CHAPTER 3

Immersion, Engagement, and Presence

A Method for Analyzing 3-D Video Games

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> . . . Video games allow the viewers to engage actively in the scenarios presented. . . . [Adolescents] are temporarily transported from life's problems by their playing, they experience a sense of personal involvement in the action when they work the controls, and they perceive the video games as not only a source of companionship, but possibly as a substitute for it.[1]
>
> Hotshot digital cinematography doesn't make a digital story immersive. What makes it immersive is a world where no territory is off-limits, anything you see is fair game, and all your actions have consequences.[2]

A recent shift in computer game design involves a move away from 2-D level design, in games like *Prince of Persia* (1992), or from isometric design in games like *Warcraft,* to 3-D design and a first-person point of view. This shift increases the sense of immersion by replicating the aesthetic approaches of first-person shooter games in other types of games, such as adventure games, role-playing games, and even strategy games, which previously used 2-D levels or isometric views. The shift in design is indicative of an overall trend to make desktop video games feel more like virtual reality. My approach here is to reexamine our concept of immersion in video games and suggest that immersion has become an excessively vague, all-inclusive concept. It is necessary to break down the concept of immersion into its more specific meanings and develop a more specific terminology. In this essay, I take the

concept of "presence," as it is used in technical literature on virtual reality for scientific applications, as the basis for developing of a set of aesthetic criteria for analyzing 3-D video game design.

Immersion

As we can see in the quotations at the beginning of this essay, *immersion* means the player is caught up in the world of the game's story (the diegetic level), but it also refers to the player's love of the game and the strategy that goes into it (the nondiegetic level). It seems clear that if we are talking about immersion in video games at the diegetic level and immersion at the nondiegetic level, then we are talking about two different things, with possibly conflicting sets of aesthetic conventions. No specific terminology has yet been proposed to clarify those issues. In addition, humanities scholars have started to pick up, from scientific literature on virtual reality, the term *presence,* defined loosely as "the feeling of being there." The terms *immersion* and *presence* are seen together more and more often, although both have been so loosely defined as to be interchangeable—which they often are.

The first step is to define each term carefully. The most accepted definition of *immersion* is Janet Murray's:

> A stirring narrative in any medium can be experienced as a virtual reality because our brains are programmed to tune into stories with an intensity that can obliterate the world around us. . . . The experience of being transported to an elaborately simulated place is pleasurable in itself, regardless of the fantasy content. We refer to this experience as immersion. *Immersion* is a metaphorical term derived from the physical experience of being submerged in water. We seek the same feeling from a psychologically immersive experience that we do from a plunge in the ocean or swimming pool: the sensation of being surrounded by a completely other reality, as different as water is from air, that takes over all of our attention, our whole perceptual apparatus . . . in a participatory medium, immersion implies learning to swim, to do the things that the new environment makes possible . . . the enjoyment of immersion as a participatory activity.[3]

Most scholars and scientists seem to agree that total photo- and audio-realism is not necessary for a virtual reality environment to produce in the viewer a sense of immersion, a sense that the world they are in is real and complete, although this awareness has not stopped VR producers from aiming for photo- and audio-realism. Also taken for granted is that the more surrounding the VR exhibition technology is (the bigger the screen, the better the surround-sound) the more immersive it will be. However, it is quite possible to become very immersed in a desktop VR, for immersion is not totally dependent on the physical dimensions of the technology. Three conditions create a sense of immersion in a virtual reality or 3-D computer game: (1) the user's expectations of the game or environment must match the

environment's conventions fairly closely; (2) the user's actions must have a non-trivial impact on the environment; and (3) the conventions of the world must be consistent, even if they don't match those of "meatspace."[4] Narrative and narrative genres are often used as a way of defining the conventions of a world and to help the user align their expectations with the logic of the world. It is no accident that role-playing and adventure games, the video game genres that have the most in common with more linear time-based narrative forms such as the cinema, were among the first to go 3-D.

Engagement

However, narrative is not a key component of most video games. Instead, many users appreciate games at a nondiegetic level—at the level of gaining points, devising a winning (or at least a spectacular) strategy, and showing off their prowess to other players during the game and afterward, during replay. To be so engaged with a game that a player reaches a level of near-obsessiveness is sometimes referred to as *deep play.* The term originated with Jeremy Bentham, in his *The Theory of Legislation* (1931). Bentham was referring to a state of mind in which users would enter into games almost irrationally, even though the stakes were so high it was pointless for them to engage in them at all. The example given was: a man whose fortune is a thousand pounds; if he wagers five hundred of it on an even bet, the marginal utility of the pound he stands to win is clearly less than the marginal disutility of the one he stands to lose. "Having come together in search of pleasure [both participants] have entered into a relationship which will bring the participants, considered collectively, net pain rather than net pleasures."[5]

The anthropologist Clifford Geertz extended the meaning of the term to the kind of substantial emotional investment humans make in violent rituals such as Balinese cock fighting. Geertz found the deepest investment of human meaning in matches where the odds are more or less even and the stakes "irrationally" high. His "deep play" requires a parity of force.

According to Diane Carr, the term *deep play,* as used in gaming magazines, refers to "a player accessing/accumulating layers of meaning that have strategic value . . . like "deep play" in a Dungeons and Dragons [board game] context would mean knowing all the monsters and the different schools of magic, for example, whereas 'shallow' play would mean more 'up and running hack and slash' style of play."[6] The term *deep play,* when referring to video games, then, is a measure of a player's level of engagement.

Presence

The shift to 3-D design in games has already led to the adoption of the term *presence,* usually applied to virtual reality environments (VREs), to be used

when discussing certain types of video games. However, the term *presence* is often used synonymously with *immersion,* which simply adds to the confusion. By specifically applying the criteria for presence developed for virtual reality design to 3-D video games we can develop a set of design criteria that will enable us to judge a game's degree of immersiveness, engagement, and the degree of presence possible. The development of such a tool takes on a certain urgency in a legal environment in which games are routinely labeled as addictive, as inductive of hallucinatory trances, and blamed as the source for crimes such as the Columbine shootings.

