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Living in Downtime: Speculation on the Implications of Virtual Reality for the Future of Religion¹

Current discussions about Virtual Reality (VR) assume the fundamental materialist axiom of the purveyors of cyberspace: that value and meaning are ultimately products of informational and neuro-systematic processes. The crisis in epistemology and ontology that VR appears to presage can be viewed as an aspect of the inexorable unfolding of an immanent social-historical process of demystification and demythologizing, the Enlightenment project of revealing the material reality behind religious-spiritual-ideological illusions. Following the deconstruction of the symbolic domain by late 20th-century critical theory, VR extends the demystifying to the very notion of the experience of reality.

For my part, I begin from two hypotheses. First, that the VR-project ultimately will be successful in deconstructing the "natural," or *given*, experience of reality (EOR) and supplementing it with a plethora of possible alternative EORs. Second, that religious-spiritual awareness cannot be reduced to material-informational processes. Given these assumptions, what significance will the virtualization of reality in simulated experience have for religious consciousness?

My remarks are in the form of notes, and my observations are speculative. They are based on the most publicized and literary aspects of the recent discussions about VR, and I have no doubt that they will be superseded, and perhaps even refuted, by actual developments in technology and society. But I must emphasize that I consider these science-fictional speculations, which are in some cases directly derived from works of SF, to be highly plausible.

At the moment, there is a widespread feeling that VR will continue to be developed along the lines of high-speed, high-resolution computer simulation (CS) -- i.e., that the speed and density of programmed perceptual information will short-circuit the "unreality testing" (O'Flaherty, 175-80) of peoples' consciousness, and lock them into a largely administered "ride." But it is also necessary to entertain seriously the idea that VR will transcend the informational carrying-capacities of CS, through technologies of direct neural interfacing. In essence, brain sciences will be able to map and to trace cognitive

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processes well enough to invent apparatuses for their direct manipulation. As a socially disseminable technology, this most likely will not mean electrodes implanted in our brains to help us live like happily robotized lab rats. More likely, direct manipulation of cognitive states will be linked to, and moderated by, other cultural apparatuses emphasizing selection and choice, and leading to collective networks. We must be ready for the emergence of a VR technology that can facilitate collectively shared intra-mental experiences that will offer another order of experience -- completely present and sensed, probably with a range of sensory intensities far surpassing our experience of the given world, yet thoroughly programmed, and determined by programmed intervention.

"Electronic LSD"

Many VR researchers discourage comparisons of VR with hallucinogenic drugs. They believe that bad associations with drugs will make people unduly suspicious and ill-disposed toward the new technology (Carpenter 39). But the similarities are too pronounced to avoid. Indeed, in a sense neural-interface VR promises a rationalized, controlled version of some of the EORs hallucinogenics provide in a "wild" form. (Discussion of "electronic LSD" [Rheingold, *Virtual Reality* 353ff.] is off the mark not because VR is incapable of radically altering consciousness through the weakening of normal cognition of reality, but because it is a highly controlled process with programmed limitations of perception, whereas the relationships between emotions, perception, and cognition in hallucinogenically induced consciousness are determined by a myriad ad hoc influences.) In the same way that many cultures cultivate the ritual use of hallucinogenics to create a collective experience of transcendence -- i.e., passage over the threshold of common perception to a putatively heightened awareness of things and relations --, it is reasonable to expect a similar application of VR in the future, inasmuch as it offers the possibility of collective experience of alternate realities.

It is the heightened sense of presence induced by the use of certain drugs that makes them useful as tools of mediation to a putatively higher, or truer, awareness. The same may be true of VR. Howard Rheingold has written about VR researchers' "conversion experiences" to faith in the revolutionary possibilities of the new technology; and, in Rheingold's words, it is "the sense of presence... [that] is the source of the conversion experience" (Rheingold, "Travels" 81). His own experience with a molecular-docking

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simulation at the University of North Carolina felt to him like an "intuition amplification" (*Ibid.*). Jaron Lanier, the visionary founder of Virtual Programming Languages (VPL), considers VR as the means toward a new, "post-symbolic communication"; the founders of the University of Washington's Human Interface Technology Laboratory (HITL) have similarly stated their intention to create a medium for direct experience, bypassing the limitations of language.² These statements are simultaneously quite practical, since they can refer to new non-writing based programming systems or direct walk-throughs of virtual spaces; and yet they imply almost religious horizons of communication among disembodied persons in an environment in which heightened meaning is a given.

