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Illustration 1:
 Film still from a demonstration of
 Ivan Sutherland's Sketchpad (1963).

On the Spot The Double Immersion of Virtual Reality

Martin Warnke

Since its invention, virtual reality has promised strictly localized and simultaneously boundless mobility: it gives the user the impression of being in a whole new world while remaining in the same place and time. This paradox strips distant and simulated locations of their sense of danger and their exclusiveness, while eliminating the user's need to actually travel to reach them. You can practice flying a fighter jet or driving a tank without putting passengers and equipment at risk; you can engage in combat without actually risking your life; you can relax in a tropical paradise without having to fly to get there; you can fly through buildings without running the risk of falling – and all this while staying put. The cybernauts chase their phantasms from within a cube with an edge length of one meter, as if they were figures in a painting by Francis Bacon. Virtual reality is the only technologically possible method of immersing into computer worlds that remains thoroughly paradoxical. How this is possible and where this leads are the focus of this essay.

1. Immersion as Illusion The Technology of Virtual Reality

Virtual reality, a highly sophisticated, technological, and extremely complex informatic illusion-producing machine, has, since its invention by Ivan Sutherland in 1968, been beset by a significant paradox. The striking contradiction between the freedom of movement it promises and the physical 'dispositif' of its users seems to be at its phantasmic core. While cybernauts effortlessly travel through an endless virtual world, they are in a kind of iron maiden that encloses them on the spot. Immobile freedom, or local boundlessness – this seems to be the paradox of virtual reality as a technology of immersion and is the subject of this article.

We will see that the materiality of virtual reality, as described by Ivan Sutherland in the mid-1960s, was the cause of this phantasmic charge. Newer technologies that, in principle, have the same function, though in entirely other forms, appear completely different, or at least do not give rise to comparable paradoxes. Classical virtual reality is thereby historicized as a maximally invasive technology of immersion.

Ivan Sutherland, the founder of virtual and augmented reality, became famous as an engineer of graphic machines. In 1963, he introduced Sketchpad to the public, a man-machine graphical communication system that was to become the precursor to all interactive computer graphics and computer-aided design programs (see 1963). With a light pen, one could draw figures on the screen that would then be manipulated, as needed, by geometric operations in industrial design processes. This device created the basis for all subsequent computer-graphic systems and ultimately for virtual reality as well (see *Illustration 1*).

Two years later, Sutherland described what could be called an engineer's vision, namely a display that could depict not only thin line graphics but anything you wanted: "A display connected to a digital computer gives us a chance to gain familiarity with concepts not realizable in the physical world. It is a looking glass into a mathematical wonderland" (1965: 506). We have to bear in mind that at this time punch cards were still high-tech, as can be seen in the film *Caprice* (dir. Frank Tashlin, USA 1967) starring Doris Day (see *Illustration 2*). Multi-medial, multi-colored, and fast-moving scenes were still far beyond anything that could be displayed by computer graphics. Thus, the wonderland that Sutherland envisioned was more abstract in mathematical-physical terms, a sphere that was normally invisible or unknown in nature like negative mass. But Sutherland, as an engineer, also rigorously embraced fantasies of an improved technology that would equate simulation and reality in a way that the French philosopher Jean Baudrillard evoked a decade later (see 1981). Sutherland's first virtual room definitely bears traits of a fantasy of omnipotence:

The ultimate display would, of course, be a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With appropriate programming such a display could literally be the Wonderland into which Alice walked. (Ibid.: 508)

Here, virtual reality is the wonderland of wishful fantasy. What Sutherland fails to consider, however, is who exactly would want to sit handcuffed to this chair in a room where a shooting will take place.

His ideas become more explicit in 1968, the year Sutherland published a paper describing an actual technological invention: the head-mounted display as the core display technology of virtual reality (see 1968). This device allowed for an immersion in the terms of informa-

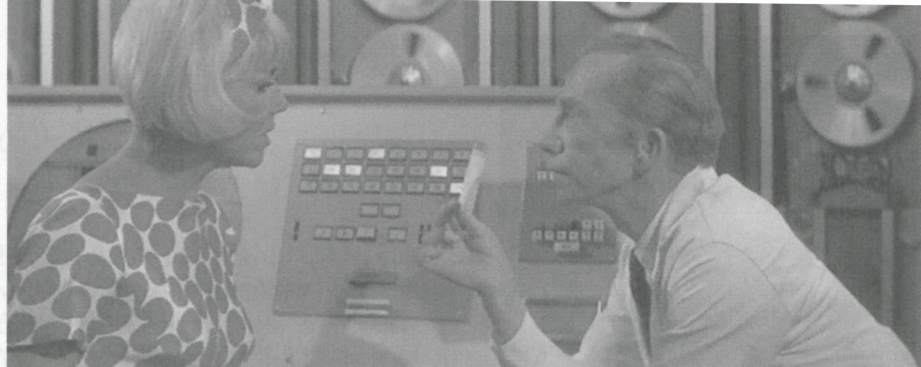


Illustration 2:
Film still from *Caprice* (dir. Frank Tashlin, USA 1967).

