

Chapter 1: Digital Technologies as a Tool

The use of digital technologies in almost every arena of daily life has vastly increased during the past decade, leading to speculations that all forms of artistic media will eventually be absorbed into the digital medium, either through digitization or through the use of computers in a specific aspect of processing or production. It is certainly true that more and more artists working in different forms of media – from painting, drawing, and sculpture to photography and video – are making use of digital technologies as a tool of creation for aspects of their art. In some cases, their work displays distinctive characteristics of the digital medium and reflects on its language and aesthetics. In other cases, the use of the technology is so subtle that it is hard to determine whether the art has been created by means of digital or analogue processes. A work suggesting that it has been created through digital manipulation may have been created entirely by means of traditional techniques, while one appearing to be entirely handmade may have undergone digital processing. In both cases, however, these two kinds of work owe as much to the histories of photography, sculpture, painting, and video as to the use of digital technologies.

While not every work that makes use of digital technologies also reflects on those technologies' aesthetics and makes a statement about them, there are certain basic characteristics exhibited by the digital medium. One of the most basic of them is that this medium allows for multiple kinds of manipulation and a seamless combination of art forms, which can lead to a blurring of the distinctions between different media. Photography, film, and video have always entailed manipulation – for example, of time and place through montage – but in digital media, the potential for manipulation is always heightened to such a degree that the reality of 'what is' at any given point is constantly open to question. Recontextualization through appropriation or collaging, as well as the relationship between copy and original, are also prominent features of the digital medium. While appropriation and collaging, techniques originating with the Cubists, Dadaists, and Surrealists at the beginning of the twentieth century, have a long history in art, the digital medium has multiplied their

14. (opposite, top) **Charles Csuri**, *SineScape*, 1967

15. (opposite, centre) **Charles Csuri**, *Sculpture Graphic/Three Dimensional Surface*, 1968. Csuri used a mathematical function to generate the sculpture's surface. A punched tape contained the data, which was sent to a numerically controlled milling machine.

16. (opposite, bottom) **Charles Csuri**, *GOSSIP (Algorithmic painting)*, 1989. For this work, which won a prize at the Ars Electronica Festival in Linz in 1990, a painting of stripes was scanned and mapped onto three-dimensional models, which were then broken up through a function for fragmentation.

possibilities and taken them to new levels. Walter Benjamin's seminal 1936 essay 'The Work of Art in the Age of Mechanical Reproduction' discussed the impact of reproduction brought about by the then 'new' media of photography and film. For Benjamin, the presence of an artwork in time and space, 'its unique existence at the place where it happens to be', constituted the authenticity, authority, and 'aura' of the art object, all of which seemed to be jeopardized by the possibilities of mechanical reproduction and the creation of identical copies. The work of art in the age of digital reproduction, however, takes instant copying, without degradation of quality from the original, for granted. The digital platform also increases the accessibility of visual materials: images can be easily digitized through scanning and are readily available for copying or dissemination on the Internet. Whether the concepts of authenticity, authority, and aura are destroyed through these forms of instant reproducibility is debatable, but they have certainly undergone profound changes.

In this chapter, the use of digital technologies as a tool for the creation of art objects and their aesthetic impact will be discussed through the use of a few key examples. Since these technologies are now commonly used in art, an inclusive survey would probably have to comprise thousands of artworks. The works presented here are merely a selection that illustrates specific aspects of digital imaging and the digital production of art.

Digital imaging: photography and print

Digital imaging as it manifests itself in photography and print is a vast field, including works that have been created or manipulated digitally but then printed in the traditional way, as well as images that have been created without the use of digital technology but then printed using digital processes. In this section, these different techniques will be considered, with a special focus on the changes they have brought about in our understanding and reading of the visual image.

Early experiments with digital image creation and output, such as the works of American artist Charles Csuri, exhibit some of the essential characteristics of the computer medium, such as forms driven by mathematical functions and their repetition and reiteration. Csuri's *SineScape* (1967) consisted of a digitized line drawing of a landscape that was then modified by a wave function in a procedure repeated about a dozen times. The original landscape thereby underwent a process of abstraction that made it appear as a notation of its own characteristics.



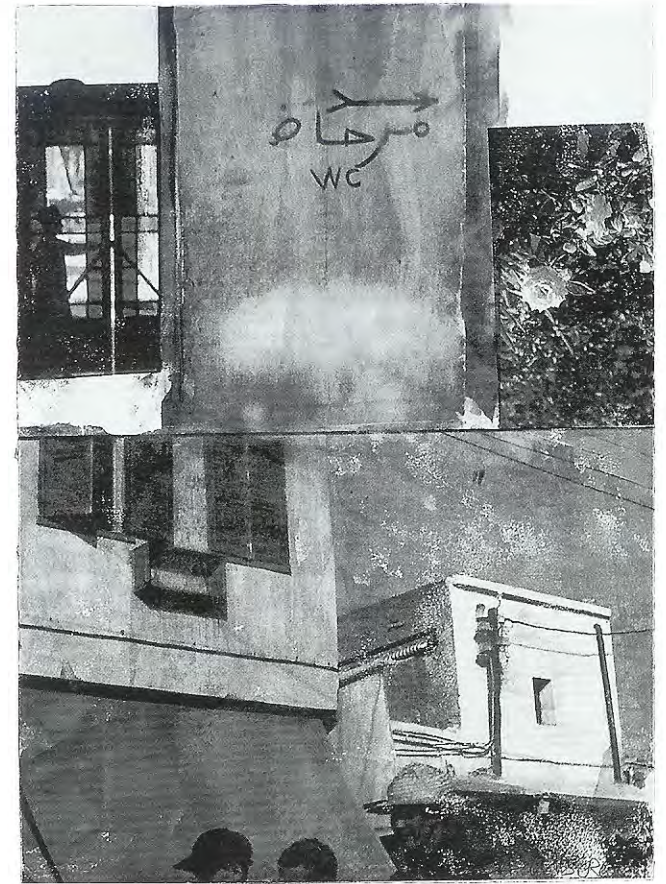
17. Nancy Burson, *Beauty Composites: First* (left) and *Second* (right), 1982

Abstract imagery consisting of formal variations driven by mathematical functions such as Csuri's constitutes one of the major strands of the early history of digital imaging. But computer technology has also been used for decades for the compositing of different forms of imagery, the overlaying or blending of visuals. Nancy Burson was among the pioneers in the field of computer-generated composite photographs, and made a major contribution to the development of the technique known as 'morphing' – the transformation of one image or object into another through composite imagery – which is now commonly used by law-enforcement agencies to age or alter the facial structure of missing persons or suspects. Burson's work has consistently addressed notions of beauty as defined by society and culture: her *Beauty Composites* (1982), which merge the faces of film stars Bette Davis, Audrey Hepburn, Grace Kelley, Sophia Loren, and Marilyn Monroe (*First Composite*) and Jane Fonda, Jacqueline Bisset, Diane Keaton, Brooke Shields, and Meryl Streep (*Second Composite*), are investigations into beauty that focus on the constituent elements of culturally defined ideals. The face literally becomes a topographical record of human aesthetics, a document and history of standards of beauty that at the same time suppresses individuality. The study and comparison of structural and compositional elements also played a major role in the work of Lillian Schwartz, who used the computer as a tool for the analysis of the works of artists such as Matisse and Picasso. Her famous image *Mona/Leo* (1987), a composite of the faces of Leonardo and the *Mona Lisa*, suggested a deceptively simple solution to the identity of the painter's subject while blurring the boundaries between the persona of the artist and his creation.

