

Segmentation and Reassembly of the Digital Moving Image : A Method of Depiction of Temporal and Spatial Nonlinearity

Title	Segmentation and Reassembly of the Digital Moving Image
Subtitle	A Method of Depiction of Temporal and Spatial Nonlinearity
Lead-in / Abstract	With the invention of the moving image, carrying in itself the concept of space-time correlation, a whole new field of artistic experimentation emerged. Today's artistic research takes advantage of the digital technology of the moving image that enables its segmentation and reassembly.
Participants and speakers	Jaschko, Susanne (DK)
Short biography of participants	<p>Susanne Jaschko works as a freelance curator for media art and cultural manager in Berlin, Germany. Her focus lies on interactive art, installation and digital moving image.</p> <p>In the past, she has worked as curator at the transmediale, international media art festival berlin, where she was deputy director from 2001 till 2004. In 1999/2000 she was in a charge of the programme management at the monomedia conference at the Berlin University of Arts. Furthermore, she initiated and curated a number of contemporary art exhibitions, e.g. at the Ludwig Forum for International Art in Aachen, Germany.</p> <p>She holds a PhD in Philosophy at the RWTH Aachen.</p>
Full text	<p>The theory of the image and of emblems is a prominent field in temporary cultural theory. For some time now, discourse about the image has been liberated from pure aesthetics and has been adopted by the complementary practice of media science and its phenomenological research. Within this context, the image is discussed across disciplines as a fundamental method of world construction. Current research on imaging techniques aims at ascertaining what impact these techniques have on our understanding of the image and on how we use the image. Thereby, for instance, it has been understood that the development of central perspective went hand in hand with a new concept of subjectivity and that photography in its early days was dedicated only to the recording of the real.</p> <p>When speaking of image-based artwork made with digital technology, we often stick to the question of how something was made and forget to ask the more important questions: why was it made and, even more important, what does it say about our image of the world?</p> <p>In 1938, Heidegger gave a lecture called <i>The constitution of a modern view of the world through metaphysics</i> in which he evaluated contemporary imaging techniques developed by the natural sciences as a fundamental change of practice in modern times. Heidegger saw the basis of this change of practice in the visualisation of the world. According to Heidegger, it was only this technological practice that engineered the world as an image and that made the constitution of a world image possible.</p> <p>My hope is that this paper, <i>Segmentation and Reassembly of the Digital Moving Image</i> will serve as a starting point for a discussion of what exactly the cultural and philosophical bases of these artworks are.</p> <p>In my paper <i>Space-Time Correlations Focused in Film Objects and Interactive Video</i> (2002), I tried to link contemporary artistic experimentation in the field of the interactive moving image to the subject of time and space representation in art history. In it, I showed that the subject of space-time relationships has always played a dominant role in art and presented some major artistic methods of its models of representation, for instance in panoramas implying an extension of format, and in interactive installations.</p> <p>With the invention of the moving image, which included the concept of space-time correlation, a whole new field of artistic experimentation emerged, using film as a basis for the transfer of space-time correlations into audio-visually perceptible representations.</p> <p>In this field of artistic research, the digital video image is connected to generative processes and computational design, thus closing the gap between opposing genres.</p> <p>In 1993, created probably the first interactive artwork using real-time video technology to alter the spatiotemporal reference of the image by scanning each pixel row of a picture and reassembling stacks of rows in the visual result. A computer programme executed various visual manipulations, such as time-lapse delay, slow motion, and time compression, which were displayed on a number of</p>

monitors.

This early work laid the foundation for a series of artworks that made use of the segmentation of the digital image into pixel rows, thus creating distortions of the original image and nonlinear spatiotemporal representations of the world. **Iwai's** main interest seemed to lie in the power of the visual effects ¹, and in fact this newfound technique provided a sense of playful immersion and expressiveness. Nevertheless, the application of such a technique in an art context is not only a function of its availability. If we assume that every invention and application of a cultural technique is closely linked to a specific change of cultural precepts and needs--as has been assumed in the case of central perspective--there must also be an underlying cultural concept behind this particular technique. ²