tion theory because it was capable of displaying spaces and actions in 3-D and in real time as if the participant were really there. It required a complex system of sensorics, computing, and display and can be considered a masterpiece of technological artistry (see *Illustration 3*). The cybernaut, whose eyes were not bound but rather equipped with two mini televisions, could turn, lift, and lower his head. An apparatus then measured his movement, while both eyes were offered a section of a virtual scene rendered by the computer, which corresponded exactly to the movement of the head. Whenever the user, for example, turned his head to the left, a part of the field of vision on the right would disappear, while on the left, a new section of the scene would slide into view. The apparatus was constructed on the basis of psychological research, which suggested that spatial-visual impressions are related to the perceiver's movement in space. Heinz von Foerster expresses this idea in the words of Humberto Maturana when he says: 'We see with our legs' ("Wir sehen mit den Beinen"; 1995: 242). NASA further developed the technology in the 1980s by adding stereoscopic graphics and stereo sound and by giving it a boost toward photo-realism.

This is the prehistory of virtual reality as a technology of immersion into imaginary computer-generated spaces.

2. The Paralyzed Cybernaut

Without any real-life experience of spatial vision, of the feedback loop between movement and perception, it would be impossible to acquire 3-D vision while navigating through a virtual environment. This is the case because the cybernaut is more or less tied to the pole of the technological device and his movements are restricted to an area of roughly one cubic meter, as any further movement would exceed the capacities of the sensorics that continually determine his precise

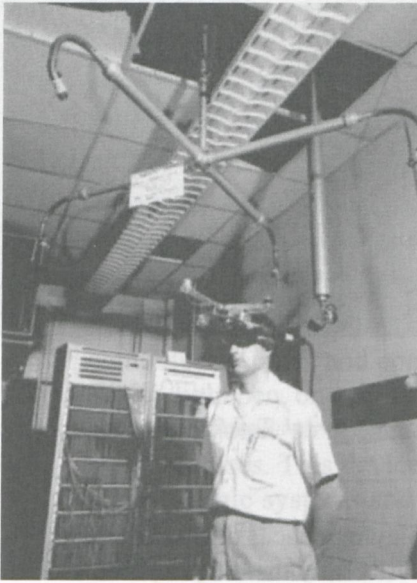


Illustration 3:
Illustration from Ivan Sutherland,
“A Head-Mounted Three
Dimensional Display” (1968).

location in space. Curiously, all fictional versions of virtual reality assume spatial immobility during visits to virtual worlds as if they were all subject to the same technological restrictions of engineering design. Without exception, all of the cybernauts portrayed by Stanisław Lem and Oswald Wiener, by the Wachowskis and James Cameron, have some kind of walking disability.

In 1964, at the same time as Ivan Sutherland, Stanisław Lem developed the idea of virtual reality, which in his *Summa Technologiae* he calls ‘phantomology’. He envisions a technological setting in which the nerve impulses of a person – for example, a man sitting on his veranda and smelling a rose – are recorded first. (That in itself would, in fact, lead to the death of the volunteer, as not only his nerves but also his brain would have to be tapped in order to record all of the impulses.) The recorded nerve impulses would then have to be inserted back into the nervous system of someone lying in lukewarm water in an isolation tank, thus constituting the actual ‘phantomology’:

And thus when our man is resting in the dark, while a series of impulses are traveling along all of his nerves into his brain – impulses that are exactly the same as those that traveled along his nerves when he was sitting on a veranda with a rose in his hand – he will subjectively find himself in that situation again. He will see the sky, a rose in his hand, a garden in the background behind the veranda, grass, children playing, and so on. (Lem 1964/2013: 198)

So far, this sounds idyllic, but then he continues:

A somewhat similar experiment has already been conducted on a dog. First, the impulses traveling along the dog’s motor nerves while it was running were recorded, after which the dog’s spinal cord was cut. Its hind legs thus became paralyzed. When the electric recording was inserted into the nerves of the paralyzed limbs, the hind part of the dog that has been paralyzed “came back to life,” performing the same movements that are performed by a normal dog while running. (Ibid.)

