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Remaking Eden: On the Reproducibility of Images and the Body in the Age of Virtual Reality and Genetic Engineering

INGEBORG REICHLÉ

New images of human beings

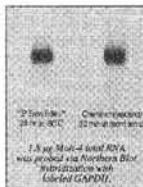
> If one follows David Harvey's observation that advertising is the official art of capitalism¹, then it would appear worthwhile to take a look at advertisements for the laboratory equipment of genetic engineers, advertisements which frequently employ citations from the world of high Renaissance art. In the magazine *Nature*, Du Pont advertises with the *Mona Lisa's* smile: "Smile! Renaissance™..."² Above the text, da Vinci's *Mona Lisa* is presented à la Andy Warhol in multiple reproductions, i.e., as 'clones.'

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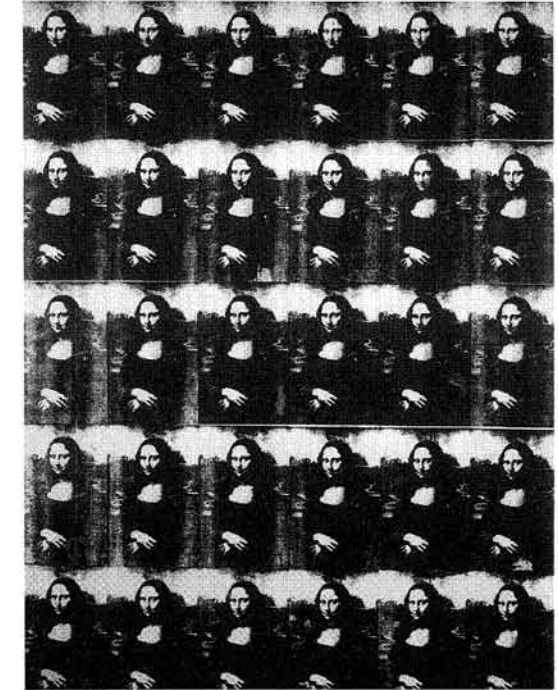


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01 Du Pont "Smile! Renaissance[™]...", advertisement in *Nature* (1995)

- 1 Harvey, David (1992): *The Condition of Postmodernity*, Cambridge Mass., 63, see Haraway, Donna (1998): Deanimation: Maps and Portraits of Life itself. In: *Picturing Science – Producing Art*, Caroline A. Jones / Peter Galison, Eds., London / New York, 181–207.
- 2 The advertisement appeared in the magazine *Nature* (1995), vol. 373, no. 6509, 1.
- 3 *Nature* (1995), vol. 373, no. 6509, 8.

Walter Benjamin's thesis about the artwork's loss of aura in the age of its technical reproducibility⁴ would seem to apply directly to these advertising images. At the beginning of his essay "The Work of Art in the Age of Mechanical Reproduction," Benjamin argued that works of art have in principle always been reproducible, as all works created by human beings are.⁵ Benjamin coupled this diagnosis of the loss of aura with an emancipatory achievement: through its technical reproducibility, the artwork has for the first time in the history of humanity been liberated from its parasitic existence in ritual.⁶ Future generations will presumably look back at our current age – an age in which the technical reproducibility of the human body through cloning has become possible in the laboratories of genetic engineers – and say something similar about the image of humans in



02 Andy Warhol, *Thirty Are Better Than One*, 1963 silkscreen print on acrylic paint on canvas, private collection, 279.4 x 240 cm

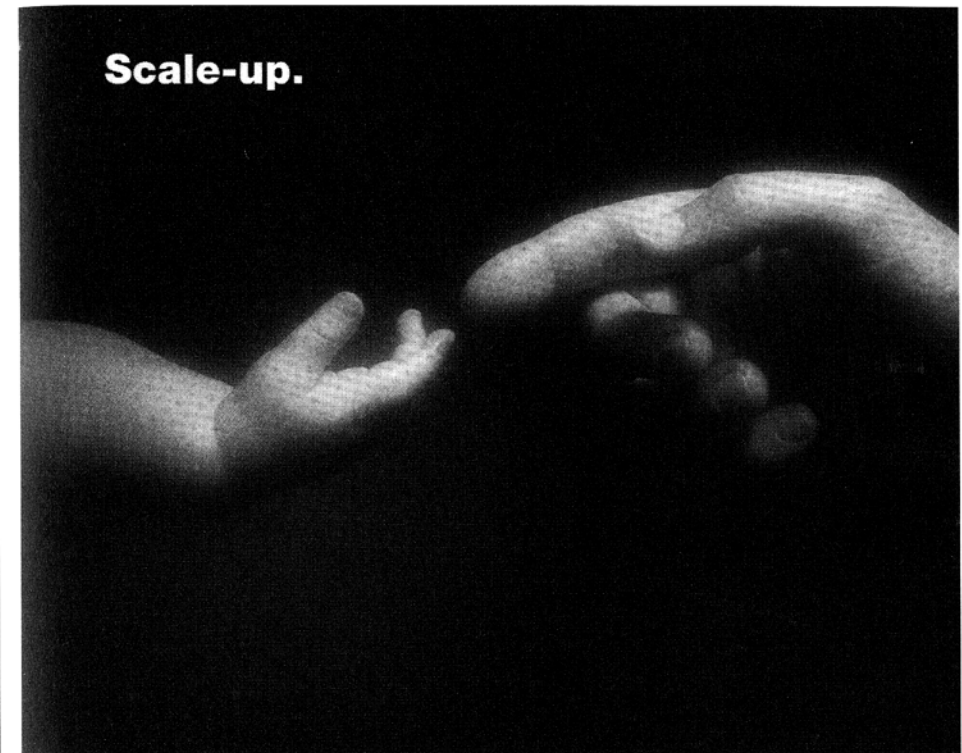
- 4 For arguments against Benjamin's thesis of the artwork's loss of aura in the age of its technical reproducibility, see Tillim, Sidney (1983): Benjamin Rediscovered: The Work of Art After the Age of Mechanical Reproduction. In: *Artforum*, vol. 21, no. 5, 65–73 and Bredekamp, Horst (1992): Der simulierte Benjamin. Mittelalterliche Bemerkungen zu seiner Aktualität. In: *Frankfurter Schule und Kunstgeschichte*, Andreas Berndt, Ed., Berlin, 117–140.
- 5 Benjamin, Walter (1991 [1936]): Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit. In: *Walter Benjamin, Abhandlungen, Gesammelte Schriften, vol. 1.2*, Rolf Tiedemann / Hermann Schweppenhäuser, Eds., Frankfurt am Main, 436–475. An English translation of the essay with the title 'The Work of Art in the Age of Mechanical Reproduction' can be found in: *Illuminations*, New York (1968), 217–251. The text first appeared 1936 in a French translation as an article in the *Zeitschrift für Sozialforschung* no. 5.
- 6 Benjamin 1991: 442.

