Vegas, Disney, and the Metaverse

On the Material Anticipation of Virtual Worlds and Virtual Play in the Second Half of the 20th Century

GUNDOLF S. FREYERMUTH

For Edgar Pankow

In his technophilosophical investigation *Reality+: Virtual Worlds and the Problems of Philosophy,* David J. Chalmers discusses the historical skepticism about the human capacity to recognize material reality. Already in the centuries before our era, Chinese, Indian, and Greek thinkers independently raised whether humans could distinguish between what was real and what was an illusion. Chalmers outlines Zuanghzi's dream about being a butterfly, Narada's dream in which he lived an entire life as a woman, and Plato's allegory of the cave whose imprisoned inhabitants mistake distorted and selective reflections for reality. He interprets these doubts as examples of philosophical domains: "Knowledge: *How can Zhuangzi know whether or not he's dreaming?* Reality: *Is Narada's transformation real or illusory?* Value: *Can one lead a good life in Plato's cave?*"[1] Classical philosophy's concerns about the perceptibility of material reality continued into the modern era, culminating in René Descartes's *Meditations on First Philosophy*.[2] With them, Chalmers writes, Descartes "set the agenda for centuries of Western

1 Chalmers, David John: *Reality+: Virtual Worlds and the Problems of Philosophy*, New York: W. W. Norton & Company 2022, loc. 362.

2 Descartes, René: *Meditations on First philosophy: In Which the Existence of God and Immortality of the Soul are Demonstrated*, Arlington, VA: Richer Resources Publications 2012 (*1641).

philosophy to come. Descartes posed what I'll call the problem of the external world: How do you know anything at all about the reality outside you?"[3]

This questioning of the realness of the external reality, which seemed to consist primarily of material entities for millennia, received a new twist in the mid-20th century: Technical digitization and cultural digitalization promoted dematerialization—the progressive replacement of analog hardware and material processes by digital software. Since the 1950s, functional mathematization turned more and more materials, tools, and apparatuses of the material world into programs. For example, in media production, software replaced paper and typewriter; canvas, brush, and paint; celluloid, film processing laboratory, and cutting room. The material basis of this process of virtualization was the digital computer as a universal machine. Eventually, its hardware components and finally, the computer itself became subject to emulation as well: virtual RAM, virtual drives, virtual server, virtual machines. However, since the 1970s, a countertrend toward the rematerialization of digitized data and media works has also set in, including the implementation of desktop publishing, rewritable CD-ROMs and DVDs, and 3D printing.

In this paper, I examine how the course and consequences of both virtualization and dialectical or compensatory efforts of (re)materialization affect our understanding of what is real—or seems at least realistic. The focus is on the field of audiovisual storytelling, in particular the implications for the defining industrial medium film and the emergence of new audiovisions such as digital games and virtual reality.

Crucial for an understanding of the development of digital audiovisuality—or more generally: of the circumstances under which new media and their specific mechanics emerge—is perhaps an observation that Walter Benjamin made when looking back at the prehistory of cinema: Long before the new medium became technically possible, artistic experiments in other media, from painting to literature to innovative experimental apparatuses, attempted to create effects aesthetically that would later be inherent in film qua medium.[4] This investigation traces a similar phenomenon: During the second half of the 20th century, a multitude of efforts can be observed to anticipate in other—old and new—media the effects of augmented and virtual reality, virtual worldbuilding, and virtual play that would become possible in the transmedium of software only decades later.

3 Chalmers: *Reality+*, loc. 147.

4 Benjamin, Walter: "Paris, the Capital of the Nineteenth Century," in: *The Arcades Project*, Cambridge, Mass.: Belknap Press 1999, pp. 3-13.—See the detailed discussion of Benjamin's theory of anticipation below pp. 20-29.

In the 1950s, when this development set in, all existing media were analog. Nota bene, aesthetic anticipations of the emerging digital transmedium's effects and future genres had to happen materially. Beyond the apparent parallels, this is also the reason for the drastic differences between the evolution of film and that of digital genres, especially games. The leap from the analog audiovisual medium of theater to the analog audiovisual medium of cinema took place in material reality: It consisted of the transition from live performances to the recording and subsequent editing of (audio-) visual play through industrial technology. In contrast, the leap from the industrial media of film and television to digital audiovisual media is characterized by the transition from material generation—in constructed settings and using human actors—to virtual and procedural generation in the transmedium of software. The shift from analog to digital audiovisuality thus seems more fundamental than the earlier one from mechanical audiovisuality (theater) to industrial audiovisuality (film) because this recent change presents the crucial issue of the relationship between material and virtual realities, their opposition as well as their intertwining.

I will proceed in nine steps. First, I will try to substantiate the hypothesis of aesthetic anticipation by discussing the theoretical foundations of the concept of future places in general and Las Vegas as a future place in particular (*I Understanding Anticipation: Non-Synchronism & Future Places*). In the second step, I position Las Vegas in the context and at the intersection of two media-historical changes that commenced in the late 1940s and early 1950s: the advent of immersive fantasy spaces, i.e., theme parks, and the conception of the digital transmedium, i.e., software. (*II Framing Las Vegas: Disney & Digital*).

In the following six chapters, I investigate the immersive and participatory experiences provided by Las Vegas's entertainment architecture. For each phase of the city's history, I will draw parallels to developments of and in the digital transmedium: graphics, simulation, games, AR, VR, the World Wide Web, and the Metaverse. The emphasis will be on the interplay between aesthetic desires and experiments on the one hand and evolving technologies and media on the other (*III Anticipating Augmented Realities: 1950s; IV Anticipating the Ultimate Display: 1960s; V Anticipating Virtual Worlds: 1990s; VI Anticipating Virtual Design:1990s; VII Anticipating Virtual Agency: 1990s; VIII Anticipating Virtual Play: 1990s.*)

I conclude by demonstrating how, at the turn of the 21st century, Las Vegas engaged in a virtualization of reality that foreshadowed the evolved modes of merging materiality and virtuality in our contemporary digital culture. (*IX Re-Framing Las Vegas: Anticipating the Metaverse*).

I UNDERSTANDING ANTICIPATION: NON-SYNCHRONISM & FUTURE PLACES

There are many Paris. Some exist in reality, some only in media—from the Paris that Rick and Ilsa will always have[5] to the Paris that Travis Henderson never found in Texas.[6] Since 1999, one such Paris can be visited in Nevada.[7] The *Paris Las Vegas Hotel & Casino* is, naturally, not a one-to-one copy of the French capital. Built for almost $800 million on the Strip, across from the faux Italian town of the *Bellagio Hotel & Casino* and down the street from the *New York-New York Hotel & Casino*, the architectural complex of the *Paris Las Vegas Hotel & Casino* offers an eclectic and condensed montage of landmark features: from the Arc de Triomphe, which is massive, but still a third smaller than the original, to the obligatory street bistros, from the Eiffel Tower, which stands 165 meters tall, but is only half the size of the original, to the Louvre-like façade to the extras in the lobby playing Parisians with baguettes and Basque berets. The arcade-like—and not all that gaudy—indoor-outdoor environments of the themed resort assemble essential components of the historical Paris that Walter Benjamin described in his *Arcades Project* and which at the same time Siegfried Kracauer conjured up in his underestimated *Jacques Offenbach and the Paris of His Time*.[8]

On the one hand, it is somewhat ironic that Las Vegas, as the future place of the late 20th century, integrated an immersive replica of Paris, a future place of the 19th century. On the other hand, the entanglement of a long-ago future with elements of a future that at the end of the 20th century seemed to be imminent suggests that we can learn a few things about Las Vegas if we take a closer look at the concept of anticipation and future places.

The basic idea that the not-yet-experienced can be anticipated goes back to the enlightenment. In the *Critique of Pure Reason*, Immanuel Kant wrote: "We are really in possession of synthetic a priori cognition, as is established by the principles of understanding, which anticipate experience."[9] Based on the principles of

5 CASABLANCA (USA 1942, D: Michael Curtiz)

6 PARIS, TEXAS (West Germany / France 1984, D: Wim Wenders)

7 Shoro, Mike: "Paris Las Vegas Turns 20," *Las Vegas Review Journal*, August 31, 2019, https://www.reviewjournal.com/business/casinos-gaming/paris-las-vegas-turns-20-photos-1838639/

8 Kracauer, Siegfried: *Jacques Offenbach and the Paris of His Time*, New York, Cambridge, Mass.: Zone Books, Distributed by MIT Press 2002.

9 Kant, Immanuel: *Critique of Pure Reason*, Cambridge; New York: Cambridge University Press 1998 (*1781), p. 655.

reason and the mind's fundamental ability to recognize patterns, we are able to give shape to the universe even before we can observe it. In the 19th century, Georg Wilhelm Friedrich Hegel continued the effort to realize future entities and events. In the lectures on aesthetics, he uses the germ-tree example to explain the relationship between concept and reality:

"In the germ [...] all determinations are contained, which the tree will show. [...] The germ is the concept, the tree the reality. [...] In the germ is contained all [...] as potential what will appear in the tree in practice."[10]

Thus, Hegel formulated the idealistic claim that concepts conceived by the mind are prior to reality. Both Kant's and Hegel's notions continued to have an impact in the 20th century.

In the early 1930s, when Las Vegas was a remote desert town of barely five thousand inhabitants, the philosopher Ernst Bloch, one of the four million residents of the German capital Berlin, developed the idea of the simultaneity of the non-simultaneous. "Not all people exist in the same Now," he stated, outlining his concept of "Ungleichzeitigkeit."[11] Hard to translate, the term denotes temporal incommensurability, a non-synchronism or non-simultaneity among individuals, groups, and places. Its effect is to create a state of non-contemporaneity within and between societies and cultures. To illustrate his concept of people living at the same time and yet in different times, Bloch could have chosen the contrast of the backward rural town of Las Vegas and the advanced industrial metropolis Berlin: the not only geographical but also temporal distance between the two places.

From a similar perspective, Bloch's Berlin contemporary and soon fellow emigrant Walter Benjamin investigated such a temporal gap between an earlier avant-gardist city and the traditional ways of life surrounding it. In his *Arcades Project*, he set out to describe how far ahead of the rest of France and the world Paris had been once. For the motto of his investigation, Benjamin adopted an insight of 19th-century historian Jules Michelet: "Each epoch dreams the one to follow."[12] Looking for such dreamy anticipations, he found that mainly three artistic achievements accompanied, augmented, and expedited the transformation of Paris from a regular city of its time to a future place:

10 Hegel, Georg Wilhelm Friedrich: *Vorlesungen über die Ästhetik I, Die Idee und das Ideal. Hg. G. Lasson*, Leipzig: F. Meiner 1931, p. 157 (my translation).

11 Bloch, Ernst: "Nonsynchronism and the Obligation to Its Dialectics," *New German Critique* 11 (1977): pp. 22-38, here p. 22.

12 W. Benjamin: "Paris, the Capital of the Nineteenth Century," p. 4.

- First, the creation of innovative architecture and urban design, i.e., the demolition and modernization of old Paris into a (proto-) industrial metropolis, on whose wide boulevards the increasing traffic and the (proto-) industrial masses could flow.[13]
- Second, radical experiments in the existing media and arts, particularly literature, theater, and painting, performed by a steady succession of artistic avant-gardes.[14]
- Third, the rise and enthusiastic appropriation of entirely new media and forms of art and entertainment like operettas, comedic and erotic stage shows, gambling and sexual services but also technology, fashion, and consumerism, and, most importantly, daguerreotype and photography, followed by their mechanical upgrades: stereoscopy, chronophotography, and finally silent film.[15]

As a result, Benjamin came to define Paris as the "capital of the 19th century."[16] The revolutionary urban design, flourishing art scene, and booming entertainment industry had a central vanishing point that was only to be reached in the 20th century: the sound film as the defining medium of industrial modernity. While working on his *Arcades Project*, Benjamin described this process in his seminal study on "The Work of Art in the Age of Mechanical Reproduction," which made him one of the founders of media studies.[17] The observation that artists—or rather their aesthetic works in traditional media—foreshadowed future media raised a crucial question: What kind of 'clairvoyance' allowed innovative art practices to point to aesthetic affordances of a medium that does not yet exist?

To answer this question, Benjamin proposed the theorem of anticipation. He observed that such 'dreamy clairvoyance' usually manifests itself in three areas: in technological and artistic experiments and changes in reception habits.

13 See in particular "Fourier, or the Arcades" and "Haussman, or the Barricades," in: Ibid., pp. 11-13.

14 See in particular "Daguerre, or the Panoramas," "Grandville, or the World Exhibitions," and "Baudelaire, or the Streets of Paris," in: Ibid., pp. 5-6, pp. 7-8, pp. 10-11.

15 Ibid.

16 Ibid.

17 Benjamin, Walter: "The Work of Art in the Age of Mechanical Reproduction," in: *Illuminations. Essays and Reflections. Edited and With an Introduction by Hannah Arendt. Preface by Leon Wieseltier*, New York: Schocken Books 2007, pp. 217-252.

- "Technology works toward a certain form of art. Before the advent of the film there were photo booklets with pictures which flitted by the onlooker upon pressure of the thumb […]."[18]
- "Secondly, the traditional art forms in certain phases of their development strenuously work toward effects which later are effortlessly attained by the new ones. Before the rise of the movie the Dadaists' performances tried to create an audience reaction which Chaplin later evoked in a more natural way."[19]
- "Thirdly, unspectacular social changes often promote a change in receptivity which will benefit the new art form. Before the movie had begun to create its public, pictures that were no longer immobile captivated an assembled audience in the so-called Kaiserpanorama."[20]

To better understand the mechanisms of these observed dreams of the future and provide a materialistic basis for his theorem of anticipation, Benjamin borrowed some of the tools from *The Interpretation of Dreams*[21] and some of the basic assumptions of dialectical materialism. They led him to determine two origins and driving forces of Paris's advancement to a future place.

First, early on, the French capital offered a fusion of the traditional pre-industrial everyday life in a city of the mid-19th century with avant-gardist elements of (proto-)industrial work and consumption, particularly new technologies of transport and media of communication. The ensuing shock-like experiences of accelerated change impressed and altered the perceptual apparatus of the urban masses of Paris as well as hundreds of thousands of visitors from all over the world. Among them was a disproportionate number of intellectuals and artists who took it upon themselves to embrace, describe, analyze and shape the new way of life. In his analysis of their reactions, reflections, and works, Benjamin followed the pattern that Freud had established for dreams and daydreams. Through the mental processing of their experiences in the advanced Paris present—the day's residue of the dream—these artists gained the patterns and raw materials to anticipate, for example, technical aspects and effects of future media artistically. As a result, they managed to satisfy, with their reflections and aesthetic experiments, the novel

18 Ibid., p. 249 (Endnote 17).

19 Ibid., pp. 249-50 (Endnote 17).

20 Ibid., p. 250 (Endnote 17).

21 Freud, Sigmund: *The Interpretation of Dreams*, London: G. Allen & Company, Ltd. 1913.

entertainment desires arising from Paris's unique experiences and thus reinforced the city's path to the future.

With his Freudian analysis, Benjamin provided a materialistic basis for the intellectual and artistic ability to anticipate: individual perceptions of contemporary life that are sometimes more, sometimes less consciously processed. In the same direction of a materialistic grounding also goes the determination of the second driving force: material potentials—affordances—in existing technologies and media. In his artwork essay, Benjamin wrote, "Just as the illustrated newspaper virtually lay hidden within lithography, so the sound film was latent in photography."[22] In comparison to Hegel's idealistic germ-tree-example—potential and realization—the sentence represents an apparent turn from biology to technology and media: from a hidden organic possibility to a material existence of elements of the future in the present.

In the following decades, similar notions of non-synchronism shaped the nascent discipline of futurology: the idea that the future which awaits the rest of humanity can already be observed in certain particularly advanced places and subcultures. Consequently, Robert Jungk titled his groundbreaking study on the future of humankind *Tomorrow Is Already Here.*[23] In the second half of the 20th century, it was not least futurological research that led to an increasing acceptance of the initially odd view that contemporaries and even locals can live in different times and often do so. "The future is already here—it's just not very evenly distributed," William Gibson quipped in 1999.[24] By then, Las Vegas, with a population of 470 000 and almost 36 million tourists per year,[25] had become a looking glass onto the future, particularly of architecture and popular entertainment like musicals,

22 Benjamin, Walter: *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*, Cambridge, Mass.: Belknap Press of Harvard University Press 2008, p. 21.—The translation in *Illuminations* is less clear: "Just as lithography virtually implied the illustrated newspaper, so did photography foreshadow the sound film." W. Benjamin: "The Work of Art," p. 219.

23 Jungk, Robert: *Tomorrow is Already Here: Scenes from a Man-Made World*, London: R. Hart-Davis 1954.—The title of the German edition *Die Zukunft hat schon begonnen* translates: "The future has already begun."

24 Gibson, William: "Talk of the Nation: The Science in Science Fiction," *National Public Radio* (Interview), November 30, 1999, Citation 11:50 min., http://www.npr.org/templates/story/story.php?storyId=1067220

25 N.N.: "Number of Visitors to Las Vegas in the United States from 2000 to 2019," 2020, https://www.statista.com/statistics/221042/visitors-to-las-vegas/

comedic and erotic stage shows, and, of course, gambling and sexual services but also technology and consumerism in general.

To learn from Las Vegas, I will adopt Benjamin's model of the effects of technological and social change on the human perceptual apparatus and the resulting development of new media to our digital present. In addition, I will supplement and augment this approach with Neal Stephenson's more recent concept of "hieroglyphic" anticipation. Writing about Science Fiction, Stephenson claims that this genre—in novels, movies, games, or other media—can do more than encourage innovation. Science Fiction can supply enchanted blueprints, "hieroglyphs of the future": "a plausible, fully thought-out picture of an alternate reality in which some sort of compelling innovation has taken place."[26] I will apply Stephenson's perspective on Science Fiction to other forms of artistic expression, namely the architecture and attractions of Las Vegas.

In modern history, there are, undoubtedly, numerous examples of cities that rose to prominence because they were, as they say, a little ahead of their time: from Venice and Florence in the Renaissance to Manchester, London, and Paris in the 19th century to Vienna during the Fin de Siècle to Berlin in the 1920s. These places developed and implemented nascent technologies first, accompanied by a concentration of capital and the rise of new classes. Together with innovative forms of work and everyday life, unique aesthetic needs emerged. They, in turn, resulted in new modes of aesthetic representation and perception. I propose understanding parts of the American West as such a future place in the second half of the 20th century.[27]

The rise of California and its neighboring states to such a—scattered-networked, i.e., post-urban—'suburb of the 20th century' already began at the time of the second industrial revolution, in the early 1920s, when the mild climate attracted two of the technologically and aesthetically most modern sectors, the aircraft and film industries. During the Second World War, the influx of high-tech companies and research institutes intensified. The region fully transformed into a laboratory of the future, whose basic inventions and products dominated globally

26 Stephenson, Neal: "Innovation Starvation," *Wired*, October 27, 2011, https://www.wired.com/2011/10/stephenson-innovation-starvation/

27 The parallels between the Paris of the early industrial era and the American West of the early digital era were first described by me in 1996. See Freyermuth, Gundolf S.: *Cyberland: Eine Führung durch den High-Tech-Underground*, Berlin: Rowohlt 1996, pp. 22 ff.

in the wake of the semiconductor and microprocessor revolution.[28] Between the late 1940s and the end of the century, in the American West, new technologies and types of urbanity, modern lifestyles, and media developed that, with some delay, took over the rest of the world. The PC, its operating systems and programs, the design of the chips, input and output devices such as the computer mouse and laser writer, and the hardware and software underlying global networking were mainly West Coast innovations. At the turn of the century, California high-tech companies dominated the world market for IT products relatively unchallenged.[29] The region's economic power was correspondingly high. Based on its gross national product, California alone would have ranked amongst the nation-states fifth in 2000, just behind Great Britain and ahead of France.[30]

The economic importance of digital technology was matched by its regional use, i.e., by the development of new digital forms of work and life. In the quarter-century from the dawn of the PC to the turn of the century, Americans, on average, implemented and used digital means of production and communication more intensively than the rest of humanity. As late as the mid-1990s, 40 percent of all PCs and the majority of digital networks were located in the United States.[31] Statistically, computer use and networking were nowhere as high as on the West Coast.[32]

---

28 In the 1950s, Silicon Valley was only the second American high-tech region after the area along Route 128. Both centers had formed around top universities: Stanford in the west, MIT in the east. Cf. Campbell-Kelly, Martin and William Aspray: *Computer: A History of the Information Machine*, New York: Basic Books 1996, p. 123.

29 Among the thousands of tech and game companies founded in the last third of the century in and around Silicon Valley were Intel (1968 in Santa Clara), Atari (1972 in Sunnyvale), Apple (1976/77 in Cupertino), Oracle (1977 in Santa Clara), 3Com (1979 in Santa Clara), Activision (1979 in Sunnyvale), Sierra Online (1979 in Simi Valley), Adobe (1982 in Los Altos), Electronic Arts (1982 in San Mateo), Compaq (1982 in Palo Alto), Sun (1982 in Stanford), Silicon Graphics (1982 in Santa Clara), Cisco (1984 in Stanford), Blizzard (1991 in Irvine), Crystal Dynamics (1992 in Redwood City), Yahoo (1994 in Sunnyvale), eBay (1995 in San Jose), PayPal (1998 in Palo Alto), Google (1998 in Menlo Park).

30 Robinson-Jacobs, Karen: "Take That, France—We're No. 5; Economy: If It Were a Separate Country, California Would Be Right Behind the U.K," *Los Angeles Times*, June 14, 2001.

31 Vgl. Leyden, Peter: "On the Edge of the Digital Age," *Star Tribune*, June 4, 1995.

32 Relevant research throughout the 1990s tended to show that the West, and the Bay Area in particular, led the way in the use of digital work and communications tools. Cf. Gilmour, Kim: "Network Neighbourhoods," *Internet Magazine*, July 1, 2001;

In this essay, I will limit myself to one vertex of the geographical triangle formed by Los Angeles in the South, San Francisco in the North, and Las Vegas in the East. Within this innovative economic zone, Las Vegas, the so-called "sin city," took on the function that red-light districts had served in the industrial metropolises of the 19th century: To the classes that rose with the latest technology, the city offered, as Paris did once, relief by satisfying traditional entertainment needs—from gambling to prostitution—as well as novel desires resulting from the social and cultural experiences of post-industrialization and digitalization.

