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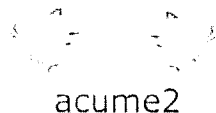
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Anneke Smelik (ed.)

**The Scientific Imaginary  
in Visual Culture**

With 17 figures

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Education and Culture

## Socrates

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Anneke Smelik

## Introduction – The Scientific Imaginary in Visual Culture

The volume *The Scientific Imaginary in Visual Culture* explores the ways in which visual culture represents and remediates science. The ‘scientific imaginary’ that is set out in the title of the book indicates that science has profound effects upon the imagination, and conversely, of the imagination in and upon science. Popular media, art and science have become intricately interlinked in contemporary visual culture. The development of new ‘mediascapes’ calls for an analysis of the ways in which visual culture and science interface. *The Scientific Imaginary in Visual Culture* is a collection of new essays in the interdisciplinary field of media studies, cultural studies and science and technology studies, exploring the mutual contaminations and hybridisations between visual culture and science.

The close relation between science and visual culture in western modernity has been widely commented upon. John Crary’s (1992) seminal book, for example, shows the intersection, convergence and exchange of disciplines ever since the birth of modern science. José van Dijck (2005) explained how the advance of medical sciences was spurred on by visualisation techniques. Galileo Galilei’s discoveries were not feasible without the invention of the telescope, just as the realist perspective in Johannes Vermeer’s paintings was not possible without his fascination for the *camera obscura*. Skills of looking and observing belonged as much to the realm of science and technology as to the realm of the arts. Visual culture as we know it today, with its vast array of audiovisual technologies and explosion of images in both the private and public sphere, derived from the concerted effort of artists and philosophers as well as engineers and scientists. In contemporary text books of media studies the term ‘visual culture’ therefore not only pertains to images in the fine art, popular film and television, advertising or the internet, but also to fields that are often mistakenly thought to be distinct from culture, such as law, medicine and the sciences (Sturken & Cartwright 2009, 347). Visual culture of today envelops a diverse range of images across previously separated but increasingly blurring disciplines.

In the course of the last century it has become clear that much of our scientific knowledge actually depends on its representation in visual culture. One of the central points in the debate about the relationship between science and its visual representation was for a long time centred on the issue of 'truth'. The nineteenth century idea that truth is self-evident by visualising an object, gave way to the Foucauldian idea that truth is an effect of discourse. The idea that to see is to know and to understand has been with us ever since the time of the Greeks; an idea that Foucault (1963) among others unravelled in his analysis of the construction of the medical gaze and clinical anatomy as an important tool for creating a certain truth in science. The development of a medical and clinical gaze was much helped by new technologies such as X-ray photography that could penetrate the surface and reveal the hidden inside of the body. Where photography and X-ray were easily coded as documenting visual evidence, imaging techniques of today, such as MRI scan, CT scan or PET scan, endoscopy, ultrasound, or computed tomography, require highly trained skills to be read.

While scientific truth may be 'complexified' through postmodern thought, science still holds a huge influence over the visual imaginary. There is, however, a certain equation between visualisation techniques and scientific truths, in the sense that in visual culture of today hierarchies may have been turned around and scientific images do not spell out a self-evident truth any longer. Postmodern culture has the effect of flattening out hierarchical differences between images, collapsing borders between science and popular media, and undoing strict boundaries between fact and fiction. In a witty and complicated argument that I cannot do justice to in this short introduction, W.J.T. Mitchell even claims that "images are like living organisms" (Mitchell, 2005, 11). At the same time artists increasingly engage with science in a growing body of artworks that does engage with 'real' living organisms, under the name of 'bio-art', 'sci-art', 'geneti-art' or the like. The postmodern turnover of hierarchies and the contemporary mutual engagement between art and science may pull together those two fields after they had radically diverged in the nineteenth century. The 'third culture' that C.P. Snow (1959) envisaged for the future may be closer than he imagined in his famous essay on 'the two cultures' of art and science. As Sian Ede points out, scientists talk more about 'beauty' than artists do today (Ede 2005, 1). She also claims that the public is better informed about contemporary science than it is about contemporary art. The question therefore shifts perhaps from issues of truth and evidence to issues of beauty and affect.

