

# Technology in Place : Real Virtuality

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## 공간연구를 위한 정보 기술 : 가상 현실

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**Abstract :** New technologie. of information and interaction create ambiguous, multifaceted relationships between concepts and realities that once seemed clear and simple. The advent of cyberspace implies the existence of cyberplaces and relationships among cyberspace and places that could be as or more complex then those that exist among the spaces and places of the non-digital world. Virtual reality-the current uses of information technologies to create replicas of places and processes in the world-offers a point of entry for exploring such relationships. But more penetrating insights become evident in the examination of real virtuality-the uses of information technologies to enhance the experience of places in the world. Real virtuality offers geographers a variety of innovative and powerful tools for augmenting the effectiveness and domain of their craft. Widespread use of real virtuality by geographers will alter their use of data, methods, and theory in research, teaching, and practice.

**요약 :** 새로운 정보기술이 등장하고 교류가 늘어나면서 과거 간명해 보였던 개념과 현실의 관계가 다변화되고 모호하게 변하고 있다. 가상공간(cyberspace)의 출현은 가상장소(cyberplaces)가 존재함을 뜻하며, 또한 현실 세계의 공간과 장소 간의 관계에 못지 않게 가상공간과 가상장소의 관계도 복잡할 것임을 암시한다. 정보기술을 활용하여 만들어 낸 세상의 여러 장소나 과정의 복제품, 즉 가상현실(virtual reality)은 이러한 관계들을 탐색하는 실마리를 제공한다. 그러나, 실제가상(real virtuality), 즉 정보기술을 이용하여 현실세계의 장소에 대한 경험을 강화하면 공간과 장소의 관계에 대하여 더 깊은 통찰을 얻을 수 있다. 실제가상은 지리학자로 하여금 그가 하는 일의 효율성을 높이고 영역을 넓히는 데 여러 가지 참신하고 강력한 도구를 마련해 준다. 실제가상이 널리 쓰이게 되면 지리학자들의 연구와 교육, 응용 분야에서 자료, 분석기법, 이론을 다루는 양식이 달라질 것이다.

### 1. Cyberspace and Cyberplaces

The rapidly increasing use of the internet for play, socializing, and work has led to the widespread use of the term *cyberspace*, and to extensive discussions of the natures of cyberspace and of the places that comprise it or reside within it. Many definitions exist. The large and rapidly growing discussion of cyberspace(more a *cyberature* than a literature, inasmuch as most of it occurs digitally on the internet) implies a space

distinct from the lived space of everyday life, but a space and places that are more than metaphors. Cyberspace and its places are likely as real for some people as the space and places of the non-digital world.

The discussion is of considerable importance to geographers(a number of whom are active participants in the conversation) because of the insights conceptions of cyberspace and its places offer into the natures of the spaces and places with which geographers more commonly interact.

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Despite the ethereal and ephemeral realms in which they exist, analysts consistently attempt to map cyberspace and its places in a variety of ways—conceptually, in terms of access to cyberspace in different parts of countries and different parts of the world, at specific dates, and over time. Maps or mappings of the infrastructure underlying cyberspace, the intensity of its use, and the different media components of the information flows that constitute cyberspace are increasingly common (see, for example, Martin Dodge. 1997. *An Atlas of Cyberspace*. <http://www.geog.ucl.ac.uk/casa/martin/atlas>). These speculations and mappings constitute a new realm for the application of geographic method and theory, as well as a fruitful source of insights into the continued emergence of geography as a discipline.

## 2. Virtual Reality

Virtual reality—a topic of great current interest—provides a useful entry point for an examination of current and prospective relationships between information technologies and geography. Creators of virtual realities attempt to re-create digitally aspects or environments from the lived, non-digital environment for purposes of training, recreation, or management. Flight simulators have long been used to train pilots. Whereas some electronic games such as *pachinko* make no attempt to mimic any kind of reality, the increasingly popular digital games offer many varieties of digital experience, many carefully calculated to replicate as faithfully as possible aspects of complete environments from the lived world.

For the purposes of geography, serious discussion of virtual realities begins in 1992 with David Gelernter's book *Mirror Worlds* and science writer Nigel Caldwell's *Global Geography Machine*. Gelernter, a computer scientist at the Massachusetts Institute of Technology Media

Laboratory, argued persuasively in *Mirror Worlds* that for practical purposes the world could be contained in a shoe box—that is, enough information about lived world processes at many scales could be gathered, processed, and displayed in a device the size of a shoe box to make effective management of those processes feasible. Calder, in a keynote address at the Atlanta, Georgia 1992 GIS/LIS meeting, argued much the same point (though he did not use the shoe box simile). He contended that satellite, GIS, GPS, and related technologies would soon make global monitoring of earth and anthropogenic processes possible and desirable. Both Gelernter and Calder focused primarily on the use of information technologies to manage ongoing process and to intervene to avoid or ameliorate the consequences of disasters. Geographically, the fundamental characteristic of Gelernter's and Calder's schemes is *centripetal* information flow. The vision portrayed is one of managers sitting in centers scanning information from a variety of places and exercising control at a distance. Though it is a *leitmotiv* in Gelernter's and Calder's work, much of the virtual reality literature and practice emphasizes substitution of virtual for real environments, especially when virtual reality is designed for recreation, as in computer-based games.