My claim of Las Vegas as a future place is, of course, not original. The unique role of this city has been noted many times in various ways and by multiple authors, most famously in the late 1960s by Robert Venturi, Denise Scott Brown, and Steven Izenour in their seminal study *Learning from Las Vegas*.[33] Venturi was also among the first to notice the cutting-edge role of the city after its demolition and reconstruction in the 1990s.[34] Another was Ada Louise Huxtable. In 1997, the long-time architecture critic of *The New York Times* described Las Vegas as "an urban design frontier where extraordinary things are happening."[35] Three years later, I reported after an extended visit:

"Las Vegas is no longer a city in the modern sense. Like nowhere else, attempts are being made here to produce in analog form what virtual reality technologies promise, but the current state of technology cannot yet deliver in satisfactory quality: the experience of distant spaces or imaginary worlds, as well as myths and fictions that can be entered and allow participation. In this respect, all Las Vegas is a Fata Morgana, an aesthetic illusion, a utopian model that heralds both more advanced virtualities and augmented post-realities of the digital era."[36]

Shim, Richard: "West Coast Cities Tops in Wireless," *CNET News.com*, March 3, 2003.

33 Venturi, Robert, Denise Scott Brown, and Steven Izenour: *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*, Cambridge Mass.: MIT Press 1977.

34 Venturi, Robert: "Las Vegas After Its Classical Age," in: *Iconography and Electronics Upon a Generic Architecture: A View From the Drafting Room*, ed. Robert Venturi, Cambridge, Mass.: MIT Press 1996, pp. 123-128.

35 Huxtable, Ada Louise: "Living With the Fake, and Liking It," *The New York Times*, March 30, 1997, https://www.nytimes.com/1997/03/30/arts/living-with-the-fake-and-liking-it.html

36 Freyermuth, Gundolf S.: "Vegas, Virtuelle Stadt," *Telepolis*, March 9, 2000, https://www.heise.de/tp/features/Vegas-virtuelle-Stadt-3441695.html?seite=all (my translation).

Later in the same year, Eckhardt Schmidt completed a documentary film entitled LAS VEGAS—THE FIRST CITY OF THE 21ST CENTURY. An online summary states: "Las Vegas, the city of players and fantasists, mutated into a city of realized virtual realities."[37] In 2007, Laura Bieger analyzed the "aesthetics of immersion" of Las Vegas, noting that the city is a "pioneer of paradigmatic cultural developments,"[38] namely the "strategic cross-fading of world and image, inviting us to a physical immersion in the reality they have generated."[39]

To understand the cultural function of Las Vegas's unique urbanity, Bieger also refers to a concept that Michel Foucault developed in the late 1960s. In his exploration of spaces opposing the ordinary environments of social life, Foucault identified, on the one hand, utopian visions: "Utopias are sites with no real place."[40] And on the other hand, places that actually exist, but to a certain extent outside everyday reality. Foucault called such places "heterotopias" and defined them as "counter-sites," "a kind of effectively enacted utopia."[41] Within the multiplicity of heterotopic spaces, he distinguished "two extreme poles": spaces of illusion—such as theater and cinema, museum and library—and spaces of compensation. "[T]heir role is to create a space that is other, another real space, as perfect, as meticulous, as well arranged as ours is messy, ill constructed, and jumbled."[42] Laura Bieger suggests that Las Vegas should be regarded as such a heterotopia as it contains "hybrid forms between utopian (i.e., unreal) and real space."[43]

Thus, the essential question of my investigation of Las Vegas as a future place is: What exactly are the mechanisms of its dream-like historical anticipations (Benjamin), its creation of future-inspiring hieroglyphs (Stephenson), and its realization of playful immersive heterotopic spaces (Foucault)?

---

37 LAS VEGAS—DIE ERSTE STADT DES 21. JAHRHUNDERTS (Germany 2000, D: Eckhardt Schmidt); summary: N.N.: "Las Vegas—die erste Stadt des 21. Jahrhunderts," *Moviepilot*, no date, https://www.moviepilot.de/movies/las-vegas-die-erste-stadt-des-21-jahrhunderts (my translation).

38 Bieger, Laura: *Ästhetik der Immersion. Raum-Erleben zwischen Welt und Bild. Las Vegas, Washington und die White City*, Bielefeld: transcript 2007, p. 10 (my translation).

39 Ibid., p. 19 (my translation).

40 Foucault, Michel: "Of Other Spaces: Utopias and Heterotopias," *foucault.info*, 1967, translated from Architecture, Mouvement, Continuité no. 5 (1984): pp. 46-49, https://foucault.info/documents/heterotopia/foucault.heteroTopia.en/

41 Ibid.

42 Ibid.

43 L. Bieger: *Ästhetik der Immersion*, p. 12 (my translation).

The focus is on media anticipations. In all future places of the modern era, the adoption of new media played an essential role. In the Renaissance, the formative new media were perspective painting and the picture-frame stage. In the industrial 19th century, the formative new media were the daily newspaper, photography, stereoscopy, and operetta. In the second half of the 20th century, the aesthetics of Las Vegas and its entertainment evolved under the influence of the industrial media of (Hollywood) film, television, and theme parks, as well as in temporal parallel to the emerging digital transmedium and networked transmedia storytelling, namely in games, augmented reality (AR), and virtual reality (VR).

My central assumption is that since the 1950s, Las Vegas's entertainment sought to offer locally and in material reality—in the form of hardware—what only later digital technology could provide globally and virtually—in the form of software.

II FRAMING LAS VEGAS: DISNEY & DIGITAL

The desire to experience worlds other than one's own everyday life, immersion in counter-worlds, by no means emerged only at the end of the industrial era. "Reality," says VR pioneer Brenda Laurel, "has always been too small for the human imagination."[44] The history of aesthetic immersion—in rite and religion, bourgeois education, art, politics, and ultimately entertainment—thus documents the state of civilization and, in particular, humanity's relationship to its tools of production, transportation, and communication.

Mind-expanding drugs offered the earliest escapes into alternative worlds. In a religious context, they created out-of-body experiences that, from today's perspective, evoke virtual reality experiences. The close connection between drug culture and high-tech culture, especially during the crucial decades of digitization in the American West, proves the persistence of the millennial fascination with psychedelic immersion. However, only the manifestation of counter-worldly experiences within a collectively perceivable reality could guarantee their sameness and repeatability. At the beginning of such staging were cave ceremonies:

"Youngsters were brought into the darkness of painted caves, where stories were told, images and songs were revealed in precise sequence, and the youths became immersed in their

44 Cited after McCarthy, Susan: "Techno-Soaps and Virtual Theater: Brenda Laurel Can Blow Anything Up," *Wired*, May/June, 1993, http://www.wired.com/wired/archive/1.02/brenda.html

coming-of-age ceremonies. Only by shutting out the rest of the world and immersing themselves in this separate space could the learning occur that changed a child into an adult."[45]

With the development of advanced civilizations, artisan-made environments replaced artistically designed caves: Temples and gardens, palaces and parks, wonders of the world, and cathedrals.

With the rise of craft culture, the visual and performing arts came into play in decorating and displaying these religious and secular spaces of experience beyond everyday life. Their works and actions guided by rules materialized the fleeting fantasies and dreams previously initiated only by drugs or rites. Sculptures, sports and votive plays, and finally, the theater as it emerged in Greece in the fifth century B.C.E., opened up a view of worlds beyond everyday life, indeed beyond life itself, that was both more reliable and intersubjective in its aesthetic quality. The operators of the Roman Colosseum provided the most spectacular—and until the industrialization of the arts never again achieved—playful staging. As always in the mechanical epoch, biological power provided what was later achieved in a more 'humane' way by utilizing machines. In the nearly 50-meter-high entertainment structure, wooden, slave-operated machinery of 20 moving platforms and 28 smaller elevators 'magically' lifted the fighters, beasts of prey, and scenery into the arena.

The early modern era then largely dispensed with animal and human sacrifice and introduced perspective illusionism into the (audio-) visual media. The mathematical-technical procedures of perspective theory reliably projected real 3D relationships onto a 2D canvas, simultaneously eliminating and simulating actual spatiality. The model of perspective paintings is still followed today by picture frame stages, cinema screens, and the monitors of television sets or computers. They all offer framed views of worlds outside the reality of our lives. The reception practice common to these modern audiovisual media can be subsumed under the concept of the window view.[46]

What lies beyond a window can neither be entered nor manipulated, however. This reduction in the experience of alternative visual and audiovisual realities to passive viewing, as it characterized the representative media of high and mass

45 Pimentel, Ken and Kevin Teixeira: *Virtual Reality: Through the New Looking Glass*, New York: Intel/McGraw-Hill 1993, p. 15.

46 On the significance of the window view in modern media history see Freyermuth, Gundolf S.: "From Analog to Digital Image Space: Towards a Historical Theory of Immersion," in: *Immersion in the Arts and Media*, ed. Burcu Dogramaci and Fabienne Liptay, Amsterdam: Rodopi 2015, 165-203.

culture for centuries, continuously awakened a desire for holistic representation and immersive use. Perspective boxes and chambers of wonder, panoramas, dioramas, and phantasmagorias experimented with deconstructing and overcoming the window view. The central high-cultural aspiration for more immersive experiences than the pre-industrial media could offer sought the "Gesamtkunstwerk," the total work of art. Its realization seemed conceivable to contemporaries only by bundling the existing media or arts. In this respect, almost all theorists of the Gesamtkunstwerk—from Wilhelm Heinse and Christoph Willibald Gluck to Herder, Novalis, and E.T.A. Hoffmann to Richard Wagner—propagated its realization as a heightening of opera's performance. Wagner finally theoretically conceived the longed-for "work of art of the future" around the middle of the 19th century.[47] After 1876, he brought it to the Bayreuth stage of illusion, which was driven by steam power and also otherwise characterized by industrial technology.

Wagner's operas, however, could not satisfy the utopian longings for more immersive media any more than film and television could in the 20th century. Parallel to their breakthrough as mass media, new media utopias as well as dystopian visions emerged that anticipated but feared such increased immersion. For example, in 1932, when the medium of sound film was only a few years old, Aldous Huxley described the evolution of movies into more immersive "feelies" in his dystopian *Brave New World*.[48] In 1940, Argentine writer Adolfo Bioy Casares, in the novel *The Invention of Morel*, designed a revolutionary imaging method that could populate the world with realistic three-dimensional copies of long-deceased people.[49] And in 1945, the French film critic Andre Bazin wrote about the path of cinema towards the 'Gesamtkunstwerk,' the "total cinema:" "a total and complete representation of reality […] the reconstruction of a perfect illusion of the outside world in sound, color, and relief […]."[50]

By this time, American movie magnate Walt Disney had long since decided to create a new medium that was more immersive than any existing offering. The initial trigger was Disney's threefold dissatisfaction with industrial modernity. First, he did not accept the medial limitations of sound film, especially its commitment to two-dimensional photorealism. Just as around the middle of the 19th

47 Wagner, Richard: *Das Kunstwerk der Zukunft*, Leipzig: O. Wigand 1850.

48 Huxley, Aldous: *Brave New World*, Garden City, N.Y.: Doubleday, Doran & Company, Inc. 1932.

49 Bioy Casares, Adolfo: *The Invention of Morel*, New York: New York Review Books 2003 (*1940).

50 Bazin, André: "The Myth of Total Cinema," in: *What Is Cinema?*, Berkeley: University of California Press 1967-1971 (*1946), pp. 23-27.

century, Richard Wagner sought to overcome what he perceived as the medial weaknesses of opera by creating total works of art, so one hundred years later, Disney wanted to transcend the medial affordances of sound film in favor of a multisensory cinematic experience. With his fundamental decision in favor of animation, Disney had already opposed the limitations of industrial reproduction technology. In its artistic content and technical process, animated film art overruled industrial automatisms by recourse to manual manipulations. In this way, Disney's studio laboriously evaded the constraint of having to stage the real thing in real-time before the camera's eye. "The painstaking art of animation was, after all, the art of perfecting the world."[51] With the animated film, Disney had gained a freedom of design that only much later digital image generation was to grant in the photorealistic reproduction of live-action. But even the most fantastic animated films, like everything else captured on celluloid, remained medially flat. Animated movies could not fulfill Disney's aesthetic ideal because he was aspiring to three-dimensional lifelikeness: "a cartoon that immerses the audience."[52]

Second, as both a father and an entertainment entrepreneur, Disney was dissatisfied with what industrial amusement parks offered. In his eyes, they prevented a satisfying experience both by the primitive aesthetic form of their individual attractions and the lack of an overall artistic conception. Therefore, Disney divided his park into distinct areas—*Adventureland*, *Frontierland*, *Fantasyland*, *Tomorrowland*, and *Main Street USA*—that were self-contained and coherent in design, i.e., had a unifying 'theme.'[53] As aesthetic models served him a variety of historical entertainment forms, including the parks of early modern Europe and the industrial genre of world's fairs.[54]

---

51 Marling, Karal Ann: "Imagineering the Disney Theme Parks," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, ed. Karal Ann Marling, Montréal, Paris: New York: Flammarion 1997, pp. 29-176, here p. 33.

52 Thomas, Bob: *Walt Disney: An American Original*, New York, N.Y.: Hyperion 1994, p. 11. Cited after Pine, B. Joseph and James H. Gilmore: *The Experience Economy: Work is Theatre & Every Business a Stage*, Boston: Harvard Business School Press 1999, p. 47.

53 Ibid.

54 See Harris, Neil: "Expository Expositions. Preparing for the Theme Parks," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, ed. Karal Ann Marling, Montréal, Paris, New York: Flammarion 1997, pp. 19-27; Tuan, Yi-Fu with Steven D. Hoelscher: "Disneyland: Its Place in World Culture," Ibid., pp. 191-198. Also Gottdiener, Mark: *The Theming of America: Dreams, Visions, and Commercial Spaces*, Boulder Colo.: Westview Press 1997, p. 38.

Third, in the sprawling car suburbs of Southern California, Disney missed the qualities of traditional urban environments. His goal was to supplement the unloved but irreversible suburbanization with more human environments that were both quantitatively better manageable and qualitatively better designed. The means to this end seemed to be entertainment architecture because fantasy spaces, such as those offered for millennia by wonders of the world, magnificent castles, or spectacular houses of faith, were materialized structures of desire. They stabilized experiences and stimulated behaviors by building them up, so to speak. As Mark Gottdiener writes of Disney's parks, the architecture itself became "a form of entertainment. Each structure provides its own fantasy. The park itself is architecture that entertains."[55]

Disney's first theme park, Disneyland, which opened in a Los Angeles suburb, thus initiated the development of a new medium comparable in both its historical function and cultural impact to the mechanical stage and industrial cinema. Within a few decades, it was to become the "most popular attraction on the earth."[56] By the end of the century, theme parks were attracting some 550 million visitors per year worldwide, including some 226 million in the United States alone.[57] US theme park revenues were $9 billion per year around 2000, higher than the roughly $7.7 billion earned at the US box office.[58]

Structurally, the theme park concept resulted from years of research into overcoming these shortcomings of modernism—of film, entertainment parks, and urbanism. Disneyland killed all three birds with one stone. As the world's first theme park, it made the 2D fantasy worlds of feature films and TV shows accessible and experienceable. "What he [Disney] was doing in his theme parks was producing his cartoon images in three dimensions."[59] Theme parks replaced watching with walking and screens with spaces turning the passively-seated audience of cinema and TV into active 'guests' who no longer looked at 2D fictions but instead entered into 3D environments and experienced cinematic narrations in a multisensory way.

---

55 M. Gottdiener: *The Theming of America*, p. 114.

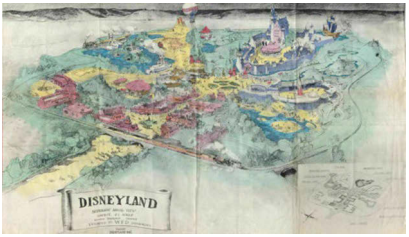
56 Ibid., p. 108.

57 Tagliabue, John: "Giving Theme Parks a Whirl; Europeans Warm to an American-Style Entertainment," *The New York Times*, September 2, 2000.

58 For U.S. theme park revenues, cf. White, LaTrina: "Theme Parks With History Entice Eclectic Fun Seekers," *CNN.com*, July 14, 2003, http://www.cnn.com/2003/TRAVEL/07/01/sprj.st03.theme.parks/.—For box office figures, cf. e.g. http://www.boxofficemojo.com/yearly/

59 Blume, Mary: "Disney Conquers Another World: Design," *International Herald Tribune*, September 27, 1997.

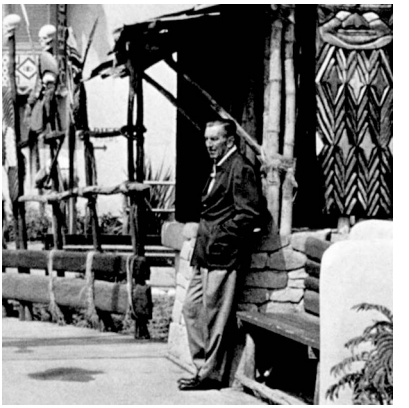
Top left: Promotional Prospectus of Disneyland, 1953; Top Right: Opening Day at Disneyland, July 17, 1955; Middle: Promotional Aerial Shot of Disneyland, 1961;Bottom Left and Right: Disneyland Attractions in the 1950s



Sources: Promotional Disney Material and Private Photographs by Unknown Visitors

Further, Disneyland revolutionized the entertainment park genre. Its attractions no longer positioned the audience in front of theatrical or historical stages—as, for example, the Prater's grotto ride still did—to entertain them with a leisurely series of static 'pictures' or tableaus. Instead, Disneyland immersed its guests in a rapid succession of thematically stylized scenes, arranged in a cinematic manner and animated by human actors or animatronic puppets. Finally, Disneyland provided walkable 'streets' and 'lands' as architectural antidotes to the non-urban and car-centric environments of the American West. "Disneyland was created to fill a vacuum […] that was uniquely regional […] a deep need […] for a human-scale, pedestrian experience of immersion in a three-dimensional narrative."[60]

Left: Walt Disney and Animator and Collaborator John Hench with the Map of Disneyland, Mid-1950s; right: Walt Disney at the Gate to Adventureland, Late 1950s



Source: Promotional Disney Photographs

For all three purposes, Walt Disney and his collaborators used the means they knew, the analog simulation processes developed in Hollywood and the California aerospace industry: in particular, methods and tricks of set design, inter alia, forced perspective, the combination of partial scale change and spatial compression, or the so-called wienie, a purposefully set visual cue that directed reception,

60 Pearce, Celia: "Narrative Environments: From Disneyland to World of Warcraft," in: *Space Time Play: Computer Games, Architecture and Urbanism—The Next Level*, ed. Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, Basel: Birkhäuser 2007, pp. 200-205, here p. 201.

as well as motion platforms, electronic control and automation of visual and acoustic effects.[61] To that extent, the theme park was a child of cinema, though a rebellious one that broke media boundaries with its turn to three-dimensionality. The second parent, however, was television with its principle of programming. "Television […] provided the physical structure for the park. The show was organized around a menu of themes, each one corresponding to a part of the park, or to a sprawling roster of 'lands' […]."[62] In sum, Karal Ann Marling describes the transformation of screenplays and movies, and TV shows into a park as a fusion of fiction and architecture—urban environmental storytelling. "At Disneyland, Walt translated that verbal and pictorial narrative into a material, spatial dimension. He made a city, or a series of cities, that told a story."[63]

In the history of media, the invention of the theme park stands at the intersection of two trajectories. On the one hand, the new medium responded to the same dissatisfaction with the state of industrial reproduction technology that led Bazin to call for the "total cinema" and simultaneously instigated a variety of elaborate technical experiments in the 1950s—from innovative wide-screen formats to 3D films to Mort Heilig's *Sensorama*. Walt Disney's longing for immersive experiences is, therefore, part of cinema's artistic crisis that led to the postindustrialization of the media landscape: to the "new triumvirate of television, wide-screen cinema, and Disneyland."[64]

On the other hand, the new medium also points to the near future, the advent and popularization of an entirely new mediality. By allowing their 'guests' to navigate cinematic narratives interactively, theme park attractions simulated experiences that could not be achieved otherwise, or only at some risk or considerable cost. The medium materially contrived with mechanical-electronic means 'safe' immersive experiences of 'dangerous' events that a few decades later, digital media and, in particular, digital simulations and digital games were to provide virtually. The new medium of theme park entertainment thus occupied an intermediate position between analog audiovisuality (theater, cinema, television) and digital audiovisuality (digital film, digital games, augmented and virtual reality).

---

61 Cf. e.g. the summary in M. Blume: "Disney Conquers Another World: Design."

62 K. Marling: "Imagineering the Disney Theme Parks," p. 73.

63 Ibid., here p. 85.

64 Huhtamo, Erkki: "Encapsulated Bodies in Motion: Simulators and the Quest for Total Immersion," in: *Critical Issues in Electronic Media*, ed. Simon Penny, Albany: State University of New York Press 1995, pp. 159-186, p. 162.—Tellingly, Disneyland presented the first 360-degree projection system *Circle-Vision 360°* in 1955.

