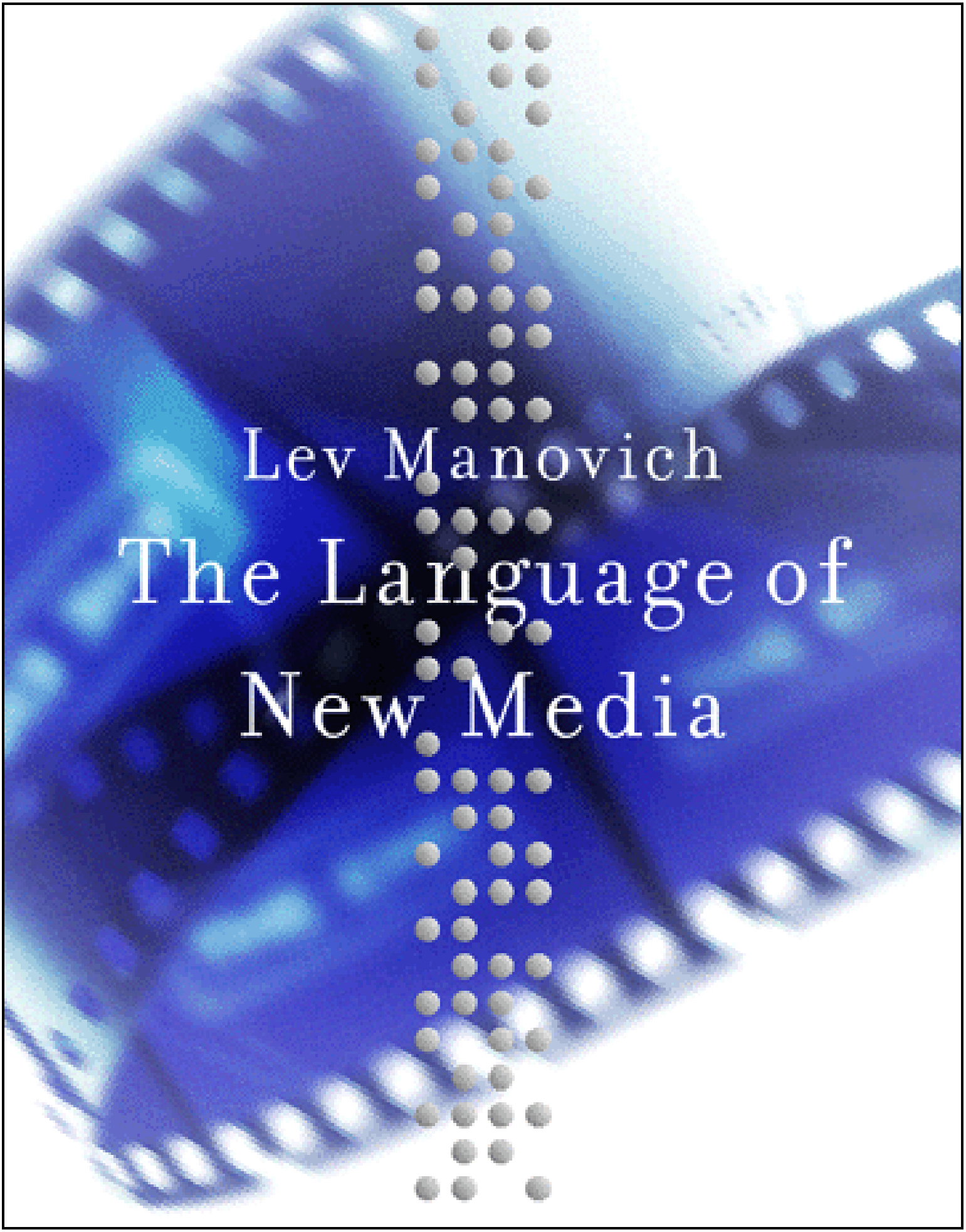
Lev Manovich
The Language of New Media

corresponding computer hardware (compression boards, storage formats such as DVD), is driven by a clearly defined goal: the exact duplication of cinematic realism. So if a computer screen, more and more, emulates cinema's screen, this not an accident but a result of conscious planning by the computer and entertainment industry. But this drive to turn new media into a simulation of classical film language, which paralles the encoding of cinema's techniques in software interfaces and hardare itself, described in "Cultural Interfaces" section, is just one direction for new media dvelopment among numerous others. I will next examine a number of new media and old media objects which point towards other possible trajectories.

New Temporality: Loop as a Narrative Engine

One of the underlying assumptions of this book is that by looking at the history of visual culture and media, and in particular cinema, we can find many strategies and techniques relevant to new media design. Put differently, in order to develop new aesthetics of new media we should pay as much attention to the cultural history as to computer's new unique possibilities to generate, organize, manipulate and distribute data.