I would put forth some precepts that seem to me to lead to this playful experimentation with the digital image and the manipulation of its spatiotemporal dimensions. The most obvious is the basic change in the perception of time and space in the modern era. Today's expanding global networks, enabling the real-time exchange of emotions and thoughts over huge distances, fundamentally influence our understanding of time and space. They have led to an unconscious adoption of their characteristic speed and have fostered the sense of shrinking geographical distances. The awareness of simultaneous existences and of multiplicity of views of the world supports the imagination of a parallel and fragmented reality that can hardly be understood and perceived as an entity. The fragmentation of the world goes hand in hand with the disaggregation of linearity. The impossibility of representing and reflecting the world in all its multiplicity encourages both a reduction of the individual and self-generated view of the world and, at the other extreme, an intense (self-) reflection of the here and now.

Pieces like *Soft Cinema* by **Lev Manovich/Andreas Kratky** and *Somebody, Somewhere, Some Time* by **Maurice Benayoun** ³ seem to be born out of the same idea, though they use the more traditional technique of collage, which already has a lively history in (video) art. *Soft Cinema* displays various streams of moving images on one screen, arranged along a clear and geometric grid. This continuous image delivery is driven by specific software that generates the output out of a movie database. *Somebody, Somewhere, Some Time*, on the other hand, assembles still images representing diverse locations, time zones and the actions linked through a quasi-narrative.

In the latter piece, the image is divided into sections accessible to the viewer, who can "dive into" the picture and its manifold details. **Benayoun's** interactive piece betrays deep roots in art history, particularly in panoramic paintings. Despite the obvious aesthetic and functional difference between the **Benayoun** and **Manovich/Kratky** pieces, in both cases complete, autonomous and representational images are combined to form an associatively linked, synchronous universe of images.

In these works, the fragmentation of the world and of a worldview takes place on a metaphorical level, by a facet-like assembly of narratives, which, taken together, represent a universal totality.

In contrast, **Iwai** and his successors don't refer directly to the multiplicity of the world in its entirety; rather, they reflect on the multiplicity of a smaller unit, the here and now, by assembling segments of one real-time image. Another experimental art project that descends from *Another Time, Another Space* is the interactive installation *Zerrfalten* (Refolding) ⁴ by **Nelson Vergara** and **Stephan Schulz**. This piece questions the depiction of time and space in linear video and photography. *Zerrfalten* contrasts these recording methods with a system that combines compressed moments of time into one large image.

The system consists of two video cameras that feed the projection. The projected image is built out of segments of the recorded image of the visitor--out of pixel rows displayed in relation to the movement of the visitor and his/her position in space. The greater his/her distance to the camera, the thinner and more numerous the vertical pixel rows from the recorded image. The closer he/she comes to the camera, the bigger the segments of the image. The programme grades these segments from left to right and freezes them, unless they are "overwritten" by another sequence of segments or deconstructed by someone walking very close to the projection. This movement opens the small lines like a curtain to their full frame size.

Vergara and **Schulz** use pixel rows as a metaphor for time compression, for the depiction of "now." Scientific research has shown that the human perception of "now" lasts for approximately 0.3 seconds. This is the time span it takes the various centres and sections of the brain to find a synchronous rhythm that we experience as the present. **Paul Virilio** coined the term "intensive time," which describes an

extreme acceleration: the time beyond experience, the technically driven time that lies below the 0.3—second threshold and eliminates space.⁵

In *Zerrfalten*, a row of pixels as a time unit represents machine time as opposed to human time. Only by adding single moments of machine time in the form of pixel rows, is an image created that the human brain can interpret. Additionally, **Vergara/Schulz** integrated a fitting model of interaction that expressed the temporal concurrence and overlap of events.

Moreover, the single pixel row, as well as the frame it originates from, work as a precise spatiotemporal description of the visitor's movement. In the case of *Zerrfalten*, visual experimentation led to an artistic result that demonstrated the nonlinear quality of space inherent in this method of segmentation and reassembly of the digital image.