The latter's development started in the same period, the years at the end and after World War II, and in parallel to the development of the theme park genre as well as the rise of Las Vegas to an entertainment metropolis.[65] Alan Turing had already conceived the purely theoretical model of a universal computing machine in 1936.[66] Yet it was not until 1945 that John von Neumann, who had co-supervised Turing's dissertation, succeeded in its technological-practical application by developing the model of a stored-program computer, the so-called Von Neumann Architecture.[67] Its main innovation was separating the material machine and its mathematical control. This step created the dualism of what today is hard- and software, more precisely: the software that we call programs.[68]

Three years later, Claude Elwood Shannon proposed a method for digitizing communicative processes and cultural artifacts.[69] The adequate transfer of analog qualities and functions into mathematical values supplied the mathematical universal machine with its universal bit material: texts, sounds, images, etc.—the software we call files. In addition, the digital computer, which initially used cathode-ray tubes to perform its switching, also found a radically new hardware basis in 1948: The invention of the transistor by Bill Shockley et al. enabled a steady process of performance enhancement, miniaturization, and cost reduction. It transformed digital machines from large-scale industrial technology for collective and professional use (mainframes, minicomputers, microcomputers, etc.) into rela-

65 See below Chapter III.

66 Turing, Alan: "On Computable Numbers, with an Application to the Entscheidungsproblem," *Proceedings of the London Mathematical Society* ser. 2. vol. 42 (1936-7), pp. 230-265; corrections, Ibid, vol 43 (1937) pp. 544-546, http://www.abelard.org/turpap2/tp2-ie.asp

67 Neumann, John von: "First Draft of a Report on the EDVAC," (1945), https://web.mit.edu/STS.035/www/PDFs/edvac.pdf

68 The term software itself, however, was not coined until 13 years later. Cf. Leonhardt, David: "John Tukey, 85, Statistician; Coined the Word 'Software,'" *The New York Times*, July 28, 2000, http://www.nytimes.com/2000/07/28/us/john-tukey-85-statistician-coined-the-word-software.html

69 Shannon, Claude Elwood: "A Mathematical Theory of Communication." Reprinted with corrections from *The Bell System Technical Journal*, Vol. 27, pp. 379-423, 623-656, July, October (1948), http://people.math.harvard.edu/~ctm/home/text/others/shannon/entropy/entropy.pdf

tively affordable private devices, which could also be used playfully for entertainment purposes (PCs, consoles, handhelds, smartphones, smartwatches).[70]

What categorically distinguishes the digital computer from all analog machines is its universality—the fact that the same (hardware) apparatus, through different (software) controls, can process in multiple ways anything that can be digitized: numbers, texts, sounds, still and moving images, and so on. Analog machines, by contrast, were and are always special machines, limited to specific tasks. With these three innovations, the technological foundations of digital culture were laid at the end of the 1940s—even if their technical realization was to take decades.

The period around 1950 also constitutes a key period because, beyond the technological basics, new ways of cultural networking and knowledge generation and transfer were imagined. Besides Shannon's mathematical theory of information, four publications, in particular, represent this beginning: Vannevar Bush's "As We May Think" (1945)[71]— the vision of a networked personal information device and, at the same time, the origin of software crosslinking and thus of the World Wide Web; Arthur C. Clarke's "Extraterrestrial Relays" (1945)[72]—the onset of global networking and hence the establishment of planetary real-time communication; Alan Turings' "Computing Machinery and Intelligence"[73] —the concept of Artificial Intelligence; James D. Watson's and F. H. C. Crick's "A Structure for Deoxyribose Nucleic Acid" (1953)[74]—the insight into the control of biological life by a decipherable code and thus the beginning of both gene manipulation and a digital image of homo sapiens, which understands our species as a programmed and thus reprogrammable life form.

In their entirety, these seven conceptions between 1945 and 1953 triggered a fundamental thrust of progress. At first, the potential of digitization was realized

70 On the dialectical relatedness of Shockley's and Shannon's work at Bell Laboratories, cf. e.g. Naughton, John: *A Brief History of the Future: The Origins of the Internet*, London: Weidenfeld & Nicolson 1999, p. 63.

71 Bush, Vannevar: "As We May Think," *The Atlantic Monthly*, July, 1945, http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm

72 Clarke, Arthur C.: "Extraterrestial Relays," *Wireless World* (October, 1945), pp. 305-308, http://www.lsi.usp.br/~rbianchi/clarke/ACC.ETRelays.html

73 Turing, Alan: "Computing Machinery and Intelligence," *Mind*, no. 59 (1950), pp. 433-460, http://www.loebner.net/Prizef/TuringArticle.html

74 Watson, James D. and F.H.C. Cricks: "A Structure for Deoxyribose Nucleic Acid," *Nature*, April 2, 1953, p. 737, http://biocrs.biomed.brown.edu/Books/Chapters/Ch%208/DH-Paper.html

technologically and economically primarily in the American West, in the region south of the Bay Area, which has been called "Silicon Valley" since the early 1970s precisely because of its rise in the wake of the silicon transistor to a global hub for technological innovation.

The first application of digital technology for entertainment purposes also happened in California, from George Lucas' unique special effects company Industrial Light and Magic in Marin County north of San Francisco to the countless start-ups of game companies in Silicon Valley—Atari, Activision, Blizzard, Electronic Arts, etc.—to the digitization of film production in the direct vicinity of Hollywood. The new genre of the theme park, which also emerged in California during this period of incipient digitalization and essentially anticipated virtual worlds, found its most forceful urban expression, however, just across the California border in Las Vegas, Nevada. Since the 1950s, the desert town rose to become the gambling and entertainment center of the American West—while also hosting the CES, the world's most influential consumer electronics trade show, where digital innovations have been presented annually for decades, from the first computer graphics to the first virtual reality apparatuses to the current attempts to realize the Metaverse.[75]

Las Vegas in the 1940s: The Construction of El Rancho Hotel and Casino Along the Las Vegas Strip

Source: Historic Aerial Photograph

75 The first Las Vegas CES was held in 1978. Cf. June, Laura and David Peirce: "Incredible Photos From The CES Vault: 1967 to 2014," *The Verge*, January 4, 2013, https://www.theverge.com/2013/1/4/3828848/ces-photo-history

El Rancho Hotel and Casino in the Late 1940s

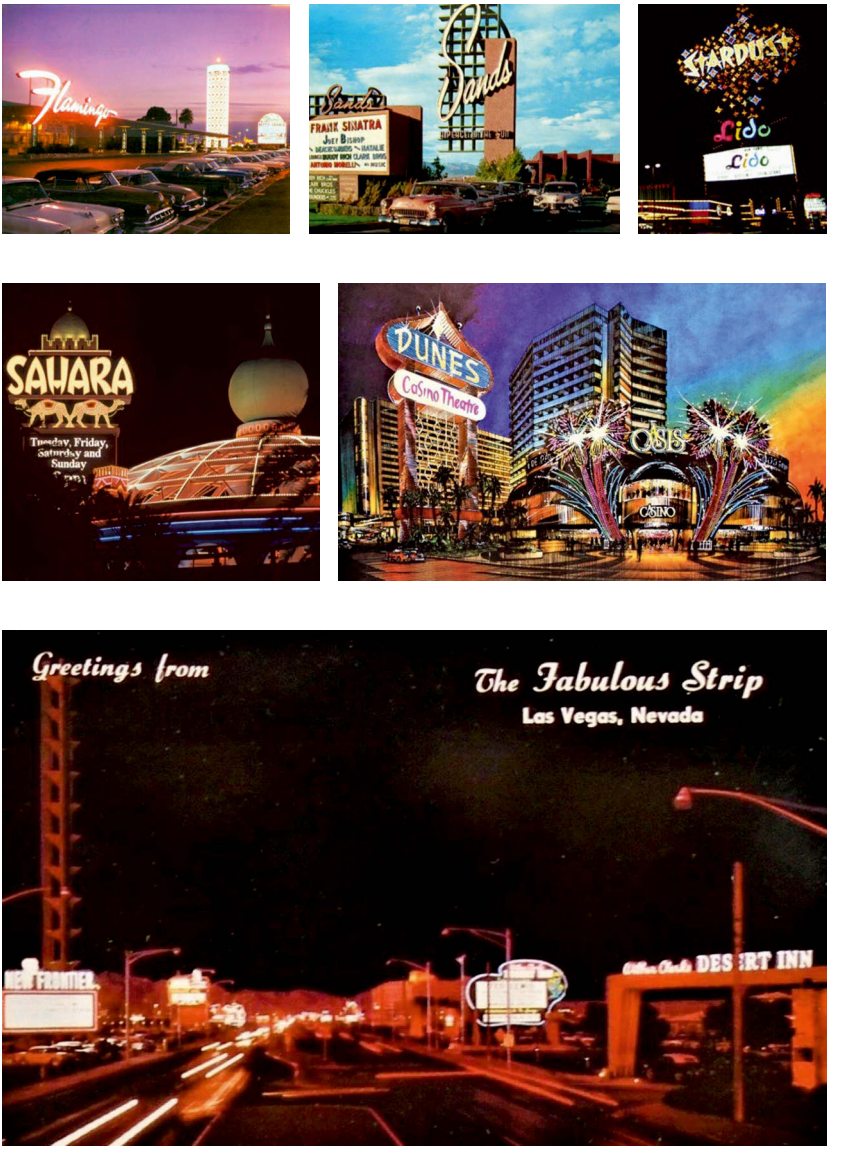
Source: Contemporary Promotional Postcard

III ANTICIPATING AUGMENTED REALITIES: 1950S

The transformation of Las Vegas from a small town of no particular importance to a future place visited and experienced every year by millions of people from all over the world happened in four stages. During the first decades of the 20th century, Las Vegas barely existed. In 1905, when a railway line made it possible to lure players into the desert oasis, a few fake 'Western' saloons, including casinos, were built. They drew their inspiration from the rustic tradition of the frontier, which by then was already obsolete. For over 40 years, little changed in these modest attempts to enhance the experience of gambling through a rudimentary fictionalization. Only with the end of World War II did the second phase begin. It brought the Mafia and modernity to Las Vegas.

As the first of the more 'cosmopolitan' casino hotels, the *Flamingo* opened in 1946 on the Las Vegas Strip, then a rural highway a little more than four miles long outside the actual city limits. Others followed, most famously, the *Sahara* (1952), *The Sands* (1952), *The Dunes* (1955), and the *Stardust* (1958). The bare concrete that characterized these modern buildings was, of course, contrary to the central business objective: a hallucination of the senses as well as the mind that made the visitors forget everyday life and immerse themselves in gambling. The modern architecture that was the rule in the industrial cities of the mid-20th-century, impoverished in themes and signs, had to be adapted to the specific purposes of Las Vegas. This was achieved through electronic embellishment.

Las Vegas in the 1950s and 1960s; Top Left: Flamingo Hotel and Casino; Top Middle: Sands Hotel and Casino; Top Right: Stardust Hotel and Casino; Middle Left: Sahara Hotel and Casino; Middle Right: Design Study of the Dunes Hotel and Casino; Bottom: The Las Vegas Strip in the 1960s



Sources: Contemporary Promotional Photographs and Postcards

Soon a characteristic of the booming town became the contrast between its 'normal' sight of unadorned buildings in the glaring desert sun and their lavish neon decoration. After sunset, it displayed gigantic bubbling waterfalls, swirling candy-colored hula hoop tires, bikini contours, and thousands of other flickering larger-than-life signs. In its day-night dualism, Las Vegas's neon or neo-modernism was reminiscent—quite in the sense of the inventors—of the landscapes of dreams charged with overdetermined meanings.[76]

The mixture of illusion and functionality of this hitherto unknown mix of modernist architecture and neon signage fascinated the contemporaries. The top-grossing musical film VIVA LAS VEGAS and particularly Elvis Presley's title song captured this excitement.[77] In the same year, *New Journalism* reporter Tom Wolfe eloquently captured neon modernism's sensory effect in his reportage "Las Vegas (What?) Las Vegas (Can't hear you! Too noisy) Las Vegas!!!."[78] One visitor named Raymond he portrayed as "a good example of the marvelous impact Las Vegas has on the senses":[79]

> "He had been rolling up and down the incredible electric-sign gauntlet of Las Vegas' Strip, U.S. Route 91, where the neon and the par lamps—bubbling, spiraling, rocketing, and exploding in sunbursts ten stories high out in the middle of the desert—celebrate one-story casinos.[80] […] Las Vegas has succeeded in wiring an entire city with this electronic stimulation, day and night, out in the middle of the desert."[81]

By creating a new style of architecture and urbanity, Las Vegas, in the early 1960s, had arrived for the first time at the frontier of the future. After researching the popular 'sin city' in 1968, the authors of the seminal architectural study *Learning*

76 Parallel to the development of neon modernism in Las Vegas, neon art emerged "as a significant phase in the development of what was to be electronic art." (Popper, Frank: *Art of the Electronic Age*, New York: Harry N. Abrams 1993, p. 17.)

77 VIVA LAS VEGAS VEGAS (USA 1964, D: George Sidney) was among the top grossing movies of the year, and the biggest success of all Elvis' films. (https://en.wikipedia.org/wiki/Viva_Las_Vegas). The single *Viva Las Vegas* sold 500.000 copies in the US alone (https://en.wikipedia.org/wiki/Viva_Las_Vegas_(song)#cite_note-2).

78 Wolfe, Tom: "Las Vegas (What?) Las Vegas (Can't hear you! Too noisy) Las Vegas!!!!," in: *The Kandy-Kolored Tangerine-Flake Streamline Baby*, New York: Noonday Press, 1966, pp. 3-28.

79 Ibid., p. 5.

80 Ibid.

81 Ibid., p. 7.

from Las Vegas described the constant bombardment with sensory stimuli to which the city exposed its residents and visitors as an "intricate maze" that "disorients the occupant in space and time" by making both appear virtually "limitless."[82] In Las Vegas's unique gestalt, they recognized an anti-modern semiotic system overlaying the structures of geography, "an architecture of communication over space,"[83] an "'architecture as communication for the Information Age (rather than as space for the Industrial Age).'"[84]

Styles in which epochal tendencies express themselves usually emerge as correspondence among economic forces, technical possibilities, and cultural interests. The local and regional trade structures shaped the order of medieval towns built around the market. Later, the metropolises of the 19th century resonated with the national and international industrial economy. Siegfried Giedion judged the skyscrapers that rose to the heavens on the US East Coast in the first half of the 20th century to be "as significant and expressive for our period as the monolithic obelisk of Egypt and the Gothic cathedral tower were for their periods."[85] Similarly, in the second half of the century, the sprawling suburban landscapes of the American West, obscured by advertising signs targeted at drivers, expressed in their car-centered architecture and sub-urbanity the emerging lifestyle(s) of a consumer civilization shaped by mass mobility and mass-brands.

In retrospect, the rapidly growing popularity of Las Vegas as a national and global entertainment destination in the quarter-century after World War II evidenced societal and cultural change. New technology has always led to a re-organization of established forms of work. With digitalization, labor lost its dependence on fixed hierarchical and temporal processes. Furthermore, the share of immaterial production in value creation grew. Its basis was knowledge work, i.e., the networked manipulation of software symbols. Iteration and distributed virtual collaboration replaced linear succession. But to be successful, knowledge work must be probing, investigational, and experimental.[86] As a consequence, playful behavior gained value. Postindustrialization and digital technology, thus, initiated a

82 R. Venturi/D. Scott Brown/S. Izenour: *Learning from Las Vegas*, p. 49.

83 Ibid., pp. 8 ff.

84 Cited after Manovich, Lev: "The Poetics of Augmented Space," *Visual Communication* 5, no. 2 (2006): pp. 219-240, here p. 232.

85 Giedion, Siegfried: *Space, Time and Architecture: The Growth of a New Tradition*, Cambridge: Harvard University Press 1949, p. 635.

86 See Chaplin, Heather: "Will The 21st Century Be Defined By Games?" *Kotaku*, September 12, 2013, http://www.kotaku.com.au/2013/09/will-the-21st-century-be-defined-by-games/

ludic turn. The rise of both the theme park genre and Las Vegas as the world capital first of gambling and then, in the 1990s, family entertainment owes much to this social shift.

In the history of architecture, the fascination with Las Vegas's neon modernism demonstrated a rising social need for more accessible and meaningful cityscapes. The neon signs flaring up on the concrete facades represented an epochal return of the ornament displaced by modernism and thus its postmodern deconstruction. The "era of capitalist industrialization [had] undercut the symbolic basis of the built environment," Mark Gottdiener wrote in his assessment of industrial urbanity: "Domination of design and planning by modernist principles eradicated developed thematic elements in cities through new construction that avoided symbols […]."[87] Consequently, "[…] capitalist downtowns were relatively devoid of meaning and were functionally structured by the needs of business."[88] Behind modern architecture, of course, were not only economic but also aesthetic intentions. Lev Manovich sums them up:

> "[M]odernist architecture […] communicated its […] narratives (the themes of progress, technology, efficiency, and rationality) through its new spaces constructed from simple geometric forms—and also through its bare, industrial looking surfaces. (Thus the absence of information from the surface, articulated in the famous 'ornament is crime' slogan by Adolf Loos, itself became a powerful communication technique of modern architecture)."[89]

The result, however, was poverty of information, meaning, and sense. Around the middle of the 20th century—compared to the present day—the opportunities to obtain information in urban environments were minimal. Analog street signs, house numbers, bell boards, directional signs, display boards, advertisement posters, etc., were static, therefore often outdated. And even if they were up-to-date, their generality did not necessarily convey the information needed individually at the moment. Additional information, however, could only be gathered in a time-consuming manner through printed listings and guides or verbal inquiries with shopkeepers, receptionists, cab drivers, passers-by, etc. In contrast, the profusion of signs conveying information and meaning in theme park sceneries and the casino hotels' neon modernism can be understood as an attempt to remedy the symbolic and informational paucity of modern architecture and industrial urbanism—as was possible with analog means and media. From today's perspective, Las

87 M. Gottdiener: *The Theming of America*, p. 15.

88 Ibid., p. 27.

89 L. Manovich: "The Poetics of Augmented Space," p. 233.

Vegas's neon ornaments anticipated the informational and playful augmentation that digital connectivity was to bring.

The idea of supplementing the perception of reality through sign systems was first advanced by *Wizard-of-Oz*-writer Lyman Frank Baum in his 1901 novel *The Master Key: An Electrical Fairy Tale.*[90] Baum imagined futuristic glasses called "character markers." They projected letters on the forehead of every person encountered: "e" for "evil," "w" for "wise," etc. Actual experiments with such augmentation through personalized real-time information started already in the 1950s. Several military projects laid the foundations for the Global Positioning System (GPS), which was then developed since the mid-1970s.[91]

In the 1980s, the concept of mobile—portable and wearable—digital technology was advanced in science as well as in the arts. Telematic installations and immersive environments sought to integrate data and real space and build perceptual bridges between the real and virtual worlds.[92] In 1990, Mazda introduced the first GPS system for consumers that could triangulate a car's position by communicating with satellites in space and augment real-world navigation with individualized directions.[93] The same year, Boeing engineer Thomas P. Caudell coined the term "augmented reality" for such enhancements to human perception, decisions, and actions with networked information in real-time.[94] In the last decade of the century, large-scale scientific projects explored how interactive virtual

90 Baum, L. Frank and Fanny Y. Cory: *The Master Key: An Electrical Fairy Tale, Founded Upon the Mysteries of Electricity and the Optimism of Its Devotees*, Indianapolis: Bowen-Merrill Co. 1901.

91 See Parkinson, Bradford W., Stephen T. Powers, and others: "The Origins of GPS, and the Pioneers Who Launched the System. Part 1," *GPS World*, May 1 2010, https://www.gpsworld.com/origins-gps-part-1/

92 See Freyermuth, Gundolf S.: "Computer machen Leute," *c't–magazin für computertechnik*, February 16, 1998, pp. 90-97; Negroponte, Nicholas (with Neil Gershenfield): "Wearable Computing," *Wired*, Dezember, 1995.

93 Steinquist, Paul: "The Future of Car Navigation Has Arrived," *The New York Times*, February 25, 2021, https://www.nytimes.com/2021/02/25/business/GPS-car-systems.html

94 Caudell, Thomas and David Mizell: "Augmented Reality: An Application of Heads-Up Display Technology to Manual Manufacturing Processes," *Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences* 2 (1992), pp. 659-669, https://www.researchgate.net/publication/3510119_Augmented_reality_An_application_of_heads-up_display_technology_to_manual_manufacturing_processes

sign systems could replace the existing analog ones.[95] The first hybrid synthetic vision system was presented by NASA in 1999.[96] In 2000, Bruce Thomas developed ARQuak, the first mobile augmented reality game, opening up urban space to playful interaction.[97]

In Las Vegas, this tendency to anticipate the emerging augmentation of the urban space reached its peak in 1995 with the opening of the *Fremont Street Experience*. It was designed by Californian architect Jon Jerde, a pioneer of entertainment architecture. As one critic wrote, Jerde wanted to tear down "the walls between celluloid and reality."[98] He sought to bring about the virtual superimposition of material reality with mediated information and narratives. At the cost of $70 million, he spanned Fremont Street, the historic center of gambling around the *Golden Nugget* casino hotel, with a massive canopy, half a kilometer long, 27 meters high, and lit by two million lights. Like the transistors of an LCD monitor, they served, together with the 540,000-watt sound system, to present digital audiovisions. The decisive factor for the success of the *Fremont Street Experience* was less the architecture itself than the program for which the canopy provided the projection surface. The evening shows, controlled by 121 computers, transformed the urban space into a gigantic display of virtual entertainment. Mark C. Taylor drew the connection between cityscape and data space:

"Long associated with the seedy side of old Vegas, 'Glitter Gulch' recently has been transformed into what is, in effect, a gigantic computer terminal or virtual-reality machine. Vegas city planners have converted the train terminal, that was inspired by the glass architecture of the Parisian arcades, into a computer terminal to create the new space

95 For example, the Endeavour Expedition (University of Berkeley, http://endeavour.cs.berkeley.edu) or the Oxygen-Project of the MIT Media Lab (http://oxygen.lcs.mit.edu)

96 N.N.: "Synthetic Vision Would Give Pilots Clear Skies All the Time," *NASA*, April 22 2008, https://www.nasa.gov/centers/langley/news/factsheets/SynthVision.html

97 Piekarski, Wayne and Bruce Thomas: "ARQuake: The Outdoor Augmented Reality Gaming System," *Communications of the ACM* 45, no. 1 (January 1, 2002), pp. 36-38, https://www.academia.edu/2218400/ARQuake_the_outdoor_augmented_reality_gaming_system

98 Iritani, Evelyn: "A Mall Master Takes On the World: Architect Jon Jerde Believes Cities Can Be Saved Through an Infusion of Fantasy and Fun That Blurs Cultural Boundaries. Not Everyone Likes the Idea," *Los Angeles Times*, July 5, 1996.

of the virtual arcade. […] To roam through Glitter Gulch is to discover the timely timelessness of terminal space."[99]

The fusion of architecture and urban planning with the info design of communication media anticipated a shift in the civilizational space-time structure. Las Vegas engaged in adapting urban space to digitalization. In his classic study *City of Bits*, which appeared the same year the Fremont Street Experience opened, William J. Mitchell described a similar transformation: "The worldwide computer network—the electronic agora—subverts, displaces and radically redefines our notions of gathering place, community, and urban life."[100] Subsequently, at the turn of the 21st century, Joel Kotkin observed the emergence of a new "digital geography":

"[T]he rise of the digital economy is repealing the economic and social geography of contemporary America. The digital revolution not only accelerates the speed with which information is processed and disseminated, it also restates the relation of space and time within our communities."[101]

The telos of change seemed to be the replacement of the industrial city by the information-rich real-time city, in which location- and time-dependent information can be called up by the individual as needed—an augmented urban experience that only became recognized as an imminent future with mobile broadband networking after the turn of the millennium.[102]

99 Taylor, Mark C.: *Hiding*, Chicago: University of Chicago Press 1997, p. 262.

100 Mitchell, William John: *City of Bits: Space, Place, and the Infobahn*, Cambridge Mass.: MIT Press 1995, p. 5.

101 Kotkin, Joel: *The New Geography: How The Digital Revolution Is Reshaping the American Landscape*, New York: Random House 2000, p. 3.—Kotkin, however, countered Mitchell's assertion that virtualization would render the question of location irrelevant: "In truth, the importance of geography is not dwindling to nothing in the digital era; in fact, quite the opposite. In reality, place—geography—matters now more than ever before. If people, companies, or industries can truly live anywhere, or at least choose from a multiplicity of places, the question of where to locate becomes increasingly contingent on the peculiar attributes of any given location." (Ibid., p. 6).