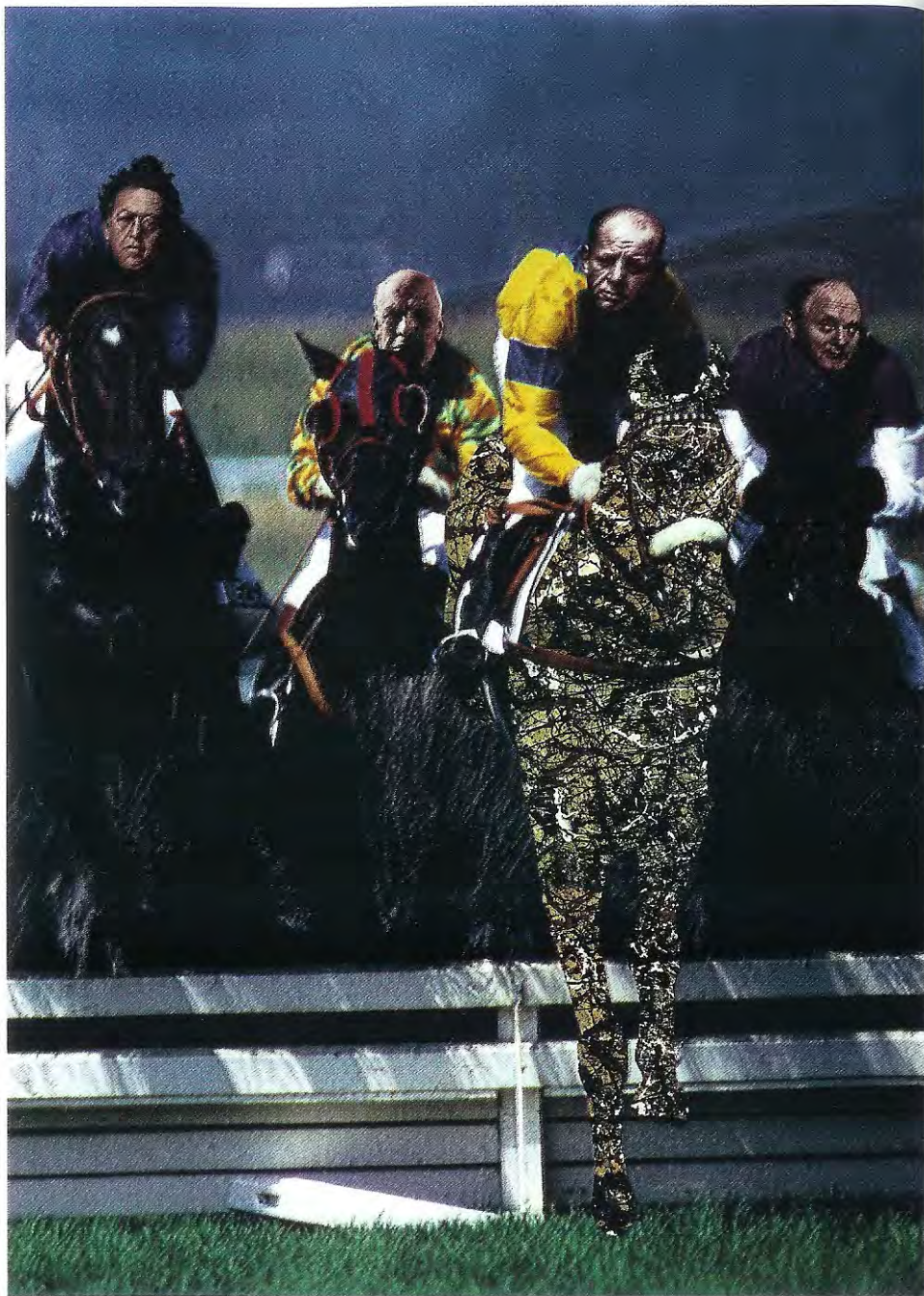


18. Lillian Schwartz,
Mona/Leo, 1987

19. Robert Rauschenberg,
Appointment, 2000. The artist scanned a number of 35mm photographs, which had been printed using water-soluble pigments. After assembling the images in a collage, he applied water to their surfaces and separately transferred them to paper. The resulting copy was then photographed and processed as a traditional screenprint.



Digital technologies add an extra dimension to the composite and collage, for disparate elements can be blended more seamlessly, with the focus being on a 'new', simulated form of reality rather than on the juxtaposition of components with a distinct spatial or temporal history. Digital collages and composites often constitute a shift from the affirmation of boundaries to their erasure. Computers are increasingly being used in compositions, by artists such as American Robert Rauschenberg (b. 1925), the pioneer of collaged multimedia works. In his computer-generated images from collages of photographs, American artist Scott Griesbach (b. 1967) takes collage's process of recontextualization to a further level by revisiting prominent players and moments of art history, often in the context of technology's absorption of art and ideas. His *Dark Horse of Abstraction* (1995) depicts the four horsemen of the Apocalypse in a steeplechase in



20. **Scott Griesbach**, *Dark Horse of Abstraction*, 1995

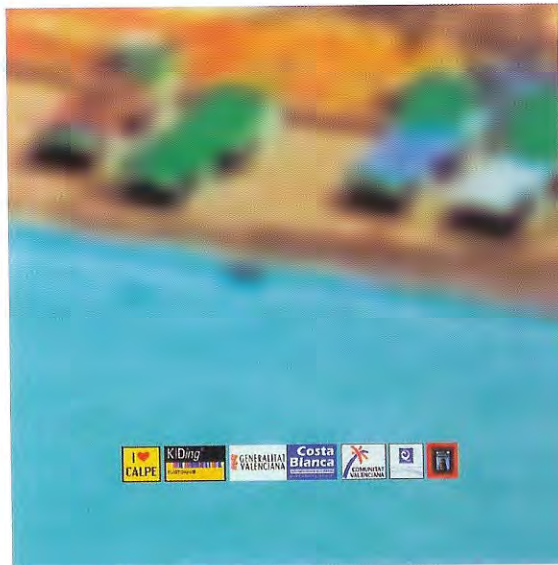
which Jackson Pollock's abstract-expressionist horse is chased by artists such as Edward Hopper along 'the path of formalist evolution'. In a humorous way, Griesbach alludes to the pursuit of pure form in art and the opposing movements that both foreshadow and challenge it. The subtext of the assimilation of artistic ideas (through technology) is also present in Griesbach's digital photomontage *Homage to Jenny Holzer and Barbara Kruger* (1995). The image shows the two artists, both of whom played a major role in the artistic exploration of text and typography – particularly in relation to the strategies and politics of advertising – behind the wheel of a large vintage automobile.

