics and value. 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 [24].

Eagleton views the contradictory nature of contemporary aesthetics as mirrored in modern ethical thought. Both the aesthetic and the ethico-political are preoccupied with the relation between particular and universal. 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" [25]. In other words, one way to transform the limits of our ethical thought to include the right of every sentient being to have his or her difference respected is to transform the aesthetic.

## TRANSFORMING THE AESTHETICS OF VIRTUAL WORLDS TO IMPACT ETHICAL THOUGHT

This leads us back to the central question—what impact does an aesthetic based on interactivity and virtual systems have on ethical issues? Or put another way, how does transforming the aesthetic through interactive virtual systems transform the limits of our ethical thought? Three bodies of thought have been particularly helpful in guiding me through the maze of connections between traditional and emerging aesthetics, traditional and emerging ethical thought, and the seemingly new mix of aesthetics and ethics generated by the possibilities of vir-

tual worlds. The first perspective is that of Ludwig Wittgenstein, the twentieth-century German philosopher. The second is found in Bertolt Brecht's theory of dramatic interaction. The third is contemporary feminist moral theory.

Wittgenstein was most successful in escaping the Cartesian prison in which we have found ourselves since Descartes 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 [26].

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 method. Concrete experience is not enough justification for the existence of 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, with which succeeding generations of philosophers have had to contend, are Descartes' insistence on certainty, known as foundationalism, and his mind-body dualism, which 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 has been the separation of thought from the rest of life, ostensibly a purifying measure and one that will ensure a correct path to knowledge. This consequence, however, has led to the continuing belief that disciplined thought is only possible in science and similar uses of thought. 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. Wittgenstein responded to this enormous task by refusing to argue with the established canon of Cartesian knowledge on its own terms. Instead, he offered a different view, one involved with the idea of wonder at the world.

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 that houses "this thinking I": the body. This separation is what Morris Berman 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 [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 for 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 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 [28].

In this quote, we can clearly understand the connection Descartes makes between knowledge and mastery. He compares the utility of understanding and possessing nature to the comprehension already acquired 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, 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:

... 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 [29].

With Descartes' "proof" of the mechanical philosophy, animals became automata, machines that could be used for a specific purpose—experimentation. Since the seventeenth century, the use of animals in experimentation has grown to a large-scale business, numbering millions of animals per year in this country alone [30]. And as Berman 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. . . . [31]

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

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 [32].

The later Wittgenstein proves to be enormously helpful in offering us a different vantage point from which to view the Cartesian paradigm involving 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 were 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, 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 [33].

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 that our language is 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.

In his later work, Wittgenstein offers 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 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 to stand in for the world, one that we relied on to answer our questions about how and why to act in the world. Wittgenstein offers us the possibility of comprehending meaning through the use of language, if we understand language as a particular kind of action. Language is interactive. Once more part of the world we are able to understand interaction as meaning, which offers us immediate answers to our questions about how and why to act in the world.

Like Wittgenstein, Brecht was not only attempting to free his discipline from the particular theories that had dominated that art form since Aristotle, but, in so doing, he was offering it the opportunity of a decidedly different worldview. Elsewhere, I have detailed this difference more completely as it applies to dramatic interaction in the development of virtual worlds [34]. In this paper I would like to emphasize how 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 styles of writing, but in what they express. For him, poetry expresses the universal, history 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" [35]. 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 [36].

Fate, or the gods, cannot be blamed for all the evils that 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 and 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 [37].

It is this desire for change—called "empowerment" in postmodern terminology—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" [38]. In this state, the viewer is able to clarify his thoughts and decide what action should be undertaken.

The two disparate worldviews of Aristotle and Brecht underlie very different 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 and our place in the universe. Our reaction to that understanding may vary according to the ideas of the environment in which we come to that understanding. 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.

This emphasis on the particular is echoed in contemporary feminist moral theory. Based largely on Carol Gilligan's ground-breaking empirical research and consequent seminal book on woman's developmental theory, *In a Different Voice* [39], contemporary philosophers and

theorists [40–42] 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 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 [43].

The idea that the ethic of care and responsibility might be extended—it cries to be extended—to the political sphere and to our social lives as a whole is affirmed by feminist political theorists, such as M.F. Katzenstein and D. Laitin. 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 also 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 [44].

This notion of the necessary relationship between public and private spheres is echoed in Eagleton’s delineation of the “ideology of the aesthetic.” As Eagleton 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 [45].

It is the actual needs and desires of individual beings that render them at the same time different from and similar to other beings. The right to participate with others while having these differences respected is what the ethico-political is about. Eagleton makes the point that Aristotle’s idea of the polis is gone. Eagleton 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 at-

tain happiness and serenity, at the level of a whole society [46].

Eagleton explains, and I contend, that 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.