which life has shriveled to mere commodity forms and the digital world has made the distinction between original and copy obsolete.

Over the past years, numerous art exhibitions⁷ have focused on the *new images of human beings* which have arisen as a result of these new technical possibilities of reproducing the body – whether these be media reproduction in the computer-generated worlds of cyberspace, or medical reproduction in the form of simulation models, or biological reproduction in the test tubes in genetic engineers' laboratories.⁹ The discussions here have moved between two poles, the one emphasizing the ostensibly impending option of escaping the burdensome physical body and existing weightless between bytes and bits, and the other focusing on the technological realization of this and the technical reproducibility of organic life.

The moment in which these new technologies directly converge is the rhetoric surrounding them, a rhetoric which stands in that problematic intellectual tradition that envisages human technology as potentially capable of creating a new nature, a second nature, and thereby implying the old motif of the technical re-instantiation of paradise,¹⁰ in which

- 7 In the arts, particularly in media art, the body has become the venue of this questioning, as it is evident in the boom of exhibitions at the beginning of the 1990's focussing on body images and body perception. I name only a few exhibitions which possessed a clear theoretical conception: *Corporal Politics*, MIT List Visual Art Center, Cambridge Mass. 1992; *PostHuman*, Deichtorhallen, Hamburg, 1992; *Abject Art. Repulsion and Desire in American Art*, Whitney Museum of American Art, New York, 1993; *Real Sex, Real Real, Real Aids, Real Text*, Vienna / Graz / Salzburg / Klagenfurt, 1994; *Oh Boy, it's a Girl!*, Kunstverein München, 1994; *The Body, Le Corps*, Kunstmuseum Bielefeld, 1994.
- 8 *Ars Electronica* (1993) focussing on *Genetische Kunst – Künstliches Leben; GameGrrl. Abwerten biotechnologischer Annahmen, Zurich / Munich* (1994); *Frankensteins Kinder*, Zurich (1997); or *Tenacity: Cultural Practices in the Age of Information- and Biotechnology* (2000), New York / Zurich. On this, see **Kuni, Verena** (1998): *Metamorphose im Zeitalter ihrer technischen Reproduzierbarkeit*. In: *Raum und Körper in den Künsten der Nachkriegszeit*, Akademie der Künste, Ed., Amsterdam / Dresden, 201–217.
- 9 Two of the most important are the 'Visible Human Project' and the 'Human Genome Project.'
- 10 On the paradise tradition, see **Stöcklein, Ansgar** (1969): *Leitbilder der Technik. Biblische Tradition und technischer Fortschritt*, Munich, 36ff.



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□□ YMC "Scale-up", advertisement in *Nature* (1995)

there is neither transience and death, nor sex and sin. The medium in which information and communication technologies converge with the life sciences is the computer. Information and the life sciences are combined here into a new paradigm, for it is the computer which – as an instrument and as a medium – permits us to get a handle on genetic resources, that is, to analyze them more quickly, to interpret them and to visualize them. Here, we are dealing with a new communication basis *and* a new resource basis.

The creation of a bio-industrial nature

“We used to think our fate is in our stars. Now we know, in large measure, our fate is in our genes,” declared James D. Watson, the first director of the *Human Genome Project*, a billion-dollar, internationally networked program established ten years ago with the goal of completely decoding human DNA. In early April of 2000, J. Craig Venter, an American geneticist