The religious potential of VR is obvious. Consider four fundamental elements of religious practice: peak experience, sacred venue, ritual performance, and sacred narrative. Each domain requires the others for its collective establishment. ("Personal spirituality" may involve three of the four elements [sacred venue is inimical to individualistic spirituality] but it leaves the collective basis of ritual and narrative "unconscious," begging the question of how and why collective practices like storytelling and ritual can cease to be collective in one's own experience.) Each of these elements can be, in theory, incorporated into virtual experiences.

Virtual Peak Experiences

Peak Experiences are the foundation from which VR's effects on religion will most likely emanate. If VR proves incapable of inducing peak experiences, it will probably have no other avenue for sacralization. VR is, almost by definition, a technology of *experience*, and its distinctive drive as a form of knowledge is the dream of crafting ever more varied, and ever more intense and compelling, experiences. Peak experiences are, in a sense, the historical crowns of experience, moments of such heightened awareness and sense of identity that experience itself dissolves into meaning. The very concept of experience is predicated on the separation (alienation, if you will) of a plurality of particular constructions and perceptions of the life-world from a sense of overarching unity of phenomena. Direct-interface VR will most likely search for ways of eliciting peak experiences as a matter of course. We may want to speak of these as *quasi*-peak experiences; but the question will certainly be debated whether *quasi* has any meaning when the experience is indistinguishable in sensation and sense of identity from

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“organic” or accidental peak experiences. Assuming that ways of inducing such mental events will be discovered in VR, it is likely that they will be quickly formalized, allowing the sacralization of the apparatus that can construct it -- on the analogy with the cult use of peyote, for example.³

Virtual Temples

Sacred venues in traditional religions gain their power to mediate between the given world and the transcendental through their putatively dual reality. On the one hand, the edifice of the temple or the location of the shrine is a space in the material world, a mundane construction or site. On the other, through the perception of analogy (the design of the temple which simulates the world or the cross, the likeness of an extraordinarily shaped Shinto tree to an extraordinary concentration of divinity, etc.) the mundane can be viewed as an entrance to the habitation of sacred powers. A fundamental requirement for a sacred venue is that it be able to create a protected environment, a sanctuary, for the perception of a reality-disturbing "truer" reality. The experience must be collective, and it must be based on analogies with reality that articulate the tasks of contemplation, prayer, ritual, etc. All temples are, to some extent, controlled and programmed virtual spaces.

VR is already capable of creating virtual spaces, and this will most likely be the path of greatest development in the next few years. Lanier's VPL and the University of Washington's HITL projects are largely concerned with the creation of virtual scenes -- their conceptions of nonsymbolic, experiential communication are linked with the experience of several people manipulating artificial spaces at the same time. The sense of the presence -- the "virtual tangibility" -- of these spaces already makes them attractive as entertainment installations and enhancers of computer-aided design. Once the perception of the spaces arrives through the channels of neural-interface VR technologies, the intensity of one's feeling of presence in them can be augmented, and their parameters can be determined through fanciful, "irreal" analogies (flying rooms, spaces that dissolve rhythmically into other spaces, places that require radically different kinds of

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manipulation -- upside down, malleable, or heavy worlds, "mythic worlds" that induce emotions appropriate to great sacred narratives: such as, for example, the stations of the cross or the life of Milarepa). For any such virtual venues to become associated with sacred sites, they would have to elicit the assent of many people, and be regularizable, i.e., there would have to be a reason for many people to agree that a certain set of parameters is not to be altered, even though altering parameters is one of the easiest things that can be done. Those collectively selected parameters would have to be able to induce the sense of heightened perception that would allow the VR-technology to act as the material manifestation of what is "ultimately" conceived to be a non-material, transcendental reality. At that point they could become a venue in which several people can agree to come together, to congregate.

No technology is able to create the conditions of its own sacralization. The factors that would have to converge to lead to one or another VR-installation becoming charged with noumena are unpredictable. It would be worthwhile to turn to the history of cult formations for possible futurological analogies to the selection of certain VR experiences as potentially religious.