The Trend Toward 3-D Design

As Mark J. P. Wolf has pointed out, most 3-D games represent their navigable space using the conventions of Classical Hollywood Cinema, at least to a degree. The difference, of course, is that these spaces are navigable; first-person shooters and virtual reality games, for example, "provide players with an unbroken exploration of space, allowing them to pan, tilt, track, and dolly through the space, which is usually presented in a first-person perspective view and is navigable in real time."[7]

Game historians generally agree that *Battlezone,* a 1980 Atari arcade game described as a "hyperrealistic tank combat simulator"[8] was probably the first game depicted from a first-person perspective[9] as seen through a periscope that simulated the interior of a tank. *Battlezone* was drawn in vector graphics, that is, straight lines that connect any two points on the screen. Games like *Lunar Lander* (1979) and *Battlezone* pioneered the vector look. The mountains and other landscape elements were depicted in luminous green polygonal shapes but were realistic enough for the Army to ask Atari to design a training simulator for them (it's not clear if this simulator was ever built).[10]

"Wireframe" is the term used for objects that are outlined, but without the planes filled in.[11] Wireframe is still an acceptable way of depicting virtual reality, and is used in films such as *The Thirteenth Floor* (1998). The first game to use polygon-based 3-D graphics was *I, Robot,* designed by Dave Theurer, and released in 1983.[12]

In 1982, isometric (i.e., "constant measurements") perspective was introduced in a Sega game called *Zaxxon.* The term isometric comes from the architectural practice of isometric drawings, "in which all horizontal lines are drawn at an angle of thirty degrees to the horizontal plane of projection."[13] The result is no vanishing points and equal emphasis given to all three planes. As Poole writes: "In video game terms, this means that an illusion of solidity is created while preserving an external viewpoint. You could see three sides of an object rather than just one; and now,

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crucially, the game screen was not just a neutral arena; it had become an environment."[14]

Isometric perspective had its heyday and is now still used for games like *SimCity, Civilization,* and *Command and Conquer,* all games in which the player controls numerous units (people, tanks, factories, etc.) within a vast playing area and with an omniscient overview.

But the foreshortening of scientific perspective had certain advantages: it implied a subjective, individual viewpoint, and it promised a degree of immersiveness that the God's-eye-view of isometric perspective could never deliver.[15] Scientific perspective made a comeback with the first truly "immersive" 3-D game, *Wolfenstein 3-D* (1992).[16] *Wolfenstein* put the player into rooms, separated by doors, with walls receding realistically into the distance and populated with bots that took the form of Nazi soldiers for the player to destroy. There was no texture on the walls or ceilings so only the walls moved with forward movement, and the bots looked 2-D as they were drawn with bit-mapped sprites whose pixels enlarged as they got closer. *Wolfenstein* made another innovation, which was adopted by the genre, which was to include a representation of hands (the player's hands) clutching a gun at the bottom of the screen. The gun is not used for aiming, but it does make the player feel more like they are incorporated into the space. These conventions were continued and developed in other first-person shooters, such as *Doom* (1993), *Hexen* (1994), *Quake* (1996), and *Unreal* (1998). Technical literature on presence in VR often make reference to the conventions of first-person shooters as the standards for a sense of presence and a transparent interface, especially *Doom, Quake,* and *Unreal.* For example, Randy Pausch et al. say that *Doom* ". . . get[s] users to the point where the interface becomes transparent and the user focuses on task performance."[17] In another example, Michael Lewis and Jeffrey Jacobson assert that: "The most sophisticated rendering pipelines are now found not on specialized scientific machines but on PC video cards costing less than $500. The most sophisticated, responsive interactive simulations are now found in the engines built to power games."[18] And finally, John Laird, comparing the possibilities for artificial intelligence research in robotics and first-person shooters, prefers the latter: "Simulated virtual environments make it possible to bypass many of these problems, while preserving the need for intelligent real-time decision-making and interaction . . . computer games provide us with a source of cheap, reliable, and flexible technology for developing our own virtual environments for research."[19]

As we can see from the above quotations, first-person shooter games and game editors are used in virtual reality research because they promise a high degree of immersiveness, engagement, and presence in an affordable, manageable format. But when researchers ascribe a high degree of presence to first-person shooter games, what exactly are they referring to?

Origins of the Term *Presence*

Steuer gives a useful outline of the provenance of the term *presence:*

> Presence is closely related to the phenomenon of *distal attribution or externalization,* which refer to the referencing of our perceptions to an external space beyond the limits of the sensory organs themselves. In unmediated perception, presence is taken for granted-what could one experience other than one's immediate physical surroundings? However, when perception is mediated by a communication technology, one is forced to perceive *two* separate environments simultaneously: the physical environment in which one is actually present, and the environment presented via the medium. . . . Telepresence is the extent to which one feels present in the mediated environment, rather than in the immediate physical environment. . . . Telepresence is defined as the experience of presence in an environment by means of a communication medium. . . . In other words, "presence" refers to the natural perception of an environment, and "telepresence" refers to the mediated perception of an environment. This environment can be either a temporally or spatially distant "real" environment (for instance, a distant space viewed through a video camera), or an animated but non-existent *virtual world* synthesized by a computer (for instance, the animated "world" created in a video game).[20]