102 On the utopia and emergence of the real-time city, cf. e.g. Freyermuth, Gundolf S.: *Kommunikette 2.0*, Hannover: Heise 2002, pp. 125 ff. and Rheingold, Howard: *Smart Mobs: The Next Social Revolution*, Cambridge, Mass.: Perseus Pub. 2002.

Freemont Street in Downtown Las Vegas; Top: the Neon 1950s; Middle: First Iteration of Freemont Street Experience Mid-1990s; Bottom: 2020s

Source: Contemporary Promotional Postcards

In sum, Las Vegas's neon modernism shared with the following periods that it was an epochal style. It allowed for observing the decline and deconstruction of classical modernism as well as the superimposition of the material reality with informational virtuality ahead of time. Of course, apart from the on-and-off and up-and-down flickering of the neon lettering and garlands that suggested movement, the information and narratives presented were as static as pre-modern ornamental forms of architecture. Only "today's electronic dynamic interactive displays make it possible for these messages to change continuously," creating "a potential space of contestation and dialog, which functions as the material manifestation of the often invisible public sphere," as Lev Manovich writes.[103]

Even though Las Vegas transformed itself into a future place with neon modernism anticipating digital enhancement of urban experiences, this phase was almost completely erased from the Las Vegas Strip since the late 1980s. One after the other, the classic casino hotels were imploded as their neon adorned facades and signature parking lots had to make place for something radically new.[104]

IV ANTICIPATING THE ULTIMATE DISPLAY: 1960S

The origin of the subsequent two phases—the creation of immersive interior spaces and then immersive exterior spaces anticipating postmodern and digital architecture, as well as the virtualization of space in games and VR—dates back to the early 1960s. Under the influence of Hollywood, especially the epic historical drama CLEOPATRA,[105] real-estate developer Jay Sarno designed an entirely novel kind of casino hotel. When, after almost four years of construction, it opened in 1966, *Caesar's Palace* was the first casino to shift the usual gambling interactions into an immersive fictional space. In his history of special effects, Norman M. Klein describes the flashy interior decor featuring "'Rome swings,' and a Circus Maximus' showroom' [that] lined the 'exact' copies of Venus de Milo, Canova's Venus, many Venuses. Poolside was an 'Olympic'-sized replica of the baths of

103 L. Manovich, "The Poetics of Augmented Space," p. 232.

104 For example, *The Dunes* was demolished in 1993 and replaced with *The Bellagio*; *The Sands* was demolished in 1996 and replaced with *The Venetian*. See for descriptions and videos Kachelriess, Rob: "The 10 Best Implosions in Las Vegas History," *Thrillist*, February 25, 2014, https://www.thrillist.com/entertainment/las-vegas/the-10-best-implosions-in-las-vegas-history

105 CLEOPATRA (USA 1963, D: Joseph L. Mankiewicz)

Pompeii, where showgirls dressed like Cleopatra greeted guests […].”[106] The casino, writes Laura Bieger, “promised its visitors an imaginary journey to the ‘imperial Rome.’”[107]

Caesar’s Palace Developer Jay Sarno Riding a Flower Chariot with Entertainer Line Renaud on Opening Day August 6, 1966

Source: Contemporary Promotional Photograph

Besides the direct influence of Hollywood cinema, a second inspiration was apparent: the aesthetics of fairs, circuses, amusement parks like *Coney Island* in New York, the Viennese *Prater*, the *Tivoli* in Copenhagen, and, of course, Disneyland. When Jay Sarno planned *Caesar’s Palace*, he took the new kind of themed transmedial environments that Disney had created a few years earlier as a model. But for his special needs, Sarno had to adapt the exterior attractions and thrill rides of the gated theme park to the interior environments of his semi-public casino hotel. This appropriation can be understood as an internalization of theme park

106 Klein, Norman M.: *The Vatican to Vegas: A History of Special Effects*, New York: New Press 2004, p. 4. See also L. Bieger: *Ästhetik der Immersion*, p. 161.

107 L. Bieger: *Ästhetik der Immersion*, p. 124 (Footnote 64), my translation.

aesthetics. Most importantly, with the transfer from outside to inside, Sarno retained Disney's artistic intentions of heightened immersion. While Disneyland replaced cinema screens with built spaces and movie audiences that watched immobilized in their seats with walking theme park guests, *Caesar's Palace* replaced the standard Las Vegas attraction of neon signs, which could only be seen as long as one had not yet entered the casino, with themed interior environments that completely immersed visitors, i.e., gamblers, in a fictional recreation of antiquity.

Circus Circus, Early 1970s

Source: Contemporary Promotional Postcard

Two years after *Caesar's Palace*, Sarno opened a second casino hotel with sumptuous stage settings, the *Circus Circus*. In adapting circensic aesthetics to the casino's interior world, Sarno went two steps further than with *Caesar's Palace*. First, he integrated gambling and movement play—in the terminology coined by Roger Caillois in the late 1950s: alea and ilinx.[108] In his semi-factual account *Fear and Loathing in Las Vegas*, self-declared Gonzo journalist Hunter S. Thompson portrayed, with some disgust, *Circus Circus's* surreal blend of the thrill of gambling with sensations of vertigo:

108 Caillois, Roger: *Man, Play and Games*, Urbana: University of Illinois Press 2001 (*1958), pp. 12 ff.

"[…] so you're down on the main floor playing blackjack, and the stakes are getting high when suddenly you chance to look up, and there, right smack above your head is a half-naked 14-year-old girl being chased through the air by a snarling wolverine, which is suddenly locked in a death battle with two silver-painted Polacks who come swinging down from opposite balconies and meet in mid-air on the wolverine's neck." [109]

Circus Circus, Early 1970s

Source: Contempory Promotional Photographs

Thompson's description also reveals the second innovative moment of the casino. *Circus Circus* facilitated an immersion in ludic sensations completely beyond the distanced window view as it had been originally established in modern painting and then continued by the theater. Their worlds and events could be viewed but not entered.

"In the industrial age, cinema continued the tradition of the window view. The framed screen, originally also covered by a curtain, processed aesthetically, as Anne Friedberg argued, the industrial experience of the mobilized gaze through—mostly closed—glass

109 Thompson, Hunter S.: *Fear and Loathing in Las Vegas: A Savage Journey to the Heart of the American Dream*, New York N.Y.: Warner Books 1982 (*1971), p. 46.

windows of different means of transportation moving faster and faster through the natural as well as the urban landscape. Later, in the second half of the 20th century, this everyday experience of transparent distance from moving images found its mediated correspondent in the framed glass screens of TVs (and then computers)."[110]

In their employment of perspectival tricks of theatrical and cinematic stage settings and the consistent presentation of tableaux, Disneyland and *Caesar's Palace* still played on the cultural habit of window gazing. As Thompson's description makes clear, *Circus Circus* finally transcended the framed gaze of analog audiovisual media. The casino placed the gambling visitors in a room—or more correctly: tent—with the acrobats, positioning them in the arena.

How pioneering this experiment in enhancing audiovisual immersion was can be deduced from the fact that, at the same time, two other completely different areas of research pursued a very similar goal. One is the emerging discipline of computer graphics. Yvan Sutherland founded the field with his 1962 MIT dissertation *Sketchpad, A Man-Machine Graphical Communication System*, for which he programmed the first interactive graphics program.[111] Three years later, when Disneyland celebrated its tenth anniversary, and *Caesar's Palace* was nearing completion, Sutherland, then a professor at Harvard, presented a radical theoretical concept—the "ultimate display":

"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. […] With appropriate programming such a display could literally be the Wonderland into which Alice walked."[112]

Thus, an ultimate display for computer graphics should move the experience of visual content away from the window view—the view on the simulation of a framed window—and into the perspectival picture behind it. It would not show

110 G. Freyermuth: "From Analog to Digital Image Space: Towards a Historical Theory of Immersion," p. 181. See also Friedberg, Anne: *Window Shopping: Cinema and the Postmodern*, Berkeley: University of California Press 1993.

111 Sutherland, Ivan Edward: *Sketchpad: A Man-Machine Graphical Communication System*, New York: Garland Pub. 1980 (*1963), https://www.cl.cam.ac.uk/techreports/UCAM-CL-TR-574.pdf. The thesis advisor was Claude E. Shannon.

112 Sutherland, Ivan Edward: "The Ultimate Display," in: *Multimedia: From Wagner to Virtual Reality*, ed. Randall Packer and Ken Jordan, New York: Norton 2001 (*1965), pp. 232-236.

2D copies of reality or images created in 2D but imagery that would be real in the sense that the user would be immersed and could experience the (audio-)visual worlds interactively.

In the following years, Sutherland tried in various ways to devise and construct elements of such an "ultimate display." In 1968, the year *Circus Circus* opened, he demonstrated the first head-mounted display (HMD), a cumbersome contraption nicknamed "The Sword of Damocles," the great grandfather of today's VR goggles.[113] What could not yet be realized as a room thus became a space for privatized perception. Simultaneously, Sutherland and his team programmed a scene generator, the great grandfather of game engines, that allowed the interactive manipulation of computer graphics, such as flight simulations.[114] With these three innovations: the concept of the Ultimate Display as not a window but a room, the HMD as a technical substitute for such a room, its simulation, and the Scene Generator as the software program to create immersive interactive visuals, Sutherland, in the second half of the 1960s, laid the foundations for virtual realities.

The second area of research that moved beyond the window view in the 1960s and placed the previous viewer in a room with the images was holography. In the late 1940s, Dennis Gabor, a physicist who had fled Nazi Germany for Britain, had proposed how a complete three-dimensional image could be recorded in form and projected into real space—by recording not just intensity (amplitude) and color (frequency) as photography did but also the phase of light. In 1971, he was to receive the Nobel Prize for his research. But at first, the technical means did not exist to reliably realize Gabor's experimental concept.

In contrast to the relatively slow development of hologrammatic research was its rapid progress in science fiction. Since Isaac Asimov's groundbreaking *Foundation* trilogy (1951-1953), novels, feature films, television series, and digital games have imagined holographic characters and worlds.[115] David J. Pizzanelli

113 Sutherland, Ivan Edward: "A Head-Mounted Three Dimensional Display," *AFIPS '68 (Fall, part I): Proceedings of the December 9-11, 1968, fall joint computer conference, part I*, December, 1968, pp. 757-764, https://www.cise.ufl.edu/research/lok/teaching/ve-s07/papers/sutherland-headmount.pdf

114 Rolfe, J. M. and K. J. Staples: *Flight Simulation*, Cambridge [Cambridgeshire]; New York: Cambridge University Press 1986, p. 234.

115 Asimov, Isaac: *Foundation*, New York: Gnome Press 1951; Asimov, Isaac: *Foundation and Empire*, New York: Gnome Press 1952; Asimov, Isaac: *Second Foundation*, New York: Gnome Press 1953.

has analyzed this myth of holography as an expression of mass psychological needs for immersive imagery.[116]

In practice, hologrammatic recordings became possible only after the development of laser light in the 1960s, based on calculations made by Albert Einstein as early as 1917.[117] Holography thus established itself as a scientific field of research. In parallel, a multitude of artistic experiments occurred worldwide. Particularly in the psychedelically oriented counterculture of the American West, the seemingly weightless light sculptures fascinated the hippie public. At the same time, the transition from static to moving holographs was accomplished. In 1969, American physicists produced a 30-second holographic film showing tropical fish in an aquarium.[118] Exhibitions of holographic works that experimented with light and movement in ways never before seen attracted hundreds of thousands of visitors.[119] The first "School of Holography" opened in San Francisco in 1971, and the first "Museum of Holography" in New York in 1976.[120] Among the most successful pioneers of holographic art were the Americans Stephen Benton, Robert Whitman, James Turrell, Rockne Krebs, the Dutchman Rudie Berkhout, and the German Dieter Jung.[121] Even commercial mass medial use, for example, holographic television, no longer seemed out of the question at the time.[122] In this context, the position of analog holography in media history can be identified: as a techno-aesthetic break with the tradition of simulating three-dimensionality in perspective.[123]

116 Cf. Pizzanelli, Daniel J.: "The Evolution of the Mythical Hologram," *Proceedings of the SPIE. The International Society for Optical Engineering* (1992), pp. 430-437.

117 K. Popper: *Art of the Electronic Age*, p. 29.

118 Kac, Eduardo: "Beyond the Spatial Paradigm: Time and Cinematic Form in Holographic Art," Sixth International Symposium on Display Holography 3358 (1998), https://www.spiedigitallibrary.org/conference-proceedings-of-spie/3358/0000/Beyond-the-spatial-paradigm--time-and-cinematic-form-in/10.1117/12.301482.short?SSO=1

119 Johnston, Sean F.: "Whatever Became of Holography?" *American Scientist*, November/December, 2011, https://www.americanscientist.org/article/whatever-became-of-holography

120 Ibid.

121 K. Popper: *Art of the Electronic Age*, p. 29.

122 S. Johnston: "Whatever Became of Holography?"

123 Desbiens, Jacques: "The Dispositif of Holography," *Arts* 8, no. 1 (2019), p. 28, https://www.mdpi.com/2076-0752/8/1/28. "[T]he holographic dispositif breaks with the perspective tradition and opens a new field of artistic research and experimentation."

The parallels to aesthetic experiments in Disneyland and Las Vegas are apparent: the movement from passive viewing to active entry into fictional spaces. In popular entertainment, this was undertaken by creating themed environments in the material world; in computer graphics, by designing themed environments in the realm of software; in holography, by recording not only amplitude and frequency—the different brightness and color—as in regular photography but also the phase of the object wave, i.e., the shape of the object. However, the drastic difference was in the (audio-)visual quality of the created experiences. The low resolution and 'unrealism' of the fledgling interactive computer graphics as well as of holography in the 1960s and 1970s, reminiscent of rough sketches or ghost images, contrasted considerably with the—so to speak 'high-resolution'—realism of the built fantasy worlds of Disneyland, *Caesar's Palace,* and *Circus Circus*.

Comparing these corresponding efforts to overcome the distanced window view in favor of a participatory entry into artificial worlds, it seems that theme parks and the Las Vegas entertainment architecture tried to produce experiences in the material world for which there was a specific demand that the emerging new analog and digital media could not satisfy yet. From this perspective, the themed attractions of the 1960s in the American West appear as anticipations; on the one hand of the contemporary holy grail of computer graphics: the "ultimate display" as a means for interactive spatial immersion; on the other hand of a holographic projection of images into real space, as it became possible only in our century with digital holography and its fusion with practices of augmented and virtual reality.

V ANTICIPATING VIRTUAL WORLDS: 1990S

The aesthetic and economic risk Jay Sarno had taken with the partially themed casino hotels *Caesar's Palace* and *Circus Circus* found no successor in the corporate culture of the 1970s and early 1980s. Parallel to the decline of industrialism, Las Vegas entered a crisis that was both economic and aesthetic. Fremont Street, the old downtown gambling center, experienced inner-city decay like many major American cities. As time went by, even Las Vegas's ubiquitous neon magic started to wear thin. The mixture of lack of imagination and sleaziness that ensued deterred well-heeled gamblers. In the 1980s, aesthetic stagnation was followed by an economic recession.[124] During the day, Vegas resembled a typical, sprawling

124 "By the late seventies, however, the number of visitors to Las Vegas had plateaued and even briefly declined." (Lehrer, Jonah: "Royal Flush: How Roger Thomas

American midtown. Empty strips of dusty desert lay between the aging concrete bunkers. At night, when the ten, twelve-story-high neon signs transformed the fortress-like fronts of the casino hotels, the entertainment possibilities beyond gambling were limited to half a dozen better restaurants and a selection of shows by stars whose best times lay behind them. Las Vegas was going out of fashion.

Toward the end of the decade, however, the fourth phase started: the biggest building boom in the city's history. Between 1989 and 1999, almost a dozen megaresorts were erected for over $10 billion on the Strip alone.[125] The driving force behind this new beginning was a change in the financing model: from dependence on gambling to its combination with family-oriented tourism.[126] It all started with Steve Wynn's *The Mirage*. When it opened in 1989, it was the first new casino hotel built on the Strip in thirteen years and with construction costs of nearly $630 million, the most expensive ever. Offering over 3,000 rooms, *The Mirage* was also the world's largest hotel and, most importantly, the first to replace neon signs with immersive fantasy environments. "Neon is cheap," Wynn declared: "It's yesterday's Las Vegas."[127] Inside the tropical hotel, the rainforest grew, and waterfalls roared. The actual sensation, however, awaited visitors before they entered: Wynn did away with the parking lot and illuminated facades and opted instead for a 3D volcano, seventeen meters high. After dark, the volcano erupted at regular intervals, thundering and spewing fire high in the sky—deliberately obstructing the guests' view of the old neon strip.

The Mirage marked the beginning of a dozen such fantasy environments spilling from the casinos' interiors onto the boulevard.[128] Just four years later, Wynn

redesigned Vegas," *The New Yorker*, March 19, 2012, https://www.newyorker.com/magazine/2012/03/26/royal-flush-2)

125 Among the most expensive new buildings were: *MGM Grand* (1993, ca. $1.1 billion); *Luxor* (1993-1998; ca. $1.2 billion); *New York New York* (1997, ca. $460 million); *Bellagio* (1998, ca. $1.6 billion); *Paris* (1999, ca. $760 million); *The Venetian* (1999, ca. $2.5 billion).

126 N.N.: "Vegas Hopes to Lure Families," *Journal and Courier*, December 3, 1989, https://www.newspapers.com/newspage/264230932/

127 Ibid.

128 The name *Mirage* was an obvious choice when building a tropical oasis in a desert city. However, it is at the same time an interesting coincidence that 'mirage' also served as the first known explanation of the term virtual reality: "When the French polymath Antonin Artaud introduced the expression 'la réalité virtuelle' as a description of theater in his 1932 essay 'The Alchemical Theater,' he […] likens theater to

took this transition from two-dimensional neon aesthetics to three-dimensional entertainment environments a step further with *Treasure Island*. The casino hotel was themed as a pirate's nest and featured a street-side bay with two galleons that engaged in naval battles several times per day. Further down Las Vegas Boulevard, the *Excalibur* opened that same year, slated to be King Arthur's castle with candy-colored battlements and towers. Other fantasy resorts built during the decade were the Spanish 'Hemingway' village of *Sunset Station* hotel and the one-billion-dollar *Mandalay Bay*, the forbidden city of a lost South Sea culture. In its sandy bay, guests could surf in the desert for the first time thanks to a wave machine.[129]

Striking about these so-called 'megaresorts' that shot up in Las Vegas during the 1990s was not only that they introduced immersive 3D exteriors. Remarkable was also that many of these new spaces no longer promised immersion into fictional worlds—as the interiors of *Caesar's Palace* and *Circus Circus* had done since the 1960s, and the exteriors of *The Mirage*, *Treasure Island, Excalibur,* or *Mandalay Bay* since the early years of the construction boom. Starting in 1992 with another interior world, the Roman alleys and squares of *Caesar's Palace Forum Shops*, Las Vegas's entrepreneurs suddenly aspired to replicate existing monuments or cities. This new group of 'simulations of the real' included, in addition to the replicas already mentioned—Rome (1992/98) and Paris (1999)—the pyramid of *Luxor* (1993), the skyline of *New York, New York* (1997), the Italian Lake Como village at the foot of the *Bellagio* (1998), and—most expensive and most spectacular—*The Venetian* (1999), a life-size recreation of Venetian landmarks.

Two complementary forces seem to have been driving this turn to simulations of real places. The first explanatory model compares Las Vegas's replicas to the compressed and stylized mental images travelers tend to form of tourist destinations. Materializations of such personal memories and collective visions of the real—"architectural translations of locales"[130]—have been created for entertainment purposes since leisure traveling became a social desire and widespread practice. In the 19th and early 20th century, 'ersatz' and memory places ranged from

the 'fictitious and illusory" world of alchemy. Both of them are 'virtual arts,' and both involve a 'mirage' […]." (D. Chalmers: *Reality+*, loc. 3089.)

129 CF. for example Booth, Cathy: "In With The New," *Time*, November 2, 1998, http://content.time.com/time/world/article/0,8599,2053901,00.html

130 L. Bieger: *Ästhetik der Immersion*, p. 142, my translation.

City Simulations on the Las Vegas Strip, 1990s: Top: New York New York Hotel and Casino; Bottom Left: Paris Hotel and Casino; Bottom Right: The Luxor Hotel and Casino

Source: Promotional Photographes of the Hotel Casinos

panorama buildings whose paintings and diorama-like installations showed distant cities or landscapes to spectacular amusement park attractions. One of the most celebrated was the entertainment park "Venice in Vienna," which opened in 1895 on 50,000 square meters of the public *Prater* park and featured artistic reproductions of Venetian buildings and canals navigable by gondolas.[131]

A second approach positions Las Vegas's turn to simulations of the real at the frontier of digital culture. As mentioned above, Robert Venturi, William J. Mitchell, and numerous other theorists have explained the effect of digital technology and media on architecture and urbanity as a fundamental paradigm shift, not least in the perception of time, space, and the world, the increasing intertwining of material and virtual structures.[132] What began around 1990 in Las Vegas—the simultaneous dislocation of real-world places and their structural compression—could thus indicate the emergence of a new epochal style: the transition from industrial modernism and postmodernism to architecture and urban planning oriented towards digital culture and emerging lifestyles that have as their vanishing point a Metaverse-like fusion of reality and virtuality.