*The Scientific Imaginary in Visual Culture* not only addresses how visual representations of science persuade, move, worry or affect us, but also raises critical and ethical issues about contemporary science. The recurrent issues that surface time and again in the scientific imaginary in visual culture can be ranged in three categories: structures and processes of the human mind and body; new

technologies in science; and ethical controversies (see also Ede 2005, 3). These elements return in many of the chapters of this book. To take just a few examples, the question of human mind and body return in the experience of video art and in experiments with perception in new media (chapters 6 and 7), as well as in the pervasive figure of the cyborg (chapter 5). Science's new technologies are discussed in the last three chapters of the book on experimental bioart as well as in the popular imagination in the movies (chapter 3). Ethical controversies are raised in the historical account of the imagination of human interiority (chapter 1), in the political aspirations of Futurism (chapter 3), in the critical discussion of the posthuman (chapter 4) and in the medical practice of in vitro fertilisation (chapter 8). This is by no means an exhaustive account, because in fact the three categories are not neatly distributed across the chapters and may often overlap and intertwine throughout the case studies that are discussed. The book thus presents a critical study of certain ways in which diverse cultural practices mediate scientific ideas and discourses.

The volume starts with a historical account of the scientific imaginary in visual culture, from representations of the human body in art and science, to cinematic or artistic representations of science and technology. Ever since scientific developments in genetics, information technology and cybernetics open up new possibilities of intervention in human lives, cultural theorists have explored the notion of the 'posthuman' (Hayles 1999). In a philosophical interlude the book re-traces the origins of the concept of the 'human' and opens up to the critical notion of the posthuman as a way to move towards a sustainable future. In the second part of the book several authors analyse figurations of the 'posthuman' in media and genres such as science fiction, 'videomorphic' culture, digital (or rather 'enactive') media and in scientific practices. Sometimes, the posthuman is figured as an uncanny 'other' and sometimes as an ethical imperative to a different kind of experience, perception or affect. The third part of the volume explores the relatively new phenomenon of 'bioart'. Through an engagement with scientific and technological developments, the bioartists address ethical issues that are either dominated or ignored by the sciences. From the chapters the reader will certainly get the idea that visual culture of today not only celebrates science but also exposes the scientific illusion of the ultimate mastery of life (cf. Mitchell 2005, 334).

The essays together interrogate the ways in which visual culture and science interface by using interdisciplinary methodologies. The blurring of boundaries between human/machine, nature/culture, technology/organism, sex/gender, heralded by the figuration of the cyborg (Haraway 1991), constitutes a theoretical point of departure for this book. The researchers question the idea of 'humanness' in a posthuman or even postnatural world. Many examples from visual culture and art show the permeable boundaries between art and science,

and the authors engage likewise with current scientific and technological concerns. This volume highlights the search for tools and theories by which we can effectively analyse the complex interplay between textual, visual, imaginary, technological and biological dimensions of science and of the scientific imaginary.

## Part I: History and Philosophy

*The Scientific Imaginary in Visual Culture* opens with three essays that provide a historical background to representations of science in Western culture, ranging from the fine arts in classical times, to popular cinema, to modern and post-modern art of today.

In the first chapter, Robert Zwijnenberg compares three historical moments of our knowledge of the human body's interior: first, the anatomical opening of our body's interior from the fourteenth century onwards and the depiction of human interiority in anatomical drawings and prints, by for example Vigevano, Da Vinci and Rembrandt; second, the representation of the body's interior by means of medical imaging technologies from the end of the nineteenth century onwards in X-ray technology, endoscopy, ultrasound, CT-scan, MRI-scan, and PET; and, third, the exposure of the interior human body at the cellular level, as it took off in particular in biomedical and genetic research after the Second World War. Zwijnenberg shows that in the early modern period anatomical knowledge was intertwined with broader philosophical and religious views about human life and the human body, which is no longer the case in the second and third phase of imaging physical interiority. In discussing contemporary bioart, such as Susan Aldworth and the Tissue Culture and Art Project, he shows that the philosophical, ethical and cultural implications of life-scientific reflection on life can be uncovered through artistic imagination. In other words, art can be critical about the cultural embedding of new technologies in ways that science itself is not, enabling art to act again as a participant in the public debate on the life sciences. Zwijnenberg argues that such participation by artists is crucial, if we value public discussions on these concerns that are not exclusively guided by life sciences experts.