## 3. Real Virtuality

As the neologism suggests, *real virtuality* stands virtual reality on its head, conceptually and in terms of nomenclature and emphasis. Real virtuality—the use of information technologies to augment and enhance the experience of lived places, employs the same technologies underlying virtual reality—computers, flexible intercommunication links, and high-quality visual displays, but for different purposes. Real virtuality emphasizes the use of these technologies *at places*,

in the lived world rather than in an information or management center or in a simulator or video parlor. The information flows of real virtuality are therefore *centrifugal* or *random access*. Rather than using new technologies to concentrate information in a few places, real virtuality uses the portability and ubiquity of information technologies to deconcentrate information, to make it available in as much abundance at as many places as possible, again with the primary purpose of using technology and the information it can carry to enrich the experience of a lived place in the non-digital world.

Examples of real virtuality technology abound and are becoming more common every month. A map is the oldest and one of the most useful real virtuality artifacts. A map distills data about the environment into a compact, portable information utility that can greatly enhance the experience of a lived, experienced place, whether for simple navigation or for understanding complex patterns and processes visible (or not visible) to the seeing observer. Navigation and positioning technologies also provide real virtuality. Satellite- and GPS-based navigation systems are now offered by all major automobile manufacturers, who advertise the prospect of never again becoming lost. Like maps, they enhance the experience of the lived environment by bringing information from a broader context to bear on the immediate tasks at hand. Precision agriculture—the use of GPS technology in conjunction with detailed analyses of crop yields and soil conditions to manage inputs of fertilizers and water—results in savings of as much as 30 percent of fertilizers and the fuels needed to apply them. On another scale, laser-guided surgery projects an image of underlying structure onto the part of the body being operated upon to enable a surgeon to cut more accurately and confidently. The images projected are based on CAT or MRI scans done prior to surgery. In all these examples, gathering information from the environment and

making it available at the site of immediate work or learning enhances the tasks at hand.

#### 4. Fantasies or Forecasts?

Visions of future uses of information media and technologies are often as much fantasy as sensible forecast. How reliable are virtual reality and real virtuality as visions of the future? Any new medium or complex of media must meet four tests before it becomes a viable enterprise: the innovation must be technologically possible, economically feasible, compatible with existing institutions, and culturally acceptable or desirable. Both virtual reality and real virtuality meet these tests.

The virtual reality industry has grown rapidly in the last several years and seems destined to continue on that path. Technologies of high-definition visual display and audio reproduction are proved technologies whose costs continue to drop even as more imaginative uses for them are devised almost monthly. Though decried in some quarters, the technologies underlying virtual reality threaten few established institutions to the degree that further development will be stalled. Attempts to slow or manage real virtuality technologies, however well intentioned, seem doomed to failure because of the dispersion of the hardware and software among millions of individuals. Unlike many traditional media, cyberspace and the internet that hosts it are dispersed in terms of hardware and control. Cyberspace is democratic to a degree unprecedented in media history. Finally, virtual reality seems culturally certain because of the degree to which it is based on the human desire for vicarious experience and the human propensity to play. Entertainment is now the force driving the development of virtual reality, and entertainment is a more powerful, wealthier basis for the continued development of virtual reality than the needs of

policy or science. If there were any question that virtual reality is viable, the recent appointment of a Vice President for Virtual Reality at Microsoft Corporation should remove all doubt.

Whatever applies to virtual reality applies equally to real virtuality, inasmuch as the same technologies are employed in much the same ways. Development has reached the stage at which any innovation in virtual reality will quickly be followed by its use in real virtuality. The beauty of putting the world in a shoe box is that a shoe box is highly portable, and all that is needed to employ the shoe box at any lived place is a computer connection, a utility increasingly offered by the internet. As advanced economies develop *ubiquitous* computing—a lived environment in which computers become integral and pervasive components of all environments, the need for connections or the need for the shoe box itself will decrease. Real virtuality is as certain as virtual reality, for the same technological, economic, institutional, and cultural reasons.