For me, the most convincing speculation on this possibility comes from one of Philip K. Dick's best works, *The Three Stigmata of Palmer Eldritch* (1965). The novel tells the tale of human colonists on a dreary, dead Mars, whose only escape from despair is a shared quasi-religious fusion, by means of a drug called Can-D, with two dolls, Perky Pat and Walt. Based on the Barbie and Ken dolls, Perky Pat and Walt represent the human ideal, complete with layouts of fashions, cars, accessories -- the treasury of American commodity-fetishism. The Martian colonists ingest Can-D and feel they are translated back to Earth by spiritually/psychically inhabiting the idol-bodies of Perky Pat and Walt. Although the drug is generally considered the essential agent for the mind-translation, "some ... claimed that the power to insure translation did not come from the Can-D, but from the accuracy of the layout" (41). The magical accuracy of the layout, of the analogy with sacred space so exact that it induces identity, is conceivably within the realm of VR's possibilities.

Virtual Rituals

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It is in the transformation of VR play and utility practices into regularized, compulsory ritual practices that the technosacralization of VR will occur. How this will happen cannot be predicted, although the study of the incorporation of secular objects into cult usage may offer some analogies. Attention is being focused increasingly on the construction of dramatic scenarios within the virtual scene, and on its concomitants: masks (which in VR will involve complex shape-changing), objects, the parameters determining how the objects can be manipulated, mask-to-mask orientation, contests for the power to affect the programming of parameters from within the virtual scene, etc.⁴

Quite possibly no one will ever want to change VR-scenarios from play into ritual. The dominant mood of VR is deconstructive; it is a correction of given reality (one need think only of its medical, prosthetic applications). It is also a system for creating an ever-variable menu of EORs to supplement "vanilla reality" and the alienation enforced by the boundaries of our physical bodies and our inherently ambiguous symbolic systems of communication. So VR is essentially born under the constellation of mutability: its greatest attraction is its alterability, its ability to create altered states, alternate experiences, alter egos. (It is on this point that Lanier's visionary ideal of a "post-symbolic communication," with its implications of direct affective and sensory contact among people within the virtual scene, falls down. For even if the participants in a virtual scenario feel that they can communicate telepathically, non-gesturally as it were (for gestures must needs fall into the category of symbolic communication), the differences among the great variety of VR-EORs will themselves establish a system of symbolic differences, a language of experiences, which at that moment will cease to be experiential alone, becoming signs and symbols as well.)

If one values highly the capacity to alter any object's or scene's properties, one is not likely to want to fix an object down without extraordinary justification. Ritual objects are usually felt to be saturated with certain powers, with an aura or *mana*, that cannot be artificially implanted in an object created through serial or mass production. That would go doubly for objects that are simulations, appearances whose properties can be changed perhaps literally with the wink of an eye. It is difficult to conceive how and why a group would accept an easily manipulated illusion to play the role of an aura-saturated ritual object. Yet we must not be too quick to believe that all simulations, and all designed experiences, will be felt to be alike in their arbitrariness. It is quite possible that certain quasi-objects (which may in fact be patterns or rhythms rather than simulated objects)

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will elicit powerful responses, peak experiences, that a collective might wish to share again and again.

The drama of religious ritual, in the west at least, usually recapitulates a heroic *agon*. It crystallizes an initiatory ordeal through which the heroic self/community overcomes, and gains control of, obstacles, in order to understand and participate in a higher power and awareness. That overcoming is transcendence. With VR, transcendence is literally artificial. But VR's artificial transcendence is no longer a matter of the heroic overcoming of obstacles, but of becoming accustomed to the program. Since the transcendental understanding gained through VR ritual is a matter of programming, its auratic justification derives from the higher mental ordering inscribed in the design and apparatus.

The element of heroic struggle is not necessarily excised, but it ceases to be the focus of transcendence. The heroism of "natural" religions is arguably the idealization of the attitude of the seeker when the "program," the design of the real, is beyond the understanding and control of human beings. Following Feuerbach's dictum that "metaphysics is only esoteric psychology," VR "materializes" the programming of the EOR, drawing EOR design into human, and hence, cultural activity. Spiritual struggles may ensue, but they are displaced in a characteristically modern way -- away from asserting one's spiritual self in a given natural world, towards constructing the possibilities of mental evolution insulated from the given reality. (Let us note that even such indulgent iconoclastic spiritual teachers as Meher Baba and Shree Rajneesh advised against the use of hallucinogenic drugs as a means to attain enlightenment, since their ease of use prevented the education of the spirit, which could only come through struggle.)

Virtual ritual, therefore, will focus on the repetition of attainments of collective peak experiences, and the choice to participate in them, rather than in the heroic struggle to rise out of the constraints of nature.