In the second chapter, Matteo Merzagora gives a historical overview of science as a topic and of scientists as a character in popular cinema, arguing that films have contributed to the shaping of the image of science and scientists among the general public. The main characteristic of scientists on screen is their ambivalence: they are good guys in their desire to understand and improve life, but they become bad guys when they try to master and control the world. The most common plot involving scientists, therefore, concerns an unstable equilibrium

between knowledge and power. Cinema recognizes that science has the power to both understand and to change the world, and it exploits this double edged power to satisfy its narrative goals. In addition to the classical science fiction topics such as encounters with alien worlds, Hollywood's scientific explorations tend to concentrate on natural catastrophes, man made disasters, manipulation of the living world, creation of artificial beings or intelligence, the relation between science and war (in particular the atomic bomb). Merzagora argues that these are the kind of topics where science can feature in its Jekyll and Hyde's suit: ambivalent and controversial. Science as portrayed in popular films is not a representation of real science, nor are popular films a faithful mirror of science in society. Cinema, therefore, reflects, constructs, and influences public perception of science and the interrelationships between science and society at large.

In the third chapter, Katia Pizzi, takes us back to the Italian Futurists and their indiscriminate endorsement of the machine, as laid down in the *Manifesto of Futurism* in 1909 by Marinetti. Pizzi explores how the movement of Futurism proposed and pursued an original aesthetic re-thinking of artistic practice, hinging on the contamination and hybridisation between visual, textual and scientific discourses. She does so by comparing the prominent figure of Marinetti to the lesser known artists Paladini and Pannaggi of the post-war Futurist avant-garde. Pizzi shows that these two artists both devised and circulated a lucid conceptualisation of machine aesthetics that was much more persuasive than Marinetti's own hackneyed reflections on machines. She claims that Marinetti's Promethean, fetishised, and sexualised machines failed to acknowledge the machine's social and economic reality. In her view, Marinetti does not resolve the relationship between man and machine, because he remains trapped in a prose that is redolent of sexual attraction and betrays latent fear and alienation. Instead, Pizzi argues that Pannaggi and Paladini's stance is in fact socially and politically embedded, and therefore heralds far more convincing and enduring cyborg alliances.

## Philosophical Interlude

After the historical background in the first part of the volume, Rosi Braidotti gives the reader the necessary philosophical background to the notion of the 'posthuman'. This will help to set the philosophical grounding for parts II and III about contemporary practices in the visual cultures of media and bioart.

In the fourth chapter, Braidotti first offers a historical context for discourses on the posthuman. She discusses the poststructuralist critique of humanism, which denounces the view of the human subject as rational, autonomous, co-

herent and endowed with self-consciousness. In spite of this poststructuralist attack on the human subject, Braidotti shows that certain forms of humanism lingered on, for example in its masculinist and eurocentrist perspectives, which needed to be undone by feminism, postcolonialism and anti-racism. In the context of the dominance of science and technology, however, another form of humanism is more relevant, and that is its persistent anthropocentrism. Braidotti argues that in the scientific imaginary of today the human has become posthuman, because biotechnologies, genetic engineering, and information and communication technologies have collapsed the boundaries between animals, vegetables, humans and machines. An anthropocentric view of the human can therefore no longer be maintained. This throws open the self–other relationship and demands a new ethics, which for Braidotti involves a return to the materiality of the body and the primacy of life itself. Only a bio-egalitarian perspective can lead to the social and ecological sustainability of the technologically and scientifically mediated world in which we live. Thus, Braidotti calls for an “embodied and embedded” accountability of the posthuman that we have become, embracing all that lives.

## Part II: Media

The second part of *The Scientific Imaginary in Visual Culture* collects essays on the ways in which different kind of media represent and remediate science, ranging from science fiction movies, video art, ‘enactive’ digital technologies, to medical practices.