Furthermore, at roughly the same time as Lem and Sutherland, Oswald Wiener – a member of Viennese Actionism who participated in the *Uni-Ferkelei* action, an obscene performance at the University of Vienna, and was a comrade-in-arms of the not-at-all-squeamish artists Otto Mühl and Hermann Nitsch – described, in his 1969 novel *Die Verbesserung von Mitteleuropa* ('The Improvement of Central Europe'), a virtual reality that considered the body of the cybernaut somewhat dispensable, and bloodily did away with it piece by piece. Wiener does not leave it at paralyzing the legs but, fictionally, proceeds to amputate body parts of the travelers in virtual worlds, whom he calls 'bio-modules' ("bio-module"; 1969/1985: CLXXXI):

[...] while, for example, the leg of a bio-module is being amputated, he is perhaps enjoying a refreshing walk through a scenic Hungarian landscape. The adapter simulates the complex interplay of the efferent nerves with kinesthetic and proprioceptive fibers, and a look at his leg tells the bio-module, at most, that the pleasure he is taking in physical activity is doing more and more good for the muscles in his extremities.¹

Here, the double immersion of virtual reality becomes apparent. Not only does the cybernaut invade artificial worlds, the virtual-reality machine, at the same time, invades the cybernaut's body.

In *The Matrix* (dir. Andy and Lana Wachowski, USA/Australia 1999), the passage into virtual reality, similar to Sutherland's engineering vision, is staged like an execution (see *Illustration 4*): the props of the 'last walk' range from the nervous prisoner's shaved head and prison clothing to the reassuring gestures of the executioner, who even closes the condemned's eyelids before pushing the spike into his neck. *The Matrix* is a collection of nearly every cinematic stereotype about virtual reality that portrays it as being only accessible to those rendered absolutely immobile – those bound on the spot.

In the virtual-reality epic *Avatar* (dir. James Cameron, USA/UK 2009), the paradox of the freedom of the incarcerated is portrayed in a similarly striking manner. The opening sequence shows, quite sin-

1 "[...] während z. B. gerade ein Bein des Bio-Moduls amputiert wird, genießt derselbe vielleicht einen erfrischenden Fußmarsch durch reizvolle ungarische Landschaften. Der Adapter simuliert das komplexe Wechselspiel der efferenten Nerven mit kinästhetischen und propriozeptiven Fasern und ein Blick auf seine Beine belehrt den Bio-Modul höchstens über die Tatsache, dass seine Bewegungsfreude dem Muskelspiel seiner Extremitäten immer besser bekomme." (Wiener 1969/1985: CLXXXI) Unless otherwise indicated, all translations are mine.



isterly, the hero on a six-year-long trip in a kind of 'space morgue' (see *Illustration 5*) and the burial of his twin brother in a cardboard box. The hero himself is already disabled, a paraplegic like Stanisław Lem's laboratory dog. Before his legs can 'come back to life', however, he must enter what looks like an iron maiden. His passage into virtual reality is staged as his being buried alive. There follows the apotheosis: in the body of his avatar, the resurrected Jake can once again feel his legs; he childishly and recklessly indulges in his artificial dream of running, just like Oswald Wiener's bio-module.

3. The Structure of the Immersion Machine

Virtual reality is an established fictional topos, triggered and manifested by a technology that, through data helmets, tracking systems, and other equipment, encloses and immobilizes cybernauts' bodies in order to illusorily invade unlimited virtual worlds. The main motive is a wish machine that confines, straps, impales, and mutilates the test subject, accompanied by the fantasies of the narrator. Fictional virtual reality is a wish fulfiller, much like a dream, dependent on a more or less sado-masochistic author.

The submission to a dominant machine frames this wish fulfillment and creates a phantasmic setting, which, depending on the psychological disposition of the operator or narrator, can range from an authoritarian-technocratic to a mildly violent or even a manifestly sado-masochistic fantasy. Oswald Wiener's fantasies of the 'bio-adapter' and David Cronenberg's fantasies of the 'Videodrome'² (*Videodrome*,

2 I kindly thank Lisa Gotto for drawing this to my attention.

Illustration 4:
 Film still from *The Matrix* (dir. Andy and
 Lana Wachowski, USA/Australia 1999).

Canada 1983) are the sadistic consequences of the virtual reality described by Ivan Sutherland, whose vision in “The Ultimate Display”, as we recall, is reminiscent of a mafia-style execution scene, including a chair, handcuffs, and bullets.

In retrospect, technological developments point out the fact that the violent streak in virtual reality arises from a clearly visible relationship between body and machine: a fetish. By contrast, today’s technologies – playing on the most microscopic computers that are completely in our power and already part of our bodies: smartphones – no longer require a painful or pleasurable act of submission. An example of this is the iPhone pet, a pet that lives in the augmented reality of the smartphone. In his film *World on a Wire* (*Welt am Draht*, West Germany 1973), Rainer Werner Fassbinder already envisions a virtual world in which an apparatus of physical submission is no longer required: here, the world is ‘on a wire’ and not under the ‘coffin lid’ of virtual reality. The film thus relegates virtual reality as a topos to history, claiming that it belongs to the mainframe computer of the 1940s and 1950s, and not to today’s networked world (see Warnke 2011). This is what makes *World on a Wire* avant-garde and *The Matrix* and *Avatar* kitsch: the latter make use of a concept of immersion that dates back to the 1960s and relies on an outdated ‘dispositif’ of localization.