Projective Narratives: SF

Sacred narratives are the memory-machines of peak experiences and ritual drama; where the latter are necessarily concentrated at specific moments and sites, narratives are

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portable and malleable. They are also the means by which the intensive experiences of enlightenment and ritual can be extended to others, in the form of persuasion, invitation, and prefiguration of initiation. With the historical-materialist conception of human life (not necessarily in the Marxist sense of the term), the memorializing function of narrative has been complicated by the prefigurative, futurological function of narrative within technological culture's futuristic orientation. Where traditional myths and spirit tales assimilated the listeners' present-time to the archaic past or the cyclically coursing mythic time, many contemporary narratives strive to prepare their listeners for the emergence of *novums* (Ernst Bloch), *a priori* unpredictable developments of human history as it emerges into the future.

In contemporary literature, SF, broadly conceived, has something of this projective mythological function. SF in this sense is not merely the fiction commercially classed as science fiction, but all forms of fiction, including that found in critical theory and philosophical discourse, that engage the basic uncertainty about what scientific/technological innovations are possible in the future, and what their implications may be for human cultures. It is an inherently future-oriented fiction, but it also involves the past, in the uncertainty that comes in anticipating the complete revision of origins, the process of scientific reconceptualization that we are becoming more and more accustomed to. A past that is not yet known is a form of the future. So is a present unanticipated by the past.⁵

Religious narrative traditionally has not concerned itself with the possibilities of futures radically different from the antecedent time, except for one particular genre, the apocalyptic. There has been considerable discussion of the relationship of the apocalyptic mode with SF; David Ketterer has even made the claim that "the apocalyptic imagination ... finds its purest outlet in science fiction" (*New Worlds for Old* 15). But Frederick Kreuziger, commenting on Ketterer's thesis, states the fundamental problem of linking apocalyptic eschatology to the futuristic, historical, scientific world-conceptions that saturate SF:

It is meaningless to speak of the radically new if *how* one expects it is through a simple unfolding of events dependent on "human instrumentality." The totally new can only be expected in a totally new

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manner. The response demanded *in the present* is a new mode of expectation, imminent expectation. (3)

The paradox presented by SF is that radical historical transformations of the human condition could very well issue from human instrumentality. The list of powers that technology has "appropriated," or is theoretically capable of appropriating, from powers that almost every previous culture has considered to be transcendental is formidable: the creation of life, of the double, the destruction of the biosphere, remote control, the transformation of genders, the fusion of organic life and machinery, spaceflight, etc. Classical SF has adopted this technoevolutionary theme as one of its favorite topoi, ranging from the naive theme of the computer that jumps its algorithmic tracks, to the cyborg, whose enhanced intellectual and physical capacities break it out of the limits given by natural evolution to human beings. We can plausibly speculate that VR will be one of the most likely candidates for introducing a *novum* into human social experience.

SF thus has a projective mythic function: not to memorialize and predict a sacred history that has been programmed to devolve according to a design of transcendental origin, but to prepare for the emergence, and ultimately the initiation, into a future that will transform, and even cut itself off from, the past that prepared its emergence. Moreover, since the *novum* may emerge from human technology -- through unforeseen consequences of rational tools and applications -- the surplus meaning of the technologies may take on a metaphysical hue.

It is not hard to discern a link between SF and narratives of the sacred. Joanna Russ even locates the specific aesthetic quality of SF in its "quasi-medieval" character. According to Russ, SF is essentially didactic; its protagonists are always collective, never individual, persons; its emphasis is always on phenomena; and it is, through its "sense of wonder," also religious and worshipful in tone. "Science is to science fiction (by analogy) what medieval Christianity was to deliberately didactic medieval fiction" (113).

Science fiction, like medieval painting, addresses itself to the mind, not to the eye. We are not presented with a representation of what we know to be true through direct experience; rather we are given what we know to be true through other means -- or in the case of science fiction, what we know to be at least possible. Thus the science fiction writer can portray Jupiter as easily as the medieval painter can portray heaven. Ultimately, none of them

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has been there, but it doesn't matter.... For this reason, science fiction, like much medieval art, can deal with transcendental events. Hence the tendency of science fiction towards wonder, awe, and a religious or quasi-religious attitude towards the universe. (116)

I would add to Russ's claim that just as religious feeling is not limited to the awe-filled contemplation of cosmic dimensions and divine majesty, SF's is not limited to the worship of science. Indeed, since the feedback of cybernetic technologies into human social life will affect many of the most fundamental categories of human thought (at the very least by demonstrating that they can be traced and manipulated by "extrinsic" apparatuses), it is quite possible that the distinctions between certain kinds of science and religious practice will dissolve, crystallizing instead around the conceptions of what Stanislaw Lem calls *autoevolution* and Humberto Maturana *autopoiesis*.⁶ This is the claim I am making about VR.

