

## JUST WHAT IS THIS VIRTUAL REALITY ANYWAY?

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The first step that a discipline takes in order to be considered scientific is to create a taxonomy, an ordered classification of a field that includes presumed natural relationships. What we need is a taxonomy of types of virtual reality.

More bluntly, I'm sick and tired of reading at the beginning of almost all VR articles something like "artificial reality, or virtual reality, or cyberspace, whatever you call it..."

We cannot benefit as a field from having many different names for the same thing. We cannot benefit from a battle over the ego-territory of who gets to name what. We cannot benefit from failing to differentiate many subtypes of virtual experience.

So here are some steps toward taxonomy.

First, I see a major subdivision between the technical folks who are building behavior transducers and writing code and the philosophical folks who are speculating about what the technical advances will do to psychology, society, and knowledge. There is much more to our field than hacks on a computer, we are discovering the information space within which we are immersed.

*Cyberspace:* electronically mediated experience

There is an even more general category of information and how people deal with it. Our culture has designated educational institutions to convey the three Rs, the skills of dealing with symbolic information. Cyberspace is not books, it is not reading, even though we can immerse ourselves in fantasy by reading.

Nor is cyberspace pure information, without human interactivity. If a book is sitting in a forest, and nobody is there to read it... Cyberspace is about experience, not representation.

Is riding a bicycle a trip in cyberspace? No, cyberspace is not experience with mechanical systems, that belongs to the last century. Cyberspace is experience with electronic information, information that takes an excursion from human scale to electronic scale and back again.

Is television cyberspace? Definitely. Cyberspace comes in all sorts of bandwidths and with different levels of fidelity to our senses. The telephone is very low bandwidth cyberspace, it addresses only one sense, in a one-dimensional format (telephone sound appears to emanate only from the earpiece), with low fidelity. But telephone conversation has the unmistakable feel of being somewhere else. The telephone creates an experience at a

distance, it puts two people whose bodies are not in touch, in touch with words. The place that the verbal interaction takes place is cyberspace.

Similarly, the television puts people who are out of touch in both time and space together. The togetherness is non-interactive, it is one way, it is flat, but it is still a shared presence.

What about a photograph, or a film? Simple cameras are not strictly electronic, and the difference between a photo and a verbal description may merely be the medium of presentation. Perhaps a taxonomy of cyberspace must be extended to include molecular mediation, or to include pictorial representations, or to include (contrary to a previous assertion) literature. It may just be too perverse to include speech via telephone and not include word via print.

So a fundamental question is the degree of interactivity required for cyberspace. Here, an analysis of the dimensionality of media may help. Generally, media can be classified by their dimensional reduction.

Radio	No spatial extent, variation over time
Writing	Variation over one dimension, frozen in time
Photography	Two spatial dimensions
Film	Two spatial, one time
Sculpture	Three spatial
Theater	Three spatial, one time, no interactivity
Parties	Three spatial, one time, interactivity

One interesting thing about this classification scheme is that the participant shows up as another dimension, in the form of interactivity. The difference between watching a film and making a film, between reading words and writing words.

Film *time* is traversable in one direction, compare that to VCR fast-forward and to the timelessness of sculpture and to a freedom to travel over any time.

Another potential classification parameter is sensory modality. The difference between silent movies and talkies is the addition of more sensory bandwidth.

In summary, some potential taxonomic structures for cyberspace:

- Dimensionality of media
- Interactivity
- Sensory mode
- Type of mediation

Cyberspace is the domain. In this context, virtual reality is an interface technique, a way to access cyberspace. So is a radio. The essential difference is that VR is inclusive, it surrounds the participant within a

three dimensional virtual environment. VR is multisensory, increasing the bandwidth to include 3D sound, tactile feedback, kinesthetic feedback, and whatever else you have in the way of behavior transducers.

***Virtual Reality:*** subjective inclusion in cyberspace

One could ask what sensory channels are mandatory for inclusion, but that is the wrong question. Each permits inclusion, each multiplies the sense of presence. Inclusion can be provided by each sense individually. As well, restricting our coupling to cyberspace to senses is an arbitrary restriction. We could include pulse rate, galvanic skin response, posture, in fact any measurable physical characteristic, as a coupling device.

***Artificial reality:*** objective inclusion in cyberspace

As if looking in a mirror, artificial reality shows you a representation of yourself, permitting disassociation of experience and body.

Finally,

***Virtual Worlds:*** databases with natural semantics