As we scan through cultural history (which includes the history of new media up until the time of research), three kinds of situations will be particularly relevant for us:

- when an earlier interesting strategy or technique was abandoned or forced into "underground" without fully developing its potential;
- when an earlier strategy can be understood as a response to the technological constrains (I am using this more technical term on purpose instead of more ideologically loaded "limitations") similar to the constrains of new media;
- when an earlier strategy was used in a situation similar to a particular situation faced by new media designers. For instance, montage was a strategy to deal with modularity of a film (how do you join separate shots?) as well as with a problem of coordinating diffirent media types such as images and sound. Both of these simutaions are being faced once again today by new media designers.

I already used these principles in discussing the parallels between nineteenth century pro-cinematic techniques and the language of new media; they also guided me in thinking about animation (the "underground" of 20th century cinema) as the basis for digital cinema new language. I will now use a particular parallel between early cinematic and new media technology to highlight another

older technique useful to new media: a loop. Characterically, many new media products, be it cultural objects (such as games) or software (various media players such as QuickTime Player) use loops in their design while treating them as temporary technological limitations. I, however, want to think about it as a source of new possibilities for new media.[373]

As already mentioned in the previous section, all nineteenth century pro-cinematic devices, up to Edison's Kinetoscope, were based on short loops. As "the seventh art" began to mature, it banished the loop to the low-art realms of the instructional film, the pornographic peep-show and the animated cartoon. In contrast, narrative cinema has avoided repetitions; as modern Western fictional forms in general, it put forward a notion of human existence as a linear progression through numerous unique events.

Cinema's birth from a loop form was reenacted at least once during its history. In one of the sequences of A Man with a Movie Camera, Vertov shows us a cameraman standing in the back of a moving automobile. As he is being carried forward by an automobile, he cranks the handle of his camera. A loop, a repetition, created by the circular movement of the handle, gives birth to a progression of events — a very basic narrative which is also quintessentially modern: a camera moving through space recording whatever is in its way. In what seems to be a reference to cinema's primal scene, these shots are intercut with the shots of a moving train. Vertov even re-stages the terror which Lumieres's film supposedly provoked in its audience; he positions his camera right along the train track so the train runs over our point of view a number of times, crushing us again and again.

Early digital movies shared the same limitations of storage as nineteenth century pro-cinematic devices. This is probably why the loop playback function was built into QuickTime interface, thus giving it the same weight as the VCR-style "play forward" function. So, in contrast to films and videotapes, QuickTime movies were supposed to be played forward, backward or looped. Computer games also heavily relied on loops. Since it was not possible to animate in real time every character, the designers stored short loops of character's motion — for instance, an enemy soldier or a monster walking back and forth — which would be recalled at the appropriate times in the game. Internet pornography also heavily relied on loops. Many sites featured numerous "channels" which were supposed to stream either feature length feature films or "live feeds"; in reality they would usually play short loops (a minute or so) over and over. Sometimes a few films will be cut into a number of short loops which would become the content of 100, 500 or 1000 channels.[374]

The history of new media tells us that the hardware limitations never go away: they disappear in one area only to come back in another. One example of this which I already noted is the hardware limitations of the 1980s in the area of 3D computer animation. In the 1990s they returned in the new area: Internet-

based real-time virtual worlds. What used to be the slow speed of CPUs became the slow bandwidth. As a result the 1990s VRML worlds look like the pre-rendered animations done ten years earlier.

The similar logic applies to loops. Earlier QuickTime movies and computer games heavily relied on loops. As the CPU speed increased and larger storage media such as CD-ROM and DVD became available, the use of loops in stand-alone hypermedia declined. However, online virtual worlds such as Active Worlds came to use loops extensively, as it provides a cheap (in terms of bandwidth and computation) way of adding some signs of "life" to their geometric-looking environments.[375] Similarly, we may expect that when digital videos will appear on small displays in our cellular phones, personal managers such as Palm Pilot or other wireless communication devices, they will once again will be arranged in short loops because of bandwidth, storage, or CPU limitations.

Can the loop be a new narrative form appropriate for the computer age?[376] It is relevant to recall that the loop gave birth not only to cinema but also to computer programming. Programming involves altering the linear flow of data through control structures, such as "if/then" and "repeat/while"; the loop is the most elementary of these control structures. Most computer programs are based on repetitions of a set number of steps; this repetition is controlled by the program's main loop. So if we strip the computer from its usual interface and follow the execution of a typical computer program, the computer will reveal itself to be another version of Ford's factory, with a loop as its conveyer belt.