Steuer's definition, which dates from 1992, is useful because it shows us how the current usage of the term *presence*—which Marie-Laure Ryan has defined as "we experience what is made of information as being material"—is derived from *telepresence,* which, as Steuer wrote in 1993, originally meant a successful experience of presence in a teleoperation environment, such as scientists on Earth using devices to work on satellites in space, which gave them the feeling of being astronauts. As Ryan noted, the word *presence* is currently used to indicate a successful feeling "being there" in a synthetic environment, while *telepresence* has been reserved for teleoperation situations such as surgery, research in space, and so on.[21] I will explore further changes in the meaning of the the word *telepresence* later in this essay. For more detail on what is meant by presence, Ryan refers to the work of Sheridan,[22] but a more detailed and more referenced series of studies are those by Lombard and Ditton.[23]

Matthew Lombard and Theresa Ditton define presence as "the artificial sense that a user has in a virtual environment that the environment is unmediated."[24] They surveyed the literature on presence and found that other researchers had conceptualized presence as the result of a combination of one or all of six different factors. Their summary indicated that an increased sense of presence can result from a combination of all or some of the following factors: quality of social interaction, realism in the environment (graphics, sound, etc.), from the effect of "transportation," from the degree of immersiveness generated by the interface, from the user's ability to

accomplish significant actions within the environment and the social impact of what occurs in the environment, and from users responding to the computer itself as an intelligent, social agent. Lombard and Ditton's elements of presence are reminiscent of Michael Heim's initial definition and categorization, in his essay, "The Essence of VR."[25] Heim defines VR as "an event or entity that is real in effect but not in fact. . . . The public knows VR as a synthetic technology combining 3-D video, audio and other sensory components to achieve a sense of immersion in an interactive, computer-generated environment." According to Heim, there are seven elements of VR: Simulation, Interaction, Artificiality, Immersion, Telepresence, Full-Body Immersion, and Networked Communications.[26] For scientists, especially cognitive scientists and therapists using VR as a treatment tool, Lombard and Ditton's definitions make up the standard, and I shall follow that approach here.

Lombard and Ditton agree that each of these six dimensions of presence are very different from each other but, rather, than focus on the differences, they focus on what each dimension has in common: "the perceptual illusion of nonmediation." Clearly, some of these elements work against others; for example, the learning curve required to act effectively can conflict with the sense of immersiveness.[27] It is worthwhile to look at each of these aspects of presence in turn.

Quality of Social Interaction

The first element of presence is the quality of the social interaction available within the VRE, that is, if it was perceived as "sociable, warm, sensitive, personal or intimate when it is used to interact with other people."[28] Lombard and Ditton surveyed studies which measured how different communication media could "(a) overcome the various communication constraints of time, location, permanence, distribution, and distance, (b) transmit the social, symbolic, and nonverbal cues of human communication; and (c) convey equivocal information." Key concerns were how intimacy and immediacy were achieved in the medium in question, especially how language choices helped reach those goals.[29]

Durlach and Slater[30] assert that the sense of being with someone, or the sense of togetherness, contributes to a heightened sense of presence; this definition includes the ability for all the participants in the VRE to interact with the space as well as with each other.

The goal of their research is to improve virtual systems such as telecommunications by increasing the sense of presence by adding the sense of "togetherness." They assume that the criteria for establishing a common environment are essentially the same as the criteria for defining a common environment in the real world, and the same problems will appear: for

example, the different backgrounds, viewpoints, and sensitivities of the participants can complicate social interaction.

The key to a sense of presence derived from social interaction is that alterations of the environment caused by the actions of one participant are clearly perceived by the other participants, and interactions with the environment in which the environmental changes are not only perceived by many or all of the participants but also are the result of collaborative work on the environment by the participants (an example given is moving heavy furniture together).

In writings about 3-D environments (as well as in text-based MUDs and 2-D MUDs), discussions of social realism often focus on the use of avatars (textual or graphic representations of users that include a character designed to fit into the fictional environment in question, complete with a set of personality traits, skills, and health status) and the methods players have for communicating with each other. How the avatars are designed is a key concern here; in particular, how each participant relates to his or her avatar. How is the sense of presence in the common environment and the sense of togetherness influenced by the choice of viewpoints?

Participants can choose an egocentric viewpoint, see the environment through the eyes of the avatar, and see one's own avatar in the same manner as one sees one's own body in the real world. Alternatively, participants can assume an exocentric viewpoint and view one's own avatar in much the same manner as one views the avatar of the other participants. A goal of Durlach and Slater's research is to discover in what ways such choices influence the sense of presence in the common environment and the sense of togetherness.

Alluquère Roseanne Stone[31] describes presence as the result of the unique persona within the physical body being transported to a mediated world, rather than the transformation of persona or instances of multiple persona within the same physical body. Stone is distinguishing presence from what the users aim for in MUD and MOO environments which Jay Bolter and Richard Grusin have described as "... the freedom to be oneself is the freedom to become someone (or something) else."[32] MUDs and MOOs offer users a variety of subject positions to choose from, from creating multiple avatars, to networking with others to jointly make up the psyche of a single avatar, to riding invisibly on the back of someone else's avatar, to encountering an AI form who has an agentless subject position.[33]

The effectiveness of avatars as a way of facilitating social interaction has not received much in the way of academic attention. How players relate to their own avatars in a single-player environment, however, and—of course—how well an avatar works for a player in a multiplayer environment depends on how the player engages with the avatar to begin with. Some avatars

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have inspired enough devotion to achieve an independent cult status. For example, the figure of Lara Croft from the *Tomb Raider* series was one of the humanoid avatars[34] who achieved stardom (twenty-six million copies sold[35] between 1996 and 2001 and her own Hollywood film). Lara appeals to players across genders, ages, and social classes and has generated a fairly large body of criticism.[36]

The quality of a game's social interaction also depends on its networks. Many games are designed as stand-alone, but playing the stand-alone game is often seen as a prelude to playing the networked version. These can range from six to eight person games, such as those possible with *Warcraft III* and similar games, to massive multiplayer online role-playing games such as *Lineage, EverQuest, Ultima Online, Asheron's Call,* and *The Sims Online.*[37]

Realism

A sense of realism is also an important factor, that is, how accurately does the virtual environment represent objects, events and people. Realism is subdivided into social realism (the extent to which the social interactions in the VRE matched interactions in the real world), and perceptual realism (how closely do the objects, environments, and events depicted match those that actually exist).