The language of advertising is obviously closely connected to the history of image manipulation and the proliferation of imagery in a media society – which has increased with digital media and the Internet. In the aesthetics of advertising, the 'image' makes the fluent transition from mere representation to branding, in which it is inscribed with a concept or value. This 'image consumer culture' has been taken to new levels by the possibilities of manipulation, compositing, and collaging enabled by digital processing, a fact that is frequently referenced in art. The



21. **Scott Griesbach**, *Homage to Jenny Holzer and Barbara Kruger*, 1995. In this work, Griesbach alludes to the impact of Kruger's and Holzer's artistic style, the 'head-on' provocation of questions about power as a motor of the human condition. For him, their art 'hits you like a truck'.

works of the team KIDing® – Angolan-born artist João António Fernandes (b. 1969) and Portuguese graphic designer Edgar Coelho Silva (b. 1975) – cross the boundaries between art and advertising with their concept of an ‘art agency’ and frequently satirize the aesthetics of advertising and branding. Their series *I Love Calpe* (1999) consists of out-of-focus images that, through colour and form (and the series’ title), suggest ‘holiday’, in this case the tourist resort Calpe on the Spanish Costa Blanca. While the blurry images themselves can function only as vague carriers of meaning, their signification is immediately defined by the small corporate and advertising logos that are overlaid as thumbnails. The creation of meaning in these works reverses the language of advertising by erasing the suggestive power of the image and foregrounding the ‘label’. The overlaid and inserted information does not seamlessly blend but deliberately disrupts the creation of the perfectly constructed image and its message. The language of advertising and mass entertainment also surfaces in the *Bollywood Satirized* series by British-born and US-based Annu Palakunnathu Matthew (b. 1964) whose work focuses on the politics of gender and race. Matthew’s *Bomb* (1999) and *What Will People Think?* (1999) are ‘Bollywood’ posters that use the traditional visual language of the movie industry’s ‘dream factory’. Inscribed with text that draws attention to gender and cultural stereotypes as well as nuclear politics, Matthew’s posters deconstruct the creation of message and context through visual images.



22. KIDing®, *I Love Calpe* 5, 1999



23. (top) Annu Palakunnathu Matthew, *Bollywood Satirized: Bomb*, 1999



24. (right) Annu Palakunnathu Matthew, *Bollywood Satirized: What Will People Think?*, 1999

Apart from the shifts that digital technologies have brought about in the realms of collage, montage, and compositing, they also challenge traditional notions of realism by facilitating the creation of alternative or simulated forms of reality, or a sense of the 'hyperreal'. The concept of artistic realism has been inextricably interconnected with the history of photography. The idea that the photograph records and represents reality 'as it is' is both an important aspect of the medium and an arguable historical convention. The subjectivity of the photographer – for example, in the choice of angle, placement, and lighting – is obviously inscribed into any photographic record. And the 'staging' and the manipulation of photographs are as old as the history of photography itself: manipulated photographs of 'seances' were used to prove the existence of ghosts; historical photos have frequently been altered for propaganda purposes, sometimes simply erasing a person with unpopular political beliefs from the scene. The fact that the digital medium allows for a seamless reconstruction and manipulation of reality seems to have heightened an awareness of the questionable nature of the authenticity of all images.

Digital technologies are frequently used to alter and question the qualities of representation, be it in a historical or predominantly aesthetic context. In his series of digital prints *The Bone Grass Boy: The Secret Banks of the Conejos River*, Los Angeles-based artist Ken Gonzales-Day (b. 1964) questions stereotypical representations of Native and Latino inhabitants in the frontier novel of the late nineteenth century by inserting himself into 'historical documents'. The work is set during the Mexican–American War

25. Ken Gonzales-Day.
Untitled #36 (Ramoncita at the Cantina), 1996



26. Patricia Piccinini.
Last Day of the Holidays, 2001



(1846–8), and the digitally (re)constructed image becomes a stand-in for the absence of an authentic history. In *Untitled #36 (Ramoncita at the Cantina)* (1996), the protagonist Ramoncita represents the figure of the Native/Latina *berdache* (a term created by Europeans from the Persian *bardaj*, originally a derogatory word for a passive homosexual partner, usually a feminine boy). Gonzales-Day describes his series as 'fictitious readymade', an object that was never made but appears to be a historical record. *The Bone Grass Boy* series challenges differences and boundaries between cultures, race, and class, as well as those between the photographic and digital media, both of which raise questions about their relationship to representation. A different kind of constructed reality is presented in *Last Day of the Holidays* (2001) by Sierra Leone-born, Australian-based artist Patricia Piccinini (b. 1965), whose work frequently creates a form of synthetic realism. The scene of a skateboarding boy in a parking lot encountering an alien creature appears at the same time artificial and familiar. Referencing cartoons and animation (particularly in its combination with 'live action' film), Piccinini plays with the 'cutesy' aesthetics of pop culture in creating a reality that seamlessly incorporates its fantasy products. A diametrically opposed approach to the alteration of the image unfolds in American artist



27. (above left) **Charles Cohen**, *12b*, 2001



28. (above right) **Charles Cohen**, *Andie 04*, 2001. The negative space in Cohen's images questions and reverses the dichotomy of foreground and background, as well as that of the subject and observer, who mentally 'fills in' what the image itself does not actually represent.

Charles Cohen's (b. 1968) archival digital inkjet prints *12b* (2001) and *Andie 04* (2001), which explore representational qualities in the context of abstraction through erasure. Cohen's work, which eradicates the human figure from pornographic scenes, subverts the images' original function and creates a void where absence becomes a presence in its own right. Erasure also becomes the key element in Venezuelan artist Alexander Apóstol's (b. 1969) series *Residente Pulido* (Polished Tenant). Apóstol's *Royal Copenhagen* (2001) and *Rosenthal* (2001) depict landmark modernist buildings without doors or windows. The buildings create a desolate city landscape where architecture functions as an inaccessible monolithic monument and artefact – an emptiness resulting from a belief in the perfection of form. The images derive their names from famous china collections, an allusion to both their texture and a certain fetishization in consumer society where everyday objects become collectibles disassociated from their original functions.