As the practice of computer programming illustrates, the loop and the sequential progression do not have to be thought as being mutually exclusive. A computer program progresses from start to end by executing a series of loops. Another illustration of how these two temporal forms can work together is Möbius House by Dutch team UN Studio/Van Berkel & Bos.[377] In this house a number of functionally different areas are arranged one after another in the form of a Möbius strip, thus forming a loop. As the narrative of the day progresses from one activity to the next, the inhabitants move from area to area.

Traditional cell animation similarly combines a narrative and a loop. In order to save labor, animators arrange many actions, such as movements of characters' legs, eyes and arms, into short loops and repeat them over and over. Thus, as already discussed in the previous section, in a typical twentieth century cartoon a large proportion of motions involves loops. This principle is taken to the extreme in Rybczynski's Tango. Subjecting live action footage to the logic of animation, Rybczynski arranges the trajectory of every character through space as a loop. These loops are further composited together resulting in a complex and intricate time-based structure. At the same time, the overall "shape" of this structure is governed by a number of narratives. The film begins in an empty room; next the loops of character's trajectories through this room are added, one

by one. The end of the film mirrors its beginning as the loops are "deleted" in a reverse order, also one by one. This metaphor for a progression of a human life (we are born alone, gradually forms relations with other humans, and eventually die alone) is also supported by another narrative: the first character to appear in the room is a young boy, the last one is an old woman.

The concept of a loop as an "engine" which puts the narrative in motion becomes a foundation of a brilliant interactive TV program Akvaario (aquarium) by a number of graduate students at Helsinki's University of Art and Design (Professor and Media Lab coordinator: Minna Tarrka).[378] In contrast to many new media objects which combine the conventions of cinema, print and HCI, Akvaario aims to preserve the continuos flow of traditional cinema, while adding interactivity to it. Along with an earlier game Jonny Mnemonic (SONY, 1995), as well as the pioneering interactive laserdisk computer installations by Graham Weinbren done in the 1980s, this project is a rare example of a new media narrative which does not rely on the oscillation between non-interactive and interactive segments (see "Illusion, Narrative and Interactivity" section for the analysis of this temporal ossicilation.)

Using the already familiar convention of such games such as Tamagotchi (1996-), the program asks TV viewers to "take charge" of a fictional human character.[379] Most shots which we see show this character engaged in different activities in his apartment: eating dinner, reading a book, starring into space. The shots replace each other following standard conventions of film and TV editing. The result is something which looks at first like a conventional, although very long, movie (the program was projected to run for three hours every day over the course of a few months), even though the shots are selected in real time by a computer porgram from a database of a few hundreds diffirent shots.

By choosing one of the four buttons which are always present on the bottom of the screen, the viewers control character's motivation. When a button is pressed, a computer program selects a sequence of particular shots to follow the shot which plays currently. Because of visual, spatial and referential discontinuity between shots typical of standard editing, the result is something which the viewer interprets as a conventional narrative. A film or television viewer viewer does not expect that any two shots which follow one another have to display the same space or subsequent moments of time. Therefore in Akvaario a computer program can "weave" an endless narrative by choosing from a database of different shots. What gives the resulting "narrative: a suficient continuity is that almost all shots show the same character.

Akvaario is one of the first examples of what in previous chapter I called a "database narrative." It is, in other words, a narrative which fully utilizes many features of database organization of data. It relies on our abilities to classify database records according to different dimensions, to sort through records, to

quickly retrieve any record, as well as to "stream" a number of different records continuously one after another.

In Akvaario the loop becomes the way to bridge linear narrative and interactive control. When the program begins, a few shots keep following each other in a loop. After users choose character's motivation by pressing a button, this loop becomes a narrative. Shots stop repeating and a sequence of new shots is displayed. If no button pressed again, the narrative turns back into a loop, i.e. a few shots start repeating over and over. In Akvaario a narrative is born from a loop and it returns back to a loop. The historical birth of modern fictional cinema out of the loop returns as a condition of cinema's rebirth as an interactive form. Rather than being an archaic leftover, a reject from cinema's evolution, the use of loop in Akvaario suggests a new temporal aesthetics for computer-based cinema.

Jean-Louis Boissier's Flora petrinsularis realizes some of the possibilities contained in the loop form in a diffirent way.[380] This CD-ROM is based on Rousseau's Confessions. It opens with a white screen, containing a numbered list. Clicking on each item leads us to a screen containing two windows, positioned side by side. Both windows show the same video loop made from a few diffirent shots. The two loops are offset from each other in time. Thus, the images appearing in the left window reappear in a moment on the right and vice versa, as though an invisible wave is running through the screen. This wave soon becomes materialized: when we click inside the windows we are taken to a new screen which also contains two windows, each showing loop of a rhythmically vibrating water surface. The loops of water surfaces can be thought of as two sign waves offset in phase. This structure, then, functions as a "meta-text" of a structure in the first screen. In other words, the loops of water surface act as a diagram of the loop structure which controls the correlations between shots in the first screen, similar to how Marey and the Gibsons diagrammed human motion in their film studies in the beginning of the twentieth century.