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- 11 The article ‘Why the future doesn’t need us’ by **Billy Joy**, one of the leading heads of the company Microsun Systems and the inventor of the programming language Java, appeared in the April edition 2000 of the magazine *Wired*. It caused a prolonged discussion about the consequences of genetic engineering, robotics and nanotechnology.
- 12 See **Rifkin, Jeremy** (1998): *The Biotech Century: Harnessing the Gene and Remaking the World*, London and **Flessner, Bernd**, Ed. (2000): *Nach dem Menschen. Der Mythos einer zweiten Schöpfung und das Entstehen einer posthumanen Kultur*, Freiburg im Breisgau.
- 13 See **Gottweis, Herbert** (1998): *Governing Molecules: The Discursive Politics of Genetic Engineering in Europe and the United States*, Cambridge Mass. / London, 153–163.
- 14 See **Fox Keller, Evelyn** (1995): *Refiguring Life: Metaphors of Twentieth-century Biology*, New York.
- 15 The processes of such abstract technologies, whose occur in microstructures invisible to the human eye, can only be represented as models and are thus dependent upon visualization. The biologist Donna Haraway refers to the cultural productions of DNA structure, as well as the fetishization of genes and their visualization in a specifically scientific-cultural context, see **Haraway** 1998: 181–187.
- 16 **Watson, James D. / Crick, Francis** (1953): The Structure of DNA. In: *Cold Spring Harbor Symposia on Quantitative Biology*, no. 18, 29–128.
- 17 **Toulmin, Stephen** (1953): *The Philosophy of Science: An Introduction*, London, 34.

and president of the Celera Genomic Company, announced to the Energy Committee of the United States Congress that the first human genome had been decoded. With this, a relatively small private company had – almost single-handedly – achieved the desired results more quickly than public research institutions. The technology of “shotgun” sequencing developed by Venter greatly accelerated the decoding of the human genome. The news of the *complete decoding* of human DNA triggered a new boom in biotechnology stocks, as well as numerous discussions about international patent law, about ethical concepts in the life sciences and ultimately about the future of human beings in general.¹¹

Yet much more interesting than the race to decode the human genome is the fact that the classical separation of science and industry appears today to have become obsolete and that we are still in no position to estimate the consequences of this implosion. Genetic technologies and biotechnologies are regarded as contenders for *the* key technologies in the coming decades. The apostles of this biological revolution continue to promise that these technologies will set in motion nothing less than a second history of creation – this time an artificially created bio-industrial nature which is supposed to replace the original concept of evolution.¹² Since the 1950’s, these apostles have described the future potentials of such technologies – initially of molecular biology and then of genetics – with the aid of the revolution metaphor.¹³ At the beginning of the 1980’s, bioinformatics, the most recent branch of genetics, was celebrated as the expression of a far-reaching upheaval and an historical break.¹⁴ The fusion of the rapid developments of both information and computer technologies with the life sciences led to an enormous acceleration in research and to the use of advanced digital image technologies for the representation of new scientific models with their own aesthetic.¹⁵ The genesis of the visualization of DNA makes clear how aesthetic representations have not only played a decisive role in the description of DNA structure, but that such aesthetic pre-figurations equally determined their discoverer. In 1953, the same year that James D. Watson and Francis Crick published a description of their model of the structure of DNA as a double helix,¹⁶ the philosopher Stephen Toulmin argued that the discovery of new methods of representation lay at the center of all great discoveries in the natural sciences.¹⁷ According to Toulmin, the criteria used to describe the analytic solution to a problem in the natural sciences always includes conceptions of beauty, harmony, simplicity, symmetry or consistency. Even the way in which a scientist seeks results, Toulmin argued,

always involves choices among aesthetic notions – a process which does not deviate significantly from artistic practices.¹⁸ In other words, models are made – they are not simply ‘there’ to be discovered. Just as structural models of DNA have undergone changes over the course of time, the concept of the gene has itself experienced a transformation. Curiously, the meaning of the concept ‘gene’ has been displaced – from an older perspective in which the gene eclipses the organism to the current understanding in which genes trigger dynamic processes within organisms.¹⁹

Today genetic technology makes possible functional interventions in essential life processes. Such technologies allow us to manipulate the reproduction cycle of nature as well as its ecological equilibrium. Above all, however, it has now become possible for humans to alter the genetic code – and with this to explode the boundaries of their own species.

Transgenic art

Geneticists today regard the idea of transplanting genes from one organism to another as harmless and unobjectionable. Transgenic animals and plants have become part of everyday life in the laboratory. Genetic engineers do not see anything monstrous nor supernatural about the con-

- ¹⁸ See **Root-Bernstein, Robert** (1996): Do We Have the Structure of DNA Right? Aesthetic Assumptions, Visual Conventions, and Unsolved Problems. In: *Art Journal, Contemporary Art and the Genetic Code*, vol. 55, no. 1, 47. See also the art-historian Judith Wechsler: **Wechsler, Judith**, Ed. (1978): *On Aesthetics in Science*, Cambridge Mass.; **Root-Bernstein, Robert** (1985): Visual Thinking: The Art of Imagining Reality. In: *Transactions of the American Philosophical Society*, no. 75, 50–67; and **Tauber, Alfred J.**, Ed. (1996): *The Elusive Synthesis: Aesthetics and Science*, Boston.
- ¹⁹ On this subject, see **Fox Keller, Evelyn** (1998): Das Gen und das Humangenomprojekt – zehn Jahre danach. In: Exh. Cat. *Genwelten, Kunst- und Ausstellungshalle der BRD*, Bonn, Petra Kruse, Ed., Cologne, 77–81. On the history of the reception of DNA models in genetic research in the context to gender relations in science, see also **Fox Keller, Evelyn** (1983): *A Feeling for the Organism – The Life and Work of Barbara McClintock*, San Francisco.
- ²⁰ **Flusser, Vilém** (1988): Curies Children. In: *ArtForum*, vol. 16, no. 7, 9.
- ²¹ **Hoffmann, Peter Gerwin** (1987): Mikroben bei Kandinsky. In: *Animal Art, Steirischer Herbst*, Richard Kriesche, Ed., Graz, no page numbers.
- ²² **Davis, Joe** (1996): Microvenus. In: *Art Journal, Contemporary Art and the Genetic Code*, vol. 55, no. 1, 70–74.

cept of recombinant DNA and the idea connected with this of artificially creating a living being from two distinct beings. Genetic engineers and industrial investors – who have entered into a relationship of unprecedented intimacy – promise immeasurable gains from the future creations of human genetics and its medical applications (gene therapy), while playing down the inherent dangers of such technologies. The ideology of genetic determinism serves as the legitimation and the motor of a scientific-industrial branch which can boast double-digit growth rates and whose research findings are more immediately available on the stock market than in the relevant scholarly journals.