The elaborate simulation of cities and monuments, especially *The Venetian*, thus testify to an architectural adaptation comparable to the rise of panoramas and passages in early industrialization. The zones of Las Vegas, where simulations of real places were clustered and made their concentrated impact, were no longer part of a city in the modern sense but resembled virtual realities—aesthetically entirely and, to a lesser extent, functionally. These analog simulations of virtuality through real montages—the creation of post-realities whose aesthetic experience sought to replace the 'originals' that existed far away or only in fiction—foreshadowed the emerging transmedial realization of virtuality.[133]

---

131 N.N.: "Venedig in Wien," *Wien Geschichte Wiki*, June 6, 2017, https://www.geschichtewiki.wien.gv.at/Venedig_in_Wien.—In addition to stores, restaurants, cafés, wine taverns and beer gardens, numerous stages offered concerts, operettas, revues, and wrestling tournaments.

132 Cf. Carpo, Mario: *The Alphabet and the Algorithm*, Cambridge, Mass.: MIT Press 2011; Shepard, Mark: *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space*, New York City, Cambridge, Mass.: Architectural League of New York; MIT Press 2011.

133 Technically, the themed architecture was made possible not least by the development of new high-tech machinery and building materials. Cf. e.g.: "So much lightweight material, including plastic designed to simulate nonplastic, is now used in the construction of the physical world that, according to a study published in a recent issue of the journal Daedalus, the amount of mass required to build the physical reality

The Venetian; Top Left: Promotional Postcard, 1990s; Top Middle: Exterior Canal with Gondolas; Top Right: Interior Canal with Gondola; Bottom Left; Replica of Doge Palace; Bottom Right; Replica of Campanile Tower.

Sources: Promotional Postcards, Promotional Photography, and Gundolf S. Freyermuth

around us has on a per capita basis actually begun to decline." (Murphy, Cullen: "The Real Thing," *The Atlantic Monthly*, August 1997, https://www.theatlantic.com/magazine/archive/1997/08/the-real-thing/376923/)

In digital graphics, related attempts were made to enable immersive experiences of artificially created environments without the costs, imponderables, and dangers of physical actions or journeys. Ivan Sutherland's 1960s experiments with head-mounted displays for flight simulations had led to the "Visually Coupled Airborne Simulator," produced for the US Air Force. These HMDs cost about $1 million apiece and seemed so futuristic that—in the times of the first STAR WARS sequels and the S*trategic Defense Imitative*, which was derisively nicknamed "Star Wars" as well—they were referred to as "Darth Vader helmets."[134] By the mid-1980s, however, the leading military technology became considerably cheaper due to a NASA project using prefabricated parts. Its goal was to build simulation systems that could be navigated and manipulated interactively but independently of specific hardware.

At this point, Jaron Lanier came into play. The young artist earned his living designing video games, including the successful music game MOONDUST for the Commodore 64.[135] But he was also experimenting with what was then called virtual environments (VE). Lanier recognized that NASA's approach meant the progression from 'special simulations' such as flight or driving simulations with specific hardware—certain cockpits, and so forth—to 'universal simulations,' i.e., simulation apparatuses as universal as the digital computer is a universal machine. For this new software-based simulation environment, which promised to realize Sutherland's concept of the ultimate display partially, Jaron Lanier coined the term *Virtual Reality*.[136]

In 1987, VPL Research—Lanier's company—built the first such universal simulation machine as a commercial product, the $250 000 *EyePhone.* It consisted of a Macintosh computer, serving as the control system, and two Silicon Graphics workstations, each of which calculated the virtual worlds at 30 frames per second for one eye. The head-mounted display featured built-in stereo speakers and two LCD eye monitors producing stereoscopic 3D images. A data glove or a full-body DataSuit completed the hardware setup. *EyePhone's* centerpiece was the

134 Bye, Ken: "50 years of VR with Tom Furness: The Super Cockpit, Virtual Retinal Display, HIT Lab, & Virtual World Society," *Voices of VR Podcast*, November 17, 2015, https://voicesofvr.com/245-50-years-of-vr-with-tom-furness-the-super-cockpit-virtual-retinal-display-hit-lab-virtual-world-society/

135 MOONDUST (Creative Software Inc. 1983, O: Jaron Lanier)

136 Steuer, Jonathan: "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication*, no. 42, 4 (1992), pp. 73-93, here p. 73, https://steinhardtapps.es.its.nyu.edu/create/courses/2015/reading/steuer.pdf

proprietary software that could dynamically execute a multitude of simulations—from flight to architecture to games—using the same set of hardware.[137]

More than thirty years later, the modernity of the system is stunning. The *EyePhone's* electromagnetic movement detection allowed for the first time two or more users to experience a virtual space simultaneously.[138] The software adjusted the virtual 3D worlds according to the direction of their gazes and gestures. Interactions in VR seemed like magic. Consequently, Lanier thought VR was "the dawn of a new era, like when Columbus returned to Spain with news of the New World. Only this time, the New World is infinite; it's the virtual world, still largely uninvented and unexplored."[139] Far-reaching hopes like these were widespread in the early 1990s when VR enjoyed its first boom phase though it was still expensive and somewhat primitive. In his classic reportage *Virtual Reality: The Revolutionary Technology of Computer-Generated Artificial Worlds—And How it Promises and Threatens to Transform Business and Society,* Howard Rheingold captured the spirit of optimism sparked by the new medium.[140]

Under capitalist circumstances, however, all utopian approaches—concepts as well as technologies—intertwine with their commercial exploitation, as Frederic Jameson has pointed out, albeit from the opposite perspective:

"[…] the works of mass culture cannot be ideological without at one and the same time being implicitly or explicitly Utopian as well: they cannot manipulate unless they offer some genuine shred of content as a fantasy bribe to the public about being so manipulated."[141]

Rheingold saw the situation of the utopian medium of virtual reality no differently. During the boom phase of the construction of imaginary places and copies of existing 'exotic' locales on the Las Vegas Strip, the "marriage of VR and Vegas

137 Sorene, Paul: "Jaron Lanier's EyePhone: Head and Glove Virtual Reality in the 1980s," *flashbak*, November 24, 2014, https://flashbak.com/jaron-laniers-eyephone-head-and-glove-virtual-reality-in-the-1980s-26180/

138 Mandel, Margery: "Careers: Entrepreneur Laid Foundations In Another World," *Boston Herald*, June 16, 1996.

139 Scheinin, Richard: "Through the Looking Glass: 'Virtual Realities' Can Take Us Into Other Worlds," *Chicago Tribune*, February 18, 1990.

140 Rheingold, Howard: *Virtual Reality*, New York: Summit Books 1991.

141 Jameson, Fredric: "Reification and Utopia in Mass Culture," *Social Text* 1 (1979): pp. 130-148, here p. 144, https://pdfs.semanticscholar.org/0106/0805d5df2d3ea7d050efa3a356a83aeb942e.pdf?_ga=2.178703139.644611213.1609164918-2123797577.1609164918

[seemed] inevitable": "By building 'destination resorts' with fantasy experiences at the center, the casinos are appropriating the high-end illusion business from the moviemakers and theme parks."[142]

VI ANTICIPATING VIRTUAL DESIGN: 1990S

In association with Las Vegas's usurpation of mass cultural entertainment tropes, central aesthetic methods of Hollywood movies and theme park attractions were also adopted and adapted. Particular significance gained cinematic editing and aesthetic theming, the design practice from which the theme park derived its name. An excellent example is the replica of the French capital on the Las Vegas Strip. When, between 1995 and 1999, the *Paris Las Vegas Hotel & Casino* was conceived and constructed, its design did not only point back to constitutive elements of Paris as a future place that Walter Benjamin had identified and which had since become mass cultural stereotypes. It also anticipated in the material world the affordances of future transmedia works by testing and developing processes of design and simulation that were applied almost twenty years later in the development of the virtual recreation of another long-past Paris in ASSASSINS' CREED UNITY.[143]

Thus, Las Vegas's dual turn to both artificial exterior 3D environments in general and simulations of the real in particular can be considered as one more attempt to fulfill aesthetic desires that digital technology had created but could not meet yet. These desires focused on profound improvements and enhancements of fictional worlds as well as reality itself—on what we now call hyperrealism and hyperreality.

Initially, the term hyperrealism referred to the final phase of Pop Art when fine artists challenged photography's territory of representationalism.144 Since the mid-1960s, Robert Bechtle, Chuck Close, Richard Estes, et al. employed the means of painting to produce pictures that looked as if a camera had captured them. Their works denoted a documentary-like visual impression without possessing the indexicality of analog photography, i.e., a direct and secure reference to something material. Today, we tend to call all photorealistic-looking images

142 Rheingold, Howard: "Total Immersion. Douglas Trumbull's Big Budget VR," *Wired*, November, 1993, http://www.wired.com/wired/archive/1.05/luxor.html. Rheingold wrote on the occasion of the opening of the Luxor Hotel and the Trumbull ride; see below p. 76.

143 ASSASSINS' CREED UNITY (Ubisoft 2014: Ubisoft Montreal)

144 Chase, Linda: *Hyperrealism*, London: Academy Editions 1975.

hyper-realistic if they result not from an imprint of physical reality but digital animation; for example, within a game engine.

In contrast to hyperrealism, hyperreality does not refer to just a visual style but specific forms of reality: meticulously designed and materially built 'real' environments. The term goes back to Umberto Eco, who formulated his theory of hyperreality while visiting the United States in the 1970s.[145] He assumed that the imitation of works of art and the complete or select reproduction of historical monuments, as it had become customary in and outside of theme parks in the US, resulted in realities that were 'more real' than the works and environments they replicated because the process of replication included enhancement. Eco claimed that these super-realities—hyper-realities—would be "more real than reality"[146] and thus, the less spectacular 'original' "reality will always be inferior to it."[147]

Walt Disney's theme park hyperrealities were based primarily on two techniques. Both stemmed from the 2D medium of film, and both were adopted and refined in Las Vegas during the 1990s. The first procedure was of photographic origin. Every shot of still or moving images selects sections of reality and the perspective on them, thus creating—by the exclusion of unwanted sights—a distinctive perception, i.e., meaning. Disney applied this photographic and cinematic principle of focusing the viewer's gaze on elements that define style and meaning to the construction of 3D attractions. The design procedure of selecting audiovisual signs that denote and connote a distinctive aesthetic and meaning for the respective attraction, Disney called *theming*. From the multitude of competing, if not contradictory, opportunities for communication and meaning-making—in real-world cities, for example, through the random combination of buildings of the most diverse epochs and functions, through signposts and advertising signs—the process creates 'more beautiful' and 'more meaningful' environments that, however, stay recognizable. The goal is aesthetic filtering, the elimination of 'noise,' the excess that in the original models—realities as well as fictions—seem accidental or too multilayered, inconsistent, or confusing. Theming unifies appearances in style and statement.

Disney's second technique originated in cinematic storytelling: the design of a narrative continuum through the montage of perspectivized reproductions. This conditioning and formatting of the theme park experience, Disney called *scripting*. Theme parks do not present exact copies of real or fictional worlds. Instead, their

145 Eco, Umberto: *Travels in Hyper Reality: Essays*, San Diego: Harcourt Brace Jovanovich 1986.

146 Ibid., p. 45.

147 Ibid., p. 46.

attractions follow the dialectical duplicity of selection and narrative montage as it had evolved in the first half-century of Hollywood filmmaking. This origination of the topics and the artistic design of the theme park from Hollywood cinema has often been noted.[148] Consequently, Disney called his *Main Street*, the entry into Disneyland, "Scene One" because it constituted the beginning of the theme park's three-dimensional stories.[149]

In direct contrast to the photorealistic principle of authenticity, theming and scripting apply to reality what is the rule in designing machines: optimization of the interface. The theme park's various "lands" were quicker to comprehend and easier to navigate than the more complex fictions and realities that modeled for them. Theming and scripting treat reality—or existing fictions—as changeable commodities. These raw materials are first stripped of all but the 'strongest' elements, those that, in a sense, remain in memory from the distance of days or months. In the second step, the remaining components are arranged to tell a better and more comprehensible story than was previously the case. The transfer of the two basic techniques of photorealistic production of moving images from their temporal 2D continuum into the spatial 3D continuum of architecture and cityscape, therefore, no longer resulted in any realism. Rather, the shaping of reality through cinematic processes, i.e., perspective, selection, and montage, produced de-realization: hyperrealistic buildings and environments that seemed more real than any reality yet had no exact counterpart. Eco accordingly defined hyperrealities as "the absolute fake […] where the boundaries between game and illusion are blurred."[150]

Several American architecture critics subsequently developed similar partly morally, partly politically motivated criticism of theme parks and Las Vegas. The urban designer Michael Sorkin, for instance, coined the term "Disneyfication" and spoke of an "architecture of deception."[151] Likewise, Ada Huxtable lamented the loss of authentic reality, the "replacement of reality with selective fantasy."[152] In the 1990s, beyond architectural criticism, the theme park genre became a symbol of what was new and either exhilarating or deplorable about post-industrial mass

148 See above p. 35f.

149 K. Marling: "Imagineering the Disney Theme Parks," p. 61.

150 U. Eco: *Travels in Hyper Reality*, p. 8.

151 Sorkin, Michael: "Introduction: Variations on a Theme Park," in: *Variations on a Theme Park: The New American City and the End of Public Space*, ed. Michael Sorkin, New York: Hill and Wang 1992, pp. xi-xv.

152 Huxtable, Ada Louise: *The Unreal America: Architecture and Illusion*, New York: New Press: Distributed by W.W. Norton 1997.

culture. Susan G. Davis noted, for example, the "ordinariness of the theme park—its easy availability as a metaphor for much of contemporary mass culture."[153]

The way in which the artificial theme park worlds blurred the boundary between reality and fiction had a stylistic impact on the other contemporary arts, just as the narrative methods of film once had. Brian Eno, for example, saw in theme parks a "relatively new cultural form that is going to become more and more a place for artists to look."[154] Just as positively, Nicholas Negroponte characterized hypertext stories as "more of a theme park than a book."[155] However, the same aesthetic influence, insofar as it affected traditional media and genres, was negatively perceived by cultural critics.[156] The fact that blockbuster films and bestselling novels, for example, increasingly dispensed with (photo-) realistic storytelling and assimilated the fantastic thrill structure of themed attractions became a widespread lament.[157]

The designers and builders of the entertainment architecture that burgeoned in Las Vegas in the 1990s did adopt essential methods of theme park construction, particularly theming. But they adapted their approach twofold: first, to the fact that their public resorts lacked the control that gated theme parks afforded; second, to the enhanced possibilities that ensued from digital design, reproduction processes, and construction methods. *The Venetian* probably best exemplifies these advances in theme park aesthetics—particularly its relationship to digital imagery.

153 Davis, Susan G.: "Variations on a Theme Park: The New American City and the End of Public Space," *The Nation*, August 31, 1992.

154 Cited after Kelly, Kevin: "Eno: Gossip Is Philosophy. Kevin Kelly Talks to the Prototypical Renaissance 2.0 Artist," *Wired*, May, 1995, http://www.wired.com/wired/archive/3.05/eno_pr.html

155 Negroponte, Nicholas: *Being Digital*, New York: Vintage 1996 (*1995). p. 72.

156 Cf. on the criticism of Disney's innovations Marcus, Greil: "Forty Years of Overstatement. Criticism and the Disney Theme Parks," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, ed. Karal Ann Marling, Montréal, Paris, New York: Flammarion 1997, pp. 201-207.

157 Cf. e.g. Jonathan Coe's angry review of Spielberg's second Jurassic Park film, in which he remarks that Hollywood is moving "away from storytelling toward a kind of theme park experience:" "Spielberg has made a theme park, not a movie (although on one level the film seems to regard itself, laughably, as a critique of theme park culture), and the real genetic monstrosity here is not the velociraptor or the pterodactyl, but the mutation of what was once intended as an art-form into a mere machine for quickening the pulse." (Coe, Jonathan: "The Lost World Jurassic Park," *New Statesman*, July 18, 1997.)

Erected for $2.5 billion on the site where the legendary *The Sands* used to stand, it was the most expensive and spectacular of the new casino hotels. When it opened at the end of the decade and the building boom, *The Venetian* offered a true-to-scale, but spatially compressed version of the Italian original, including a 96-meter-high Campanile, Canale Grande, and Rialto bridge; all of them created art-historically exact in plaster and marble. Robert Venturi, who a quarter-century earlier had recognized the cityscape of old neon Vegas as trailblazing, now analyzed the new development as a series of transformations from "signs to scenes," "electric to electronic," and, most shrewdly, "neon to pixel."[158] What is accurate about this observation is that the artistic methods and aesthetic principles underlying the *Venetian's* architecture are very close to those of digital photo-editing:

"While Disney had still oriented itself on the model of film and serially assembled perspective reproductions of details, the *Venetian's* designers, aesthetically following the guidelines of their software tools, constructed its elements along the lines of digital image processing. From what they perceived to be the 'model' or source material, they created an improved counter-reality, a super-reality in which all traces of processing and assembling were erased in hyper-realistic seamlessness."[159]

A few years later, Laura Bieger analyzed Las Vegas's aesthetic procedures similarly:

"It is, in other words, the image of a computer-simulated super-city that manipulates its reference reality with digital image processing techniques (e.g., cut-and-paste, clean-up, and smoothing procedures), achieving immense spatial and temporal compression. […] the new Las Vegas image space is a material translation of a virtual computer image."[160]

The decisive difference to digital photo-editing, however, is that *The Venetian* and many similar exterior and interior themed environments, for example the *Forum Shops* of *Caesar's Palace,* were not a montage of images but spaces. They turned the visual illusion of 'enhanced' and 'edited' 2D photos into massive architecture, a montage of the real, realized in materiality. As a result, the 'fake' Venice or Rome cannot only be looked at but entered and experienced with all senses.

158 R. Venturi: "Las Vegas After Its Classical Age," pp. 127-128.

159 Freyermuth, Gundolf S.: "Digitalisierung: Die transmediale Konversion von Kunst und Unterhaltung in der zweiten Hälfte des 20. Jahrhunderts" (Diss phil, Free University Berlin, 2004, p. 283, my translation.)

160 L. Bieger: *Ästhetik der Immersion*, p. 208, my translation.

Outdoor Environments Simulated Indoors: The Forum Shops of Caesar's Palace in the late 1990s

Source: Gundolf S. Freyermuth

VII ANTICIPATING VIRTUAL AGENCY: 1990S

With their fantasy worlds or simulations of 'exotic' real-world places, the new mega-resorts managed to change the image of "sin city." Las Vegas's immersive 3D environments successfully appealed to new demographics, especially middle-class families with children. As a result, the last decade of the 20th century saw a unique economic boom. Contributing to this growth of visitors and revenues, in addition to the individual 3D attractions, was the large number of new casino hotels. Collectively, they transformed the Strip from a car-centric suburban street into a busy promenade.

Not ten years earlier, the eight kilometers of the Strip had to be explored by automobile. Most of the casino hotels stood at a great distance from each other, offering self-contained experiences. Visiting the various casinos produced a sequence of distinctive aesthetic experiences, similar to attending various cinema showings. The casinos' neon signs, better visible from afar than from too close, corresponded to this standard approach by car, as did the concrete parking lots that lay as a buffer zone between the Strip and the lobbies' entrances. In the nineties, the typical Las Vegas neon facades disappeared with almost no exception. Taking their place were fantasy installations such as *Treasure Island's* Buccaneer Bay, *Bellagio's* Lake Como, and the *Venetian's* Piazza, as well as people movers—electric walking belts, occasionally covered and air-conditioned—that transported the public past the installations and into the casino hotels.

"[T]he Las Vegas Strip has become one of the most pedestrian-oriented urban areas in the American West. […] If the postwar Strip was symptomatic of the suburban sprawl of the United States, the 21st-century Strip is representative of a nationwide migration from suburbia back to the cities, America's 'urban renaissance.'"[161]

The change in the sensory experience of the city was dramatic. Suddenly, several fantastic 3D environments competed with each other. Mark Gottdiener was one of the first to describe the effect: "Each differentiated casino with its separate theme, standing juxtaposed against other casinos, produces an overarching intertextuality that is the grand text of Las Vegas [....]."[162] To the rationally constructed 'real montage' of themed casino hotels, the Strip represented the irrational counterpart.

161 Cf. Al, Stefan: "The Most American City Isn't New York, L.A., Or Chicago," *Fast Company*, November 4, 2017, https://www.fastcompany.com/90109341/learning-from-las-vegas-no-really

162 M. Gottdiener: *The Theming of America*, p. 103.

Individually, aesthetically self-contained worlds of experience were presented. In sum, the immersion resembled an aesthetic mad dash. The unplanned effect when strolling along the densely built-up Strip, as was now customary, amounted to disorientation. The jumble of fascinating monuments seemed as abrupt as if a drugged editor had spliced together the highlights from a dozen very different films: Paris of the twenties, Rome of the present, a flame-breathing volcano, the Campanile, a Caribbean pirate's nest, etc. Such a psychedelic effect of hyperreal illusion architecture, Umberto Eco described already in his 1970s analysis of San Luis Obispo's themed *Madonna Inn*:

"To convey its external appearance […], we can only venture some analogies. Let's say that Albert Speer, while leafing through a book on Gaudi, swallowed an overgenerous dose of LSD and began to build a nuptial catacomb for Liza Minnelli."[163]

However, the Strip's timeless, unhinged thematic chaos was familiar not only to those with drug experiences. The World Wide Web's few early adopters knew similar disorientation. Global digital networking allowed in virtuality for the first time what the Strip empowered strollers to do in reality: an abrupt commute between places and times and between simulacra of real attractions and others that related solely to cultural fantasies. It became possible, for example, to jump within seconds from the virtual presence of a German bank in Frankfurt to a stockbroker in New York, from a bookstore in Seattle to a library in Munich, from the *Los Angeles Times* to the Hamburg *Spiegel* magazine, from a *Star Trek* website to a Lufthansa flight schedule, and then into the world of knights in an online game. Cruising or strolling on the Strip resembled the contemporary experience of surfing the Web. If the individual gestalt of the themed casinos was aligned with image processing, their agglomeration was aligned with the central experience of virtual communication: the arbitrary neighborhoods of the emerging WWW.