In the fifth chapter, Anneke Smelik, explores one of the prevailing figurations in a culture dominated by science and technology: the man-machine or the cyborg, a *cybernetic organism*. Starting from popular images of the cyborg in car commercials and videoclips, she traces the figuration of the hardware, software and wetware cyborg in Sci-Fi movies in the past few decades. While cinema may originally have seen science and technology as potentially threatening, for example in the figure of the mad scientist producing an evil cyborg, or machines as enslavers rather than liberators, Smelik claims that the cyborg is now no longer a figure that instils fear or anxiety. Instead, the figure of the cyborg points to deep-seated desires of posthuman men and women of today to fuse with science, machines and technologies. This is not only apparent in the popularity of the cyborg in visual culture, but also in cultural practices of enhancing and altering the human body, like in the military, sports, fitness and cosmetic surgery. Smelik therefore concludes that human beings of the twenty-first century take control of their own destinies by entering intimate relationships with the machines that they build and construct. The scientific imaginary has thus

stimulated the self-fashioning of men and women as cyborgs, not only in popular cinema but also in everyday life.

In the sixth chapter, Paolo Granata looks at video art as the symbolic form that is best suited to represent a quintessential stylistic moment of the current scientific and technological imagination. He compares the perspective culture of modern age to the ‘videomorphic’ culture of the contemporary, postmodern, age. The process he calls videomorphosis is the result of the convergence of technologies of vision that were conceived over the ages, including the latest image processing technologies. Video art thus seems to re-run in slow motion many phenomena of contemporary visual culture. Granata argues that post-modern culture has replaced the perspective vision of the Renaissance with videomorphic vision, implying an involvement of the entire perceptive system. The manifold expressions in video art and video installations reveal the synaesthetic vocation of videomorphosis, reconnecting the sensorial – visual, sound, tactile – component of the aesthetic experience to the super-sensory, or cognitive, realm of ideas. As such, Granata argues, video art points to the continuing process of constituting contemporary man’s *Weltanschauung* in a culture governed by visual technologies.

In the seventh chapter, Michel van Dartel continues a similar line of investigation by discussing new media applications, so-called ‘enactive media’, where the viewers become active users and the user’s body is designated an active role in the media experience. Van Dartel claims that enactive media art is of particular relevance to a revised psychology of perception, which is based on the idea that a perceiver ‘enacts’ perceptual experiences, in other words, that perceptions are not mere passive processes but enactive actions. Enactive media artworks illustrate how the principle of enactive, or sensorimotor, coordination of the body, shapes our perception of new media. In a complex interaction between media art and psychology, he shows how some instances of media art allow for the remediation of recent theory of perception through art, while this same theory in turn opens up new horizons for artistic exploration. Enactive media thus do not only offer new directions for scientific research, but also new possibilities for artistic exploration through theoretical insight. A dialogue between the scientific discipline of psychology and the visual culture of ‘enactive media’ can connect body and media in new ways, remediate theory accumulated in the enactive approach, and also create new media art experiences. Therefore, Van Dartel strongly advocates a mutually beneficial dialogue between psychologists studying the enactive approach and media artists pursuing an enactive artwork.

In the eighth chapter we move from media to the medical practice of IVF, in vitro fertilisation. Edyta Just examines human-technology encounters in the practice of IVF, based on empirical data from interviews with IVF-patients and an analysis of visual representations of IVF procedures on the Internet. She



shows that in visual culture the human body and technology are approached as two ontologically different, and radically opposite units, repeating the binary oppositions that are so prevalent in western culture. The modes of convergence that occur between visual culture and science can therefore not be assessed as positive. Using a deleuzean framework, Edyta Just argues that it is crucial to conceptualise human-technology interactions differently, allowing for an affirmative approach of human-technology encounters in terms of productive co-operation rather than in terms of defeat or surrender. To understand such co-operation as affirmative and productive, or in her words, as a space of transformative becoming, enables us to see that the interaction between the human body and its technological surrounding can be one of experiment and possibility rather than danger and stagnation. Thus, Just argues, we can leave behind the euphoria or melancholia of binary oppositions and instead engage with an empowered view of the human body in its affirmative relation to technology.

### Part III: Bioart

The third and last part of the volume *The Scientific Imaginary in Visual Culture* opens up the more recent terrain of 'bioart'; the nexus between art and the 'wet' life sciences. Some of those projects involve collaborations between artists and scientists, experimenting with interdisciplinary and potentially transgressive methodologies. Bioart often focuses on a cultural critique of the genetically engineered human and implications of biomedical engineering. The bioartists that are discussed or presented in this book, Helen Chadwick, Julia Reodica, and of course Trish Adams, Catherine Fargher and Terumi Narushima, develop innovative modes of creative practice as they attempt to find new meanings in a posthuman or even postnatural environment.