Even contemporary artists have taken up the procedures of gene technology and biotechnology in their own works and have transferred the functioning of the genetic laboratory, its instruments and scientific practices, into the aesthetic productions within art galleries. More than a decade ago, Vilém Flusser foresaw the contours of this artistic development and predicted that biotechnics would become an instrument of artists who someday might create wheat with the power of sight, photo-synthetic horses, and

“an enormous color symphony [...] in which the color of every living organism will complement the colors of every other organism” and would provide new artists with a “foundation for intellectual processes which have not existed up to now.”²⁰

A year earlier, the artist Peter Gerwin Hoffmann had presented his installation *Mikroben bei Kandinsky* for the first time in Graz, Austria. *Mikroben bei Kandinsky* consisted of bacterial cultures which Hoffmann had taken from a Kandinsky painting. Hoffman declared that with this procedure the dichotomy of art and nature had been transcended:

“Gene technology has put [...] and end [to] [...] the polarity nature-art. The living organisms [...] that surround us [...] can only be understood and interpreted as works of art.”²¹

Several years ago, the artist Joe Davis thematized attempts to introduce DNA as the carrier of non-biological information in his project *Microvenus*.²² The media artist and theorist Eduardo Kac has moved along this interface between art and gene technology formulated by Flusser in his recent projects *GFP K-9* (1998), *Genesis* (1998/99) and *Bunny* (2000), thereby raising the debate about *transgenic* art as a new art form. These projects are supposed to use artistic means to investigate the cultural effects of the life sciences and their new possibilities for the transformation of life. However, the aesthetic of the artistic staging here drowns out

the investigation of the laboratory as a site of the social processes of construction and as a social institution and a site of knowledge production.²³ Neither the practices nor the rhetoric of scientific debates about gene technology are analyzed in the exhibitions. Transgenic art appears, rather, to participate in a long tradition of art theory centered on the topos of the artist-engineer. However, in contrast to this topos, which referred via Newton's mechanics to the creation of 'living works,' transgenic art today is concerned with the actual creation of new organic life from aesthetic perspectives, a creation which is made possible through direct technological access to DNA, the carrier of genetic substance. In contrast to this, early geneticists such as Jacques Loeb understood themselves as engineer-artists. At the beginning of the 20th century Loeb was convinced that all life processes could ultimately be traced back to clear, simple and controllable connections. His vision was the development of a "biological engineering art" and a "technology of the living being." He did not want to

- 23 Cf. **Haraway, Donna** (1996): *Anspruchsloser Zeuge @ Zweites Jahrtausend. FrauMann trifft OncoMouse. Leviathan und die vier Jots: Die Tatsachen verdrehen*. In: *Vermittelte Weiblichkeit. Feministische Wissenschafts- und Gesellschaftstheorie*, Elvira Scheich, Ed., Hamburg, 347–389 und **Schultz, Susanne** Ed. (1996): *Geld.beat.synthetik. Abwerten bio/technologischer Annahmen*, Berlin / Amsterdam.
- 24 **Loeb, Jacques** (1911): *Das Leben*, Leipzig. See also **Pauly, Philip J.** (1987): *Controlling Life. Jacques Loeb and the Engineering Ideal in Biology*, New York / Oxford.
- 25 **Burnham, Jack** (1968): *Beyond Modern Sculpture: The Effects of Science and Technology on Sculpture of this Century*, New York, 376.
- 26 **Gesser, George** (1993): Notes on Genetic Art. In: *Leonardo*, vol. 26, no. 3, 210.
- 27 See **Kris, Ernst / Kurz, Otto** (1980): *Die Legende vom Künstler: Ein geschichtlicher Versuch*, Frankfurt am Main, 84.
- 28 See **Bredenkamp, Horst** (1992): Der Mensch als 'zweiter Gott'. Motive der Wiederkehr eines kunsttheoretischen Topos im Zeitalter der Bildsimulation. In: *Interface I. Elektronische Medien und künstlerischen Kreativität*, Klaus Peter Dencker, Ed., Hamburg, 134–147.
- 29 See **Reiche, Claudia** (1998): 'Lebende Bilder' aus dem Computer. Konstruktionen ihrer Mediengeschichte". In: *BildKörper. Verwandlungen des Menschen zwischen Medium und Medizin*, Marianne Schuller / Claudia Reiche / Gunnar Schmidt, Eds., Hamburg, 123–165.

limit this re-forming of life to the world of plants and animals, but also wanted to derive from biology the criteria for the communal or social life of humans.²⁴

The return of art-theoretical topoi

The desire to breathe life into created images as well as the attempt to create artificial life are the dreams of artists, which reach back into antiquity. The contemporary appropriation of such dreams, however, involves a number of alterations. Already in 1968, the art theorist Jack Burnham regarded the artists' dream of a Pygmalion created through a computer-generated world of images to be fulfilled:

"As the Cybernetic Art of this generation grows more intelligent and sensitive, the Greek obsession with 'living' sculpture will take on an undreamt of reality."²⁵

The artist George Gesser also sees this artists' dream to have been realized in the connection of art and genetics, and points, in addition to this, to the numerous similarities between traditional sculpture and transgenic art:

"Genetic art involves many of the same choices that traditional painters and sculptors make, choices having to do with color, size, scale, form, texture and pattern. But at the same time, genetic art involves some very different considerations. Since it is alive, genetic art is constantly changing, at least on the surface. Some genetic art is self-replicating, much is seasonal and most is to some degree ecosystem-specific."²⁶

Also inherent in this discourse is the notion of surpassing or exceeding nature, compensating for nature's lacks by bringing together the beauty of individual parts into *one* beautiful body through a combinatory art. In the 15th century, Leone Battista Alberti characterized artists' creations as those of "second Gods." This accords not only with the parable of the "*Deus artifex*" in the sense of an artistically active deity or a deity who supports artists, but also with that parable – recurring since the Renaissance – of the artist who creates his works like a god.²⁷ Over the centuries, the ancient dream of creating 'life itself' has produced a virtually infinite chain of simulation attempts: as the realization of a celibacy machine (*machine célibataire*), the attempt at autonomous male reproduction, a reproduction which does not require the child-bearing female body and which also implies phantasms of immortality. The tradition of this topos continues uninterrupted in the computer-generated world of images,²⁸ and if, through the introduction of genetic algorithms, computer-generated

image worlds appear to be alive,²⁹ this characterization seems all the more valid for transgenic art. If, in the simulation of life processes through images, only the logic of the *bios* is extracted from biology – or to formulate this differently, if the basic laws of biology are distilled from organic systems and introduced into technological systems such as the computer – then the logic of life has been separated from matter. In the rhetoric of the life sciences, the genome has been de-materialized into pure logos, that is, it has become liberated from the *materia* – which has negative connotations in terms of cultural history – and is torn out of *natura*. Through this, the genome becomes symbolically charged as an extract, as the “code of life,” and thus becomes a symbol of the most diverse visions. However, the re-valuing of nature and culture here does not involve – as one might have expected – a transcendence of traditional valuations of the female sex/women as inferior. Once again the *materia*, which since antiquity has been equated with femininity, is strictly devalued in this figure of thought,³⁰ referring questions about the representation of gender in connection with reproduction technologies and thus their cultural and patriarchal implications.

The gender metamorphosis of cyberspace

The new technologies of telecommunication – first and foremost, the Internet and cyberspace – have also acquired a symbolic meaning in a way similar to that of the new technologies of reproduction. Cyberfeminists, in particular, have analyzed the gender metamorphosis of cyberspace with political and theoretical acuity – from the concept of the body in cyberspace up to the positioning of the female subject on the Internet.³¹

30 Becker-Schmidt, Regina (1996): Computer sapiens. Problemaufriß und sechs feministische Thesen zum Verhältnis von Wissenschaft, Technik und gesellschaftlicher Entwicklung. In: *Vermittelte Weiblichkeit. Feministische Wissenschafts- und Gesellschaftstheorie*, Elvira Scheich, Ed., Hamburg, 336ff.

31 Theorists such as Sherry Turkle, Anne Balsamo, Rosi Braidotti et al.

32 See Eerikäinen, Hannu (2000): Cyberspace – Cyborg – Cybersex. On the Topos of Disembodiment in the Cyber Discourse. In: *Nach dem Menschen. Der Mythos einer zweiten Schöpfung und das Entstehen einer posthumanen Kultur*, Bernd Flessner, Ed., Freiburg im Breisgau, 133–179.

33 Robins, Kevin (1996): *Into the Image. Culture and Politics in the Field of Vision*, London / New York, 13.

34 See Kris / Kurz 1980: 84ff.

The thesis which often forms the point of departure here is that current developments in media technologies significantly effect theoretical debates about embodiment and gender identity, and that technologies are always tied to images of the body and gender situated within an historically specific social matrix. One of the most powerful metaphors in the discourse about the new technologies is the disembodiment³² of communication in new media practices.

The history of efforts to transcend the limits of the physical body does not begin with digitalization. In particular, the visual, sight-fixated tradition of Occidental history is implicated in this tendency to disembodiment. Since the Cartesian 17th century, the eye has assumed a life of its own, both discursively and technologically. It has become hypostatized, which also means that the body is denied and the material conditions of seeing and of creating images are suppressed. Descartes is regarded as the source of this strategy of disembodiment, which releases the gaze from all the limitations of human existence. From the *camera obscura* to cyberspace, this virtualization of seeing has been continually perfected, all the way up to the disembodied eye in the world of virtual reality.³³

For a number of years, theorists have been concerned with the desire to leave behind one's physical body and to exist in a virtual body, i.e., the fusing together of human and machine and the ‘dissolution’ of the body as an ontological unit. Today we find ourselves in an advanced stage of development regarding such issues, a development which has been radicalized both by the historical avant-garde and its demand to transgress the boundaries between human and machine and by the dissemination of new technologies. The transgression of art and life or of human and machine was the explicit goal of the historical avant-garde of the 19th and 20th centuries, in particular of Italian futurism. In this projected symbiosis of human and machine, death was not regarded as something evil, but rather was recognized as the fulfillment and re-instantiation of a paradisiacal condition. The transformation of human beings into machines was supposed to secure not only their physical death, but, at the same time, their survival as well. With this vision of a technological re-instantiation of paradise, the futurists placed themselves in an intellectual tradition – as problematic as it is inexhaustible – which postulates human technology as able to mitigate original sin and thus refers to the old motif of the technological re-instantiation of paradise, passed on by artists who claim to be “second Gods.”³⁴