As a material foreshadowing of networked 3D online worlds, the themed buildings and cityscapes, however, lacked the fluidity and interactivity of software. In the public sphere of the Strip, as in the semi-public sphere of the casino hotels, it was difficult to supplement the experience of immersion with that of playful interaction and to use scripting to control the narrative reception of the themed environments. Las Vegas's entertainment architecture used the history or histories of many people and nations, which they partly reconstructed authentically and partly freely expanded. But the hotel casinos themselves did not tell any stories. Their architects and designers felt this shortcoming and tried to remedy it.

163 U. Eco: *Travels in Hyper Reality*, p. 24.

The first approach consisted in resorting to passive attractions, the kind of voyeuristic and exploratory curiosity that was otherwise reserved for circuses, zoos, theaters, vaudeville, and trips around the world. The spectrum of what the hotel casino's integrated in the nineties, depending on their 'theme,' ranged from the artistic acts of *Circus Circus* to the spectacle of the volcano that regularly erupted in front of the *Mirage*, to the elaborate water features of the *Bellagio* and the cinematic sea battle in front of *Treasure Island*. Other examples included the *Mirage's* tigers in glass cages, the *Bellagio's* dépendance of the Guggenheim Museum presenting the world's most valuable collection of Impressionist paintings, the *Venetian's* gondola rides, the animatronic Atlantis show at the *Forum Shops*, where Poseidon fought his fiery son and icy daughter for succession to lightning, smoke and fountain steam, and the *Luxor's* authentic replica of the Tomb of Tut-Ench-Amun and gigantic laser beam still visible 400 kilometers away. Spectacles were thus embedded in the architectural 3D immersion, some of them at least rudimentarily narrative. However, the voyeuristic curiosity was satisfied at the price of removing physical immersion: the visitors to the themed buildings were once again transformed into passive viewers. They were no longer part of the fiction, but only its audience.

For this lack, a second group of productions tried to compensate with participatory spectacles. Most casino hotels employed extras who greeted the visitors and encouraged them to participate in the respective 3D fiction by interacting playfully. The *Circus Circus*, for instance, had clowns, the *Paris* flics and bike messengers delivering baguettes, the *Star Trek Hilton* Klingons and Ferengis, and the *Venetian* prominent residents like Marco Polo as well as marauding squads of masked carnivalists. Themed guest meals also served the same goal of participatory immersion. The *Excalibur* offered medieval dining, the *Star Trek Hilton* food as a science fiction experience, and the *Caesar's Palace* had a Magical Empire dinner theater with jugglers and ghosts who romped around the Roman catacomb tables.

Finally, the third group of productions sought to set the audience itself in motion, thus organizing narrative sequences along the lines of the journey, the archetypal figure of storytelling. While the paths of single walkers could hardly be controlled, and therefore it was impossible to determine how they individually received the 3D fictional spaces, their positioning in vehicles allowed for a detailed pre-planning of the sequences and thus better scripting of the themed experience. The *Luxor*, for example, invited its guests to take a Nile ride from the reception to the elevator as an initiation; the *New York, New York* featured a Coney Island roller coaster ride around the Empire State Building, Statue of Liberty, and other replicated city landmarks; the *Paris* offered a high glide to the observation deck of the

Eiffel Tower; the *Venetian* provided a half-hour gondola ride with 'real' Venetian gondoliers on the inner and outer canals of the artificial city.

These attractions had their historical model in the driving pleasures that emerged with industrialization:

"The ideas of encapsulating bodies in a 'machine' and physically moving them to produce pleasure was already a central feature of the earliest mechanical amusement park attractions in the late nineteenth century, such as water 'chutes,' Ferris wheels, and roller coasters. Their proliferation was clearly related metapsychologically to the increasing mechanization of man's relationship to his surroundings and to his experience of time and space. Being 'bonded' to different technological 'prostheses' was as traumatic as liberating […]."[164]

Rides on fixed routes and at controlled speeds that defined the perceptual range were also an essential form of theme park entertainment, starting with Disneyland in the 1950s—along with more subtle forms of navigational guidance, such as structural obstacles or signage. Unlike the rides of industrial amusement parks, however, these installations used to be not only themed but also scripted: "Narrative was what separated Disneyland from all those other parks."[165] The fast-paced rides were complemented by themed scenic design. Extras or animatronic automata generated additional narrative elements. In the process, Erkki Huhtamo writes, "two-dimensional motion picture stories and spaces, were reconstructed in three-dimensional space and transformed into amusement park rides."[166] For example, *Adventureland's* JUNGLE RIVER CRUISE, the most spectacular ride when Disneyland opened, was modeled after John Huston's 1951 film AFRICAN QUEEN: "It was a cinematic experience, an art director's pipe dream composed of curves and well-placed switchbacks that hid one part of the set from another and so preserved the illusion."[167]

The necessity to organize narrative movement as a ride in real space suggested building up narrative tension beyond theatrical elements as an escalating series of those physical thrills that every mechanical movement of the body beyond its

164 E. Huhtamo: "Encapsulated Bodies in Motion," p. 167.

165 K. Marling: "Imagineering the Disney Theme Parks," p. 74.

166 E. Huhtamo: "Encapsulated Bodies in Motion," p. 162.

167 K. Marling: "Imagineering the Disney Theme Parks," p. 105. See also "[…] Harper Goff's original rendition of Adventureland's Jungle River Cruise, the boats inspired by the Bogart-Hepburn African Queen, was easily the greatest of all the new Disney 'ride' genres at the park's opening in 1955." (Sklar, Marty: "The Artist as Imagineer," Ibid., Montréal, Paris, New York: Flammarion, pp. 13-17, here p. 15.).

natural capacities produces. The exact scripting of such thrills functioned as the narrative complement to environmental theming. At first glance, this play on danger seemed to conflict with the fundamental aesthetic promise of the theme park genre "to create a cultural space where people could experience, however briefly, freedom from fear."[168] However, it was precisely the theme park's fundamental aesthetic of "reassurance" that made the enjoyment of physical danger possible. Disney thus used Kant's insight that the experience of the "dynamically sublime," such as the "nature as might,"[169] turns into an object of curiosity as long as we do not believe ourselves to be in physical danger. The entire passage reads as if Kant had already visited the Las Vegas of the 1990s:

"[C]onsider bold, overhanging and, as it were, threatening rocks, thunderclouds piling up in the sky and moving about accompanied by lightning and thunderclaps, volcanoes with all their destructive power, hurricanes with all the devastation they leave behind, the boundless ocean heaved up, the high waterfall of a mighty river, and so on. Compared to the might of any of these, our ability to resist becomes an insignificant trifle. Yet the sight of them becomes all the more attractive the more fearful it is, provided we are in a safe place."[170]

Thanks to digital control technology, the end of the 20th century saw a dramatic change in what could be created as a 'safe' experience in the material world. For example, Six Flags' California park *Magic Mountain* opened the $20 million SUPERMAN—THE ESCAPE ride in 1997. Its highlight was a fall from twice the height of the Niagara Falls, during which consumers became cosmonauts by first having to withstand the pressure of 4.5 times the force of gravity and then experiencing space weightlessness for 6.5 seconds.[171] Casino hotels could hardly compete with such rides in their confined urban exteriors and limited indoor spaces. Therefore, in the competition for the audience, they focused on a new type of attraction that had become available since the late 1980s: virtual rides that moved the motion thrills out of the material world and into software-driven simulations.

168 Watts, Steven: "The Magic Kingdom: Walt Disney and the American Way of Life," *The New Republic*, June 15, 1998.

169 Kant, Immanuel: *Critique of Judgment*, Indianapolis, Ind.: Hackett Pub. Co. 1987 (*1790), p. 119.

170 Ibid., p. 120.

171 Cf. Ferrell, David: "Riding A Speeding Bullet: You Can Test Your Nerves Of Steel On Superman the Escape," *Los Angeles Times*, March 13, 1997; N.N.: "Roller-Coasters: Hold On To Your Hat," *The Economist U.S. Edition*, February 24, 1996.

VIII ANTICIPATING VIRTUAL PLAY: 1990S

In the early 1980s, when *Time* magazine declared the personal computer the "Machine of the Year,"[172] when William Gibson's novel *Neuromancer*[173] invoked entry into Cyberspace and when the first transmedia GUI computer, the Mac, was launched, when Woody Allen imagined the merging of fiction and reality in THE PURPLE ROSE OF CAIRO,[174] when NASA researchers made a data helmet out of cheap Radio Shack merchandise, and Jaron Lanier founded the company that was to be the first to turn virtual reality into a purchasable product, the new entertainment genre of virtual rides also emerged, working with both analog and digital simulation. Of all the variants of contemporary entertainment, only virtual rides—using aerospace know-how and advanced military-industrial control technology and robotics—enabled thematic immersion and scripted interaction both in a confined space and without endangering the participants. Though the ride-shows were fundamentally simulations, the artistic concept was no longer just a matter of realistically creating individual sensations like flying, as military and commercial flight simulators or attractions at fairgrounds used to do. Instead, the objective was an immersion into entire fictional worlds through transmedial and environmental storytelling.[175]

A key artist whose achievements can outline this development was Douglas Trumbull.[176] Like Walt Disney a generation before, the filmmaker considered the level of immersion offered by 2D feature films to be insufficient. While working on the special effects of science fiction classics such as 2001—A SPACE ODYSSEY, SILENT RUNNING, CLOSE ENCOUNTERS OF THE THIRD KIND, and BLADE RUNNER,[177] Trumbull explored ways to increase audience immersion. The future of

172 McCracken, Harry: "Time's Machine of the Year, 30 Years Later," *Time*, January 4, 2013, https://techland.time.com/2013/01/04/times-machine-of-the-year-30-years-later/

173 Gibson, William: *Neuromancer*, New York: Ace Books 1984.

174 THE PURPLE ROSE OF CAIRO (USA 1985, D: Woody Allen)

175 Cf. Carson, Don: "Environmental Storytelling: Creating Immersive 3D Worlds Using Lessons Learned from the Theme Park Industry," *Gamasutra*, March 1, 2000, https://www.gamedeveloper.com/design/environmental-storytelling-creating-immersive-3d-worlds-using-lessons-learned-from-the-theme-park-industry

176 Greenwald, Jeff: "Trumbull's Vision," *Wired*, January, 1997, http://www.wired.com/wired/archive/5.01/fftrumbull_pr.html

177 2001—A SPACE ODYSSEY (GB/USA 1968, D: Stanley Kubrick); SILENT RUNNING (USA 1972, D: Douglas Trumbull); CLOSE ENCOUNTERS OF THE THIRD KIND (USA 1977, D: Steven Spielberg); BLADE RUNNER (USA 1982, D: Ridley Scott).

cinema, he said, "was occurring outside of mainstream cinema—in theme park rides and attractions and world's fairs."[178] This insight allowed Trumbull to become perhaps the most influential avant-gardist of motion cinema.

In 1974, he designed the first motion capsule. Ten years later, he built the first virtual ride, A TOUR OF THE UNIVERSE, for $10 million.[179] The attraction simulated a spaceport of the future year 2019, from which a shuttle took off on a round trip towards Jupiter. The spectacular ride caught the attention of George Lucas. The creator of the transmedial STAR WARS universe commissioned Trumbull to design STAR TOURS, a STAR WARS ride adaptation for Disneyland.[180] It opened in early 1987. Technically, the virtual ride was based on the computer-controlled synchronization of wide-screen film images, pre-produced and presented on spherical screens, with hydraulic movement platforms, such as those used to train combat pilots. Aesthetically, STAR TOURS allowed for a physically tangible real-time participation in typical STAR WARS action.

Six years later, Douglas Trumbull produced the first such attraction in Las Vegas. IN SEARCH OF THE OBELISK, located in the *Luxor Hotel & Casino,* became the gold standard of the new genre. It was advanced in both aesthetic and technical terms. The narrative quality heightened that the ride through the fictitious cave under the pyramid was the first part of a fantasy trilogy called SECRETS OF THE LUXOR PYRAMID, i.e., it was—initially—embedded in a broader fictional context.[181] The first-person-audiovisuals owed their technical superiority to two improvements. First, the analog captured ride film was digitally enhanced. Second, the projection of the hybrid images—partially photorealistic, partly hyperrealistic[182]—was synchronized with a novel motion device developed by Trumbull and

178 Greenwald: "Trumbull's Vision."

179 Conroy, Ed: "The History of the Tour of the Universe Spaceship Simulator at the CN Tower," *blogTO*, October, 2019, https://www.blogto.com/city/2020/09/tour-of-the-universe-cn-tower/. The promotional video can be watched here: https://www.youtube.com/watch?v=yfjcbsYQK1I&t=47s

180 STAR TOURS opened in 1987 and closed in 2010. A year later the successor ride STAR TOURS—THE ADVENTURE CONTINUES opened.

181 For critics and the public alike, however, the ride itself remained the main attraction. Cf Gorman, Tom: "Weekend Escape: Las Vegas; The Strip Says, 'Kids, Got Clean Thrills For You, But You Gotta Bring Your Boring Parents. Deal?'" *Los Angeles Times*, November 20, 1994. Part 2 and 3 of the attraction were closed after a relatively short time.

182 Ibid., p. 22.

controlled by 40 Silicon Graphics workstations and a dozen other computers.[183] IN SEARCH OF THE OBELISK was, in Trumbull's words, an "experiment in finally going over the edge of a belief barrier through careful control of photography and projection, to the point where a motion picture can be seen to be a real live event."[184]

The success established the trend for virtual reality entertainment in Las Vegas. By the end of the 1990s, dozens of simulators had been put into operation. The defense company McFadden alone installed some 30 simulator platforms.[185] The majority—such as the CINEMA RIDE at *Caesar's Palace* or the THEATER OF SENSATIONS at *The Venetian*—were aimed solely at fairground thrills. Some productions, however, could rival Trumbull's IN SEARCH OF THE OBELISK, such as the $35 million RACE FOR ATLANTIS in the *Forum Shops* annex of *Caesar's Palace*.[186] Its dramatic elements were limited to sportive competition, but the grippingly realistic Imax 3D images made the ride unique.

The most artistically and technically advanced attraction opened, after three years of construction, at the Las Vegas Hilton in early 1998: STAR TREK: THE EXPERIENCE. The $70 million, 6,000 square-foot installation mixed analog and digitally generated simulations with various scenes featuring actors.[187] Director Mario Kamberg had the material spaceship models used in the STAR TREK TV production scanned and digitally generated two-thirds of the four-minute film. The other third consisted of traditionally shot and digitally enhanced images. The ride film was shown in a hyper-realistic replica of DEEP SPACE NINE, the space station from the STAR TREK series.[188] The entirely digitally controlled 3D backdrops had

183 Swain, Bob: "Specially Effective Fun: Interactive Movies," *The Guardian*, August 25, 1994.

184 H. Rheingold: "Total Immersion. Douglas Trumbull's Big Budget VR."

185 N.N.: "Virtual Rides Take Off," *Los Angeles Times*, August 4, 1997.

186 RACE FOR ATLANTIS (USA 1998, D: Arish Fyzee), https://www.giantscreencinema.com/Films/Film-Database/FilmDatabaseDetailView/movieid/239

187 Rubin, Judith: "Are You Experienced? Landmark Entertainment, Paramount Parks, and a Galaxy of Artisans Beam Aboard the $70 Million Star Trek Extravaganza at the Las Vegas Hilton," *TCI (Theatre Crafts International)*, April, 1998.

188 N.N.: "Presskit Star Trek—The Experience," 1999.—See also Freyermuth, Gundolf S.: "Holodeck heute," *c't–magazin für computertechnik*, August 30, 1999, pp. 72-77, http://freyermuth.com/reprints/archiv2008/reprintJMar2008/Holodeck_heute.html.—There are several videos documenting STAR TREK-THE EXPERIENCE; for example *Star Trek: The Technorama Experience* (2008, 49 min.; https://www.youtube.com/watch?v=LulQBf4kLnk) and *The Final Frontier of Star Trek: The Experience – Las*

37 themed scenes. Elements of the museum, the theater, and a second simulation—a 'real' elevator ride that ended with the virtual abduction into the future—further supplemented the immersion to create an interactive fiction totaling 22 minutes in length. 700 000 visitors flocked to the facility in the first six months after it opened, and waiting times of two hours were not uncommon.[189] The central appeal of STAR TREK: THE EXPERIENCE was the possibility of personal participation in a popular mass cultural fiction. "The experience most people have had with STAR TREK over the years has focused on watching television or a movie," Producer Rick Berman stated. "This blows away the proscenium."[190]

The experience of presence was significantly enhanced by the outstanding characteristic of ride films, which set them apart from regular cinematic productions: The viewers in their motion seats followed the events from a first-person perspective, subjectivized as if in a stream of consciousness. Psychologists first described this effect in the late 19th century. Avant-garde writers then employed it as a narrative technique in the early 20th century. Audiovisually, the origins of the first-person perspective go back to the first decades of the 20th century as well, to early flight simulators using point-of-view silent movies.

While the narrative cinema, with a few exceptions, avoided the first-person perspective—the most famous of these exceptions is the noir murder mystery LADY IN THE LAKE[191]—it found its further technological development in the analog flight simulators of the 1950s and 1960s. Remote-controlled TV cameras 'landing' into model landscapes enabled for the first time interactive first-person simulations.[192] Since the 1970s, flight simulation switched to digital 2D and later

Vegas | Expedition Extinct (2020, 28 min; https://www.youtube.com/watch?v=RXcq5C_yAQc)

189 Except for the room-sized reconstruction of the Enterprise D from STAR TREK—THE NEXT GENERATION, the command bridge and the large corridor, all facilities existed twice. That's why the shows could start 30 seconds apart. At peak times, about 2000 paying time travelers per hour were transported into the simulated future. See N.N.: "Presskit Star Trek—The Experience."

190 Cited after ibid.

191 LADY IN THE LAKE (USA 1947, D: Robert Montgomery)

192 J. Rolfe/K. Staples: *Flight Simulation*, p. 156.— Rolfe, J. M. and K. J. Staples: *Flight Simulation*, Cambridge [Cambridgeshire]; New York: Cambridge University Press 1986, p. 156.—At the same time, Walt Disney also started to experiment with first person perspectives. The perspective of analog rides in Disneyland often put the visitors in the role of the hero. The cast of the 1955 ride *Snow White*, for example, spared Snow White: "[S]he was absent in representational form because the spectator was

3D polygon graphics generated and manipulated in real-time. In the late 1980s, when motion rides gained popularity, the first-person perspective was used with particular effectiveness in Virtual Reality. In addition to Lanier's *EyePhone* and other goggle-based systems, the contemporary options included *CAVE* installations (*Cave Automatic Virtual Environment*), which used a set of projectors and 3D glasses and were demonstrated first in 1991.

Compared to these VR experiences, the increased immersion that motion rides achieved by exploiting the first-person perspective contrasted with the continued immobilization of the viewers in their seats, even though these seats were moving a few inches in synchronization with the moving images of the ride film.

"Although motion simulators have tried to bridge the gap between the audience space and the virtual world of the screen and to create a more dynamic response from the passengers, they still share a very traditional nineteenth-century conception about the audience. It was encountered in the diorama as well as in the opera or the melodrama theatre."[193]

The virtual rides ran automatically and identically, like any film, and thus independently of the audience and its behavior. As a result, the experience was physically intensive but still primarily passive. Only before and after the motion ride, when the participants moved by foot through themed narrative spaces, often guided by actors, opportunities arose to interact. To this end, the typical attraction had three stages. The pre-show or onboarding produced "the immersive experience by gradually dissolving the border separating the physical world and the virtual world of the screen, even though this takes place in the sphere of play and the willing suspension of disbelief."[194] It was followed by the ride-show as the centerpiece and then the post-show or debriefing, which predominantly had the audience exit through an appropriately themed gift store, i.e., a sales area whose offers were mainly merchandising goods from the just lived-through fiction.

The ride-show itself usually consisted of three acts as well. The first act was about establishing the normality of the fictional world. Actors, appropriately costumed, introduced the participants to the supposed event or travel plan and instructed them how to react to certain dangers or emergencies, which were, of course, presented as very unlikely. Thereupon the announced ordinary course of events would set in, usually a form of visiting, sightseeing, or voyage. An

meant to take her place in the story." (K. Marling: "Imagineering the Disney Theme Parks," p. 75)

193 E. Huhtamo: "Encapsulated Bodies in Motion," p. 174.

194 Ibid., pp. 171-172.

unexpected turning point, a breaking catastrophe or attack, marked the end of the first act. The second act then was about survival and escape. At its center was the motion ride. As the show's climax, it let the participants physically experience moments of extreme hopelessness and then a dramatic rescue. In the end, the participants emerged to safety.

Looking back on the 1990s, parallels with another emerging and tremendously popular entertainment genre are striking. First-person virtual rides were put into operation and became successful with both critics and the public when pioneering games like WOLFENSTEIN 3D, DOOM, and QUAKE were released and popularized the FPS game genre.[195] Even though their pixel graphics could not keep up with the 'high resolution' of the ride attractions, which consisted of material environments and moving images in cinematic quality, the first-person shooters' affinity to the motion rides can hardly be overlooked.

In this sense, the achievements of motion rides such as IN SEARCH OF THE OBELISK and STAR TREK—THE EXPERIENCE were twofold: They serviced the exact needs for interactive post-cinematic immersion that digital games, and especially first-person shooters, aimed to satisfy, and they enabled such post-cinematic immersion in a sensual quality that in the 1990s was not yet available digitally. Compared to digital games, the price for this was a lower level of interactivity. Karen Collins alludes to this anticipation of playfully acting in and interacting with hyperreal environments when she writes: "If video games had parents, one would be the bespectacled academic world of computer science and the other would be the flamboyant and fun penny arcade, with a close cousin in Las Vegas."[196] Thus, again, essential elements of digital audiovisuality, particularly games, were anticipated in Las Vegas: the possibility to experience high-resolution hyperrealities in the first-person perspective.

IX RE-FRAMING LAS VEGAS: ANTICIPATING THE METAVERSE

In summary, since the end of World War II and until the turn of the century, the remote desert town of Las Vegas transformed into a national and then global

195 WOLFENSTEIN 3D (id Software 1992, O: John Romero, Tom Hall); DOOM (id software 1993, O: John Carmack, John Romero et al.); QUAKE (id Software, O: John Carmack, John Romero et al.)