As each mouse click reveals another loop, the viewer becomes an editor, but not in a traditional sense. Rather than constructing a singular narrative sequence and discarding material which is not used, here the viewer brings to the forefront, one by one, numerous layers of looped actions which seem to be taking place all at once, a multitude of separate but co-existing temporalities. The viewer is not cutting but re-shuffling. In a reversal of Vertov's sequence where a loop generated a narrative, viewer's attempt to create a story in Flora petrinsularis leads to a loop.

It is useful to analyze the loop structure of Flora petrinsularis using montage theory. From this perspective, the repetition of images in two adjoint windows can be interpreted as an example of what Eisenstein called rhythmical montage. At the same time, Boissier takes montage apart, so to speak. The shots which in traditional temporal montage would follow each in time here appear next to each other in space. In addition, rather than being "hard-wired" by an editor in

only one possible structure, here the shots can appear in different combinations since they are activated by a user moving a mouse across the windows.

At the same time, it is possible to find more traditional temporal montage in this work as well — for instance, the move from first screen which shows close-up of a woman to a second screen which shows water surfaces and back to the first screen. This move can be interpreted as a traditional parallel editing. In cinema parallel editing involves alternating between two subjects. For instance, a chase sequence may go back and forth between the images of two cars, one pursuing another. However in our case the water images are always present "underneath" the first set of images. So the logic here is again one of co-existence rather than that of replacement, typical of cinema (see my discussion of spatial montage below).

The loop which structures Flora petrinsularis on a number of levels becomes a metaphor for human desire which can never achieve resolution. It can be also read as a comment on cinematic realism. What are the minimal conditions necessary to create the impression of reality? As Boissier demonstrates, in the case of a field of grass, a close-up of a plant or a stream, just a few looped frames become sufficient to produce the illusion of life and of linear time.

Steven Neale describes how early film demonstrated its authenticity by representing moving nature: "What was lacking [in photographs] was the wind, the very index of real, natural movement. Hence the obsessive contemporary fascination, not just with movement, not just with scale, but also with waves and sea spray, with smoke and spray."[381] What for early cinema was its biggest pride and achievement — a faithful documentation of nature's movement — becomes for Boissier a subject of ironic and melancholic simulation. As the few frames are looped over and over, we see blades of grades shifting slightly back and forth, rhythmically responding to the blow of non-existent wind which is almost approximated by the noise of a computer reading data from a CD-ROM.

Something else is being simulated here as well, perhaps unintentionally. As you watch the CD-ROM, the computer periodically staggers, unable to maintain consistent data rate. As a result, the images on the screen move in uneven bursts, slowing and speeding up with human-like irregularity. It is as though they are brought to life not by a digital machine but by a human operator, cranking the handle of the Zootrope a century and a half ago...

Spatial Montage

Along with taking on a loop, Flora petrinsularis can also be seen as a step towards what I will call a spatial montage. Instead of a traditional singular frame of cinema, Boissier uses two images at once, positioned side by side. This can be thought of a simplest case of a spatial montage. In general, spatial montage would

involve a number of images, potentially of different sizes and proportions, appearing on the screen at the same time. This by itself of course does not result in montage; it up to the filmmaker to construct a logic which drives which images appear together, when they appear and what kind of relationships they enter with each other.

Spatial montage represents an alternative to traditional cinematic temporal montage, replacing its traditional sequential mode with a spatial one. Ford's assembly line relied on the separation of the production process into a set of repetitive, sequential, and simple activities. The same principle made computer programming possible: a computer program breaks a tasks into a series of elemental operations to be executed one at a time. Cinema followed this logic of industrial production as well. It replaced all other modes of narration with a sequential narrative, an assembly line of shots which appear on the screen one at a time. A sequential narrative turned out to be particularly incompatible with a spatial narrative which played a prominent role in European visual culture for centuries. From Giotto's fresco cycle at Capella degli Scrovegni in Padua to Courbet's A Burial at Ornans, artists presented a multitude of separate events within a single space, be it the fictional space of a painting or the physical space which can be taken by the viewer all in once. In the case of Giotto's fresco cycle and many other fresco and icon cycles, each narrative event is framed separately but all of them can be viewed together in a single glance. In other cases, different events are represented as taking place within a single pictorial space. Sometimes, events which formed one narrative but they separated by time were depicted within a single painting. More often, the painting's subject became an excuse to show a number of separate "micro-narratives" (for instance, works by Hiëronymous Bosch and Peter Bruegel). All in all, in contrast to cinema's sequential narrative, in spatial narrative all the "shots" were accessible to a viewer at one. Like nineteenth century animation, spatial narrative did not disappear completely in the 20th century; but just as animation, it came to be delegated to a minor form of Western culture — comics.