Serious analysts and popular writers now focus more on virtual reality than on real virtuality for several reasons. One is the engineering ethos in which much of the innovation in information technology occurs. Most media innovations originate in the drive to overcome an existing problem. They are not attempts to invent a new medium, or more important, to find the optimal uses for the innovation. For that reason, humanity is repeatedly satisfied by innovations in the short run and surprised by the consequences of their use in the long term, as each medium creates a new niche with unexpected capabilities based on its comparative advantage. Second, and closely related to the first, is the emphasis in media innovation on *substitution*. In much the same way that virtual reality is now seen as a substitute for lived environments, media innovations are almost always seen for several decades as replacements for old ways of accomplishing specific tasks. When

media use eventually results in new and distinct niches, they usually lie far, conceptually and operationally, from what their inventors had in mind. Third, there remains among media engineers a strong direction bias, a tendency to think of media as unidirectional rather than two-way, interactive networks. Thus media analysts continue to think primarily in terms of information flowing from many places into information or control centers. They are much less prone to base their thinking and work on the two-way, random access capabilities of media, the internet, and cyberspace.

Real virtuality may not be the ultimate stage of what are now thought of as cyberspace and virtual reality, but real virtuality will be more important and powerful in the medium and long term than virtual reality. Virtuality is the one-way medium substitute for the real thing. Real virtuality uses technologies not as substitute, but as tools to enhance the experience of lived places. The emerging power of real virtuality resides in its use of two-way interactive media, in the use of place as a principle for organizing information, and in the human hunger for experience in place. Increasingly, place or geographical coordinates will be used as the key to finding information of all kinds. In the United States, it is likely that within 20 years most statistical information will no longer be gathered and summarized by the minor civil divisions (municipalities, counties, states, *etc.*) traditionally used as containers for geographically-referenced data. Rather, each datum will be tied to its geographic coordinates, enabling a data user to aggregate or disaggregate data at will for his or her own purposes. That conceptual and operational shift will create powerful support for real virtuality and will simultaneously make it more attractive. Finally, however sophisticated they become, virtual reality representations will remain virtual, that is, substitutes for the real thing. Powerful visual media and elegant travel programs they offer have wrought no decrease in tourism. On the contrary,

they stimulate more people to travel and experience places. As has been characteristic of all previous media innovations, virtual reality will not grow at the expense of travel to lived places and environments. On the contrary, virtual reality will motivate more people to experience the real thing, augmented as much as possible by the information real virtuality can bring on that experience.

## 5. Real Virtuality and Geography

Geographers will find real virtuality a powerful tool for their purposes over the short, intermediate, and long term. Some of the uses of real virtuality are already traditional and commonplace in the discipline, such as the use of maps to provide context for the visible landscape during field excursions. Other prospective uses will present intriguing challenges and opportunities to employ new media in innovative ways and to shape the evolution of media themselves. All guarantee a lively future for the geographical enterprise.

Virtual reality and real virtuality will support growing demands for geographically referenced data. Computer games now most likely constitute the largest single market for geographic data, exceeding in quantity and monetary value the demand for such data for marketing, locational analysis, government mapping programs, and military operations. The designers of computer games seek ever more realistic representations of reality, which demand greater densities of data. Game designers are moving rapidly from two-dimensional representations to three-dimensional portrayals and to animation in two and three dimensions. As that process continues, the demands for spatial data will grow exponentially, as will the need for local knowledge to support the creation of highly realistic virtual environments. Geographers should enjoy comparatively full employment if they are willing to prepare for and

seize the opportunities the growth of the computer entertainment industry offers.

As geographers become more familiar with the technologies underlying virtual reality they will inevitably employ them in the field, thus furthering the evolution of real virtuality. Over the next decade, we might expect, reasonably, to go on field virtual trips, in which the technology employed to enhance what is seen rivals in importance the landscape visible to the unaided eye. Consider the explanatory and educational power of a device capable of projecting *onto a view of the canyon itself* a fast-forward display of the last 500 million years of the erosional history of the American Grand Canyon. Whether accomplished with a transparent screen and projector or with special eyeglasses linked to computers, such a display would enrich immeasurably the understanding of what lay before the viewer, how it came to be, and what it will become in the future. Such displays would enrich equally the places and landscapes observed and analyzed in urban geography and in many of the specialties geographers pursue. I expect the interplay of relevant technologies and the work of geographers to result in exciting changes in the ways geography is practiced and professed in years to come.

Acquiring the technical dexterity needed to employ the technologies of real virtuality will be a minor and not very demanding chore as software becomes more user-friendly. Creating the knowledge and developing the imagination needed to make effective use of these new tools will demand all the empirical, conceptual, and theoretical skills geographers can bring to the task. Local knowledge based on field work will become more useful owing to the need to forge links between local action spaces and global processes. The conceptual ambiguity between virtuality and reality will likely increase before it decrease. I have contrasted reality and virtuality as if they were separable, but the thrust of theoretical

developments in human geography over the last decade has been to suggest that what people conceive as reality is a combination of metaphors (virtualities broadly conceived) and the natural environment, that what humans experience as space and place is neither wholly reality nor

wholly metaphor, but an amalgam of the two. The diverse kitbag of ideas and theories that geographers bring to the exploration of human imagination encapsulated in the relationships between virtuality and reality promises an exciting future for the discipline.