196 Collins, Karen: *Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*, Cambridge, Mass.: MIT Press 2008, p. 7.

metropolis of post-industrial entertainment. Three significant phases could be distinguished. In the early 1950s, the faux frontier town of Las Vegas caught up with industrial modernism while at the same time developing anticipatory forms of postmodern and digital urbanity. The moving magic of neon décor typical for Las Vegas in the 1950s and 1960s illuminated, enchanted, and enhanced the material reality of concrete buildings. This augmentation with signs and meanings via analog visual media anticipated the semiotic augmentation of urban spaces with digital augmented reality applications decades later.

In a second phase, since the mid-1960s, casino hotels adopted techniques Walt Disney had developed for his first theme park Disneyland a few years earlier. With the theming of their interiors, casinos such as *Caesar's Palace* tried to overcome the window view on fictional worlds in favor of an immersive entry. At the same time, in the realm of digital graphics, Yvan Sutherland called for a similar immersion into artificial worlds with his utopian concept of the "ultimate display."

Between 1968, when the *Circus Circus* casino hotel opened featuring neon signs and classically themed attractions, and 1989, when the new *Mirage* casino hotel replaced the standard parking lot, and the neon signs, with a three-dimensional 'material' volcano, Las Vegas suffered through two decades of aesthetic as well as economic stagnation. In this same period, digital technology—computers as well as digital networking, pioneered in the American West—pushed its way out of the large institutions of science, the military, and government and into everyday life. The Arpanet went online in 1969, and game consoles and personal computers appeared in the 1970s. With them, digital games and productivity software such as spreadsheets and Word processing became popular. The Internet, the networking of tens of thousands of individual networks, was launched in 1983. The first GUI computer for the mass market, the Apple Macintosh, was introduced in 1984, and the first commercial Virtual Reality System, VPL's Eyephone, in 1988.

The rapid popularization of digital technology in work and entertainment prompted a range of speculation about the future of media. Such efforts to imagine new media run through the modern era. Common to these media utopias—the total work of art, the feelies, the total cinema—was that they aimed for an increased degree of sensuality compared to existing audiovisual media: While audiences viewed theatrical performances, feature films, and television programs with a sense of detachment, as if through a window into another world, the media utopias promised complete immersion. However, these visions not only stimulated the imagination. They also shaped contemporary media practice. The function of such guiding principles, Michael Friedewald writes, is to "steer the individual

perceptions and value systems of the people involved in producing technical knowledge in a common direction."[197]

In the period when the dissatisfaction with Las Vegas came into evidence, and a radical rebuilding of the city was initiated, three new media utopias emerged. In 1982, William Gibson conceived of a new communication medium—"Cyberspace"—as a disembodied "consensual hallucination."[198] His vision extended the technological development of digital networking and dematerialization into the future. Consequently, the term Cyberspace became a buzzword during the boom period of the WWW in the 1990s.[199] Five years later, Gene Roddenberry introduced the holodeck in ENCOUNTER AT FARPOINT, the pilot episode of the TV series STAR TREK: THE NEXT GENERATION (1987-1994).[200] This futuristic variant of 'materialized' holographic 3D images influenced the collective imagination 114 times through the many episodes of the TV series and several STAR TREK motion pictures.[201]

The utopian holodeck, like STAR TREK's universal replicator, was situated in the context of efforts to complement the decades-long process of progressing virtualization—replacing more and more hardware with software—with options to re-materialize the media produced in the digital transmedium. The 1980s saw the rise of desktop publishing through laser printers. At the end of the decade, consumers gained the ability to burn CD-ROMs and later DVD-ROMs. Also, 3D printers entered the market, allowing material instantiations of virtual objects if only very rudimentarily in the first decades.

In this respect, the third phase of Las Vegas as a place of the future, which commenced in the 1990s, can be interpreted as a re-materialization of digital desires, i.e., as attempts to realize in the material world the virtual realities that could not be produced virtually, or not yet in satisfactory quality. The new casino hotels along the Strip pioneered immersion in fantasy buildings and replicas of existing

197 Friedewald, Michael: *Der Computer als Werkzeug und Medium: Die geistigen und technischen Wurzeln des Personal Computers*, Berlin: GNT-Verlag, 1999, p. 23, my translation.

198 W. Gibson: *Neuromancer*, p. 6.

199 See G. Freyermuth: *Cyberland*.

200 ENCOUNTER AT FARPOINT (USA 1987, D: Corey Allen).

201 Sezen, Tonguc Ibrahim: "Beyond the Holonovel. The Holographic Interactive Digital Entertainment Utopia of Star Trek," in: *Playing Utopia: Futures in Digital Games*, ed. Benjamin Beil, Gundolf S. Freyermuth, and Hanns Christian Schmidt, Bielefeld: transcript, 2019, pp. 187-207, here p. 184. See also Murray, Janet Horowitz: *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*, New York: Free Press 1997.

exotic locations through hyperrealistic worldbuilding. Their designers created a digital update of the Hollywood film-inspired analog practice of theming, which now became more aligned with digital image processing. They also tried to simulate interactions with fictional worlds in material reality. Last but not least, Las Vegas's casino hotels anticipated elements of digital play with innovative motion rides that were themed and scripted and combined elements of theater, cinema, and digital simulation.

The technological and cultural change that loomed during this transitional phase in Las Vegas was, in this respect, twofold. On the one hand, it concerned the design of transmedia 3D spaces for playful action. It happened in parallel to developments in digital gaming. The theme park and game designer Don Carson remembers accordingly that, for him, in the early 1990s, digital games approached the qualities of these real-world attractions. "Not until the release of games like MYST and DOOM did I fully see a potential bridge between the theme park world I was working in and the world of the computer on my desktop."[202] Game designer Celia Pearce expresses the same sentiment, including online worlds:

> "Thanks in part to the advent of 3D and eventually real-time 3D in the 1990s, video games have come increasingly to resemble theme parks in terms of both design and culture. [...] In addition to making use of the major facets of theme park creation—spatial narrative, experience design, 'illusion of authenticity' and immersion—digital games and networks also introduce three new key dimensions to spatial media: Agency, Identity and Persistent Community."[203]

Since then, three decades have passed, and digital games have made great strides in their effort to replicate in the transmedium of software the immersive experience of hyperreality that theme parks and Las Vegas offered first. Strong "synergies between computer games, architecture and urbanism"[204] were established during this process. Immersive narrative in virtual urban spaces has characterized many seminal digital games, among them games about Las Vegas, beginning with GODFATHER: THE GAME.[205] In spring 2022, Wikipedia lists about 75 such

202 D. Carson: "Environmental Storytelling."

203 C. Pearce: "Narrative Environments," p. 201.

204 Borries, Friedrich von, Steffen P. Walz, and Matthias Böttger: "Introduction," in: *Space Time Play: Computer Games, Architecture and Urbanism–The Next Level*, Basel: Birkhäuser 2007, pp. 10-13, here p. 11.

205 GODFATHER: THE GAME (Creative Materials 1991). The game "admirably recreates the gangster-filled streets of New York and Las Vegas with the same kind of muted

games.[206] One of the most recent is HORIZON FORBIDDEN WEST.[207] It shows Las Vegas in ruins, reclaimed by nature, partly submerged under water: "[T]he true beauty of the long-forgotten city is revealed, with gorgeous holographic light displays showing a glimmer of what Las Vegas once was."[208] However, the Wikipedia listing still misses the title that best represents the close relationship between Las Vegas and digital games: GRAND THEFT AUTO SAN ANDREAS.[209] The 2004 game takes place twelve years earlier, in 1992, in Las Venturas, a virtual version of Las Vegas. But besides classic casino hotels like *Caligula's Palace* (i.e., *Caesar's Palace*) and *The Clown's Pocket* (i.e., *Circus Circus*), Las Venturas also offers resorts that were not yet built at that time, such as *Pirates in Men's Pants* (i.e., *Treasure Island* that only opened in October 1993). In creating Las Venturas, GRAND THEFT AUTO SAN ANDREAS made the material hyperreality of Las Vegas experienceable in virtual hyperrealism. Following the thoughts of Jean Baudrillard, Las Venturas is thus the simulacrum of a simulacrum of a simulacrum.[210]

The second significant change that Las Vegas heralded in the 1990s was a functional reconstruction of reality itself, or more precisely, the superimposition of virtuality on the material world. This trend of digital culture found its expression in a media utopia as well. In his 1992 novel *Snow Crash,* Neal Stephenson combined global digital networking—Gibson's *Cyberspace*—with a material experience of virtuality—Roddenberry's *Holodeck*—in his *Metaverse*.[211] The description of this virtual world of entertainment reads as if Stephenson modeled it on the Strip: The center of the Metaverse is a networked 3D boulevard called "The Street," 100 meters wide and over 60,000 kilometers long, that exists parallel to reality. But not only the Strip of the 1990s seemed to be a kind of betaverse—a

---

shades and period detail that went into the Oscar-winning movie." (Fox, Matt: *The Video Games Guide: 1,000+ Arcade, Console and Computer Games, 1962-2012*, Jefferson, N.C.: McFarland & Company, Inc., Publishers 2013, p. 125.)

206 N.N.: "Video Games Set in the Las Vegas Valley," *Wikipedia*, 2022, https://en.wikipedia.org/wiki/Category:Video_games_set_in_the_Las_Vegas_Valley

207 HORIZON FORBIDDEN WEST (Sony Interactive Entertainment 2022, O: Guerilla Games). I thank Benjamin Beil and Karen Bohlender for pointing me to the game.

208 Barnes, Jessica: "Horizon Forbidden West: How Stanley Chen's Impact on Las Vegas Opened the Door to Poseidon," *GameRant*, March 8, 2022, https://gamerant.com/horizon-forbidden-west-stanley-chen-impact-las-vegas-poseidon/

209 GRAND THEFT AUTO SAN ANDREAS (Rockstar Games 2004, O: Dan Houser et al.).

210 Baudrillard, Jean: *Simulacra and Simulation*, Ann Arbor: University of Michigan Press 1994 (*1981).

211 Stephenson, Neal: *Snow Crash*, New York: Bantam Books 1992.

beta version of the Metaverse. Parallel to the conversion of the Strip into a hyper-realistic material montage of fantastic and exotic locales, experiments began to realize Metaverse-like experiences in the realm of software.

Online 3D worlds emerged with meeting places, stores, educational and entertainment offerings, and even their own currencies. The first was CYBERTOWN in 1995,[212] the most successful SECOND LIFE, which opened in 2003 and had almost 65 million users in 2021.[213] At the same time, online games evolved into proto-Metaverses, rivaling in revenue Las Vegas casinos. WORLD OF WARCRAFT, for example, attracted at its peak in 2017 up to 46 million monthly players and produced around $10 billion in revenue.[214] MINECRAFT, which Microsoft bought in 2014 for $2.5 billion, is currently populated by over 140 million players every month.[215] However, as in Las Vegas, visitors to this and many other successful online worlds not only play (or gamble). They create new self-images—in the case of games, their avatars. They celebrate weddings and birthdays and organize company parties and school graduations. Millions also attend mass concerts of superstars like BTS, Ariana Grande, or Travis Scott.[216] At present, the most successful 3D game worlds include the online "experience" platform ROBLOX (2006), with 43 million daily users and a market value of $38 billion in 2021,[217] and FORTNITE

212 CYBERTOWN (IVN 1995, O: Hawk & SFX); see Robertson, Adi: "When the Virtual City of Cybertown Went Dark, Its Citizens Rebuilt It," *The Verge*, April, 2022, https://www.theverge.com/23032658/cybertown-revival-blaxxun-virtual-community-rebuilding-project

213 SECOND LIFE (Linden Lab 2003, O: Philip Rosedale), see Greener, Rory: "Second Life Storefront User Traffic Jumps 35 Percent in 2021," *XR Today*, January 12, 2022, https://www.xrtoday.com/virtual-reality/second-life-user-traffic-jumps-35-percent-in-2021/

214 WORLD OF WARCRAFT (Blizzard Entertainment 2004, O: Jeff Kaplan, Rob Pardo, Tom Chilton); see Galov, Nick: "15 Facts About The WoW Player Count in 2022," *Web Tribunal*, April 6, 2022, https://webtribunal.net/blog/wow-player-count/#gref

215 MINECRAFT (Mojang Studios 2011, O:Markus Perrsson); see K, Branko: "15+ Mind-boggling Minecraft Statistics for the Dedicated Gamer," ibid., https://webtribunal.net/blog/minecraft-statistics/#gref

216 For example, the most successful live music concert in MINECRAFT, the *Fire Festival* in January 2019, attracted 87 000 fans. (N.N.: "Largest Live Music Concert Performed in Minecraft," *Guinness World Records*, 2022, https://www.guinnessworldrecords.com/world-records/466539-largest-live-music-concert-performed-in-minecraft

217 ROBLOX (Roblox Corporation 2006, O: Roblox Corporation); see Wise, Jason: "Roblox Statistics 2022: How Many People Play Roblox?" April 22, 2022,

(2017), with over 350 million registered users.[218] Its developer Epic Games explicitly wants to bring about the Metaverse[219] and offers a "MetaHuma Creator" that allows players to create their hyper-realistic doppelgangers.[220]

Compared to the media of the analog past, these virtual game worlds possess a unique quality: They have transformed from escapist entertainment, to which one retreats for a few hours, to living environments that—like Las Vegas—exist parallel to and entirely on an equal footing with everyday reality. Under the conditions of cultural digitalization, media utopias become social utopias, utopias of new hybrid life forms that survive partly in materiality and partly in virtuality. David J. Chalmers calls such a hybrid reality "Reality+."[221] He posits that virtual realities are "genuine realities"[222] and that we can enjoy "a fully meaningful life" in other realities than the physical one.[223] This assertion of a "virtual realism"[224] seems to contradict the material foundation of enlightenment and modernity, but it fits into the paradigm of postmodernity, its playful anything-goes culture. The Metaverse, as Neal Stephenson designed it and powerful high-tech corporations of our time want to realize it, is insofar also a wager on new 'ultimate questions,' a new metaphysics. Decades ago, these contemporary challenges of advanced virtualization to our understanding of material reality and physical life were anticipated, configured, and shaped aesthetically by Las Vegas's hyperrealities.

---

https://earthweb.com/roblox-statistics/; see also Robertson, Adi: "Apple Said Roblox Developers Don't Make Games, and Now Roblox Agrees: The Word 'Game' Has Been Replaced by 'Experience' across Roblox's Website," *The Verge*, May 14, 2021, https://www.theverge.com/2021/5/14/22436014/apple-roblox-epic-fortnite-trial-what-is-game-name-change

218 FORTNITE (Epic Games 2017, O: Epic Games, People Can Fly); see Garton, Alex: "How many people play Fortnite? Player count in 2022," *Dexerto*, April 13, 2022, https://www.dexerto.com/fortnite/how-many-people-play-fortnite-player-count-1666278/

219 N.N.: "Announcing a $1 Billion Funding Round to Support Epic's Long-Term Vision for the Metaverse," *Epic Games*, April 13, 2021, https://www.epicgames.com/site/en-US/news/announcing-a-1-billion-funding-round-to-support-epics-long-term-vision-for-the-metaverse

220 N.N.: "High-Fidelity Digital Humans Made Easy," *Unrealengine.com*, April 23, 2022, https://www.unrealengine.com/en-US/metahuman-creator

221 Chalmers: *Reality+*.

222 Ibid., loc. 159.

223 Ibid., loc. 162.

224 Ibid., loc. 1807.

LITERATURE

Al, Stefan: "The Most American City Isn't New York, L.A., Or Chicago," *Fast Company*, November 4, 2017, https://www.fastcompany.com/90109341/learning-from-las-vegas-no-really

Asimov, Isaac: *Foundation.* New York: Gnome Press, 1951.

Asimov, Isaac: *Foundation and Empire.* New York: Gnome Press, 1952.

Asimov, Isaac: *Second Foundation.* New York: Gnome Press, 1953.

Barnes, Jessica: "Horizon Forbidden West: How Stanley Chen's Impact on Las Vegas Opened the Door to Poseidon," *GameRant*, March 8, 2022. https://gamerant.com/horizon-forbidden-west-stanley-chen-impact-las-vegas-poseidon/

Baudrillard, Jean: *Simulacra and Simulation*, Ann Arbor: University of Michigan Press 1994 (*1981).

Baum, L. Frank, and Fanny Y. Cory: *The Master Key: An Electrical Fairy Tale, Founded Upon the Mysteries of Electricity and the Optimism of Its Devotees*, Indianapolis: Bowen-Merrill Co. 1901.

Bazin, André: "The Myth of Total Cinema," in: *What Is Cinema?*, pp. 23-27. Berkeley: University of California Press 1967-1971 (*1946).

Benjamin, Walter: "Paris, the Capital of the Nineteenth Century," in: *The Arcades Project*, pp. 3-13, Cambridge, Mass.: Belknap Press 1999.

Benjamin, Walter: "The Work of Art in the Age of Mechanical Reproduction," in: *Illuminations. Essays and Reflections. Edited and With an Introduction by Hannah Arendt. Preface by Leon Wieseltier*, pp. 217-252, New York: Schocken Books 2007.

Benjamin, Walter: *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*, Cambridge, Mass.: Belknap Press of Harvard University Press 2008.

Bieger, Laura: *Ästhetik der Immersion. Raum-Erleben zwischen Welt und Bild. Las Vegas, Washington und die White City*, Bielefeld: transcript 2007.

Bioy Casares, Adolfo: *The Invention of Morel*, New York: New York Review Books 2003 (*1940).

Bloch, Ernst: "Nonsynchronism and the Obligation to Its Dialectics," *New German Critique* 11 (1977), pp. 22-38.

Blume, Mary: "Disney Conquers Another World: Design," *International Herald Tribune*, September 27, 1997.

Booth, Cathy: "In With The New," *Time*, November 2, 1998, http://content.time.com/time/world/article/0,8599,2053901,00.html

Borries, Friedrich von, Steffen P. Walz, and Matthias Böttger: "Introduction," in: *Space Time Play: Computer Games, Architecture and Urbanism—The Next Level*, pp. 10-13, Basel: Birkhäuser 2007.

Bush, Vannevar: "As We May Think," *The Atlantic Monthly*, July, 1945, http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm

Bye, Ken: "50 years of VR with Tom Furness: The Super Cockpit, Virtual Retinal Display, HIT Lab, & Virtual World Society," *Voices of VR Podcast*, November 17, 2015, https://voicesofvr.com/245-50-years-of-vr-with-tom-furness-the-super-cockpit-virtual-retinal-display-hit-lab-virtual-world-society/

Caillois, Roger: *Man, Play and Games*, Urbana: University of Illinois Press 2001 (*1958).

Campbell-Kelly, Martin, and William Aspray: *Computer: A History of the Information Machine*, New York: Basic Books 1996.

Carpo, Mario: *The Alphabet and the Algorithm*, Cambridge, Mass.: MIT Press 2011.

Carson, Don: "Environmental Storytelling: Creating Immersive 3D Worlds Using Lessons Learned from the Theme Park Industry," *Gamasutra*, March 1, 2000, https://www.gamedeveloper.com/design/environmental-storytelling-creating-immersive-3d-worlds-using-lessons-learned-from-the-theme-park-industry

Caudell, Thomas, and David Mizell: "Augmented Reality: An application of Heads-Up Display Technology to Manual Manufacturing Processes," *Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences* 2 (1992), pp. 659-669, https://www.researchgate.net/publication/3510119_Augmented_reality_An_application_of_headsup_display_technology_to_manual_manufacturing_processes

Chalmers, David John: *Reality+: Virtual Worlds and the Problems of Philosophy*, New York: W. W. Norton & Company 2022.

Chaplin, Heather: "Will The 21st Century Be Defined By Games?" *Kotaku*, September 12, 2013, http://www.kotaku.com.au/2013/09/will-the-21st-century-be-defined-by-games/

Chase, Linda: *Hyperrealism*, London: Academy Editions 1975.

Clarke, Arthur C.: "Extraterrestial Relays," *Wireless World* (October, 1945), pp. 305-308, http://www.lsi.usp.br/~rbianchi/clarke/ACC.ETRelays.html

Coe, Jonathan: "The Lost World Jurassic Park," *New Statesman*, July 18, 1997.

Collins, Karen: *Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*, Cambridge, Mass.: MIT Press 2008.

Conroy, Ed: "The History of the Tour of the Universe Spaceship Simulator at the CN Tower," *blogTO*, October, 2019.,https://www.blogto.com/city/2020/09/tour-of-the-universe-cn-tower/

Davis, Susan G.: "Variations on a Theme Park: The New American City and the End of Public Space," *The Nation*, August 31, 1992.

Desbiens, Jacques: "The Dispositif of Holography," *Arts* 8, no. 1 (2019), p. 28. https://www.mdpi.com/2076-0752/8/1/28

Descartes, Rene: *Meditations on First philosophy: In Which the Existence of God and Immortality of the Soul are Demonstrated*, Arlington, VA: Richer Resources Publications 2012 (*1641).

Eco, Umberto: *Travels in Hyper Reality: Essays*, San Diego: Harcourt Brace Jovanovich 1986.

Ferrell, David: "Riding A Speeding Bullet: You Can Test Your Nerves Of Steel On Superman the Escape," *Los Angeles Times*, March 13, 1997.

Foucault, Michel: "Of Other Spaces: Utopias and Heterotopias," *foucault.info*, 1967, translated from Architecture, Mouvement, Continuité no. 5 (1984), pp. 46-49, https://foucault.info/documents/heterotopia/foucault.heteroTopia.en/

Fox, Matt: *The Video Games Guide: 1,000+ Arcade, Console and Computer Games, 1962-2012*, Jefferson, N.C.: McFarland & Company, Inc., Publishers 2013.

Freud, Sigmund: *The Interpretation of Dreams*, London: G. Allen & Company, Ltd. 1913.

Freyermuth, Gundolf S.: *Cyberland: Eine Führung durch den High-Tech-Underground*, Berlin: Rowohlt 1996.

Freyermuth, Gundolf S.: "Computer machen Leute," *c't–magazin für computer-technik*, February 16, 1998, pp. 90-97.

Freyermuth, Gundolf S.: "Holodeck heute," *c't–magazin für computertechnik*, August 30, 1999, pp. 72-77, http://freyermuth.com/reprints/archiv2008/reprintJMar2008/Holodeck_heute.html

Freyermuth, Gundolf S.: "Vegas, Virtuelle Stadt," *Telepolis*, March 9, 2000, https://www.heise.de/tp/features/Vegas-virtuelle-Stadt-3441695.html?seite=all

Freyermuth, Gundolf S.: *Kommunikette 2.0*, Hannover: Heise 2002.