Disembodied communication practices

Today, networked computers make available worldwide a medium which enables communication between interlocutors who are spatially removed from one another and permits them to react simultaneously to each other. Isolated individuals in the new postmodern social order are pushed into a virtual proximity, making possible the revival of communication practices familiar in oral cultures. There is a particular vision connected with this: just as artificial intelligence attempts to realize spirit independent of the body, telematic communication establishes a reciprocal communication independent of the physical location or situatedness of the interlocutors. While the model for dialogical tele-presence can be found in the oral conversation, these two forms of communication are distinguished by the fact that the presence of the body is no longer a presupposition for the former. The written word already introduced a form of communication between interlocutors who were not physically present. However, this was only possible at the price of preventing direct interaction between self and other: written communication is a communication which necessarily forgoes this kind of interaction. And this is precisely what interactivity has been able to achieve: individuals who are not physically present can react to one another in their communication. This is considered to be the specific accomplishment of online-communication. The distinction between oral and telematic communication can thus be described as the distinction between physically-bound and physically-unbound forms of communication. While operating with symbols is indeed possible with traditional literary technologies, an interaction with symbolic artifacts is not. Computer-generated worlds make possible a new interactivity with symbolic structures. With this, however, the observer is not longer merely an observer, but rather becomes a participant in the computer-generated symbolic world of textual and imagistic spaces, a participant who can engage in telematic communication prac-

35 Balsamo, Anne (1993): The Virtual Body in Cyberspace. In: *Research in Philosophy and Technology*, vol. 13, 119–139.

36 Müller, Jörg (1996): *Virtuelle Körper. Aspekte sozialer Körperlichkeit im Cyberspace* (Schriftenreihe des WZB: Wissenschaftszentrum für Sozialforschung), Berlin, 96–105.

37 Austin, John L. (1962): *How to do Things with Words*, Oxford.

38 Butler, Judith (1997): *Excitable Speech. A Politics of the Performative*, London / New York.

tices, if his or her body has been transformed into a semiotic entity. This means that the entry or immersion into virtual reality is only possible through disembodiment.³⁵ The user must transform his or her body into a sign for the body, a transformation which often occurs with the assistance of ‘bioapparatuses’ such as datagloves, dataglasses and datasuits. Here, the term ‘disembodiment’ does not mean that the corporeality of the body has become obsolete, but rather that the body has been divided into a *physical body* which is situated in time and space and a *virtual body* which is present in the symbolic world only as a representation. The corporeality or physical situatedness of communicating individuals is transformed into staged or produced *digital bodies* in the sense of artificially created identities. The physical body – its movements and perspective within the virtual world as symbolic entity – continues to be present: the body must be ‘present’ here, precisely where it does not exist as a physical entity, in this case within a world of ‘data.’ Thus, disembodiment does not mean that the body disappears, but rather that the body is divided into a corporeal, spatio-temporally situated physical body and a virtual body existing only as an expression of data.³⁶ It is not that there are more people who act and communicate via the Internet, but rather that there are more representations – representations for which quite possibly there are no longer any natural references. These representations can be implicit in the sense that real head movements are synchronized with the perspective produced by the images, or they can be explicit in the sense that the body is represented as graphic representation – usually as a graphic hand – within the electronic image-space, i.e., real gestures are coordinated with the simulated hand so that the virtual hand is, in fact, able to act in the virtual world. Depersonalized communication in the Internet nullifies that ‘performative dimension’ of speech described by John L. Austin as “speech as action.”³⁷ In her book *Excitable Speech*, Judith Butler takes up Austin’s idea of the performative.³⁸ For Butler, performativity becomes not only the nucleus in the exercise of power in speech, but also the possibility for the subversion of that power. The fact that Butler takes up Austin’s argument, but ultimately develops a different interpretation of performativity has to do with the different role which she attributes to the embodiment of speech. Butler concludes that speaking bodies can be transformed into data configurations and thereby nullify virtualization, which had constituted the characteristic feature of written or oral communication. The question arising from this is to what degree engendered practices of communication continue or disappear here.

Renaissance™

The fact that the advertisements cited at the beginning of the article play with the question of the technical reproducibility of images and bodies and that they employ citations from high Renaissance art should not be surprising given the current rhetoric of genetic engineering and its industrial uses, in particular its hearkening back to those artists' topoi from antiquity and the Renaissance described above. In the magazine *Nature*, Du Pont advertises with the *Mona Lisa's* smile. Above the text, we see images of da Vinci's *Mona Lisa* filling a grid of five *Mona Lisa's* across and six down, recalling Andy Warhol's larger-than-life photo-screen (in ink and polymer paint) from 1963 *Thirty Are Better Than One*, which consisted of multiple reproductions of the *Mona Lisa*. This alienation assumes the form of a pop art series à la Andy Warhol in the 1960's, which Baudrillard had already interpreted as the "subtle killing of the original."³⁹ YMC advertises with a citation from Michaelangelo's famous frescoes in the Sistine Chapel in Rome: *The Creation of Adam*. Here, however, it is not the power of God's hand which creates Adam, but rather that of a genetic engineer, which we see reaching out to the hand of a small child. In evoking the world of high Western art, these advertising images point to high cultural production. The *Mona Lisa* is a symbol of the culture of Western Humanism, and its creator Leonardo da Vinci⁴⁰ stands for a very particular type of artist, for scientific humanism and technical progress, just as the paintings of the Louvre stand for originality and authenticity. In the pre-digital world, a copy was always inferior to the original: even the best analogic technology could only produce an approximate duplicate. In the digital world, the question of the original

39 Baudrillard, Jean (1993): *Symbolic Exchange and Death*, London, 155.

40 Like almost no other artist, Leonardo da Vinci and his work have been appropriated by the life sciences and degraded within the context of corporate self-representation, advertising, science news illustrations, conference brochures and magazine covers. On this see Haraway 1998: 181–210.