It is not accidental that the marginalization of spatial narrative and the privileging of sequential mode of narration coincided with the rise of historical paradigm in human sciences. Cultural geographer Edward Soja has argued that the rise of history in the second half of the nineteenth century coincided with the decline in spatial imagination and the spatial mode of social analysis.[382] According to Soja, it is only in the last decades of the twentieth century that this mode made a powerful comeback, as exemplified by the growing importance of such concepts as "geopolitics" and "globalisation" as well as by the key role analysis of space played in theories of post-modernism. Indeed, although some of the best thinkers of the twentieth century such as Freud, Panofsky and Foucault were able to combine historical and spatial mode of analysis in their theories, they probably represent an exemption rather than the norm. The same holds for film

theory, which, from Eisenstein in the 1920s to Deleuse in the 1980s, focused on temporal rather than spatial structures of film.

Twentieth century film practice has elaborated complex techniques of montage between different images replacing each other in time; but the possibility of what can be called "spatial montage" between simultaneously co-exiting images was not explored as systematically. (Thus cinema also given to historical imagination at the expense of spatial one.) The notable exemptions include the use of split screen by Hans Abel in Napoléon in the 1920s and also by the American experimental filmmaker Stan Van der Beek in the 1960s; also some other works, or rather, events, of the 1960s “expanded cinema” movement, and, last but not least, the legendary multi-image multimedia presentation shown in the Chech Pavilion at the1967 World Expo. Emil Radok’s Diaolyektan consisted from 112 separate cubes. One hundred and sixty different images could be projected onto each cube. Radok was able to “direct” each cube separately. To the best of my knowledge, since this project nobody tried again to create a spatial montage of this complexity in any technology.

Traditional film and video technology were designed to completely fill a screen with a single image; thus to explore spatial montage a filmmaker had to work “against” the technology. This in part explains why so few tried to do this. But when, in the 1970s, the screen became a bit-mapped computer display, with individual pixels corresponding to memory locations which can be dynamically updated by a computer program, one image/ one screen logic was broken. Since the Xerox Park Alto workstation, GUI used multiple windows. It would be logical to expect that cultural forms based on moving images will eventually adopt similar conventions. In the 1990s some computer games such as Golden Eye (Nintendo/Rare, 1997) already used multiple windows to present the same action simultaneously from different viewpoints. We may expect that computer-based cinema will eventually have to follow the same direction — especially when the limitations of communication bandwidth will disappear, while the resolution of displays will significantly increase, from the typical 1-2K in 2000 to 4K, 8K or beyond. I believe that the next generation of cinema — broadband cinema — will add multiple windows to its language. When this happen, the tradition of spatial narrative which twentieth century cinema suppressed will re-emerge one again.

Looking back at visual culture and art of the previous centuries gives many ideas for how spatial narrative can be further developed in a computer; but what about spatial montage? In other words, what will happen if we combine two different cultural traditions: informationally dense visual narratives of Renaissance and Baroque painters with “attention demanding” shot juxtapositions of twentieth century film directors? "My boyfriend came back from war!," a Web-based work by the young Moscow artist Olga Lialina, can be read as an exploration of this direction.[383] Using the capability of HTML to create frames within frames, Lialina leads us through a narrative which begins with an single

screen. This screen becomes progressively divided into more and more frames as we follow different links. Throughout, an image of a human couple and of a constantly blinking window remain on the left part of screen. These two images enter into new combinations with texts and images on the right part which keep changing as the user interacts with the work. As the narrative activates different parts of the screen, montage in time gives way to montage in space. Put differently, we can say that montage acquires a new spatial dimension. In addition to montage dimensions already explored by cinema (differences in images' content, composition, movement) we now have a new dimension: the position of the images in space in relation to each other. In addition, as images do not replace each other (as in cinema) but remain on the screen throughout the movie, each new image is juxtaposed not just with one image which preceded it, but with all the other images present on the screen.

The logic of replacement, characteristic of cinema, gives way to the logic of addition and co-existence. Time becomes spatialized, distributed over the surface of the screen. In spatial montage, nothing is potentially forgotten, nothing is erased. Just as we use computers to accumulate endless texts, messages, notes and data, and just as a person, going through life, accumulates more and more memories, with the past slowly acquiring more weight than the future, spatial montage can accumulate events and images as it progresses through its narrative. In contrast to cinema's screen, which primarily functioned as a record of perception, here computer screen functions as a record of memory.

