VIRTUAL REALITY, AS UNREAL AS IT GETS
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Any technology which has the audacity to call itself a variety of reality must also propose a paradigm shift. In essence, a paradigm shift expands the potential of an entire discipline. For me, Virtual Reality (VR) has expanded every aspect of Computer Science. VR is coming, inevitably and rapidly. I do not propose to constrain or corral or condemn the flow of progress; I do propose that we are in a unique position to watch, with open eyes and with instruments in hand, the emergence of the next computational paradigm.

I have coordinated and recorded the initial VR experience of over 500 people in half-a-dozen contexts. Mean enjoyment, rated on a scale from 1 (yuk!) to 10 (wow!), is 9.3 (N = 280). VR taps a positive emotional core. People enjoy it, people write about it, people stand hours in line for five minutes of it, people want it, and people will buy it. Consider the comments: empowering, the feeling of freedom, dreaming while awake, vast potential in every direction.

And just what is the paradigm shift? Computers are not only symbol processors, they are *reality generators*. VR is the body of techniques that apply computation to the generation of cognitively valid realities. Display is inclusive (3D real-time, subjective perspective). Interface is defined by physiology; interaction, by natural behavior. Virtual entities can be responsive and autonomous; VR is inhabited by artificial life. Software tools include the Virtual Body, the Wand, conversational programming, and negotiated communality.

The Copernican revolution introduced a physics that differed fundamentally from appearance. VR introduces a metaphysics that differs fundamentally from the material. The following outline may help us to decide which side of the monitor we wish to stand on.

Characteristics

Inclusion: VR encapsulates the participant (formerly the user) inside information. It places computation at the closure of our senses. Simulated physical reality is a subset.

Pluralism: A digital environment is individually customized to a participant's perspective. Shared perspective is to be negotiated rather than assumed.

Cognitive integration: Unifying analytic symbolism with audiovisual imagery generates a feeling of wholeness. Computation becomes emotional, reason loses its crown. The material no longer dominates the senses.

Immaterial realism: VR is constructed, not given. It begins as Void, not as a subject/object dichotomy. It is completely representational, but not a priori rational, empirical, or verifiable.

Cornucopia: Bits are cheap. The currency of VR is organization, not possession, not accumulation, not territory.

Paradox: VR allows mutually inconsistent environments to coexist without degradation. It both separates and includes. Overlay VR mixes the real with the virtual.

Issues

Multiple concurrent realities: VR permits comparison of realities, it is the first scientific instrument of metaphysics. Does experience in VR transfer to physical reality (PR)? What is the role of PR in the information age? How graciously will PR admit competition?

Big Science: What is the scientific method, the empirical standard, of digital environments? What does cross-validation of realities do to semantics? Is Psychology the Physics of VR?

Fluid self: What are the cognitive effects of programmable Virtual Bodies, of transportable perspectives, of synesthetic sensation, of masslessness, of negotiable communalities, of complete empowerment?

Cybersocialization: What are the ethics and politics of VR? What will interaction without material impact be like? Who has the right to limit access to the immaterial? Is anarchy a natural consequence of locally definable realities? How will folks respond to explicitly penetrating world views? What emergent phenomena will we see?

"I'm sorry Dave, I can't let you do that." : The VR programmer is no longer responsible for every token, no longer the symbolic god. What are the rights of autonomous computational entities? Will there be a Virtual Environmental Protection Agency?

Intoxication: It's hard to get haughty about non-physical highs. Are there sensory channels to ecstasy? Is living in VR necessarily pathological?

Formalism

To formalize VR, we must shift from a symbolic calculus to a spatial calculus
and build the participant into the axioms. For a familiar interpretation, let
( ) be the boundary between mind and body. PR on the outside, participant on
the inside.

>   Let ( ) be a distinction between realities.
>   Let i   be the participant.

Spencer Brown's *Laws of Form* provide the axiomatic basis:

>   *Observe*:   i (   ) = (   )
>   *Participate*:   (i) =

The right-hand-side of each equation is descriptive (objective), the left-
hand-side is experiential (participatory). Logic, the strategy of reason, is
symbolic by convention, not by necessity. Architectural design has a sensual,
experiential semantics. It is but a quirk of typography that we have ignored
the experiential semantics of computational languages. At the foundation of
Virtual Reality is the Void.