"Social realism is the extent to which a media portrayal is plausible or 'true to life' in that it reflects events that do or could occur in the nonmediated world."[38] Perceptual realism is what is usually vaguely meant by "realism" or "photorealism"—how well the environment looks and sounds like the real world. An animated cartoon, for example, could have a low degree of perceptual realism but a high degree of social realism. Social realism is achieved by designing the world to match the real one, with streets and stores and homes and parks, as well as organizing rituals and ceremonies that enable players to identify their social place in the world. In most MUDs, for example, ceremonies such as "beheadings," funerals, and MUD weddings are common practices.

Clive Fencott[39] believes that as presence is based on perception, it is the content of the virtual environment, and how that content is designed, that is most important; in close agreement are Prothero et al.[40] who believe that presence is enhanced by how the user perceives the space, specifically, an increased sense of presence results from a wide field of view and a sense of foreground and background, which enables the user to orient themselves in space and understand the orientation of virtual objects in the same space. Clive Fencott's research focuses on the perceptual realism necessary to generate a feeling of presence in a virtual environment, or VRE. According to Fencott, "presence is a mental state, it is therefore a direct result of perception

rather than sensation. In other words, the mental constructions that people build from stimuli are more important than the stimuli themselves." The aim of Fencott's research is to discover how content affects perception. To aid him in this goal he has come up with the model of *Perceptual Opportunities:* "The art of V[R]E design is surely to provide users with carefully structured opportunities to allow them to explore, strategise, and generally feel some sense of control over what they are doing." Perceptual opportunities include Sureties, Shocks, and Surprises.

"Sureties" are mundane details that are attractive because they are highly predictable. Examples of sureties include: Architectural details such as lamp-posts, street furniture, and marks to indicate distance; indicators to tell us where to go such as railings, paths, doorways; and background sound that reassures us (cars in distance, etc.).

Shocks are poor design elements that jar the user out of the sense of "reality" of the VRE, such as the "end of the world" shock—the user can see where the environment ends; "film set shock"—buildings are incomplete; polygon leaks—seeing through cracks; and latency and motion sickness caused by poor design or overlong use of the hardware.

Surprises are nonpredictable details that arise logically out of the VRE design. There are three types of Surprises: attractors, connectors, and retainers.

Attactors tempt the user to go or do something. These include mystery objects the user may want to examine, such as moving object that attract attention (such as animation), objects needed for tasks in the VRE, objects that cause fear, alien objects that indicate the end of a level, sensation objects that attract attention through the nonvisual sense, awesome objects that impress by their size, and dynamically figured objects that relocate in space and time.

Connectors are configurations of perceptual opportunities that help the visitor figure out how to use/explore the VRE, such as axes or direction signs, choice points that should indicate outcome of both choices, and deflectors such as a closed door.

Retainers are the interesting things that make users linger and enjoy the VRE such as hot spots, learning areas, puzzles, gadgets, and so on.

Perceptual Maps are designs that show how sureties, surprises, and shocks work together.

Telepresence, Teleoperation, Teleportation

Lombard and Ditton, in their 1997 article, referred to this as "transportation." (When they wrote the abstract for their study in 2000, they referred to this category as "teleportation" or "telepresence," using the words

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interchangeably).[41] Lombard and Ditton have identified three types of transportation: (1) "You are there," in which the user is transported to another place, the oldest version of presence; (2) "It is here," in which another place and the objects within it are transported to the user—the example given is of how television "brings the objects and people from another place to the media user's environment"[42]; and (3) "We are together," in which two or more communicators are transported to a common space, such as in immersive video conferencing.

For the the purposes of humanities scholarship, however, especially when it comes to the analysis of 3-D games, it seems better to abandon the first meaning of "transportation" as this is too similar to the conventional definition of the word *presence* itself. By the same token, it seems better to retain the term "telepresence" for the second meaning Lombard and Ditton ascribed to *transportation,* that is, "telepresence systems use video signals and computer graphics to place the user at a remote or inaccessible location."[43] *Telepresence* can also cover the "we are there together" meaning, as this is only different from "You are there" in that it covers more users, whereas *teleoperation* will keep its meaning of people controlling tools, such as surgical instruments, and performing manipulations such as surgery on a patient that is made present to them through the use of virtual reality, covering Lombard and Ditton's second meaning.

Finally, a third term needs to be added to cover something that does not, as yet, happen in real life but is quite frequent in games: *teleportation.* In *Diablo,* for example, players can open portals that will transport them from the dungeons below to the village above and vice versa. Other games, such as *Titanic,* have maps as interfaces; the player can click on where they want to go on a map and they are instantly there.

Perceptual and Psychological Immersion

Presence is also the result of perceptual and psychological immersion. The first is accomplished by blocking as many of the senses as possible to the outside world and making it possible for the user to perceive only the artificial world, by the use of goggles, headphones, gloves, and so on. The second results from the user's mental absorption in the world. Theorists such as Schuemie et al.[44] have followed Lombard and Ditton in assuming that the ability to interact with the mediated environment is the most important factor in the sense of presence, and that this explains why immersive virtual reality environments have been shown to be effective in the treatment of fear of heights, fear of flying, arachnophobia, claustrophobia, and agoraphobia, and the fear of being in places from which escape might be difficult or embarrassing.