As I already noted, spatial montage can also be seen as an aesthetics appropriate for the user experience of muli-tasking and multiple windows of GUI. In the text of his lecture "Of other spaces" Michel Foucault writes: "We are now in the epoch of simultaneity: we are in epoch of juxtaposition, the epoch of near and far, of the side-by-side, of the dispersed…our experience of the world is less of a long life developing through time that that of a network that connects points and intersects with its own skein…"[384] Writing this in the early 1970s, Foucault appears to prefigure not only the network society, exemplified by the Internet ("a network which connects points") but also GUI ("epoch of simultaneity…of the side-by-side). GUI allows the users to run a number of software applications at the same time; and it uses the convention of multiple overlapping windows to present both data and controls. The construct of the desktop with presents the user with multiple icons which are all simultaneously and continuously "active" (since they all can be clicked at any time) follows the same logic of "simultaneity" and of "side-by-side." On the level of computer programming, this logic corresponds to object-oriented programming. Instead of a single program which, like Ford's assembly line, is executed one statement at a time, in object-oriented paradigm a number of objects send messages to each other. These objects are all active simultaneously. Object-oriented paradigm and multiple windows of GUI work together; object-oriented approach was in fact used to program the

original Macintosh GUI which substituted the "one command at a time" logic of DOS with the logic of simultaneity of multiple windows and icons.

The spatial montage of "My boyfriend came back from war!" follows this logic of simultaneity of modern GUI. Multiple and simultaneously active icons and windows of GUI become the multiple and simultaneously active frames and hyperlinks of this Web artwork. Just as the GUI user can click on any icon at any time, changing the overall "state" of the computer environment, the user of Lialina's site can activate different hyperlinks which are all simultaneously present. Each action either changes the contents of a single frame or creates new frame(s). In either case, the "state" of the screen as a whole is affected. The result is a new cinema where syncronic dimension is no longer privileged to the diacronic dimension, space is no longer privileged to time, the simultaneity is no longer privileged to sequence, montage within a shot is no longer privileged to montage in time.

Cinema as an Information Space

As we saw in "Cultural Interfaces" section, cinema language which originally was an interface to narrative taking place in 3D space is now becoming an interface to all types of computer data and media. I discussed how such elements of this language as rectangular framing, mobile camera, image transitions, montage in time and montage within an image reappear in general purpose HCI, in interfaces of software applications and in cultural interfaces.

Yet another way to think about new media interfaces in relation to cinema is to interpret the later as information space. If HCI is an interface to computer data, and a book is interface to text, cinema can be thought of an interface to events taking place in 3D space. Just as painting before it, cinema presented us with familiar images of visible reality — interiors, landscapes, human characters — arranged within a rectangular frame. The aesthetics of these arrangements ranges from extreme scarcity to extreme density. The examples of the former are paintings by Morandi and shots in Late Spring (Yasujiro Ozu, 1949); the examples of the later are paintings by Bosch and Bruegel (and much of Northern Renaissance painting in general), and many shots in A Man with a Movie Camera.[385] It would be only a small leap to relate this density of "pictorial displays" to the density of contemporary information displays such as Web portals which may contain a few dozen hyperlinked elements; or the interfaces of popular software packages which similarly present the user with dozens commands at once. Can the contemporary information designers learn from information displays of the past — particular films, paintings and other visual forms which follow the aesthetics of density?

In making such a connection I rely on work of art historian Svetlana Alpers who claimed that in contrast to Italian Renaissance painting primarily concerned with narration, Dutch painting of the Seventeenth century is focused on description.[386] While the Italians subordinated details to the narrative action, creating clear hierarchy of viewer's attention, in Dutch paintings particular details and, consequently, viewer's attention, are more evenly distributed throughout the whole image. While functioning as a window into an illusionary space, the Dutch painting also is a loving catalog of numerous objects, different material surfaces and light effects painted in minute detail (works by Vermeer, for instance.) The dense surfaces of these paintings can be easily related to contemporary interfaces; in addition, they can be also related to the future aesthetics of a moving image, when the digital displays will move much beyond the resolution of analog television and film.

The trilogy of computer films by Paris-based filmmaker Christian Boustani, develops such an aesthetics of density. Taking his inspiration from Renaissance Dutch painting as well as from classical Japanese art, Boustani uses digital compositing to achieve unprecedented. for film, information density. While this density was typical for old art he draws on, it was never before achieved in cinema. In Brugge (1995) Boustani recreates the images typical of winter landscape scenes in Dutch seventeenth century painting. His next film A Viagem (The Voyage, 1998) achieves even higher information density; some shots of the film use as many as 1600 separate layers.