The alternative realities created through digital manipulation are complemented by works that have an air of the 'hyperreal', creating a heightened reality that seems to be neither artificial nor an authentic representation. While temporal and spatial continuity are maintained, the concept of reality still

29. **Alexander Apóstol**, *Residente Pulido: Royal Copenhagen*, 2001



30. **Alexander Apóstol**, *Residente Pulido: Rosenthal*, 2001





31. (opposite, top) **Paul Smith**, from the series *Action*, 2000

32. (opposite, bottom) **Paul Smith**, from the series *Action*, 2000

33. (this page) **Paul Smith**, from the series *Artists Rifles*, 1997. In *Artists Rifles*, Smith literally becomes every soldier in scenarios of army life, hinting at the loss of individuality in the army and the anonymity of military force.

remains questionable. In his series *Artists Rifles* and *Action*, British artist Paul Smith (b. 1969) inserts himself as the protagonist of his own works, deconstructing myths of masculine stereotypes and glorification. The *Action* series depicts Smith as the omnipotent superhero of action films – jumping from one building to the next or in free fall, parachuting from a plane. The heroic fantasies propagated by the movie industry become the reality of the artist (and everyman). In a gallery environment, the works are installed as light boxes under the ceiling, enhancing the illusion and forcing the viewer to look up to the hero. The polished ‘hyperreality’ of Dutch artist Gerald van der Kaap’s (b. 1959) *12th of Never* (1999) equally comprises the subtext of a levelling of individuality, both in the context of mass transportation and mass media with its stylized language of perfection and beautification. This abstraction produced by perfection becomes

34. Gerald van der Kaap,
12th of Never, c. 1999



a focus of American Craig Kalpakjian's (b. 1961) work, which frequently depicts 'landscapes' of the everyday, such as office buildings and details of interiors, that seem eerily real yet are completely computer-generated. In Kalpakjian's digital video *Corridor* (1997), viewers follow a seemingly endless hallway that, in its even structure and lighting, invokes both emptiness and formal perfection. The synthetic nature of *Corridor*'s computer-generated world alludes to the artificiality of many of the environments and office buildings we inhabit on a daily basis and the alienating effects induced by modern architecture.



35. Craig Kalpakjian,
Corridor, 1997

The refined possibilities of manipulating images also lead to a certain 'dematerialization' of the naturalistic aspects of representation, or at least to a redefinition of the relationship between the viewer, nature, and its representation. Numerous digital art works address the notion of an enhanced nature or explore issues of artificial life and organisms. An example of this redefined relationship between nature and representation are the high-resolution scans of moths – *Great Tiger Moth*, *Ctenucha Moth*, *Leopard Moth* (2001) – by Joseph Scheer (b. 1958). The images are created by passing a scanner over the body of the moth and provide a far more detailed view than could ever be achieved with a



36. (top) Joseph Scheer, *Arctia Caja Americana* (*Great Tiger Moth*), 2001.



37. (centre) Joseph Scheer, *Ctenucha Virginica* (*Ctenucha Moth*), 2001.



38. (right) Joseph Scheer, *Zeuzera Pyrina* (*Leopard Moth*), 2001. While the prints seem to suggest a form of photorealism, their visual qualities also radically differ from those of photography. The evenness of the scan replaces the single focal point of a camera and leads to an almost supernatural level of detail, a heightened physical presence of nature.

camera. The surface texture of the moths' bodies becomes an almost tangible reality. The concept of an enhanced nature also manifests itself in *Mere* (1994) by Peter Campus (b. 1937), a seminal figure in video art, and *Untitled #339* (1996), a C-print from a digital image by Oliver Wasow (b. 1960). Both Campus's insect and Wasow's landscape suggest an 'otherworldliness' and at the same time a believable reality that might exist in an unknown place. *Mere* and Wasow's landscape are neither 'here' nor 'there', depicting a stylized or dramatic, painterly view while maintaining basic spatial and temporal referents to create a seamless, unified image.

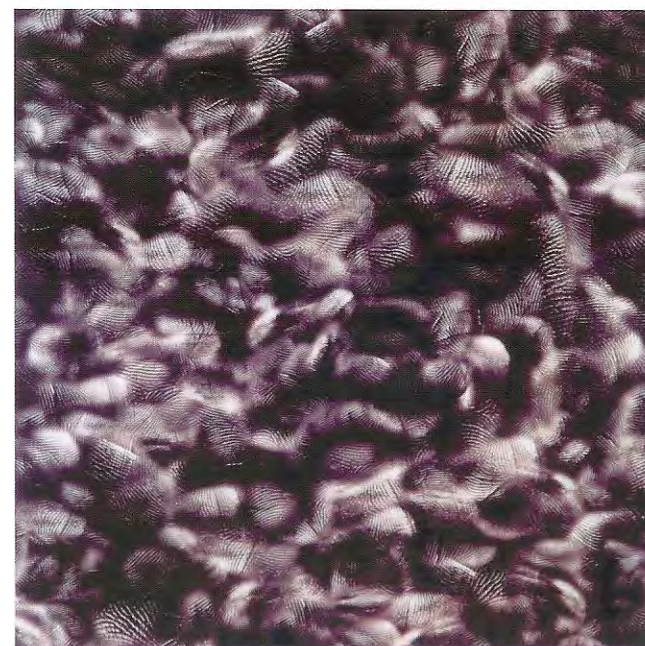
39. Peter Campus, *Mere*, 1994



40. Oliver Wasow, *Untitled #339*, 1996. Wasow has created a body of work consisting of landscapes that verge on the fantastic, and is particularly interested in a synthesis of fiction and reality, or culture and nature, and the ways they inform our view of the world around us.

In his series *Horror Vacui* and *Digital Hide*, Spanish artist Daniel Canogar (b. 1964) creates composite collages that reflect on relationships between the body and its image by merging body parts into structures and patterns that suggest and transcend naturalism. The interlocked hands in *Horror Vacui* (1999) suggest both dismemberment and the creation of an 'other' as an organic whole processed by technology. Canogar's *Digital Hide 2* (2000), in particular, seems to create a new form of anatomy, inscribed by human fingerprints but unrecognizable as existing biological form. Canogar's rewriting of the body operates on the border of fear and fascination with technologically formed organisms. The

41. Daniel Canogar, *Horror Vacui*, 1999



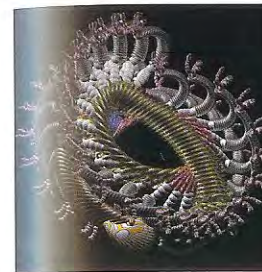
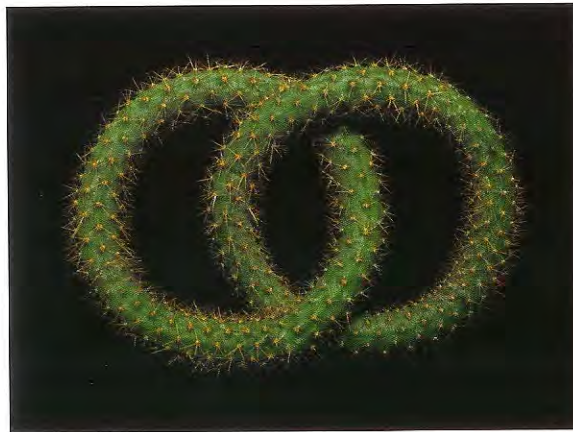
42. Daniel Canogar, *Digital Hide 2*, 2000

