Virtual Reality in the Age of Telepresence

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Those interested in understanding electronic media are eventually drawn to the deep chasm that divides 'virtual reality' from 'telepresence'. The chasm has its origins in human perception, epistemology, and ontology: factors which have evolved over millions of years and been subjects of inquiry for at least two millennia. However, the shifting technological vegetation in this chasm can obscure its underlying topology. To understand the two forms and make sense of their differences, it is helpful to look at the relation between virtual reality (VR) and telepresence: it bears a similarity to the relation between painting and photography. To paraphrase Walter Benjamin,[1] the question is not whether telepresence is VR, but rather how might telepresence transform the nature of electronic art?

Virtual reality presents a simulacrum, a synthetic construction; in contrast, telepresence provides access to a remote physical environment. With telepresence, what is being experienced is distal rather than simulacral. That said, there is no universal agreement on the definitions of VR and telepresence. Unfortunately, they are sometimes used interchangeably in studies of electronic immersion.[2] However, my concern is not with the physiological and psychological issues of immersion, but with perceptions of fiction and reality.

The word 'virtual reality' was coined by Jaron Lanier in 1979.[3] Its oxymoronic richness comes from 'virtual: being in essence or effect, *not in fact*' (my italics).[4] Pierre Lévy[5] points out that virtual in this context should be balanced against 'actual': 'reality: actual being or existence of anything, in distinction from mere appearance; *fact*' (my italics).[6] For our purposes here, we can define virtual reality as the presentation of perceptual information that (1) 'realistically' simulates a fictitious 3D environment and (2) allows the user to choose a spatial viewpoint (i.e. to move through this environment). This definition is broad enough to include the popular Virtual Reality Modeling Language (VRML), the standard for 3D rendering on the WWW.

The engineering of useful telepresence is an active area of research for space, undersea, and medical applications.[7] The source of the word 'telepresence' was reported by Marvin Minsky: 'To convey the idea of these remote-control tools, scientists often use the words teleoperators or telefactors. I prefer to call them telepresences, a name suggested by my

futurist friend Pat Gunkel'.[8] The word itself comes from 'tele', Greek for distance; and 'presence: the sense of proximity in time and space'.[9] Thus telepresence also has rich oxymoronic overtones. For the purpose of this article, telepresence can be defined as the presentation of perceptual information that *claims* to correspond to a remote physical reality. It is important to note that it is not at all obvious how to verify this claim: telepresence, like photography, can be doctored.[10]

Two examples of electronic art provide landmarks on either side of the VR/telepresence chasm. For convenience, I will refer to the primary authors although both are collaborative artworks.

Char Davies' *Osmose* (1995) combines high-end graphics workstations, body-mounted sensors, and a head-mounted display to create the effect that a viewer is bodily immersed in a synthetic environment.[11] Davies' lyrical images evoke an imaginary natural environment including a pond and forest. Trained as a painter, she makes striking use of sfumato effects. One of the most innovative aspects of this installation is her use of potentiometers around the chest of the 'immersant' to detect and respond to breathing. This pneumatic interface allows the immersant to navigate through the environment in a manner akin to scuba diving.

Eduardo Kac's *Rara Avis* (1996) places two digital cameras and robotic pan/tilt mechanisms inside the head of a fibreglass bird.[12] This telerobotic apparatus is located in an aviary filled with live birds. The cameras and robotic head are linked to a head-mounted display in a museum[13] and also to the internet via the WWW, Mbone, and CUSeeMe.[14] These links provide remote access to the bird's eye view.

Osmose is widely acknowledged as a watershed in VR as an artform. Born in Canada, Davies' aesthetics of graphics and audio combine to produce an innovative and polished result that stands in contrast to the parapatetic polygons that preceded it. *Osmose* has a seductive effect on its immersants. One gets the sense of being immersed in a dream-like floating narrative. This environment was wholly invented by Davies. It is a deliberately fictional space, one does not confuse the *Osmose* environment with a remote physical reality.