A well-known example of a VRE with a very high level of immersiveness is *Osmose,* by Char Davies. Davies believes that full body immersion in a virtual environment can lead to shifts in mental awareness. She also felt that the technology associated with the Cartesian types of virtual reality inherited from the Western-scientific-industrial complex is not neutral. Davies set out to deliberately circumvent these conventions. "*Osmose* . . . shuns conventional hand-based modes of user interaction which tend to reduce the body to that of disembodied eye and probing hand in favour of an embodying interface which tracks breath and shifting balance, grounding the immersive experience in that participant's own body."[45] The metaphor for *Osmose* is scuba diving: the environments are slightly blurred and without horizon lines, much like the ocean; users move from space to space by breathing or adjusting their balance. Some users have strong emotional reactions to Davies's environments, suggesting that the high degree of immersion, with an interface that involves the kinesthetic sense as well as hearing and sight, results in a high degree of presence.

The Use of a Social Actor in the Medium

The use of a synthetic social actor also can lead to a heightened sense of presence. Users respond to virtual guides and virtual pets in much the same way they respond to the direct address of newscasters on TV.

Synthetic social actors can be of different types. For example, an interaction with a social actor can be preprogrammed. In the text-based MUD *Angalon,* users can battle with a scarecrow, a battle that plays like a cut-scene in a graphic game: the user's actions instigate the struggle, but once started it plays out according to the MUD's programming. More interactive encounters are possible, for example, in the same MUD users also can adopt one of the kittens that are nested in a barn, and the kitten will make its presence felt by perching on the user's shoulder or climbing up their leg. In spite of the clearly programmed nature of these synthetic social actors, users tend to respond to them realistically. An excellent example is "The Thing" in *The Thing Growing,* a virtual animated character in a CAVE (Computer Automated Virtual Environment) designed by Josephine Anstey and Dave Paper. *The Thing Growing* takes advantage of everything tacked VR in CAVEs has to offer to create a situation in which the user takes a leading role and develops an emotional relationship with the Thing. First the user follows the sound of the Thing's voice and lets it out of its box; then the Thing insists on a sort of couple relationship, expressed mainly through dancing (with the Thing and the user alternating in leading). No matter how cooperative the user is, however, the Thing is never emotionally satisfied and even takes revenge by locking the user in a space where they can no longer interact. The user gets

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a chance for revenge, however, only to discover that such intimacy between virtual character and human user is "forbidden" and other police-things are on their way to judge and sentence the Thing and the user.[46]

Intelligent Environment

Finally, a sense of presence can result from users responding to the computer itself as an intelligent, social agent. Humans tend to do this, even though they consciously understand that such responses to computers are illogical. Responses, such as treating a computer with politeness and ascribing it with gender stereotypes are aimed at the computer itself, and not to the programmer. Therefore, when the virtual medium itself follows basic social cues, the user will feel a higher sense of presence. This includes most artificial intelligence (AI) programming, such as natural language programming, which is designed to make the machine seem more human.

I am currently conducting an experiment in how the sense of presence is altered if a 3-D CAVE environment responds to the user's subconscious cues as well as conscious ones. The name of the project is *The Memesis Project.* It is an experiment in interactive narrative designed to test certain theories of presence and immersion in the environment and transparency or immediacy in the interface. In this version of *Memesis,* the environment is designed to resemble a haunted house that collects information about the user's phobias and deep-seated psychological fears in order to provide an ultimate, more thrilling "haunted house" experience. If the first, single-user version is successful, future versions of *Memesis* are planned to carry the interactive narrative and engagement research even further.[47] The principle goal is to see how much and in what way a more intelligent environment can affect the user's sense of presence.

As we can see from the above, *immersion* and the nondiegetic level of involvement with a game that I have labeled *engagement* are both aspects of what researchers in virtual reality have labeled *presence.* As we have seen, many elements, some overlapping, some fairly incompatible with each other, go into making up a sense of presence. In summing up their six conceptualizations of presence, Lombard and Ditton emphasize that: "Because it is a perceptual illusion, presence is a property of a person. However it results from an interaction among formal and content characteristics of a medium and characteristics of a media user, and therefore it can and does vary across individuals and across time for the same individual."[48] Individual scientists working in virtual reality have focused on particular elements that make up a feeling of presence. We can now take advantage of their findings to devise a method for the aesthetic and cultural analysis of 3-D video games. This investigation can take two forms: a quantitative, analytical one or a qualitative,

aesthetic one. My goal in this article is the articulation of a theoretical tool for the qualitative, aesthetic analysis of 3-D video games. The important thing to remember is that the various elements of presence should be seen as a continuum that each game will embody differently. Once we analyze how different elements of presence are weighted in each game, we can ask ourselves what purpose that serves in this particular game. As an example of application of this method, I have conducted my own analysis of of *Myst: Exile* (2001).

Myst III: Exile: The Case Study

Exile is the third in the series of groundbreaking video games released by Cyan, beginning with the original *Myst* in 1993, which was a breakthrough in 3-D rendering in its day and became a bestseller across all game categories and stayed on the bestseller list for 104 weeks. The original *Myst* was composed on Apple computers, and consisted of still images linked together in HyperCard. The images were of stunning beauty, a tradition kept up in the sequels. In the original, the Miller brothers, the game's creators, focused on realistic images, especially textures. There were puzzles to be solved involving fanciful but mechanical (and therefore easily understandable) machines. There were some short video clips in which the user was addressed by a limited number of characters, but these were rare. The user was addressed as someone known to Atrus, who could help repair the tragic effect of the actions of Atrus's sons. The sequel, *Riven,* (1997) continued the conventions of *Myst,* although it was a much larger game, this time composed on SGI machines using SoftImage. *Riven* added journeys in a variety of mechanical contrivances, to great effect, and there were more characters. Although not produced by the Miller Brothers, *Exile* builds on and continues the convention of both games. Images for *Exile* were modeled in Discreet's 3ds max on Mac computers.