41 Haraway 1998: 197.

42 Richards, Catherine (1993): *Virtual Bodies*. In: *Angles of Incidence. Video Reflections of Multimedia Artworks*, The Banff Centre for the Arts, 15–22, and Hawthorne, Susan (1999): *Cyborgs, Virtual Bodies and Organic Bodies: Theoretical Feminist Responses*. In: *CyberFeminism: Connectivity, Critique and Creativity*, Susan Hawthorne / Renate Klein, Eds., North Melbourne, 213–249.

becomes obsolete, since every copy – even thousands of copies – is just as good as the original.

In the practice of genetic cloning as well, there is no longer any object of reference. Original images and reproductions become indistinguishable, and the modernist opposition of copy and original – upon which most of the art market is ultimately based – is erased by the transnational postmodern power of genetic identification and replication in both bodies and laboratories.⁴¹ Walter Benjamin's thesis of the artwork's loss of aura (today the human body's loss of aura) in an age of technical reproducibility appears particularly apt, as the separation between natural and artificial becomes obsolete.

The discussion of new technologies such as virtual reality, genetic engineering and robotics provides a forum for conflicting views on gender and body politics in postmodern societies. At the center of these conflicts are the postmodern subject and the definitions of gender and technology. The metaphorical images of the body in cyberspace are profoundly intertwined with the issue of technical speculation within a male-dominated society. Violent and sexist imagery are an integral part of contemporary discourses about new telecommunication technologies, discourses which cling to nineteenth-century notions of technology, sexual difference and gender roles in order to resist the transformations brought about by the new postmodern social order.

The predominant metaphors employed by genetic researchers stand unambiguously in the tradition of patriarchal models of thought. The discourses reflect the failure of traditional models of the human body to represent adequately the blurring and layering between cyborgs, the virtual body and the 'real' organic body.⁴² However, although traditional concepts of the body are no longer adequate for these new technologies of reproduction and the old dichotomies have apparently become obsolete, binary constructions of gender continue to reappear as hierarchizing moments in the discourses about these technologies. <

BIBLIOGRAPHY

Print

Rustin, John L. (1962): *How to do Things with Words*, Oxford
Balsamo, Anne (1993): The Virtual Body in Cyberspace. In: *Research in Philosophy and Technology*, vol. 13, 119–139
Baudrillard, Jean (1993): *Symbolic Exchange and Death*, London
Becker-Schmidt, Regina (1996): Computer sapiens. Problemaufriß und sechs feministische Thesen zum Verhältnis von Wissenschaft, Technik und gesellschaftlicher Entwicklung. In: *Vermittelte Weiblichkeit. Feministische Wissenschafts- und Gesellschaftstheorie*, Elvira Scheich, Ed., Hamburg, 336ff.
Benjamin, Walter (1936): L'Œuvre d'art à l'âge de sa reproduction mécanisée. In: *Zeitschrift für Sozialforschung*, vol. 5.
Benjamin, Walter (1968[1936]): The Work of Art in the Age of Mechanical Reproduction. In: *Illuminations*, New York, 217–251.
Benjamin, Walter (1991[1936]): Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit. In: *Walter Benjamin, Abhandlungen, Gesammelte Schriften*, vol. 1.2, Rolf Tiedemann / Hermann Schweppenhäuser, Eds., Frankfurt am Main
Bredenkamp, Horst (1992): Der Mensch als 'zweiter Gott'. Motive der Wiederkehr eines kunsttheoretischen Topos im Zeitalter der Bildsimulation. In: *Interface I. Elektronische Medien und künstlerischen Kreativität*, Klaus Peter Dencker, Ed., Hamburg, 134–147 (=Bredenkamp 1992a)
Bredenkamp, Horst (1992): Der simulierte Benjamin. Mittelalterliche Bemerkungen zu seiner Aktualität. In: *Frankfurter Schule und Kunstgeschichte*, Andreas Berndt, Ed., Berlin, 117–140 (=Bredenkamp 1992b)
Burnham, Jack (1968): *Beyond Modern Sculpture: The Effects of Science and Technology on Sculpture of this Century*, New York
Butler, Judith (1997): *Excitable Speech. A Politics of the Performative*, London / New York
Davis, Joe (1996): Microvenus. In: *Art Journal, Contemporary Art and the Genetic Code*, vol. 55, no. 1, 70–74
Eerikäinen, Hannu (2000): Cyberspace – Cyborg – Cybersex. On the Topos of Disembodiment in the Cyber Discourse. In: *Nach dem Menschen. Der Mythos einer zweiten Schöpfung und das Entstehen einer posthumanen Kultur*, Bernd Flessner, Ed., Freiburg im Breisgau, 133–179
Flessner, Bernd, Ed. (2000): *Nach dem Menschen. Der Mythos einer zweiten Schöpfung und das Entstehen einer posthumanen Kultur*, Freiburg im Breisgau
Flusser, Vilém (1988): Curies Children. In: *Art Forum*, vol. 16, no. 7
Fox Keller, Evelyn (1983): *A Feeling for the Organism – The Life and Work of Barbara McClintock*, San Francisco
Fox Keller, Evelyn (1995): *Refiguring Life: Metaphors of Twentieth-century Biology*, New York
Fox Keller, Evelyn (1998): Das Gen und das Humangenomprojekt – zehn Jahre danach. In: Exh. Cat. *Genwelten, Kunst- und Ausstellungshalle der BRD*, Bonn, Petra Kruse, Ed., Cologne, 77–81