43. (below left) Dieter Huber, *Klone #100*, 1997

44. (below right) Dieter Huber, *Klone #76*, 1997

45. (bottom) Dieter Huber, *Klone #117*, 1998–9

concept of technologized, artificial life-forms is also at the core of the *Klone* series by Austrian artist Dieter Huber (b. 1962), which depicts technologically transformed plants, humans, and landscapes. Huber's work explicitly establishes a connection to genetic engineering, biotechnology, and changing notions of the organism in the age of new technologies. Huber's *Klone #100* (1997) and *Klone #76* (1997) show mutated plants that appear at the same time real and unfamiliar, a fictitious result of an engineering of nature. The deceptively sober and scientific nature of Huber's photographs enhances the perception of the images as a



46. (above left) William Latham, *HOOD2*, 1995

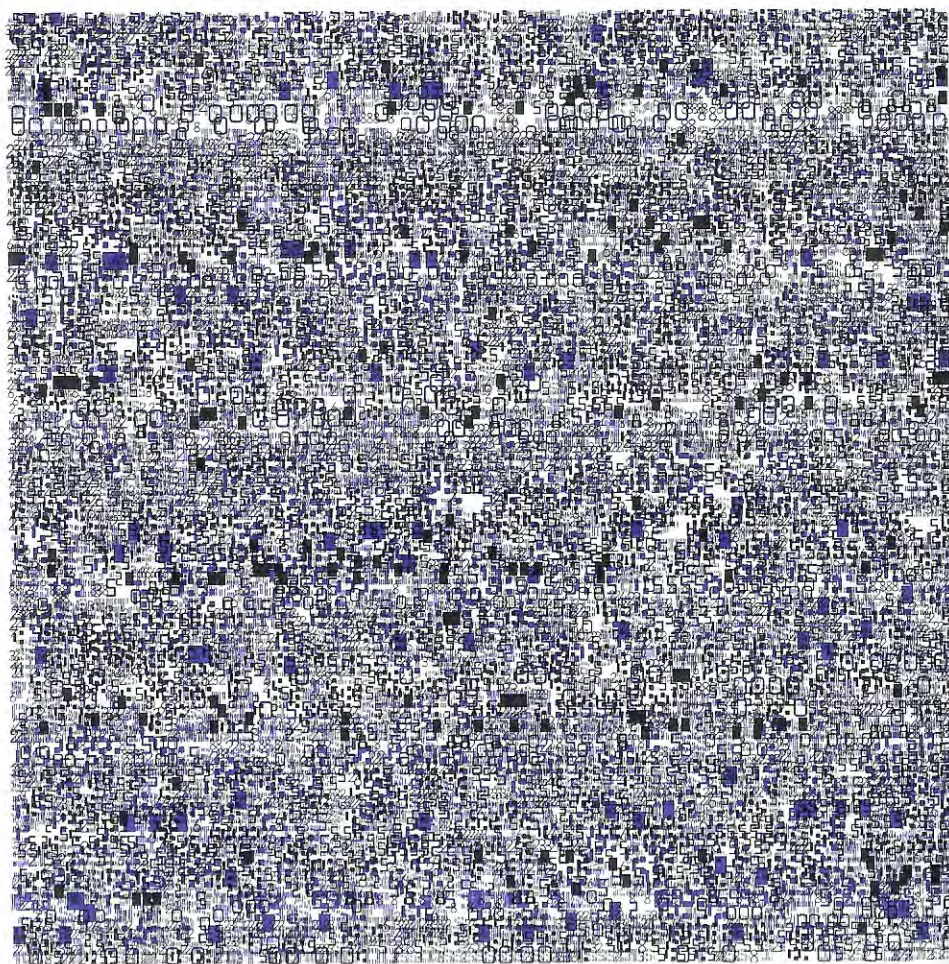
47. (above right) William Latham, *SERIOA2A*, 1995
Latham's work results in a computer-generated nature that crosses the boundary between animated sequences and virtual sculptures implying unlimited possibilities. Latham's images do not represent natural form but highlight the aesthetics of computer-generated morphology, an artificial nature that is reminiscent of, and yet distinctly different from, living organisms.



reality. The artist combines analogue and digital technologies in the creation of his work, starting from analogue images that are then digitized and digitally manipulated but finally presented as a photograph. Huber's landscapes equally seem deceptively real while their flawless composition and arrangement hints at an artificial, beautified nature. An entirely different form of computer-generated 'nature' is represented by the works of British sculptor William Latham. Working as a research fellow in the IBM Scientific Centre at Winchester in southern England, Latham (in collaboration with Stephen Todd) developed programs that allow users to shape sculptural three-dimensional (3D) forms according to 'genetic' properties. Through algorithms generating fractal and spiral mutations, Latham simulates the geometry of natural forms to produce artificial 'organisms'. His programs, which have been developed into commercial software, use elements of random mutation and rules of 'natural selection' to create an evolution of forms – genetic variations based on aesthetic choices. The use of evolutionary and behavioural algorithms has become a broad field of artistic creation, which will be further discussed later in the section on artificial life.

It has frequently been argued that the digital image is not representational because it is encoded and does not record or

48. **Andreas Müller-Pohle**, *Digital Scores III (after Nicéphore Niépce)*, 1998. Müller-Pohle translated the oldest preserved photograph, Niépce's view from his study, into digital form. He digitized the image and converted the seven million bytes into alphanumeric code. The result, transcribed onto eight square panels, is indecipherable, yet contains an accurate binary description of the original. *Digital Scores* points both to the fluid transition of information in the digital realm and to the different forms of encoding inherent to the digital and photographic media.



reproduce physical reality. While this is debatable on the level of the 'content' of the image, which often simulates and represents a physical reality, it is true from the perspective of its production. The digital image consists of discrete, modular elements, pixels that are based on algorithms, mathematical formulas. While bits are still essentially threads of lights, they do not by nature require a physical object to 'represent' and are not based on a principle of continuity with a real world. Many digital images make this fact the focus of artistic exploration – often in relation and contrast to other media such as photography. They also sometimes visualize a process that otherwise would remain unseen, by translating and 'encoding' visual information. German artist Andreas Müller-Pohle's (b. 1951) series *Face Codes* (1998–9) unites analogue and