Freyermuth, Gundolf S.: "Digitalisierung: Die transmediale Konversion von Kunst und Unterhaltung in der zweiten Hälfte des 20. Jahrhunderts," Diss phil, Freie Universität Berlin 2004.

Freyermuth, Gundolf S.: "From Analog to Digital Image Space: Towards a Historical Theory of Immersion," in: *Immersion in the Arts and Media*, edited by Burcu Dogramaci and Fabienne Liptay, pp. 165-203, Amsterdam: Rodopi 2015.

Friedberg, Anne: *Window Shopping: Cinema and the Postmodern*, Berkeley: University of California Press 1993.

Friedewald, Michael: *Der Computer als Werkzeug und Medium: Die geistigen und technischen Wurzeln des Personal Computers*, Berlin: GNT-Verlag 1999.

Galov, Nick: "15 Facts About The WoW Player Count in 2022," *Web Tribunal*, April 6, 2022, https://webtribunal.net/blog/wow-player-count/#gref

Garton, Alex: "How many people play Fortnite? Player count in 2022," *Dexerto*, April 13, 2022, https://www.dexerto.com/fortnite/how-many-people-play-fortnite-player-count-1666278/

Gibson, William: *Neuromancer*, New York: Ace Books 1984.

Gibson, William: "Talk of the Nation: The Science in Science Fiction," *National Public Radio* (Interview), November 30, 1999, Citation 11:50 min, http://www.npr.org/templates/story/story.php?storyId=1067220

Giedion, Siegfried: *Space, Time and Architecture: The Growth of a New Tradition*, Cambridge: Harvard University Press 1949.

Gilmour, Kim: "Network Neighbourhoods," *Internet Magazine*, July 1, 2001.

Gorman, Tom: "Weekend Escape: Las Vegas; The Strip Says, 'Kids, Got Clean Thrills For You, But You Gotta Bring Your Boring Parents. Deal?'" *Los Angeles Times*, November 20, 1994.

Gottdiener, Mark: *The Theming of America: Dreams, Visions, and Commercial Spaces*, Boulder Colo.: Westview Press 1997.

Greener, Rory: "Second Life Storefront User Traffic Jumps 35 Percent in 2021," *XR Today*, January 12, 2022, https://www.xrtoday.com/virtual-reality/second-life-user-traffic-jumps-35-percent-in-2021/

Greenwald, Jeff: "Trumbull's Vision," *Wired*, January, 1997, http://www.wired.com/wired/archive/5.01/fftrumbull_pr.html

Harris, Neil: "Expository Expositions. Preparing for the Theme Parks," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, edited by Karal Ann Marling, pp. 19-27, Montréal, Paris, New York: Flammarion 1997.

Hegel, Georg Wilhelm Friedrich: *Vorlesungen über die Ästhetik I, Die Idee und das Ideal. Hg. G. Lasson*, Leipzig: F. Meiner 1931.

Huhtamo, Erkki: "Encapsulated Bodies in Motion: Simulators and the Quest for Total Immersion," in: *Critical Issues in Electronic Media*, edited by Simon Penny, pp. 159-186, Albany: State University of New York Press 1995.

Huxley, Aldous: *Brave New World*, Garden City, N.Y.: Doubleday, Doran & Company, Inc. 1932.

Huxtable, Ada Louise: "Living With the Fake, and Liking It," *The New York Times*, March 30, 1997, https://www.nytimes.com/1997/03/30/arts/living-with-the-fake-and-liking-it.html

Huxtable, Ada Louise: *The Unreal America: Architecture and Illusion*, New York: New Press: Distributed by W.W. Norton 1997.

Iritani, Evelyn: "A Mall Master Takes On the World: Architect Jon Jerde Believes Cities Can Be Saved Through an Infusion of Fantasy and Fun That Blurs Cultural Boundaries. Not Everyone Likes the Idea," *Los Angeles Times*, July 5, 1996.

Jameson, Fredric: "Reification and Utopia in Mass Culture," *Social Text* 1 (1979), pp. 130-148, https://pdfs.semanticscholar.org/0106/0805d5df2d3ea7d050efa3a356a83aeb942e.pdf?_ga=2.178703139.644611213.160916491821237975 77.1609164918

Johnston, Sean F.: "Whatever Became of Holography?" *American Scientist*, November-December, 2011, https://www.americanscientist.org/article/whatever-became-of-holography

June, Laura, and David Peirce: "Incredible Photos From The CES Vault: 1967 To 2014," *The Verge*, January 4, 2013, https://www.theverge.com/2013/1/4/3828848/ces-photo-history

Jungk, Robert: *Tomorrow is Already Here: Scenes from a Man-Made World*, London: R. Hart-Davis 1954.

K, Branko: "15+ Mind-boggling Minecraft Statistics for the Dedicated Gamer," *Web Tribunal*, April 6, 2022, https://webtribunal.net/blog/minecraft-statistics/#gref

Kac, Eduardo: "Beyond the Spatial Paradigm: Time and Cinematic Form in Holographic a=Art," *Sixth International Symposium on Display Holography* 3358 (1998). https://www.spiedigitallibrary.org/conference-proceedings-of-spie/3358/0000/Beyond-the-spatial-paradigm--time-and-cinematic-form-in/10.1117/12.301482.short?SSO=1

Kachelriess, Rob: "The 10 Best Implosions in Las Vegas History," *Thrillist*, February 25, 2014, https://www.thrillist.com/entertainment/las-vegas/the-10-best-implosions-in-las-vegas-history

Kant, Immanuel: *Critique of Judgment*, Indianapolis, Ind.: Hackett Pub. Co. 1987 (*1790).

Kant, Immanuel: *Critique of Pure Reason*, Cambridge; New York: Cambridge University Press 1998 (*1781).

Kelly, Kevin: "Eno: Gossip Is Philosophy. Kevin Kelly Talks to the Prototypical Renaissance 2.0 Artist," *Wired*, May, 1995, http://www.wired.com/wired/archive/3.05/eno_pr.html

Klein, Norman M.: *The Vatican to Vegas: A History of Special Effects*, New York: New Press 2004.

Kotkin, Joel: *The New Geography: How The Digital Revolution Is Reshaping the American Landscape*, New York: Random House 2000.

Kracauer, Siegfried: *Jacques Offenbach and the Paris of His Time*, New York, Cambridge, Mass.: Zone Books, Distributed by MIT Press 2002.

Lehrer, Jonah: "Royal Flush: How Roger Thomas redesigned Vegas," *The New Yorker*, March 19, 2012, https://www.newyorker.com/magazine/2012/03/26/royal-flush-2

Leonhardt, David: "John Tukey, 85, Statistician; Coined the Word 'Software'," *The New York Times*, July 28, 2000, http://www.nytimes.com/2000/07/28/us/john-tukey-85-statistician-coined-the-word-software.html

Leyden, Peter: "On the Edge of the Digital Age," *Star Tribune*, June 4, 1995.

Mandel, Margery: "Careers: Entrepreneur Laid Foundations In Another World," *Boston Herald*, June 16, 1996.

Manovich, Lev: "The Poetics of Augmented Space," *Visual Communication* 5, no. 2 (2006), pp. 219-240.

Marcus, Greil: "Forty Years of Overstatement. Criticism and the Disney Theme Parks," in: *Designing* Disney's *Theme Parks: The Architecture of Reassurance*, edited by Karal Ann Marling, pp. 201-207, Montréal, Paris, New York: Flammarion 1997.

Marling, Karal Ann: "Imagineering the Disney Theme Parks," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, edited by Karal Ann Marling, pp. 29-176, Montréal, Paris: New York: Flammarion 1997.

McCarthy, Susan: "Techno-Soaps and Virtual Theater: Brenda Laurel Can Blow Anything Up," *Wired*, May/June, 1993, http://www.wired.com/wired/archive/1.02/brenda.html

McCracken, Harry: "Time's Machine of the Year, 30 Years Later," *Time*, January 4, 2013, https://techland.time.com/2013/01/04/times-machine-of-the-year-30-years-later/

Mitchell, William John: *City of Bits: Space, Place, and the Infobahn*, Cambridge Mass.: MIT Press 1995.

Murphy, Cullen: "The Real Thing," *The Atlantic Monthly*, August, 1997, https://www.theatlantic.com/magazine/archive/1997/08/the-real-thing/376923/

Murray, Janet Horowitz: *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*, New York: Free Press 1997.

N.N.: "Vegas Hopes to Lure Families," *Journal and Courier*, December 3, 1989, https://www.newspapers.com/newspage/264230932/

N.N.: "Roller-Coasters: Hold On To Your Hat," *The Economist U.S. Edition*, February 24, 1996.

N.N.: "Virtual Rides Take Off," *Los Angeles Times*, August 4, 1997.

N.N.: "Presskit Star Trek—The Experience," 1999.

N.N.: "California Rises to 6th Place On List of Largest Economies," *Los Angeles Times*, October 5 2000.

N.N.: "Synthetic Vision Would Give Pilots Clear Skies All the Time," *NASA*, April 22, 2008, https://www.nasa.gov/centers/langley/news/factsheets/SynthVision.html

N.N.: "Venedig in Wien," *Wien Geschichte Wiki*, June 6, 2017, https://www.geschichtewiki.wien.gv.at/Venedig_in_Wien

N.N.: "Number of Visitors to Las Vegas in the United States from 2000 to 2019," 2020, https://www.statista.com/statistics/221042/visitors-to-las-vegas/

N.N.: "Announcing a $1 Billion Funding Round to Support Epic's Long-Term Vision for the Metaverse," *Epic Games*, April 13, 2021, https://www.epicgames.com/site/en-US/news/announcing-a-1-billion-funding-round-to-support-epics-long-term-vision-for-the-metaverse.

N.N.: "High-Fidelity Digital Humans Made Easy," *Unrealengine.com*, April 23, 2022, https://www.unrealengine.com/en-US/metahuman-creator.

N.N.: "Largest Live Music Concert Performed in Minecraft," *Guinness World Records*, 2022, https://www.guinnessworldrecords.com/world-records/466539-largest-live-music-concert-performed-in-minecraft

N.N.: "Video Games Set in the Las Vegas Valley," *Wikipedia*, 2022, https://en.wikipedia.org/wiki/Category:Video_games_set_in_the_Las_Vegas_Valley

N.N.: "Las Vegas—die erste Stadt des 21. Jahrhunderts," *Moviepilot*, no date. https://www.moviepilot.de/movies/las-vegas-die-erste-stadt-des-21-jahrhunderts

Naughton, John: *A Brief History of the Future: The Origins of the Internet*, London: Weidenfeld & Nicolson 1999.

Negroponte, Nicholas: *Being Digital*, New York: Vintage 1996 (*1995).

Negroponte, Nicholas (with Neil Gershenfield): "Wearable Computing," *Wired*, Dezember, 1995.

Neumann, John von: "First Draft of a Report on the EDVAC," (1945). https://web.mit.edu/STS.035/www/PDFs/edvac.pdf

Parkinson, Bradford W., Stephen T. Powers, and others: "The Origins of GPS, and the Pioneers Who Launched the System. Part 1," *GPS World*, May 1, 2010, https://www.gpsworld.com/origins-gps-part-1/

Pearce, Celia: "Narrative Environments: From Disneyland to World of Warcraft." In: *Space Time Play: Computer Games, Architecture and Urbanism—The Next Level*, edited by Friedrich von Borries, Steffen P. Walz and Matthias Böttger, pp. 200-205, Basel: Birkhäuser 2007.

Piekarski, Wayne, and Bruce Thomas: "ARQuake: The Outdoor Augmented Reality Gaming System," *Communications of the ACM* 45, no. 1 (January 1, 2002): pp. 36-38. https://www.academia.edu/2218400/ARQuake_the_outdoor_augmented_reality_gaming_system

Pimentel, Ken, and Kevin Teixeira: *Virtual Reality: Through the New Looking Glass*, New York: Intel/McGraw-Hill 1993.

Pine, B. Joseph, and James H. Gilmore: *The Experience Economy: Work is Theatre & Every Business a Stage*, Boston: Harvard Business School Press 1999.

Pizzanelli, Daniel J.: "The Evolution of the Mythical Hologram," *Proceedings of the SPIE. The International Society for Optical Engineering* (1992): pp. 430-437.

Popper, Frank: *Art of the Electronic Age*, New York: Harry N. Abrams 1993.

Rheingold, Howard: *Virtual Reality*, New York: Summit Books 1991.

Rheingold, Howard: "Total Immersion. Douglas Trumbull's Big Budget VR," *Wired*, November, 1993, http://www.wired.com/wired/archive/1.05/luxor.html

Rheingold, Howard: *Smart Mobs: The Next Social Revolution*, Cambridge, Mass.: Perseus Pub. 2002.

Robertson, Adi: "Apple Said Roblox Developers Don't Make Games, and Now Roblox Agrees: The Word 'Game' Has Been Replaced by 'Experience' across Roblox's Website," *The Verge*, May 14, 2021, https://www.theverge.com/2021/5/14/22436014/apple-roblox-epic-fortnite-trial-what-is-game-name-change

Robertson, Adi: "When the Virtual City of Cybertown Went Dark, Its Citizens Rebuilt It," *The Verge*, April 2022, https://www.theverge.com/23032658/cybertown-revival-blaxxun-virtual-community-rebuilding-project

Robinson-Jacobs, Karen: "Take That, France—We're No. 5; Economy: If It Were a Separate Country, California Would Be Right Behind the U.K," *Los Angeles Times*, June 14 2001.

Rolfe, J. M., and K. J. Staples: *Flight Simulation*, Cambridge [Cambridgeshire]; New York: Cambridge University Press 1986.

Rubin, Judith: "Are You Experienced? Landmark Entertainment, Paramount Parks, and a Galaxy of Artisans Beam Aboard the $ 70 Million Star Trek Extravaganza at the Las Vegas Hilton," *TCI (Theatre Crafts International)*, April, 1998.

Scheinin, Richard: "Through the Looking Glass: 'Virtual Realities' Can Take Us Into Other Worlds," *Chicago Tribune*, February 18, 1990.

Sezen, Tonguc Ibrahim: "Beyond the Holonovel. The Holographic Interactive Digital Entertainment Utopia of Star Trek," in: *Playing Utopia: Futures in*

Digital Games, edited by Benjamin Beil, Gundolf S. Freyermuth and Hanns Christian Schmidt, pp. 187-207, Bielefeld: transcript 2019.

Shannon, Claude Elwood: "A Mathematical Theory of Communication. Reprinted with corrections from The Bell System Technical Journal, Vol. 27, pp. 379-423, 623-656, July, October, 1948," 1948, http://people.math.harvard.edu/~ctm/home/text/others/shannon/entropy/entropy.pdf

Shepard, Mark: *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space*, New York City, Cambridge, Mass.: Architectural League of New York; MIT Press 2011.

Shim, Richard: "West Coast Cities Tops in Wireless," *CNET News.com*, March 3 2003.

Shoro, Mike: "Paris Las Vegas Turns 20," *Las Vegas Review Journal*, August 31, 2019, https://www.reviewjournal.com/business/casinos-gaming/paris-las-vegas-turns-20-photos-1838639/

Sklar, Marty: "The Artist as Imagineer," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, edited by Karal Ann Marling, pp. 13-17, Montréal, Paris, New York: Flammarion, 1997.

Sorene, Paul: "Jaron Lanier's EyePhone: Head and Glove Virtual Reality in the 1980s," *flashbak*, November 24, 2014, https://flashbak.com/jaron-laniers-eyephone-head-and-glove-virtual-reality-in-the-1980s-26180/.

Sorkin, Michael: "Introduction: Variations on a Theme Park," in: *Variations on a Theme Park: The New American City and the End of Public Space*, edited by Michael Sorkin, pp. xi-xv, New York: Hill and Wang 1992.

Steinquist, Paul: "The Future of Car Navigation Has Arrived," *The New York Times*, February 25, 2021, https://www.nytimes.com/2021/02/25/business/GPS-car-systems.html

Stephenson, Neal: *Snow Crash.* New York: Bantam Books, 1992.

Stephenson, Neal: "Innovation Starvation," *Wired*, October 27, 2011, https://www.wired.com/2011/10/stephenson-innovation-starvation/

Steuer, Jonathan: "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication*, no. 42, 4 (1992), pp. 73-93, https://steinhardtapps.es.its.nyu.edu/create/courses/2015/reading/steuer.pdf.

Sutherland, Ivan Edward: "A Head-Mounted Three Dimensional Display," *AFIPS '68 (Fall, part I): Proceedings of the December 9-11, 1968, fall joint computer conference, part I*, December, 1968, pp. 757-764, https://www.cise.ufl.edu/research/lok/teaching/ve-s07/papers/sutherland-headmount.pdf

Sutherland, Ivan Edward: *Sketchpad: A Man-Machine Graphical Communication System.* New York: Garland Pub. 1980 (*1963), https://www.cl.cam.ac.uk/techreports/UCAM-CL-TR-574.pdf

Sutherland, Ivan Edward: "The Ultimate Display," in: *Multimedia: From Wagner to Virtual Reality*, edited by Randall Packer and Ken Jordan, pp. 232-236, New York: Norton 2001 (*1965).

Swain, Bob: "Specialley Effective Fun: Interactive Movies," *The Guardian*, August 25, 1994.

Tagliabue, John: "Giving Theme Parks a Whirl; Europeans Warm to an American-Style Entertainment," *The New York Times*, September 2, 2000.

Taylor, Mark C.: *Hiding*, Chicago: University of Chicago Press 1997.

Thomas, Bob: *Walt Disney: An American Original*, New York, N.Y.: Hyperion 1994.

Thompson, Hunter S.: *Fear and Loathing in Las Vegas: A Savage Journey to the Heart of the American Dream*, New York N.Y.: Warner Books 1982 (*1971).

Tuan, Yi-Fu with Steven D. Hoelscher: "Disneyland: Its Place in World Culture," in: *Designing Disney's Theme Parks: The Architecture of Reassurance*, edited by Karal Ann Marling, pp. 191-198, Montréal, Paris, New York: Flammarion 1997.

Turing, Alan: "On Computable Numbers, with an Application to the Entscheidungsproblem," *Proceedings of the London Mathematical Society* ser. 2. vol. 42 (1936-7): pp. 230-265; corrections, Ibid, vol 43 (1937) pp. 544-546, http://www.abelard.org/turpap2/tp2-ie.asp

Turing, Alan: "Computing Machinery and Intelligence." *Mind*, no. 59 (1950): pp. 433-460, http://www.loebner.net/Prizef/TuringArticle.html

Venturi, Robert: "Las Vegas After Its Classical Age," in: *Iconography and Electronics Upon a Generic Architecture: A View From the Drafting Room*, edited by Robert Venturi, pp. 123-128, Cambridge, Mass.: MIT Press 1996.

Venturi, Robert, Denise Scott Brown, and Steven Izenour: *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*, Cambridge Mass.: MIT Press 1977.

Wagner, Richard: *Das Kunstwerk der Zukunft*, Leipzig: O. Wigand 1850.

Watson, James D., and F.H.C. Cricks: "A Structure for Deoxyribose Nucleic Acid," *Nature*, 2. April, 1953, p. 737, http://biocrs.biomed.brown.edu/Books/Chapters/Ch%208/DH-Paper.html

Watts, Steven: "The Magic Kingdom: Walt Disney and the American Way of Life," *The New Republic*, June 15, 1998.

White, LaTrina: "Theme Parks With History Entice Eclectic Fun Seekers," *CNN.com*, July 14, 2003, http://www.cnn.com/2003/TRAVEL/07/01/sprj.st03.theme.parks/

Wise, Jason: "Roblox Statistics 2022: How Many People Play Roblox?" April 22, 2022, https://earthweb.com/roblox-statistics/

Wolfe, Tom: "Las Vegas (What?) Las Vegas (Can't hear you! Too noisy) Las Vegas!!!!," in: *The Kandy-Kolored Tangerine-Flake Streamline Baby*, pp. 3-28, New York: Noonday Press 1966.

FILMOGRAPHY

2001—A SPACE ODYSSEY (GB/USA 1968, D: Stanley Kubrick)
BLADE RUNNER (USA 1982, D: Ridley Scott)
CASABLANCA (USA 1942, D: Michael Curtiz)
CLEOPATRA (USA 1963, D: Joseph L. Mankiewicz)
CLOSE ENCOUNTERS OF THE THIRD KIND (USA 1977, D: Steven Spielberg)
ENCOUNTER AT FARPOINT (USA 1987, D: Corey Allen)
LADY IN THE LAKE (USA 1947, D: Robert Montgomery).
LAS VEGAS—DIE ERSTE STADT DES 21. JAHRHUNDERTS (Germany 2000, D: Eckhardt Schmidt)
PARIS, TEXAS (West Germany / France 1984, D: Wim Wenders)
SILENT RUNNING (USA 1972, D: Douglas Trumbull)
THE PURPLE ROSE OF CAIRO (USA 1985, D: Woody Allen)
VIVA LAS VEGAS VEGAS (USA 1964, D: George Sidney)

GAMEOGRAPHY

CYBERTOWN (IVN 1995, O: Hawk & SFX)
DOOM (id software 1993, O: John Carmack, John Romero et al.)
FORTNITE (Epic Games 2017, O: Epic Games, People Can Fly)
GODFATHER: THE GAME (Creative Materials 1991)
GRAND THEFT AUTO SAN ANDREAS (Rockstar Games 2004, O: Dan Houser et al.)
HORIZON FORBIDDEN WEST (Sony Interactive Entertainment 2022, O: Guerilla Games)
MINECRAFT (Mojang Studios 2011, O: Markus Perrsson)
MOONDUST (Creative Software Inc. 1983, O: Jaron Lanier)
QUAKE (id Software, O: John Carmack, John Romero et al.)
ROBLOX (Roblox Corporation 2006, O: Roblox Corporation)
SECOND LIFE (Linden Lab 2003, O: Philip Rosedale)
WOLFENSTEIN 3D (id Software 1992, O: John Romero, Tom Hall)
WORLD OF WARCRAFT (Blizzard Entertainment 2004, O: Jeff Kaplan, Rob Pardo, Tom Chilton)