VR TAXONOMY -- A CONVERSATION
William Bricken with Alan Wexelblat
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I'm posting this conversation between Alan Wexelblat and myself in order to
stir interest in the development of a VR taxonomy, classically the first step
in the evolution of a field from vague ideas to mathematical models. Appended
at the end is a communication to Steve Tice about a taxonomy for judging
SIGGRAPH'91 VR entries.

CONVERSATION

Bricken:

Virtual reality (VR) systems were introduced to the general public by VPL and
by Autodesk on June 6, 1989, VR Day, at two trade shows.

Wexelblat:

On behalf of Myron Kreuger and those (like myself) that his work over the last
decade has brought into this field, I must protest. Surely you don't mean
this to read the way I interpret it.

Bricken:

Yep, summarizing history in one sentence always leaves a lot to be desired.
There is an interesting tussle going on about Fatherhood of VR, which I find
quite unappealing. Sutherland, in my opinion, is the only person with the
right to claim founder status.

So some clarifications:

THEME: Let's identify differences in approaches, then use different
words/names for them. I'm damn tired of seeing articles which begin "virtual
reality, or artificial reality, or cyberspace, or microworlds, or ..." as if
they were all the same. These approaches only appear to be the same when we
fail to make discriminations. For another viewpoint, see Steve Tice's
classification of VR systems for the SIGGRAPH'91 VR exhibit.

To me, the defining characteristic of VR is *first-person inclusion*. Systems
which do not immerse you in sensory stimulation emphasize an object/subject
relationship rather than a participant/environment relationship. The
distinction is somewhat delicate, cause it's easy for some folks to get
immersed in a story, or a text-based program, or a scene out of an airplane
window. So I think of designed immersion.

Lots of partial systems will be developed over the next few years, just like video games have moved from 2D-third person to 2 1/2D to 3D-first person to inclusion. There is a good economic reason not to wait for full immersion, almost all existing simulation and display systems use an objective metaphor and this won't change quickly. I'll still suggest that calling a window-based display "VR" does not make it VR. Inclusion is physiologically measurable; the difference between VR and windows is more than words, even when the windows provide 3D images and interaction.

Myron's work is pioneering, but much of it includes a disembodied representation of the participant. It provides a third-person image which the participant identifies with. Since this is not the way we participate within reality (except for some dream states), it is not VR. I like Myron's name: third-person interactivity is *artificial reality*.   Again the delicate distinction: VR simulates a subjective experience rather than a viewing of self representation.

Myron has pioneered the connection between sensing devices and electronic display, mainly for aesthetics/art. Interactivity is critical to VR, but I hesitate to call all electronic interaction "VR". Is the photoelectric cell on a garage door "VR", or a camcorder?

There is something very general going on with information space, as opposed to mass space. I call this general thing "cyberspace", the phenomenon of electronically mediated experience. The automobile is a great example of mechanically mediated experience. Phone conversations are cyberspace.

Finally, VR (first-person inclusive) was first made available to hundreds of people (who stood in line) on 6/6/89. Please let me know if there is an earlier date when a functional VR system was publicly presented.

Wexelblat:

Well, to the extent that you draw thin boundaries within a fairly small experience space, I suspect you're right in pinpointing 6/6/89. In that way you've excluded prior public showings by people like Kreuger and Southerland.

HOWEVER (and this a big yeahbut), I think you're splitting hairs. It takes you that long to explain it to me who knows a heck of a lot about it. Those differences don't mean diddly to someone who knows nothing about the field.

Sure, there's a lot to be said for precision. But if you're the only one who agrees with your terminology, terminological rigor causes more confusion than it solves. Furthermore, if you're being rigorous in an available-to-the-general-public form (as I thought your paper was) then you ought to define your terms so people know what you're being rigorous about.

Bricken:

Yep, thin boundaries. The paper came from the SIGGRAPH panel, and had a lot
of context provided by other panelists.