Like its predecessors, the game is not designed for multiplayer play, so social interaction is limited to conversing with the artificial characters. As in the earlier games, the game characters, depicted through video footage, speak to the player but the player has no way of speaking back.

The game begins with the player finding him or herself in a sheltered garden, overlooking a dry landscape. After a moment he or she realizes that they are being addressed by Catherine, Atrus's wife, who is holding a baby. Cathering directs the player to go into Atrus's office, as Atrus is expecting them.

This first scene sets up most of the elements relating to presence for the entire game. The user has no avatar, other than the most basic cursors

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(pointer for setting a direction, open hand for grasping an object, zoom in/zoom out, and the lighting bolt for indicating a site where fast transitions to another part of the game environment is possible). The player has a first-person perspective at human eye-level (following the cinematic convention, this eye-level is set roughly at the level of a six-foot-tall human) throughout the game. Players cannot see their own reflection in glass or water, or even see their own feet when they look down, but they can take rides in elevators and zeppelins and other related contraptions, can turn the pages of books, peer closely at objects, and "pick up" certain items as well as manipulate mechanical contraptions. As a result of these measures, the game has an extremely high degree of social realism, as the majority of the elements in this fantastical world conform quite closely to how things would be in our world. The carefully designed, beautifully elaborated 3-D graphics and a soundtrack consisting of well-timed ambient sounds as well as sound effects give the game a high degree of perceptual realism.

Beyond the introductory scene, however, the player does not see another character for very long stretches of game time. The player's journey through the *Exile* environment takes the form of pursuit of a character called Saavedro, who has stolen the book of a new age Atrus had just composed, called Releeshan. Occasionally the player gets a glimpse of Saavedro, and sometimes Saavedro has left recorded video messages that help the player advance through the game. But, apart from that, the world of *Myst III: Exile* is as lonely and empty as its predecessors were. This makes the environment feel less like the real world and more like a dreamscape, part of the designer's goal. Nevertheless, although the characters (when they appear) look very realistic, the fact that their appearances are rare and do not allow the user to talk back, lowers the sense of presence that would be provided by more synthetic characters.

The game does have a sense of environmental intelligence built into the puzzles. The puzzles must be solved in an exact way, but they are built into the environment very creatively. Players familiar with the prequels will have a sense of how to solve the puzzles, as they are a reflection of Atrus's way of thinking and philosophy. So the player has a relationship with Atrus in a removed sense, and the game is partly a treasure hunt that can be solved by how well the player understands Atrus's mind. In *Exile,* the Atrus layer in the environment is there, as Atrus designed and built the environment and puzzles, but a new layer has been added on top, Saavedro's, who has altered and reset all the puzzles to make life difficult for anyone who might come looking for him (he assumes in fact that it is Atrus who is looking for him and addresses the player as Atrus in the middle of the game; only

later does he realize his mistake). So the player finds themself inserted into a long game of cat-and-mouse that is really taking place between Atrus and Saavedro, with the player assumed to be on Atrus's side (there is no option to play from any other perspective). The way to lose the game is by not understanding Saavedro and being taken advantage of by him. Though subtle, this intersubjective triangulation between Atrus, Saavedro, and the player gives the game environment a feeling of presence that it would otherwise lack, based on the intelligence of the environment.

Teleportation is used in this game through the linking books, as in the original *Myst.* The designers have included many references to other forms of virtual reality, such as three telescopes that need to be carefully lined up, to holograms, to portals (the linking books) that transport the player to other parts of the game. Ironically, these mediations add to the feeling that the world itself is nonmediated.

Because the game is a desktop computer game, the degree of perceptual immersion is limited. The player is always aware of the relatively small screen and the need to use the mouse. Using the mouse properly can be a challenge on certain puzzles. This low degree of perceptual immersion is amply made up for, however, by a very high degree of psychological immersion. Once the player adapts to the game's conventions it is possible, if one is so inclined, to lose oneself in the beauty and peacefulness of the environment. There is not much need to strategize as the realistic environment also uses sureties, shocks, and surprises to guide the player from one place to another and from one puzzle to another. If the player does not resist the logic of railings and closed doors (trying to jump down the elevator shaft, for example, or off a cliff, does not accomplish anything) then it is perfectly clear where to go and how to get there. There is no time limit to solving the puzzles and therefore no sense of hurry. This contributes greatly to the overall sense of psychological immersion.

For a sense of how the perceptual realism works in *Myst III: Exile,* let's take a closer look at the first age, J'nanin: The Lesson Age. J'nanin is full of sureties that guide and show the player where to go: catwalks, stone steps, stepping stones, sandy paths, curving metal stairways, and ladders. Only by following these paths can the player move through the game (and of course, link to different Ages through books, a *Myst* convention that would be familiar to players from other games with similar devices, such as the portals in *Diablo*). So "Sureties," as Fencott has defined them, are one of the principle elements that add to the presence in this world. Shocks, the signs that we are playing a game, are rare. If a player insists on trying to jump into a pool of water, off an cliff, or down an elevator shaft, nothing will happen, and they will hear a whispery warning sound, the closest thing this game has to a shock. Of course the game is very large and requires switching

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CDs regularly, but once started on a CD the player can play for a long time without other interruptions.

What makes the *Myst* franchise special are its surprises. Attractors abound: players want to read the diaries scattered throughout the world (and know that the information in them functions as a retainer, as a device for helping them solve the puzzles). They want to play with the numerous gadgets like lamps, gears, and levers, and, best of all, go for wild rides in rail cars or blimps. They know that in order to do this they need to solve the puzzles. Attractors that appear early in the game, such as the Venus flytrap and the scale that balances wooden and crystal balls, serve as connectors to other parts of the game, because the player will encounter puzzles later that can be solved with the information garnered from the scale or the flytrap. This type of surprise is typical to adventure games and therefore feels very intuitive to players with a minimum of experience.