Since then, however, the virtual has become inseparably interwoven with the real; it has become ubiquitous. It has also become much more confusing, because one no longer has to enter into an ‘iron maiden’ in order to be part of a computed world. As is shown in *World on a Wire*, there is no longer a staged passage into an artificial fantasy world. Our orientation is lost, because we don’t know whether we ourselves are observing or are being observed, whether we are in the so-called real or in the so-called virtual world: the apparatus disappears in the palms of our hands, in our clothing, in our bodies, in the air. An interface that, in an emergency, could be rejected no longer exists. Even the wire that Fassbinder’s world is still attached to and that, in ex-

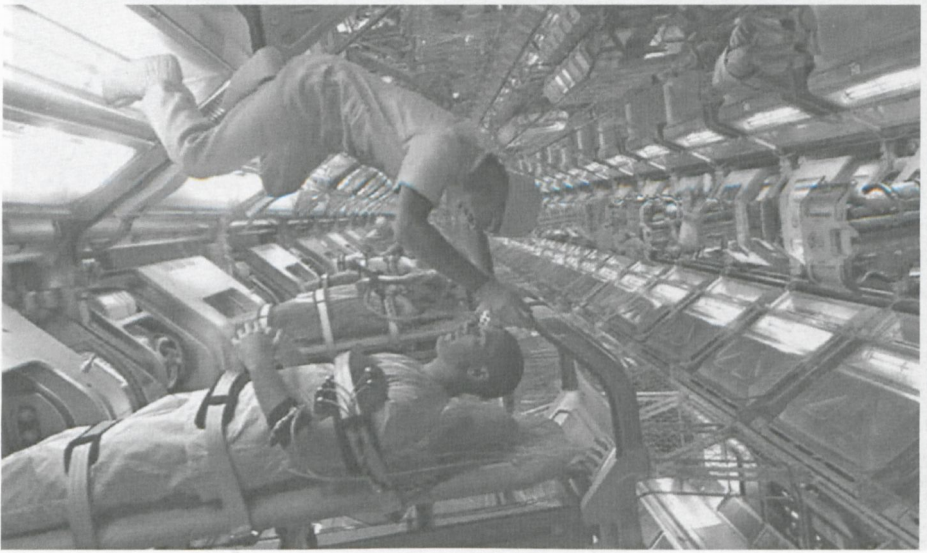


Illustration 5:
Film still from *Avatar* (dir. James Cameron, USA/UK 2009).

treme cases, could be cut off no longer exists. With it, the spot where the singularity of a defined passage could still be localized has disappeared as well. This dreadful spot, a terrifying place, can no longer be banished, severed, or avoided by a dream with a happy ending.

The existence of such a spot or place has itself become a desire and a fantasy, a set piece in an irrecoverable techno-romanticism, as shown in *The Matrix* and *Avatar*. In reality, its time has passed once and for all.

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At the same time, computer simulations of massed ghost towns are utilized in the battle practice of making contact with the enemy in the same way immersive 3-D visualizations overlaid with role-playing are employed in the therapeutic treatment of those traumatized by military service. The constitutive factors of these kinds of “military disorders” are the focus of Harun Farocki’s film *Immersion* (Germany 2009, as part of the series *Sehenswürdiges*). He makes the unsuspecting viewer a witness to a simulated experiment in which a visibly shaken test subject reconstructs a life-threatening conflict, which is simultaneously played as an animated film before his eyes. The photo series *per seculi IIII* (2007) by Beate Geisler and Oliver Vogt also refers to the constitutive efficacy of virtual combat scenes by capturing the ubiquitous analog military model terrain as dystopian parallel worlds on the edges of our civilized living environments. Both artistic approaches indicate the fact that immersive combat simulations are not limited to restricted military areas or to the preparation for possible peace-keeping missions. Rather, their scope further contributes to the implicit totalization of a culture of hostility. To the degree that they tend to reduce encounters with the foreign to a stereotypical, ideologically primed, they potentially naturalize the concept of a world order that appears to be only defensible by war.

J. Preliminary Thoughts

A missionary of the Middle Ages went forth to sea. As one of the images in search of the terrestrial paradise, he reached the horizon where the earth and the heavens met, and that he discovered a certain point where they were not joined together, and where, by stooping, he passed under the roof of the heavens. (Elihu Carrion 1873: 1914)

An imaginary dip into virtual reality, whether in the cinema, at a computer screen, in an art installation, at a concert, or while reading a novel, is usually grasped as a transition into an *imaginal* world, one mobilized by an *imaginal* apparatus, a function removed from empirical reality. In the *imaginal* world, the *imaginal* apparatus is a *function* of *reception* of a