Actually, the "define the terms" paper was not ready for SIGGRAPH, and is
still under revision. What I'm really interested in is identifying a
consensus among broad-VR workers about the terms we are using to describe our
work. With cyberspace, I suspect we are in very deep water, identifying stuff
that is all around us, yet the entire culture has been blind to. EG: is there
a word for the radio and TV broadcast "waves" that permeate our physical
space? I hope that we'll end up discussing *what-is-going-on*, and decide on
particular words for particular things.

Part of the problem of the general public not understanding our work is that
we do not even have a taxonomy yet. By default, the journalists are doing the
preliminary science. Folks battling about who has claim to what first really
begs the question of what the what is.

I'm also tired of reports that say VR is a batch of hardware interface
devices. That's like describing a meal by pointing to the forks and spoons.

Wexelblat:

Perhaps then it could be revised to include more of that context so that an
independent reader doesn't get confused.

I think you'd be lucky to get consensus on what's in the field at all, let
alone terminology as detailed as you have it worked out. For example, I have
a nebulous feeling about, for example, telepresence. The literal translation
of a remote scene does not, I think, qualify. But on the other hand,
telepresence is usually to a remote unit with un-human capabilities, which is
a kind of AR (I can't bend steel bars or dig in rock with my ordinary hands,
but with telepresence to a robot I could). I also feel that things like MUDs
are definitely out, but others disagree.

Not to mention there's the baggage of the word's [cyberspace] origin in the SF
community. That tends to lead people to believe it's this far-future stuff,
not happening today.

I think the discussion is a good idea, but I despair of coming to a common
terminology by fiat. Perhaps a number of us could get together and write a
taxonomical proposal? This is always the case [that journalists are defining
the field], even with established fields like physics. The journalists will
always use the most attention-grabbing words they can find and will smear
boundaries because they're attempting to have the widest possible appeal. Not
to denigrate them, but that's their job.

On the other hand, I'm not sure myself what to call some things. For example, the book Benedikt is editing will simply be called CYBERSPACE (a bad idea, imho). But I was thinking of calling my/our book SOFTWHERE: APPLICATIONS OF ARTIFICIAL REALITY.

I really am of the hands-free school. That's also why I want SOFTWHERE to stress *what can you DO with it*. Rather than worrying about what it is.

Bricken to Tice:

Thanks for the VR Gallery Jurist package. It's brave of you to suggest a categorization of the domain (VEM, VCS, application types). All the categories seem to assume a visual interface. This might discourage Habitat-like systems which are text based but still interactive and multiparticipant. And the 3D sound folks: for instance, we have interactive 3D sound running without a trace of graphics.

In a more philosophical vein, once information is mediated electronically, it gets real hard for me to distinguish teleoperation from telegraphics. Is the structure of the database really a defining characteristic? Or the processing of the signal? We thrashed this issue for the Presence journal, which tries to combine the two communities. For me, a critical difference is image or model. Images don't have parts and are interactive only in the sense of viewing.

Then there's the visualization community. Some databases have natural semantics (they model real things), some model information only (like the stock market). What of techniques to interact with information? Of course, I've been arguing that modeling reality with VR misses the whole point of VR.

Where does SIMNET (immersive but no headmount) fit in? Or the Media Room? Where are you putting Krueger's work?

Overlay techniques? Non-remote sensory extension like infrared goggles? Technically, the VCS category is not dealing with images, it is dealing with objects. What about synesthesia? Prosthetic mapping for the blind and disabled (eg mapping sight into sound)?

It's hard to argue that the telephone is not low-bandwidth VR. It's hard to argue that good movies are not immersive. Its hard to argue that *mechanical* linkage to robots is not telepresence. Do we assume a computer graphics bias? What needs to happen is a community discussion of VR concepts and defining qualities?

These comments are not intended to be critical. The classification-of-VR task is something I've wrestled with for a while. It's a tough problem.

Thanks for the good groundwork.