To sum up, *Myst III: Exile,* like its predecessors, offers users the opportunity to explore a particular kind of world—the typical adventure game experience. *Exile* provides a more meditative experience, the result of the way the game's design emphasizes perceptual realism and minimizes social interaction. All of this is in keeping with the game's genre and theme. Other games emphasize different elements of presence. For example, *Diablo II* has an isometric view; the player can choose from a number of avatars; the game is populated by numerous nonplayer characters and can be played alone or in multiplayer versions. Compared to *Exile,* however, the world is not all that visually immersive, and each new dungeon does not look all that different from the next. *Diablo* emphasizes social interaction. Social realism is low, which means that there is a lot of information the player must learn about weapons and monsters in order to succeed. However, once this is accomplished, psychological immersion can be very high, as battling the various monsters and other players requires the player's constant attention and strategic calculation. The monsters are not very complex social actors, unlike *Exile*'s Saavedro, who has a long history and a complex set of motivations. But the *Diablo* player does not have time to really think about such issues, anyway.

In short, Lombard and Ditton's conceptualization of presence enables critics and analysts to conduct an aesthetic analysis of various types of games, which can contribute to a fuller overall analysis as well as to a badly needed elaboration of game genres, which have experienced some rapid changes recently. An elaborated concept of presence also can help those working in virtual reality, those working in games, and those working in interactive instruction design develop a common vocabulary and therefore learn from each other. It also provides players with a terminology to discuss the games that they like, so they can ask for more.

Notes

1. Eugen Provenzo, *Video Kids: Making Sense of Nintendo* (Cambridge, MA: Harvard University Press, 1991), 64–65.
2. J. C. Herz, *Joystick Nation: How Video Games Ate Our Quarters, Won Our Hearts and Rewired Our Minds* (Boston, New York, Toronto, London: Little, Brown, and Company, 1997), 155.
3. Janet Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (Cambridge, MA: The MIT Press, 1997), 98–99.
4. Two representative discussions of the nature of immersiveness can be found in Thomas B. Sheridan, "Interaction, Imagination and Immersion: Some Research Needs," in *Proceedings of the ACM Symposium on Virtual Reality Software and Technology.* Seoul, Korea, (2000), 5, and in George Robertson, Mary Czerwinski, and Maarten van Dantzich, "Immersion in Desktop Virtual Reality," in *Proceedings of the 10th Annual ACM symposium on User Interface Software and Technology.* Banff, Canada (1997), 11.
5. Clifford Geertz, "Deep Play: Notes on the Balinese Cockfight," in *The Interpretation of Cultures* (New York: Basic Books [1972] 1973), 432.
6. Personal communication.
7. Mark J. P. Wolf, *The Medium of the Video Game* (Austin: University of Texas Press, 2001), 66.
8. Van Burnham, *Supercade: A Visual History of the Videogame Age 1971–1984* (Cambridge, MA: The MIT Press, 2001), 216.
9. See Steven Poole, *Trigger Happy: Video games and the Entertainment Revolution* (New York: Arcade Publishing, 2000), 112, and Wolf, *The Medium of the Video Game.*
10. Van Burnham, *Supercade.*
11. Poole, *Trigger Happy,* 211.
12. Van Burnham, *Supercade,* 382.
13. Poole, *Trigger Happy,* 121.
14. Poole, *Trigger Happy,* 121.
15. Poole, *Trigger Happy,* 122–23.
16. Atari's vector arcade game, *Star Wars* (1983), had an immersive first person perspective, like *Battlezone,* with guns at the edge of the screen and the ability to steer through the space. This article focuses primarily on 3-D games with polygonal graphics, but we are not done learning from older vector games.
17. Randy Pausch, Jon Snoddy, Robert Taylor, Scott Watson, and Eric Haseltine, "Disney's Aladdin: first steps toward storytelling in virtual reality," in *Proceedings of the 23rd annual conference on Computer Graphics and interactive Techniques* (1996), 95.
18. Michael Lewis, and Jeffrey Jacobson, "Game Engines in Scientific Research" (Special Issue: Game Engines in Scientific Research), *Communications of the ACM* 45, No. 1 (January 2002): 27.
19. John E. Laird, "Research in Human-Level AI Using Computer Games," *Communications of the ACM* 45, No. 1 (January 2002): 32.
20. Jonathan Steuer, "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication, 42,* No. 4 (Autumn, 1992): 73–93. Available online at <http://www.cyborganic.com/People/jonathan/Academia/Papers/Web/defining-vr.html>.
21. Marie-Laure Ryan, *Narrative as Virtual Reality: Immersion and Interactivity in Literature and Electronic Media* (Baltimore, MD: The Johns Hopkins University Press, 2001), 67–68.
22. For example, see Thomas B. Sheridan, "Interaction, Imagination and Immersion: Some Research Needs," in *Proceedings of the ACM Symposium on Virtual Reality Software and Technology,* Seoul, Korea, 2000.
23. See especially M. Lombard et al., "Measuring presence: a literature-based approach to the development of a standardized paper-and-pencil instrument." Project abstract submitted for presentation at *Presence 2000: The Third International Workshop on Presence.* Available online at <http://nimbus.temple.edu/~mlombard/P2000.htm>.
24. Jay David Bolter and Richard Grusin use *immediacy* to define a similar concept, in their book *Remediation* (Cambridge, MA: The MIT Press, [1999] 2000):

> *Immediacy* (or *transparent immediacy*): A style of visual representation whose goal is to make the viewer forget the presence of the medium (canvas, photographic film, cinema, and so on) and believe that he is in the presence of the object of

representation. One of the two strategies of remediation; its opposite is *hypermediacy,* "A style of visual representation whose goal is to remind the viewer of the medium. One of the two strategies of remediation." (272–73).