Gesser, George (1993): Notes on Genetic Art. In: *Leonardo*, vol. 26, no. 3, 210
Gottweis, Herbert (1998): *Governing Molecules: The Discursive Politics of Genetic Engineering in Europe and the United States*, Cambridge Mass. / London, 153–163
Haraway, Donna (1996): Anspruchsloser Zeuge @ Zweites Jahrtausend. FrauMann trifft OncoMouse. Leviathan und die vier Jots: Die Tatsachen verdrehen. In: *Vermittelte Weiblichkeit. Feministische Wissenschafts- und Gesellschaftstheorie*, Elvira Scheich, Ed., Hamburg, 347–389
Haraway, Donna (1998): Deanimation: Maps and Portraits of Life itself. In: *Picturing Science – Producing Art*, Caroline A. Jones / Peter Galison, Eds., London / New York, 181–207
Harvey, David (1992): *The Condition of Postmodernity*, Cambridge Mass.
Hawthorne, Susan (1999): Cyborgs, Virtual Bodies and Organic Bodies: Theoretical Feminist Responses. In: *CyberFeminism: Connectivity, Critique and Creativity*, Susan Hawthorne / Renate Klein, Eds., North Melbourne, 213–249
Hoffmann, Peter Gerwin (1987): Mikroben bei Kandinsky. In: *Animal Art, Steirischer Herbst*, Richard Kriesche, Ed., Graz, no page numbers
Joy, Billy (2000): Why the future doesn't need us. In: *Wired* 4/2000
Kris, Ernst / Kurz, Otto (1980): *Die Legende vom Künstler: Ein geschichtlicher Versuch*, Frankfurt am Main
Kuni, Verena (1998): Metamorphose im Zeitalter ihrer technischen Reproduzierbarkeit. In: *Raum und Körper in den Künsten der Nachkriegszeit*, Akademie der Künste, Ed., Amsterdam / Dresden, 201–217
Loeb, Jacques (1911): *Das Leben*, Leipzig
Müller, Jörg (1996): *Virtuelle Körper. Aspekte sozialer Körperlichkeit im Cyberspace* (Schriftenreihe des WZB: Wissenschaftszentrum für Sozialforschung), Berlin, 96–105
Pauly, Philip J. (1987): *Controlling Life. Jacques Loeb and the Engineering Ideal in Biology*, New York / Oxford
Reiche, Claudia (1998): 'Lebende Bilder' aus dem Computer. Konstruktionen ihrer Mediengeschichte". In: *BildKörper. Verwandlungen des Menschen zwischen Medium und Medizin*, Marianne Schuller / Claudia Reiche / Gunnar Schmidt, Eds., Hamburg, 123–165
Richards, Catherine (1993): Virtual Bodies. In: *Angles of Incidence. Video Reflections of Multimedia Artworks*, The Banff Centre for the Arts, 15–22
Rifkin, Jeremy (1998): *The Biotech Century: Harnessing the Gene and Remaking the World*, London
Robins, Kevin (1996): *Into the Image. Culture and Politics in the Field of Vision*, London / New York
Root-Bernstein, Robert (1985): Visual Thinking: The Art of Imagining Reality. In: *Transactions of the American Philosophical Society*, no. 75, 50–67
Root-Bernstein, Robert (1996): Do We Have the Structure of DNA Right? Aesthetic Assumptions, Visual

Conventions, and Unsolved Problems. In: *Art Journal, Contemporary Art and the Genetic Code*, vol. 55, no. 1 **Schultz, Susanne** Ed. (1996): *Geld.beat.synthetik. Abwerten biotechnologischer Annahmen*, Berlin / Amsterdam **Ströcklein, Ansgar** (1969): *Leitbilder der Technik. Biblische Tradition und technischer Fortschritt*, Munich, 36ff. **Tauber, Alfred J.**, Ed. (1996): *The Elusive Synthesis: Aesthetics and Science*, Boston **Tillim, Sidney** (1983): Benjamin Rediscovered: The Work of Art After the Age of Mechanical Reproduction. In: *Artforum*, vol. 21, no. 5, 65–73 **Toulmin, Stephen** (1953): *The Philosophy of Science: An Introduction*, London **Watson, James D. / Crick, Francis** (1953): The Structure of DNA. In: *Cold Spring Harbor Symposia on Quantitative Biology*, no. 18, 29–128 **Wechsler, Judith**, Ed. (1978): *On Aesthetics in Science*, Cambridge Mass.

Illustration

- 01** Du Pont advertisement "Smile! Renaissance™...", 1995. In: *Nature* (1995) vol. 373, no. 6509, 1
- 02** Andy Warhol, Thirty Are Better Than One, 1963. In: *Andy Warhol Retrospektive*, Kynaston McShine, Ed., Munich 1989, 237
- 03** YMC advertisement "Scale-up", 1995. In: *Nature* (1995) vol. 373, no. 6509, 8