In the ninth chapter, Aline Ferreira, explores how the artist and the scientist have increasingly come to inhabit contiguous or overlapping aesthetic and epistemological spaces. She concentrates on two different developments within bioart: the turn inwards of versions of self-portraiture, which emphasize the genetic decoding of one's genome, and the visibility conferred on the hymen and the placenta, female organs or membranes that function as thresholds. Issues of visibility and invisibility are thus central to the artworks that she discusses: Helen Chadwick's *One Flesh* and *Viral Landscapes*, and Julia Reodica's *The hymNext Project*. Ferreira argues that these bioartworks can be regarded as alternative attempts at self-portraiture, drawing as they do on the artists' cells, in an effort to reflect on the nature of identity and the increasingly permeable boundaries of the body. The artists explore the space beneath the skin, the occluded interiority of bodies, bringing to light organic elements traditionally

not seen in such configurations. At the same time, the bioartworks make visible what has traditionally been hidden, such as the placenta and the hymen, opening up a 'matrixial gaze' that undoes the overriding male gaze. The turning inward to the body, away from external appearances, reflects a scientific and genetic imaginary reminiscent of a paradigm shift that took place in the last decades of the twentieth century. According to Ferreira, this cellular imaginary and poetics goes to the heart of contemporary biological developments suggesting that to a great extent we are defined by our DNA.

The last two chapters of the book are written by two Australian artist/researchers, who are creators and practitioners of bioart. In the tenth chapter, Trish Adams reinterprets scientific image data from the perspective of a visual artist and recontextualises contemporary biomedical research in interactive art installations. Adams explores the visual complexities and effects of developing technologies on both art and science, and the emergence of hybridisations and productive cross-disciplinary outcomes. In her essay she discusses two of her own experimental art/science projects, *machina carnis* and *mellifera*. Both mixed reality projects speculate on the effects that the convergent and divergent elements of art and science have on concepts of the natural and the artificial as well as objectivity and subjectivity. Adams probes the role of interactivity in new media art, through the interplay between the real-time installations, remote Internet access and virtual environments. Expanding upon the sites of exchange between digital technologies and the ambiguity of data flow and bodily 'presence', the artist/researcher questions contemporary notions of virtual identities and mixed realities. The developing relational systems that evolved during these projects suggest to her that the term 'corporeality' encompasses more than just a biological definition, and should instead be embedded within a wider network of notions of living and non-living and constructions of 'human' and 'posthuman'.

In the eleventh and last chapter, performer Catherine Fargher and musician Terumi Narushima present their installation *BioHome: The Chromosome Knitting Project*. This is a hybrid performance/installation incorporating live wet biology practices in a contemporary biotech display home. The artwork features video, interactive sound, live theatre and text to explore reproductive futures and biotechnologies. It was developed to exist in a range of contexts, such as scientific laboratories, conferences, galleries and museums, as well as theatrical and performance contexts. By 'wet biology' the artists refer to their work with live plant or animal material, including genetic modification of organisms as well as the creation of bio-products such as DNA fibres and live cell cultures. In the *BioHome* project they have tried to present this science live, rather than merely represent it through a mediated form. Previously, these technologies had been used by visual and installation artists under the label of 'bioart', but they have been rarely presented in a performance context. The artists therefore

suggest to label this new form of performance as 'bio-performance'. In the case of *BioHome*, scientific concepts of evolution, mutation and hybridity influenced the form and content of the work. As a hybrid art form, the *BioHome* project shows how the meeting of science, technology and art produces creative chances for all involved.

The essays gathered here in the volume *The Scientific Imaginary in Visual Culture* testify to the liveliness of the interdisciplinary fields of media studies, cultural studies and science and technology studies. On the one hand, the writers highlight the possible promise of the modes of convergence that are emerging both within the fields of visual culture and science and between those two fields. On the other hand, the authors develop ethical and cultural reflections on new developments in science and its visualisation techniques. In that balancing act, the authors have tried to look for the sustainable connections between the human or rather the posthuman and their multiple others in a globalised world that is increasingly infused by technology and science.

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## Part I: History and Philosophy