25. Originally published in Michael Heim, *The Metaphysics of Virtual Reality (*New York: Oxford University Press, 1993).
26. By simulation, Heim means the trend in certain kinds of VR applications that try to approach photo-realism, using graphics or photographs, and also use surround-sound with an aim toward "realism." Heim points out that we think of any interaction mediated by a machine as a virtual one (including phone calls with people we never meet). By *Artificiality,* Heim means what other scholars such as Cubitt mean by *Simulation;* in other words, an environment with possibilities for action (a world) that is a human construct. This construct can be mental, like the mental-maps of Australian Aborigines, or constructed, like a 3-D VR. For Heim,*Immersion* refers to VR technology's goal to "cut off visual and audio sensations from the surrounding world and replaces them with computer-generated sensations." *Full-Body Immersion,* which Heim also called "Projection VR," following Myron Krueger, is defined as "Interactive Environments where the user moves without encumbering gear" (such as a Head Mount Display) Projection VR requires more suspension of disbelief on the part of the user. Heim makes the distinction between VR and *telepresence:* virtual reality shades into telepresence when you bring human effectiveness into a distant location—for example, using robotics. For *Networked Communications,* Heim followed the definition of Jason Lanier: a virtual world is a shared construct, a RB2 (Reality Built for Two) Communication with others in an environment is essential; online networked communities strongly embodies this element of VR. Heim incorporates all seven elements into a new definition of VR: "An artificial simulation can offer users an interactive experience of telepresence on a network that allows users to feel immersed in a communications environment."
27. See, for example, M. Ryan, "Cyberspace, Virtuality and the Text," in *Cyberspace Textuality, Computer Technology and Literary Theory,* ed. Marie-Laure Ryan (Bloomington and Indianapolis: Indiana University Press, 1999), 78–107.
28. Matthew Lombard and Theresa Ditton, "At the Heart of It All: The Concept of Presence," *JCMC* 3, No. 2 (September, 1997): 4.
29. Lombard and Ditton, "At the Heart of It All: The Concept of Presence," 4.
30. Nat Durlach and Mel Slater, "Presence in Shared Virtual Environments and Virtual Togetherness," Research Laboratory of Electronics (Cambridge, MA: The MIT Press, 2000).
31. Alluquère Roseanne Stone, *The War of Desire and Technology at the Close of the Mechanical Age* (Cambridge, MA: The MIT Press, 1996), 83–92.
32. Bolter and Grusin, *Remediation,* 247.
33. Alison McMahan, "Spectator, Avatar, Golem, Bot: Interface and Subject Position in Interactive Fiction" (paper given at the Society for Cinema Studies Conference, Chicago, 2000). See also "The Effect of Multiform Narrative on Subjectivity," *Screen* 40, no 2 (Summer 1999): 146–157.
34. Pac-Man, of course, also achieved a high degree of recognisability and tie-in merchandising and spinoff TV show, hit song, and numerous sequel games.
35. Ad copy on back of *Lara Croft: Lethal and Loaded,* 50 min. West Long Branch, NJ: White Star Video, 2001, DVD.
36. See especially Diane Carr's article in *ScreenPlay: Cinema/videogames/interfaces,* eds. Geoff King and Tanya Krzywinska (London: Wallflower Press, 2002); and my chapter on avatars and bots in Alison McMahan, *Branching Characters, Branching Plots: A Critical Approach to Interactive Fiction* (forthcoming).
37. For a more detailed cultural analysis of networked communications and MUDs, see my essay "Verbal-Visual-Virtual: A MUDdy History," in *Gramma: Journal of Theory and Criticism* 7 (1999): 73–90.
38. Lombard and Ditton, "At the Heart of it All: The Concept of Presence," 5.
39. Clive Fencott, "Presence and the content of Virtual Environments," (1999). Available online at <http://web.onyxnet.co.uk/Fencott-onyxnet.co.uk/pres99/pres99.htm>.
40. J. D. Prothero, D. E. Parker, T. A. Furness III, and M. J. Wells, "Foreground/background manipulations affect presence" (paper presented at HFES '95). Available online at <http://www.hitl.washington.edu>.

41. Matthew Lombard et al., "Measuring Presence."
42. Lombard and Ditton, "At the Heart of it All: The Concept of Presence," 6.
43. Bolter and Grusin, *Remediation,* 214.
44. M. J. Schuemie, C. A. P. G. van der Mast, M. Krijn, and P. M. G. Emmelkamp, "Exploratory Design and Evaluation of a User Interface for Virtual Reality Exposure Therapy," in *Medicine Meets Virtual Reality,* ed. J. D. Westwood, H. M. Hoffman, R. A. Robb, D. Stredney, 468–474. IOS Press, 2002. Available online at <http://graphics.tudelft.nl/~vrphobia/mmvr2002.pdf>.
45. From the Immersence website at <http://www.immersence.com/publications/ephpaper-B.htm>.
46. Josephine Anstey and Dave Pape, "Animation in the Cave," *Animation World Magazine* (April 1, 1998). Available online at <http://mag.awn.com/index.php3?ltype=search&sval=Animation+in+the+Cave&article_no=532>.
47. Alison McMahan, "Sentient VR: The Memesis Project (Report of a Work in Progress)." In *Proceedings of the 6th World Multiconference on Systemics, Cybernetics and Informatics,* ed. Ngib Callaos, Marin Bica and Maria Sanchez. International Institute of Informatics and Systematics, Vol. XII (2002): 467-472. Available online at <http://faculty.vassar.edu/almcmahan/memesis/home/index.html>.
48. Lombard and Ditton, "At the Heart of it All: The Concept of Presence," 10.