This new cinematic aesthetics of density seems to be highly appropriate for out age. If, from a city street to a Web page, we are surrounded by highly dense information surfaces, it is appropriate to expect from cinema similar logic. (In a same fashion, we may think of spatial montage as reflecting another contemporary daily experience: working with a number of different applications at once on a computer. If we are now used to distribute and rapidly switch our attention from one program to another, from one set of windows and command to another set, we may find multiple streams of audio-visual information presented simultaneously more satisfying than a single stream of traditional cinema.)

It is appropriate that some of the most dense shots of A Viagem recreates a Renaissance marketplace, this symbol of emerging capitalism which was probably responsible for the new density of Renaissance painting (think, for instance, of Dutch still-lives which function as a kind of store display window aiming to overwhelm the viewer and seduce her into making a purchase). In the same way, in the 1990s the commercialization of the Internet was responsible for the new density of Web pages. By the end of the decade all home pages of big companies and Internet portals became indexes containing dozens of entries in a small type. If every small area of the screen can potentially contain a lucrative add or a link to a page with one, this leaves no place for the aesthetics of emptiness and

minimalism. Thus it is not surprising that commercialized Web joined the same aesthetics of information density and competing signs and images which characterizes visual culture in a capitalist society in general.

If Lialina's spatial montage relies on HTML frames and actions of the user to activate images appearing in these frames, Boustani's spatial montage is more purely cinematic and painterly. He combines mobility of camera and movement of objects characteristic of cinema which the "hyper-realism" of old Dutch painting which presented everything "in focus." In analog cinema, the inevitable "depth of field" artifact acted as a limit to the information density of an image. The achievement of Boustani is to create images where every detail is in focus and yet the overall image is easily readable. This could only be done through digital compositing. By reducing visible reality to numbers the computer makes possible for us to literally see in a new way. If, according to Benjamin, early twentieth century cinema used close-up "to bring things 'closer' spatially and humanly," "to get hold of an object at very close range," and, as a result, destroyed their aura, digital composites of Boustani can be said to bring objects close to a viewer without "extracting" them away from their places in the word. (Of course also an opposite interpretation is possible: we can say that Boustani's digital eye is super-human. Similar to the argument in "Synthetic Image and its subject" section, his vision can be interpreted as the gaze of a cyborg or computer vison system which can see things equally well at any distance.)

Scrutinizing the prototypical perceptual spaces of modernity — the factory, the movie theater, the shopping arcade — Walter Benjamin insisted on the contiguity between the perceptual experiences in the workplace and outside of it:

> Whereas Poe's passers-by cast glances in all directions which still appeared to be aimless, today's pedestrians are obliged to do so in order to keep abreast of traffic signals. Thus technology has subjected the human sensorium to a complex kind of training. There came a day when a new and urgent need for stimuli was met by the film. In a film, perception in the form of shocks was established as a formal principle. That which determines the rhythm of production on a conveyer belt is the basis of the rhythm of reception in the film.[387]

For Benjamin, the modern regime of perceptual labor, where the eye is constantly asked to process stimuli, equally manifests itself in work and leisure. The eye is trained to keep pace with the rhythm of industrial production at the factory and to navigate through the complex visual semiosphere beyond the factory gates. It is appropriate to expect that the computer age will follow the same logic, presenting the users with similarly structured perceptual experiences at work and at home, on

a computer screen and outside of it. Indeed, as I already noted, we now use the same interfaces for work and for leisure, the condition exemplified most dramatically by Web browsers. Another example is the use of the same interfaces in flight and military simulators, in computer games modeled after these simulators, and in the actual controls of planes and other vehicles (recall the popular perception of Gulf War as "video game war.") But if Benjamin appears to regret that the subjects of an industrial lost pre-modern freedom of perception, now regimented by factory, modern city and film, we may instead think of information density of our own workspaces as a new aesthetic challenge, something to explore rather than to condemn. Similarly, we should explore the aesthetic possibilities of all aspects of user's experience with a computer, this key experience of modern life: dynamic windows of GUI, multi-tasking, search engines, databases, navigable space, and others.

Cinema as a Code

When radically new cultural forms appropriate for the age of wireless telecommunication, multitasking operating systems and information appliances will arrive, what will they look like? How would we even know they are here? Would future films look like a "data shower" from the movie "Matrix"? Is the famous fountain at Xerox Park in which the strength of the water stream reflects the behavior of the stock market, with stock data arriving in real time over Internet, represents the future of public sculpture?