49. **Andreas Müller-Pohle**, *Face Code 2134 (Kyoto)*, 1998–9



digital representation on the level of the image itself. The *Face Codes* are selections from several hundred video portraits recorded in Kyoto and Tokyo in 1998. The portrait images were digitally manipulated by first creating a standardized template and then adjusting the position of the heads, as well as the height of the eyes, lips, and chins, according to it. The individual faces were thus transformed into a unified structure. The artist then opened the image files as ASCII text files (ASCII stands for American Standard Code for Information Interchange, a common format for text files in computers and on the Internet that represents alphabetic and numeric characters as binary numbers). With software capable of processing both Western and Asian sign systems, the ASCII code was then translated into Japanese writing, which is a mixture of the sign systems Kanji, Hiragana, Katakana, and Romaji. A string of eight consecutive Kanji signs



selected from the translated alphanumeric code appears under the portraits, inscribing the 'genetic' makeup of the image itself onto its surface. The initial 'erasure' of the individuality of people's faces by means of a template points to the process of equalizing that occurs in the digital image, where any visual information ultimately is a calculable quantity. The concept of the human face as the sum of its data is further enhanced by the 'subtitles' that represent these data as a sign system. Genetic code in the literal sense becomes the focus of Müller-Pohle's *Blind Genes* (2002), for which he searched a genetic database on the Internet for the keyword 'blindness'. The gene sequences returned by the search were used regardless of their quality or completeness – partial results or sequences that were merely postulated were accepted as valid returns, pointing to the state of research at the time and the metaphorical element of the artistic process. The DNA bases CGAT (Cytosine, Guanine, Adenine, Thymine) were then positioned in blocks of ten, translated into Braille and coloured – A: yellow, G: blue, C: red, T: green. The height of the single pieces is produced by the different lengths of the sequences. Through a process of data translation, the genetic, organic 'code' for blindness manifests itself as Braille, the code and sign system that establishes an 'interface' with the seeing world.

The visualization of sign systems is also explored in American artist Warren Neidich's (b. 1956) 'conversation maps' – among them *I am in love with him, Kevin Spacey* (2002) and *I worked on my film today. Are you dating someone now?* (2002). At first glance, these maps are reminiscent of abstract paintings of wave forms. But the images in fact represent everyday conversations that were conducted in sign language, with lights being attached to the participants' fingers and arms. Neidich photographed these conversations with very long exposures, creating black-and-white photo documentations, which were then digitized and subsequently superimposed and coloured by means of imaging software. The maps contain from five to thirty layered conversations and are exhibited as light boxes. Through the use of digital technology, Neidich's conversation maps not only document and visually translate a process but also represent it as comparative conversational patterns. The original photograph is transformed into a seemingly painterly abstraction. A notable characteristic of digital images that focus on aspects of encoding and visualization is that the process and meaning of an image do not always reveal themselves on the visual level but often rely on external contextual information to help 'explain' the work.

50. Andreas Müller-Pohle, *Blind Genes, IV_28_AF254868*, 2002



51. (opposite, top) **Warren Neidich**, *Conversation Map (I worked on my film today. Are you dating someone now?)*, 2002

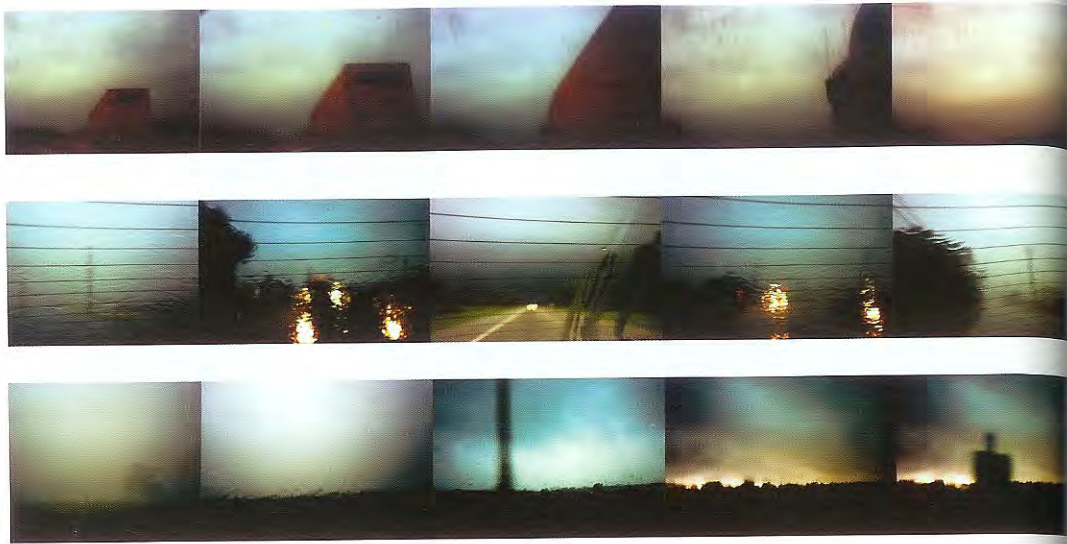
52. (opposite, bottom) **Warren Neidich**, *Conversation Map (I am in love with him, Kevin Spacey)*, 2002



The multiple possibilities for constructing a digital image by combining qualities inherent to or associated with different art forms frequently erode the boundaries between diverse media, such as painting and photography. In Casey Williams' (b. 1947) *Tokyogaze III* (2000) and *Opal Sun I* (2000), for example, photography merges with a type of painterly colour-field abstraction. Informed by the aesthetics of industrialism, Williams' images developed out of numerous boat rides in the port of Houston, Texas. The less textured and nuanced quality of inkjet prints is counterbalanced by the fact that the images are printed on



53. (right) **Casey Williams**, *Tokyogaze III*, 2000



54. Ana Marton, 3x5, 2000

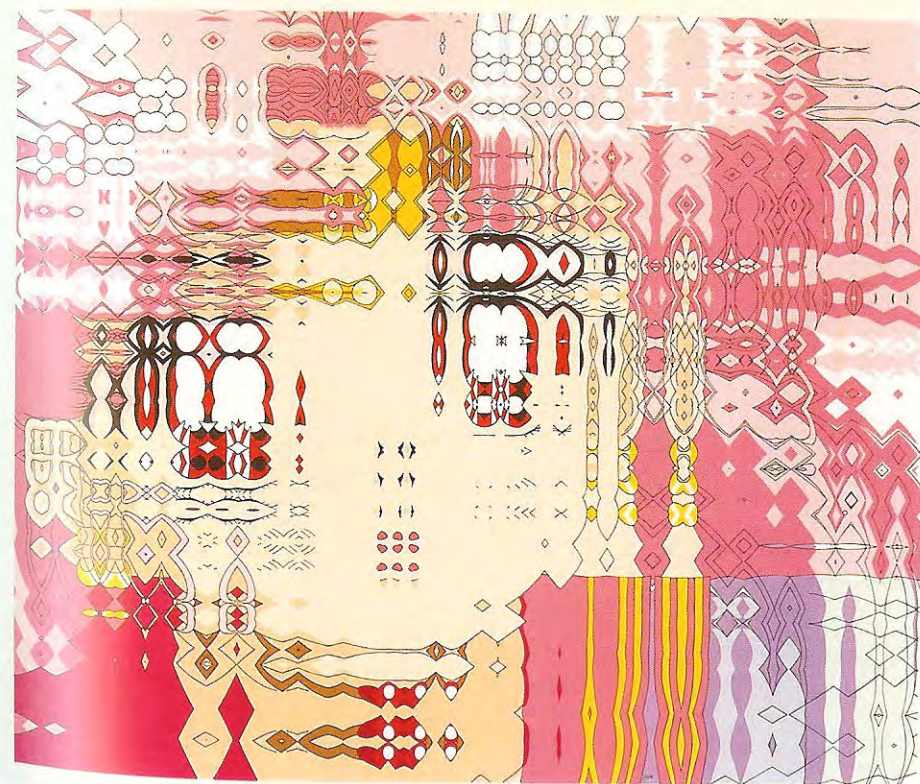


canvas, which contributes to enhancing the painterly attributes. A very different fusion of media occurs in Romanian-born artist Ana Marton's series of digitally printed photographic rolls. Her work *3x5* (2000) layers different 'spaces' of photographic representation, from the original photographic roll to the two-dimensional 'record of reality'.