In contrast, *Rara Avis* exemplifies telepresence as an artform.[15] In this work, Brazilian-born Kac raises a variety of postmodern issues. We get a glimpse from the outsider perspective of a caged rare bird. Kac's choice of location is crucial. Even if a human did enter the cage, the behaviour of the birds would be greatly affected by this trespass. Thus, the robotic cameras permit remote viewing of a rarely seen reality. Equally important, this view is accessible on the net, extending the viewing range well beyond the gallery. However, on the net, the images are 2D frames viewed on a computer monitor. On the WWW the refresh rate is approximately 1000 times slower than television. But again, I am not concerned here with immersion; my interest is in epistemological issues for which immersion is not a prerequisite. *Rara*

Avis is pure telepresence; the cameras provide access to a live remote environment. To his credit, Kac makes little attempt at narrative and does not adorn his birdcage. It is obvious to all participants that neither the birds nor the cage are synthetic.

Contrasting *Osmose* with *Rara Avis* as artistic landmarks helps us to navigate the conceptual space between virtual reality and telepresence. *Osmose* presents an imaginary perspective while *Rara Avis* presents a 'real' yet remote perspective. This distinction is vital; a very deep chasm lies between them. And yet we cannot reach the bottom of this chasm. As we descend, our perceptions become blurred. Immersants in *Osmose*, through a combination of suspension of disbelief and 'trompe le corps',[16] often report a sensation on the border of reality. And some who experience *Rara Avis* may be sceptical: how can one know if the birds seen in *Rara Avis* are live or taken from a prestored library of photographs? Even if they are live, how has the robotic bird disrupted their behaviour?

> The boundaries between what is seen and what is staged are increasingly blurry ... the crucial issue may not be the camera but a gnawing sense that the world itself, knowable only through imprecise perceptions, is a tissue of uncertainties, ambiguities, fictions masquerading as facts and facts as tenuous as clouds.[17]

Every technology distorts what it measures. When Galileo's telescope provided new perspectives on remote terrain, he was greeted with scepticism. Indeed, seventeenth-century lenses were highly inaccurate. The telescope, adamantly rejected by the Catholic Church, illuminated epistemological questions that set the stage for Descartes' 'dubitus ergo sum'. We are now in the Age of Telepresence, where communications, computing, and robotics provide perspectives on remote territory. We are right to doubt these new lenses.[18]

In this brief article I have argued that telepresence is a category of electronic art distinct from virtual reality. Prying these categories apart suggests critical issues in the chasm between. While VR admits to its illusory nature, telepresence claims to correspond to a remote physical reality. Thus telepresence has the capacity to introduce cult value to an electronic community fascinated by exhibition value. Our archaeological instincts draw us to this terrain between truth and fiction. By raising doubts as to whether we are experiencing reality or a carefully constructed simulacrum, telepresence has the potential to transform the very nature of electronic art.

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Notes

1 W. Benjamin, *Illuminations*, trans. Harry Zohn (New York: Schocken Books, 1936/1969). Other works that have influenced the ideas presented in this article, in addition to those directly cited, are: H. Foster, *The Return of the Real* (Cambridge, Mass: MIT Press, 1996); M. Lombard and T. Ditton, 'At the Heart of It All: The Concept of Telepresence', in *Journal of Computer Mediated Communications*, 3, no. 2 (September 1997) at <http://207.201.161.120/jcmc/vol3/issue2/> (11 September 1997); and G. Stoker, introductory essay to 'Fleshfactor', Ars Electronica (Austria, Linz: Ars Electronica, 1997).

2 S. Fisher, 'Introduction to Telepresence', *Notebook from Revue Virtuelle*, Gallery Guide (Paris: Centre Georges Pompidou, 1992); J. Steuer, 'Defining Virtual Reality: Dimensions Determining Telepresence' in *Communication in the Age of Virtual Reality*, eds. F. Biocca and M.R. Levy (Hillsdale, NJ: Lawrence Erlbaum Associates, 1995), pp. 33-56; F. Biocca, 'The Cyborg's Dilemma: Progressive Embodiment in Virtual Environments', *Journal of Computer Mediated Communications*, 3, no. 2 (September 1997) at <http://207.201.161.120/jcmc/vol3/issue2/> (11 September 1997).