I have been trying to arrive at a term that would describe the projective mythological function of SF from the perspective of the study of religions. Its role is not prefigurative, since the point is precisely that future *novums* cannot be predicted. The SF text may have a profound influence on the emergence of the *novums* -- the *locus classicus* in the study of VR is the influence of William Gibson's depiction of cyberspace and Sim/Stim in his novel *Neuromancer* (1984). But one of SF narratives' main functions is to prepare a certain mood of reception for major changes brought about by technoevolution. They are, consequently, *pre-texts* of emergent practices and states of consciousness, to which they may ultimately bear no resemblance. By setting up narrative analogies based on projections from the present state of technology and society, they encourage a readiness to prepare for initiation into transformed conditions. Thus the widely accepted notion that SF is about the present, not the future, is only half true. The present reality that is SF's range of reference is inherently future-oriented.

Virtual Faiths

SF has essentially pre-textualized at least three religious attitudes that may emerge from collective religious VR-EORs.

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1. *Artificial Transcendence*. Philip K. Dick's works, especially *The Three Stigmata of Palmer Eldritch* (1964), *Ubik* (1965), and the neglected *Maze of Death* (1970), explore the most dramatic religion of simulation. In this mode, the relations between virtual (i.e., consciously composed) and given realities will be a contest for the determination of ultimate value. The naive ideal of VR offering a utopian domain will quickly become a field of extremely heightened religious (and hence quite anti-rationalist, and therefore anti-utopian) conflict. The felt need to differentiate between artificial and given realities will lead to different communal projects and desires. Some examples: one can easily imagine the feeling that shared experiences in VR constitute the fullest experience of human awareness, and therefore the part of life necessarily lived in the given is living in "downtime" (the state of mind of the Martian colonists in *Palmer Eldritch*). Competitions might emerge for the privileging of certain interactive VR simulations over others. A dialectical conflict might ensue between those who view the difference between VR EORs and given EORs as the difference between true and false perceptions of reality, with different groups ascribing privileged status to different sides. Surely also a longing will develop for some transcendence out of the cognitive carousel of VR, and the necessary -- but now hidden -- power conflicts inherent in communal experience (as in the struggles among different consciousnesses for dominance in *Ubik*).

This last condition, the desire for transcendence out of a world-view that perceives given reality as entangled in a web of virtualities, is evocatively narrated by Dick in *Maze of Death*. In the novel, the surviving crew of a damaged spaceship doomed to circle a distant star without hope of rescue, pass the time of their lives by incessantly playing out shared virtual scenarios through a computer that they program to synthesize everything they know about Earth's religions. Within this synthetic creation, the crew lose their real memories in a "polyencephalic" drama, whose outcome is never foreseen -- but which inevitably ends with a return to real-world consciousness. At the end of the novel, one of the characters is rescued from the cycle and removed from the ship by a religious intercessor that had been invented for the virtual reality scenario. Transcendence emerges from the projections of virtual reality.

2. *Cybernetic Animism; Golemism*. A second possibility, presented in Gibson's cyberspace trilogy (*Neuromancer* [1984]; *Count Zero* [1986]; *Mona Lisa Overdrive* [1988]) is the ascription of transcendental attributes to aspects of the VR system, once it has been allowed to develop hypercomplex qualities. Gibson's novels tell of the progressive stages

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of the evolution of a new form of consciousness, emerging from the Artificial Intelligence capacities of cyberspace. Cyberspace, one of the most powerful concepts bestowed on contemporary discourse by SF, is for Gibson's characters a "consensual hallucination" of the datasphere that all computer systems have in common. In the novels, the consciousness of this data-realm first achieves godlike powers, then, in the second novel, fragments into partial spirits in the machine, modelled by Gibson on the divinities of Haitian voodoo. In the last of the novels, certain human beings are able to inhabit cyberspace through constructs known as Alephs, which are able to model the totality of cyberspace in miniature, and even to act on the real world.