*Barrington Street*⁷, also by **Schulz**, uses video footage shot from a moving shopping cart that was pushed down Barrington Street in Halifax, Canada. If there is no manipulation by the user, the programme automatically selects the middle and vertical pixel row of each video frame and freezes it on the right side of the former pixel row. If the user intervenes and moves the cursor, the pixel row parallel to the cursor is taken out. Thus a change of perspective is implied, providing unique nonlinear views of the street architecture. The nonlinear perspective conveys the impression of space that is dependent both on time and on the movement of the viewer.

That time and space were rediscovered extensively in the 1990s as topics in philosophy, physics and art can be interpreted either as a late consequence of **Einstein's** theory of relativity finally reaching mass consciousness or as a side effect of globalisation, which comprises the ideas of distributed space, multitudes, and simultaneity. However, the laws of nature are far less incontestable than we might like. For lack of a general and logical comprehension of time and space, we usually favour a naive and illogical understanding of these concepts. Admittedly, art is limited by its metaphorical language, and its appeal to our senses can only convey a rather simple idea of time and space compared to the true complexity of the subject. Nevertheless, artists feel compelled to find appropriate visualisations and systems that provide a notion of the implications of time theory. **Tania Ruiz Gutierrez** researched models of time representations and came up with a piece about the question of cyclic time and space. For this piece called *La Plaza 2* she extracted pedestrians from video footage and looped their movements in an endless and desynchronized process, while she imprisoned them in a torus-like model space.⁷ She programmed the trajectories of these figures so that they will walk forever without reaching the boundary of the model space, since the space wraps back on itself. The pedestrians walk in a straight line and at a constant speed, enclosed in the system and in the frame. The film is programmed to last until the moment when all the possible encounters between figures have taken place.

While the **Ruiz** piece can be described as a film that runs by itself in a predefined way, **David Rokeby's** piece *Sorting Daemon* extracts human faces from their real-time contexts and reassembles them in a vibrant collage. A CCTV system connected to a computer system recognizes moving people on the street; when it finds what it thinks might be a person, it removes the person's image from the background.⁷

Then, the extracted image of the face is divided up according to areas of similar colour. The resulting swatches of colour are next grouped according to hue. The original faces first appear at the bottom of the collage and slowly separate into the coloured regions with their appropriate locations.

According to **Rokeby**, the focus of this piece lies both in exploring the generative process and in reflecting critically on surveillance systems. Nevertheless, it is closely related to previous pieces by **Rokeby**, such as *Seen* and *Taken*, both of which document and visualise the spatiotemporal occurrences of some site in real time, employing feedbacks, delays, processions of motion studies and loops as well as the extraction of persons from the source image. The fragmented images of *Sorting Daemon* therefore explore not only the metaphorical decomposition of a person by the recognition and classification of phenotype through software, but also embody the fragmentation of existence and of the world in general.

The aesthetics of visual and sonic noise is well-established in today's art culture, but it has recently been given new life by the development of real-time video-processing techniques and equivalent sound tools. In his essay for the *Dokumenta 11* catalogue, **Sarat Maharaj** points out that sonic noise is neither the junk of the music system nor the simple antithesis of musical composition, but rather raw data for digital sound manufacturing done without a script in a tense

correlation to the visual.⁸ **Rokeby's** *Sorting Daemon* is a production apparatus for visual noise, for a structured horror vacui, in which the endless stream of fragments overlap, are duplicated, and appear and disappear without any recognizable goal. Comparable to what **Maharaj** asserts for sonic noise, here the visual composition executed by the programme is neither a strict negation of traditional pictorial composition nor a visual scrap yard of digital fragments. Instead the visual output is part of the predefined generative process, which is what **Rokeby** is primarily interested in.

This ideological shift--from product to process--is an inherent differentia of digital culture and characterises also the following artworks, in which the degree of segmentation and abstraction of the digital image is further increased.