While digital media and traditional painting or drawing, in particular, seem to occupy opposite ends of the scale in their

inherent languages, these media are now frequently merged into new unities by artists who employ digital technologies as a step in the creation of a painting, drawing, or print. For his *Rhapsody Spray* series (2000), London-born artist Carl Fudge (b. 1962) digitally manipulated the scanned image of the Japanese anime (cartoon) character Sailor Chibi-Moon, which was then produced as a series of screenprints. While the physicality of the print is traditional, the abstraction of the composition, in its stretching and copying of elements, has a distinctly digital feel. Despite the digital manipulation, the images do not lose the context of their original but maintain discrete attributes of an anime character in colour scheme and forms (a distinctive feature of anime characters is that they are capable of shifting shape and turning into different personalities). Anime as a pop-cultural form has developed a cult following outside of Japan, and its aesthetic influences can be traced in many digital artworks, in particular animations, which will be discussed later.

55. Carl Fudge, *Rhapsody Spray I*, 2000



The aesthetics of digital composition also play a prominent role in the work of Chris Finley (b. 1971), who frequently creates digital templates for his paintings. Finley's work process mirrors the limitations that are inherent to the restricted menu of imaging software: working within the restraints of a set of options determining colour, shape, and form, Finley combines elements that are digitally manipulated through rotation or copying. The artist then re-creates the composition on canvas and mixes the colours to conform to the digital palette. The result are paintings where traditional craft blends with the clearcut shapes and colour fields of computer-generated painting. A completely different form of digital process is employed by Joseph Nechvatal (b. 1951) whose 'computer-robotic assisted' paintings are created

56. Chris Finley, *Goo Goo Pow Wow 2*, 2001



by means of a virus-like program that performs a degradation and transformation of the image. After digitally composing and manipulating image elements, most notably through the transformations induced by the virus, Nechvatal transfers his files over the Internet to a remote computer-driven robotic painting machine, which executes the painting. The artist himself is not involved in the process of painting itself, which ultimately takes place as an act of 'telepresence'. In paintings such as *vOluptuary drOid décOlletage* (2002) and *the birth Of the viractual* (2001), parts of the (intimate) human body are intermixed with flower or fruit ornaments into a virally created collage. The hybrid image suggests an androgyny that Nechvatal traces to Roman poet Ovid's *Metamorphoses*, which depicts transmutation as a universal



57. (right, top) Joseph Nechvatal, *the birth Of the viractual*, 2001



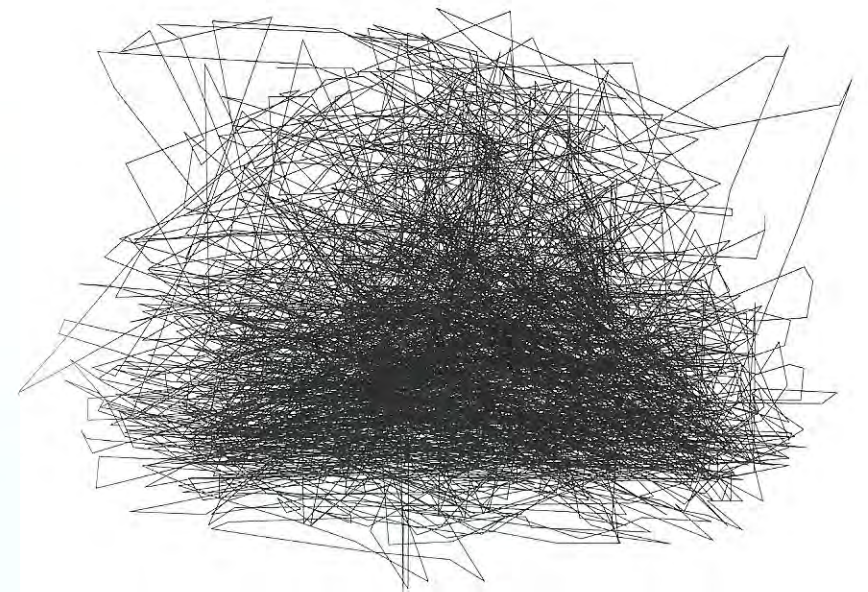
58. (right) Joseph Nechvatal, *vOluptuary drOid décOlletage*, 2002

59. (below) Jochem
Hendricks, *EYE*, 2001

60. (opposite, top) Jochem
Hendricks, *Blinzeln*, 1992

61. (opposite, bottom) Jochem
Hendricks, *Fernsehen*, 1992

principle driving the nature of the world. Nechvatal's paintings strive to create an interface between the biological and technological, the viral, virtual, and actual or 'viractual', as the artist refers to it. While Nechvatal's interface manifests itself within the painting, German artist Jochem Hendricks (b. 1957) uses digital technology as an interface that enables a direct representation of the artist's gaze. For his 'eye drawings', Hendricks uses goggle-like equipment to scan the motion of the eye and send the data to a printer, which translates the process of looking into physical drawings. In works such as *Fernsehen* (TV, 1992) and *Blinzeln* (Blinking, 1992), the artist's 'view of the world' is literally transcribed as an artwork. Hendricks's drawing *EYE* (2001) is a graph of the artist's reading of the 'Eye' entertainment section of the *San Jose Mercury News*. A previous work, *Zeitung* (Newspaper, 1994), charted the reading of an entire issue of the German newspaper *Frankfurter Allgemeine Zeitung*. While Hendricks's eye drawings are reminiscent of early plotter drawings in their rawness, at the same time they offer a precise record of the root of artistic process and visual perception, the process of 'seeing' itself.



It has been suggested that the creation of artworks such as paintings or drawings on a computer implies a loss of relationship with the 'mark' – that is, that there is a significant lack of personality in the mark one produces on a computer screen as opposed to one on paper or canvas. While this is certainly true, the comparison with painting and drawing itself is slightly problematic. Art created by means of computer technologies is more comparable with other technologically mediated art forms such as film, video, and photography, where the individuality and voice of an artist does not manifest itself in a direct physical intervention. Concept, all elements of the composition process, the writing of software, and many other aspects of digital art's creation are still highly individual forms of expression that carry the aesthetic signature of an artist.