## RECOMMENDATIONS FOR THE DESIGN OF VIRTUAL WORLDS

The preceding is a summary of connections and contrasts among several aesthetic and ethical spheres of thought I have found most helpful in contemplating making art with virtual systems. 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 can I offer for the development of this ethical interactive aesthetic? Several general recommendations seem in order, as well as more specific ones. Elsewhere, I have listed six factors useful in critiquing current trends in the design of virtual systems [47]. These factors include, but are not limited to: interface, content, environment, perception, plasticity and performance. This list was constructed out of the factors emphasized by present virtual-reality design trends, and the factors that I believe to be integral to the project undertaken by the emerging aesthetic of interactivity.

The recommendation that virtual-reality systems must be open systems can be made across the six factors of interface, content, environment, perception, performance and plasticity. Access to the technology for all 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. Certainly Brecht’s notions of how dramatic structure can encourage participation and responsibility may be applied to these factors in general. From Brecht, we have learned that an environment that is not completely

immersive—one that provides us with reality checks and pointers to physical reality, with its jumble of perception, environment, content and behavior—is one that ultimately will be the most creative and productive where it counts most, not only for ourselves, but for others in the real world. Simultaneously, allowing the participants freedom in defining their world by allowing them to develop tools and contribute their own content will show them the importance of their involvement in determining the future of our relationships with technology. In looking at present trends in virtual-reality design, one has to account for where, how and why they are being made.

The following specific questions and accompanying recommendations address each of the factors’ potential for opening up a multimodal information exchange, distributing control and contextualizing judgments, coupled with encouragement, concern or caring for the needs and desires of others as if they were our own. These descriptions were used originally for critiquing present trends in virtual reality design. Here, they are used for making recommendations for their use.

### Interface

According to Brenda Laurel, 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.” 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” [48].

She also suggests that one of the reasons interface design is so hard to accomplish is that it is “interdisciplinary and highly political.” These remarks by Laurel, one of the pioneers in 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. Perhaps Myron Krueger’s ideas on unencumbered responsive environments have been on the right track all along. As an interface, they seem to solve many of the problems that encumbered immersive environments generate. Ultimately, the interface must reflect—since it will also direct—our sense of wholeness

as physical beings and our trust in our ability to make judgments.

## Content

The content of a virtual world can be defined as what that virtual world purports to be about—its meaning. In a virtual world designed by the Human Interface Technology Lab at the University of Washington, Seattle, one is immersed in a underwater shark-filled world in which one is directed to net the sharks. In this world, the goal, on one level, would always have to be netting enough sharks. Our relationship to the sharks can only be one of dominance and destruction since netting automatically disintegrates them. Meaning can be derived, however, from a combination of content and the context in which that content exists. The “angry god” face, which appears and announces that the game is over because not enough sharks were netted, provides the context of the world. In this world, the user has extremely limited control or choice—the author of the software program has given the computer control of this world. This world’s meaning exists in the hierarchy and dominance demonstrated by the consequences of not netting the sharks. 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. Engagement should not take precedence over the knowledge offered in meaning.

## Environment

Environment includes the space in which the world exists and all the identifying physical qualities of that world. What relationship the participant has with this world will in some ways be determined by the environment. How changeable by the participant is the environment, how infinite, how limited? How much of it does the participant determine? The environment, also, must be able to be molded by the participants. Together, they will map meaning on the world.

## Perception

How close to human perception—sight, touch, smell, hearing, kinesthesia—does the world allow us to come and how much control do we have over these perceptions? How much does our involvement in the virtual world depend on “amplifying” or manipulating our senses? Control over the participant’s perceptions should, ultimately, be under the direction of the participant.

## Performance

How and why do we interact with and in the virtual world? On what does our behavior depend? Does our behavior affect others inside or outside of the virtual world? In what way does our behavior affect the virtual world, or the actual world? Is it an open or closed system? How and why are we interacting with, and in, the virtual world should be made clear. On what our behavior depends and how our behavior affects others in the virtual world, or outside of it, should be made manifest. The consequences of our behavior in the virtual world and its consequences in the actual world should be transparent.

## Plasticity

How moldable, flexible and pliable are the characteristics of the virtual world? How much does it push back? What does it give the participant back? It should be moldable, flexible, and pliable, but it should also push back. The cause of that pushing back should be the actual, physical reality of which virtual reality is a part.

Often overlooked is the fact that virtual reality is only a humanly constructed part of the actual physical reality in which we exist. We, after all, have created it in our image. Sometimes it mirrors all of the same nagging questions of how and why we act—questions we hoped we had left behind in the “real” world.

Contemplating any one of these six areas will necessarily bring up issues involving the other five areas. We may successfully engender enough thought to assist in developing other recommendations for an ethical aesthetic for virtual worlds. My hope is that the preceding text demonstrates not only the advantages of working towards an ethical aesthetic for virtual worlds, but the implausibility of doing anything else.

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