Osman Kahn and **Daniel Sauter** have employed the segmentation of the digital image into pixel rows in several works, starting with a piece called *We interrupt your regularly scheduled program...*⁹ which reinterprets the TV broadcast stream by abstraction and time lapse. They chose television as an image source because of its huge impact on society. By switching through daily TV programmes the viewer collects a mass of fragments of information which he/she has to process somehow. It is well known that the mass of information that the human brain must process has never been bigger than it is today. This continuous, nonlinear intake of information has significantly influenced our perceptions of time and chronology and has fostered the development of spatial information management systems. In the piece, a stream of lines is created by first generating a pixel average of every horizontal pixel row for every frame. Then a one-pixel-thick slice of every one of these horizontally averaged pixel rows is kept in memory and scrolled down the projection. The result is a perpetual flow of abstract row patterns that pulsate and change colour and speed in relation to the source material.¹⁰

In his provocative though dated essay *The work of art in the age of mechanical reproduction*, **Walter Benjamin** compares film with painting and finds film wanting: "The painting invites the spectator to contemplation; before it the spectator can abandon himself to his associations. Before the movie frame he cannot do so. No sooner have his eyes grasped a scene than it is already changed. It cannot be arrested."¹¹

Of course, **Benjamin** was referring to contemporary narrative film; however, today's experimental artwork with the digital moving image goes far beyond figurativeness and narration, and sometimes it even links itself back to abstract painting.

André Bazin was one of the most influential proponents of the idea that cinema, under the aegis of photography, "freed Western painting, once and for all, from its obsession with realism and allowed it to recover its aesthetic autonomy."¹² Following this train of thought, video liberated cinema from the bondage of narration, and now and finally, the digital moving image frees itself from linearity and figurativeness.¹³ Through both the abandonment of narrative and the reintroduction of complete abstraction, digital art regains its contemplative and auratic nature.

One last example of the segmentation and reassembly of the digital image is a project by **Jeremy Welsh** that intends to bridge the fields of painting and digital media. One of the results of this project was the exhibition *Dialogue/Transition*¹⁴, which was mounted in collaboration with the painter **Jon Arne Mogstad** and the media artist **Trond Lossius**, whose main focus is on sound.

The database behind the project contains numerous photographic images of container terminals that represent temporary architecture and urban zones and thus function as metaphors for transition and transience. By applying several effect filters and video editing programmes, these still images are heavily manipulated: For instance, a single row of pixels is extracted and stretched across the entire image area and then imported into a video editing programme where they are treated as frames of a single-cell animation. Also, more complex geometric forms are achieved by combining several streams of animation in a single video image consisting of multiple layers.¹⁵ The visual results of this image processing are strong rhythmic and repeating patterns which are read and then translated, through real-time sound processing, into ambient sound.

The visual output of this process takes on the quality of "painting over time"¹⁶, comparable to the result that **Kahn/Sauter** achieve through the live processing of digital moving images. The abstract digital moving image thereby gains the contemplative quality whose absence Benjamin complained of.

The segmentation and reassembly of the digital image, the extraction of pixel rows and the "compression" of the image, is used in various ways mainly to express the

temporal quality of the world. This method produces a broad spectrum of visual results, ranging from figurativeness and readability to pure abstraction and contemplation. The experimentation in this field of artistic production is fostered both by the artists' search for new means of visual expression beyond the narrative and their exploration of the visual capabilities of the video image and its tools. Within this artistic field, the focus of the work often lies in the live process of translation and transformation from one level of perception to another. Moreover, the work is based on a serious examination of complex space and time correlations whose perception and understanding has changed deeply through the everyday use of locative media.

By applying one basic technical method, i.e. the extraction of pixel rows, and combining those "comprised" moments of time in one moving image, a variety of artistic results is achieved. While the visual products of this artistic method strongly relate to each other and to contemporary painting and photography, for instance to present-day pinhole camera photography, the cultural basis for this kind of work is the acceleration of daily life and the disbandment of distances. In an even more technology-based future, the digital moving image that today plays a dominant role in culture already will be liberated from darkened rooms and monitors and the rectangular shape – thus leading to new artistic models representing the complex concepts of time and space.