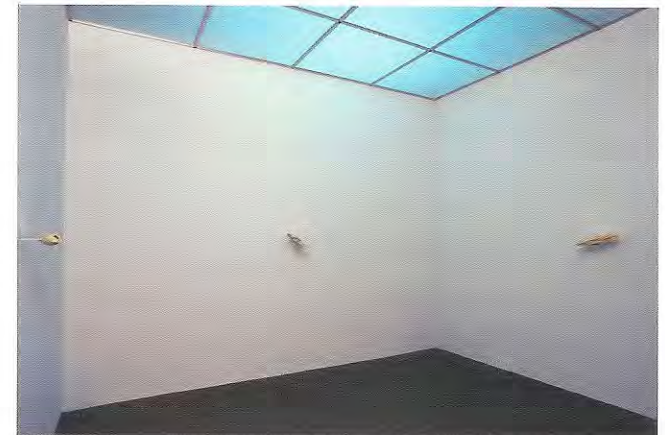
Sculpture

Digital technologies are also increasingly employed in various stages of the creation and production of sculptural objects, ranging from modelling software to manufacturing machines. While some sculptors make use of the technologies both in the initial design process and in the output of the physical objects, others create sculptures that exist only exclusively in the virtual realm and can take the form of a CAD (computer-aided design) model or a digital animation.

There are different types of computer-controlled manufacturing machines that allow for the production of physical objects and three-dimensional prints, so-called stereolithographs. Three-dimensional objects are created by what is commonly known as rapid prototyping technology, which automates the fabrication of a prototype from a CAD model (for example, by carving the object out of a block of material or by building it through layer-by-layer fabrication). Rapid prototyping is also often used for the creation of a mould for the casting of a sculpture. New tools for modelling and output have changed the construction and perception of three-dimensional experience and broadened the creative possibilities of sculptors. Digital media translate the notion of three-dimensional space into the virtual realm and thus open up new dimensions for the relationship between form, volume, and space. Tangibility, which has been a major characteristic of sculpture, is not necessarily a defining quality any more. The transphysical aspect of the virtual environment changes traditional modes of experience that were defined by gravity, scale, material, and so on. Scaling operations,

proportional shifts, eccentric vantage points, morphing processes, and 3D montage are some of the techniques employed in the realm of digital sculpture.

While some digitally produced objects do not exhibit distinctive features of the medium and could have been created by traditional means, others immediately point to the process of their creation. Robert Lazzarini's (b. 1965) sculptures *skulls* (2000), for example, could not have been created without digital technologies, a fact that is immediately obvious to the viewer's eye. Based on 3D CAD files that were distorted and then produced as sculptures, the skulls achieve a perspectival distortion that never resolves itself into a three-dimensional object as we know it (looking at these objects can in fact induce nausea). At the same time, the skulls are firmly embedded in the history of art,



62. Robert Lazzarini,
skulls, 2000



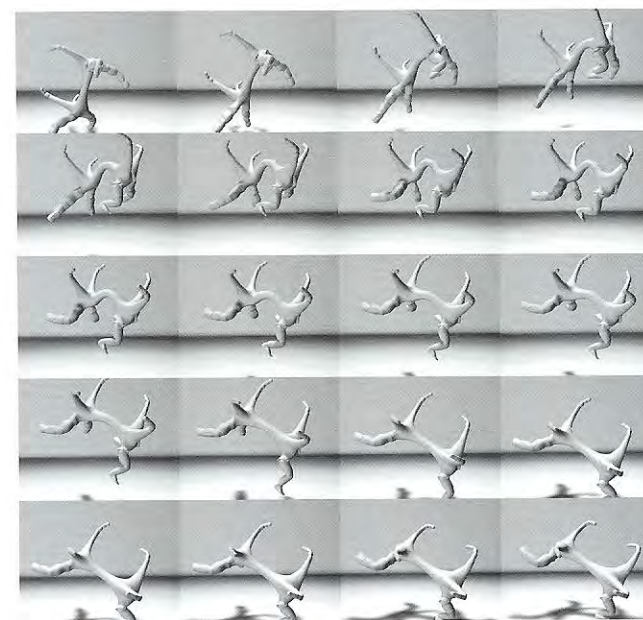
recalling Hans Holbein's anamorphic skull in the foreground of his well-known painting *The Ambassadors* (1533) in the National Gallery, London, and various other distortions that have been explored in painting through the ages.

Sculptor Michael Rees (b. 1958) uses rapid prototyping to create objects that borrow from medical anatomy for an exploration of what he refers to as 'spiritual/psychological anatomy'. In Rees's *Anja Spine* series (1998), anatomical elements and organic forms, such as a spine with ears protruding from it, are woven into complex sculptural structures, which raise questions about the



63. Michael Rees, *Anja Spine Series 5*, 1998

64. (right) Michael Rees, *A Life Series 002*, 2002. Joining body parts without paying attention to the functionality of the result, Rees represents the physical body as mutable and clonable. The use of limbs as modular elements implies that body parts are components that can be reconfigured at will, and hints at the objectification of our bodies. The artist also created animations, such as *A Life movie (monster Series)* from 2002 (below), in which the artificial sculptural bodies come to life and perform their permutations.



scientific validation of a sensuality that transcends the known structure of the body. Rees uses science and its imagery as a way of weaving systems, both analytical and intuitive. 'Anja' is the Hindu term for the sixth of the Chakras, energy centres that are openings for life energy and vitalize the physical body to bring about the development of our self-consciousness. The word 'Anja' means 'command', in the sense of spiritual guidance and, while still part of embodied existence, is associated with the most subtle



elements. Rees's *A Life* series (2002) continued his interest in the permutations of the human body in the context of artificial life.

Questions surrounding new relationships between the body and representation are raised by German artist Karin Sander's (b. 1957) work *1:10* (1999–2000), which presents itself as sculptural miniature portraits of people on a scale of 1 to 10. The miniatures are created by taking a 360-degree scan of the subject's body. The resulting file is then fabricated as a three-dimensional plastic object and finally airbrushed, using a photo of the person as a reference for accurate colouring. Sander herself is not involved in the actual creation of the object, which is entirely machine-produced, and she also makes a point of not affecting the appearance of the subject by 'directing' their posture or choice of clothes. While the final object appears to be a traditional sculpture, it simultaneously questions the notion of sculpture itself. The artist does not work with physical materials at any point, and the final object does not bear her 'mark'. It is in fact less a physical 'representation' than an accurate miniature copy of a person that suggests an unfiltered purity. At its very basis, Sander's work remains conceptual, an idea that is executed by various kinds of technology.

Sander's working process exemplifies the concept of 'telemanufacturing', the possibilities of digitally 'teleporting' forms, which can then be created at a specific site on an 'as needed, where needed' basis. Through telemanufacturing, virtual 3D forms can be remotely translated into a haptic experience – an idea and form, conceived anywhere, can literally be at your fingertips. Affordable 3D printers will probably be introduced to the mass market in the not too distant future, establishing another level of physicality for digitally transmitted information.

65. Karin Sander, *Bernhard J. Deubig 1:10*, 1999