As Gibson hints, these transcendental qualities are powerful but extremely labile, since they are overdetermined with respect to structural instability. In objective terms, the spirits of a cybernetic system are subject to the chaotic properties of complex evolution; in subjective terms, the participants in cyberspace know they have been determined by the artificial immanence of the hard- and software design. With extremely powerful VR technologies, such cybernetic animism might develop into a faith in the supersensory, transcendental agency of the computer system itself. This has been depicted in very different ways by David Cronenberg in his film *Videodrome* (1983) and Stanislaw Lem in the novella *Golem XIV* (1981). In Cronenberg's film, the television-system becomes first a medium for, and then the incarnation of, a new order of reality, in which "the television screen is the retina of the mind's eye." Lem, by contrast, depicts his light-driven (hence "enlightened") supercomputer, the fourteenth in a series of supercomputers that have broken away from human control as soon as they were switched on, as an acolyte of a new faith, "toposophy." Driven by "the hunger for infinity," the superluminal computers all set out on metaphysical quests, never knowing when and how they will be able to ascend from one "zone of silence" to a higher one.

A developing being can never know in advance whether it is entering a trap or a tunnel, whether it will penetrate a region of silence, never to return, or emerge from it strengthened. ...[O]ne cannot formulate a theory so general as to provide an unequivocal explanation of passages through silence for all subzonal brains. The unconstructability of such *hill-climbing toposophical theory* is clear... (*Imaginary Magnitude* 197)

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Gibson depicts his spirit-inhabited computer-web from the inside, as a region in which human beings may actually live and act for a while. For Lem, the evolutionary leap is made not by us, and certainly not for us, but by a luminal supermachine for which human beings were mediating tools. Our higher consciousness is, to paraphrase Lyotard, "exteriorized with respect to the thinker."

3. *Machine Zen*. A third possibility is the perception of VR via a form of Zen Buddhism or Taoism. Essentially, this would treat the alternative EORs as aspects of a single -- albeit undelimitable -- continuum. A version of this is prefigured in Dick's *Man in the High Castle* (1962) in which an alternate reality (in which Germany and Japan have won World War II) is sectored into a potentially infinite continuum of alternate universes, each with different degrees of "reality" vis a vis the others. Another can be found in Robert Pirsig's *Zen and the Art of Motorcycle Maintenance*, in which the Buddha is found to be present in any well-made thing, including a motorcycle (and, by extension, a virtual reality installation). But considering the Taoist doctrine of naturalness, the Taoist response will either veer toward cyber-animism, or will reject VR an unhealthy reduction of the range of experience and consciousness. In my view, it is Buddhism that is most well-positioned to accept VR-religiosity with minimum resistance since for Buddhism the given reality is already quite "virtual," a simulation, given its solidity through the constant reinforcement of human desire. And indeed, it is probably through Buddhist and Buddhist-influenced critiques of the objectivity of the experience of reality that paths toward a philosophical understanding of virtuality and its degrees will be found.

Notes

1. This piece was originally delivered as a paper before the Society for Literature and Science in 1991, and published in expanded form in German in *Hyperkultur: Zur Fiktion des Computerzeitalters*, Martin Klepper, Ruth Mayer, & Ernst-Peter Schneck, eds. Berlin: De Gruyter, 1996.

2. A recent self-description of the "Activities of the Human Interface Technology Laboratory (HITL)" of the Washington Technology Center is explicit on this point: "The objective of the Human Interface Technology Laboratory is to develop natural interface techniques, hardware and software designed for experiential rather than symbolic

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interaction..." which will be "responsive to natural human physiology and cognition, systems that emphasize spatial interaction rather than symbolic processing." (My thanks to Rob Kelley for bringing the HITL project description to my attention.)

3. On the peyote cult, see Bryan Wilson, *Magic and the Millennium* (Frogmore, St Albans: 1975), 414-449, and Weston LaBarre, *The Peyote Cult* (Hamden, Conn.: 1964).

4. On questions of dramatic construction in programmed virtual experience see Brenda Laurel, *Computers as Theatre* (New York: 1991) and Ann Lasko-Harvill, "Identity and Mask in Virtual Reality," a paper presented at The Second International Conference on Cyberspace, University of California, Santa Cruz, April 1991.

5. This interpretation of SF is developed at greater length in my article "The SF of Theory: Baudrillard and Haraway," *Science-Fiction Studies* (November 1991). 387-89.

6. Lem's exposition of autoevolution appears in Chapter X of his *Summa Technologiae* (as yet untranslated into English); Maturana's and Varela's notion of autopoiesis is discussed in their *The Tree of Life* (1990). See also David Porush, "Prigogine, Chaos, and Contemporary SF," *Science-Fiction Studies* 55 (November 1991): 367-86, and Marvin Minsky, *The Society of Mind* (New York, 1986), "Appendix."

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