3 J. Lanier, personal communication with the author, 6 January 1998.

4 This is the definition given in *Websters 7th New Collegiate Dictionary* (Springfield, Mass: Miriam Co, 1971).

5 P. Lévy, *Qu'est-ce que le Virtuel?* (Paris: La Decouverte, 1995).

6 *Websters Dictionary*, op. cit.

7 T. Sheridan, *Telerobotics, Automation, and Human Supervisory Control* (Cambridge, Mass: MIT Press, 1992).

8 M. Minsky, *Omni*, 2, no. 9 (June 1980).

9 *Websters Dictionary*, op. cit.

10 In an insightful essay on VR and telepresence, Lev Manovich makes a related point: 'the purpose of all representational technologies is either to deceive or to enable action.' He puts VR in the former category and telepresence in the latter. My interest is in the relation between fiction and reality; but the linkage between action and reality is an important subject for further study. L. Manovich, 'To Lie and to Act: Potemkin's Villages, Cinema, and Telepresence', conference paper given at ISEA97, held in Chicago, USA, September 1997. See also K. Goldberg, Panel at the International Symposium of Electronic Art (ISEA97), Chicago, USA, September 1997.

11 For further discussion of Davies' work and ideas, see C. Davies, 'Notes on Being in Immersive Virtual Space', a paper delivered at ISEA95, the Sixth International Symposium on Electronic Arts, held in Montreal, Canada, September 1995.

12 For further discussion of Kac's work and ideas see E. Kac, 'Ornitorrinco: Exploring Telepresence and Remote Sensing', *Leonardo*, 24, no. 2 (1991), p. 233; E. Kac, 'Towards Telepresence Art', *Interface*, 4, no. 2 (Nov. 1992), pp. 2-4; E. Kac, 'Telepresence Art', in *Teleskulptur 3*, eds. R. Kriesche and P. Hoffman (Austria: Kulturdata and Division of Cultural Affairs of the City of Graz, 1993), pp. 48-72; E. Kac, 'Ornitorrinco and Rara Avis: Networked Telepresence Art' (with a technical appendix by Ed Bennett), *Leonardo*, 29, no. 5 (1996), pp. 389-400.

13 *Rara Avis* has been shown four times: at the Out of Bounds exhibition at both the Nexus Contemporary Art Center, Atlanta, USA, 28 June-24 August 1996, and

the Huntington Art Gallery, Austin, TX, January 17-March 2, 1997; at the Centro Cultural de Belem, Lisbon, Portugal, 11 April-8 May 1997; and I Bienal de Artes Visuais do Mercosul exhibition at Casa de Cultura Quintana, Porto Alegre, Brazil, 2 October-30 November 1997.

14 Mbone and CUSeeMe are standard teleconferencing interfaces on the WWW.

15 Many contemporary artists have used telepresence as the basis for electronic artwork. An incomplete list includes Susan Collins, John Canny, Judith Donath, Ken Feingold, Scott Fisher, Greg Garvey, Emily Hartzell, Perry Hobermann, Eduardo Kac, Rafael Lozano-Hemmer, Steve Mann, Michael Naimark, Mark Pauline, Eric Paulos, Michael Rodemer, Julia Scher, Nina Sobell, Stelarc, Gerfried Stoker, Richard Wallace, and Steve Wilson.

16 This is my own phrase, meaning 'trick the body', and is intended to be analogous with the French term 'trompe l'oeil'.

17 V. Goldberg, 'Review of Jeff Wall Photography', *New York Times*, 16 March 1997.

18 See K. Goldberg and J. Malpas, *The Robot in the Garden: Telerobotics and Telepistemology on the WWW* (Cambridge, Mass: MIT Press, forthcoming) for more on the concept of 'telepistemology'.