■ 1. In *The Leonardo Gallery*, MIT Press, the piece is described as follows: "This 'live' sculpting in time generates some strange and beautiful distortions of the time and spatial dimensions that are displayed upon a rig of eight monitors."
<http://mitpress2.mit.edu/e-journals/Leonardo/gallery/gallery332/iwai.html>

■ 2. Here I just want to point to two pieces that were produced at the Media Art Academy in Cologne (KHM) in 2003: In Vera Doerk's work "Update," visitors' motions are tracked and recorded. The single video frames are then displayed in the original sequence in a 3-D picture, while areas of high movement are identified by the software and visually connected by white lines between the single frames. Thus movement in space and time is documented and exposed. See
<http://netzspannung.org/learning/codekit/update>

Another piece, called "selftime," made by Bei-Kyong Lee, plays with the opposite: While the image of motionless spectators is shown in the video projection, moving spectators are erased from the video image. The latter are represented by generated pixel dust.

■ 3. Both works were shown in the exhibition "Future Cinema: Cinematic Imaginary after Film", ZKM Center for Art and Media Karlsruhe, curated by Jeffrey Shaw and Peter Weibel, 16 November 2002–30 March 2003 (and other venues).

■ 4. A full documentation of the project is available at
www.maybevideodoes.de/sites/zerrfalten.html

■ 5. This was discussed in the introduction to *Machine Times*. DEAF_00 Book. Published by NAI Publishers and V2_Organisation, Rotterdam, 2000.

■ 6. The project "Barrington Street" was the result of an artistic research that finally led to "Zerrfalten". A documentation is available at
www.maybevideodoes.de/sites/barrington.html

■ 7. "In such a closed system, events are no longer read parallel to each other but through each other." Tania Ruiz Gutierrez: "From the matter of the facts to other substantial matters." Unpublished paper in which she describes the results of her artistic research. This research is part of her PhD thesis at the Université Sorbonne, Paris.

■ 8. See Rokeby's description of the piece in the catalogue "Transmitter. 21 April–23 May 2004, Kunsthalle Dominikanerkirche Osnabrück," published by Hermann Nöring, Ralf Sausmikat; copyright European Media Art Festival 2004, pp. 64–67.

■ 9. Sarat Maharaj: "Xeno-Epistemics. Ein provisorischer Werkzeugkasten zur Sondierung der Wissensproduktion in der Kunst und des Retinalen." In: *Dokumenta 11_Plattform 5: Ausstellung*. Katalog, Ostfildern 2002.

■ 10. This piece is a student project, which Kahn/Sauter realised at UCLA, California, in 2003, and which received an honorable mention at the Prix Ars Electronica in 2004, in the category Interactive Art. The installation contains a TV monitor placed with its screen toward a projection screen or wall. Next to the monitor the image is projected onto the screen, evoking the impression of a flowing

abstract digital landscape that pours out of the TV. See project page
www.daniel-sauter.com/display.php?project_id=10

- 11. The installation is interactive in the sense that the viewers can switch channels. Whereas the image is "compressed," the original sound is kept, so that the viewer possibly identifies the programme.
- 12. Walter Benjamin, "The work of art in the age of mechanical reproduction," paragraph XIV. Quoted from:
<http://bid.berkeley.edu/bidclass/readings/benjamin.html>
- 13. André Bazin: The Ontology of the Photographic Image. What Is Cinema?, translated by Hugh Gray, University of California Press, Berkeley, 1967, p. 16. Quoted from: Paul Arthur: Transformations in Film as Reality (Part 6). On the Virtues and Limitations of Collage.
www.city.yamagata.yamagata.jp/yidff/docbox/11/box11-1-e.html
- 14. In speaking of the aesthetic autonomy of the digital moving image, one cannot ignore the vivid experimentation with digital video documentary. This type of aesthetics forms the opposite pole within the formal and semantic spectrum of the digital moving image.
- 15. The show was realised at Christiansands Kunstforening (Norway) in March 2004, and showed paintings by Mogstad that combine the use of photographic reproduction and digital manipulation with traditional and new painting techniques. Lossius created the overall digital sound and contributed a video installation that uses abstract visual information from a live video feed to generate the soundscape.
- 16. The full description of the research project at the Bergen College of Art and Design (Kunsthøgskolen i Bergen) is to be found in the text: The Bridge: the expanded field of painting and digital media, an art research project by Jeremy Welsh that will be published in the Kunsthøgskolen i Bergen yearbook 2004.
- 17. *ibidem*.