We don't yet know the answers to these questions. However, what artists and critics can do is point out the radically new nature of new media by staging — as opposed to hiding — its new properties. As my last example, I will discuss Vuk Cosic's ASCII films, which effectively stage one characteristic of computer-based moving images — their identity as a computer code.[388]

It is worthwhile to relate Cosic's films to both Zuse's "found footage movies" from the 1930s, which I invoke in the beginning of this book, and to the first all-digital feature length movie made sixty years later — Lucas's Stars Wars: Episode 1, The Phantom Menace.[389] Zuse superimposes digital code over the film images. Lucas follows the opposite logic: in his film, digital code "lies under" his images. That is, given that most images in the film were put together on computer workstations, during the post-production process they were pure digital data. The frames were made up from numbers rather than bodies, faces, and landscapes. The Phantom Menace is, therefore, can be called the first feature-length commercial abstract film: two hours worth of frames made up from matrix of numbers. But this is hidden from the audience.

What Lucas hides, Cosic reveals. His ASCII films "perform" the new status of media as digital data. The ASCII code that results when an image is digitized is displayed on the screen. The result is as satisfying poetically as it is conceptually — for what we get is a double image: a recognizable film image and an abstract code together. Both are visible at once. Thus, rather than erasing the image in favor of the code as in Zuse's film, or hiding the code from us as in Lucas's film, in ASCII films the code and the image coexist.

Like VinylVideo project by Gebhard Sengmüller which records TV programs and films on old vinyl disks,[390] Cosic's ASCII initiative[391] is a systematic program of translating media content from one obsolete format into another. These projects remind us that since at least the 1960s the operation of media translation has been at the core of our culture. Films transferred to video; video transferred from one video format to another; video transferred to digital data; digital data transferred from one format to another: from floppy disks to Jaz drives, from CD-ROMs to DVDs; and so on, indefinitely. The artists noticed this new logic of culture early on: in the 1960s, Roy Lichtenstein and Andy Warhol already made media translation the basis of their art. Sengmuller and Cosic understand that the only way to deal with built-in media obsolescence of a modern society is by ironically resurrecting dead media. Sengmuller translates old TV programs into vinyl disks; Cosic translates old films into ASCII images.[392]

Why do I call ASCII images an obsolete media format? Before the printers capable of outputting raster digital images became widely available toward the end of the 1980s, it was commonplace to make printouts of images on dot matrix printers by converting the images into ASCII code. I was surprised that in 1999 I still was able to find the appropriate program on my UNIX system. Called simply "toascii," the command, according to the UNIX system manual page for the program, "prints textual characters that represent the black and white image used as input."

The reference to early days of computing is not unique to Cosic but shared by other net.artists. Jodi.org, the famous net.art project created by the artistic team of Joan Heemskerk and Dirk Paesmans, often evokes DOS commands and the characteristic green color of computer terminals from the 1980s[393]; a Russian net.artist Alexei Shulgin has performed music in the late 1990s using old 386PC.[394] But in the case of ASCII code, its use evokes not only a peculiar episode in the history of computer culture but a number of earlier forms of media and communication technologies as well. ASCII is an abbreviation of American Standard Code for Information Interchange. The code was originally developed for teleprinters and was only later adopted for computers in the 1960s. A teleprinter was a twentieth-century telegraph system that translated the input from a typewriter keyboard into a series of coded electric impulses, which were then transmitted over communications lines to a receiving system, which decoded the

pulses and printed the message onto a paper tape or other medium. Teleprinters were introduced in the 1920s and were widely used until the 1980s (Telex being the most popular system), when they were gradually replaced by fax and computer networks.[395]

ASCII code was itself an extension of an earlier code invented by Jean-Maurice-Emile Baudot in 1874. In Baudot code, each letter of an alphabet is represented by a five-unit combination of current-on or current-off signals of equal duration. ASCII code extends Baudot code by using eight-unit combinations (that is, eight "bits" or one "byte") to represent 256 different symbols. Baudot code itself was an improvement over the Morse code invented for early electric telegraph systems in the 1830s. And so on.

The history of ASCII code compresses a number of technological and conceptual developments which lead to (but I am sure will not stop at) a modern digital computers: cryptography, real-time communication, communication network technology, coding systems. By juxtaposing ASCII code with the history of cinema, Cosic accomplishes what can be called an artistic compression. That is, along with staging the new status of moving images as a computer code, he also "encodes" in these images many key issues of computer culture and new media art.

As this book has argued, in computer age, cinema, along with other established cultural forms, indeed becomes precisely a code. It is now used to communicate all types of data and experiences; and its language is encoded in interfaces and defaults of software programs and hardware itself. Yet, while on the one hand new media strengthens existing cultural forms and languages, including the language of cinema, it simultaneously "opens" them up for redefinition. The elements of their interfaces become separated from the types of data they were traditionally connected to. Further, what was previously in the background, on the margins, comes into the center. For instance, animation comes to challenge live cinema; spatial montage comes to challenge temporal montage, database comes to challenge narrative; search engine comes to challenge encyclopedia; and, last but not least, online distribution of culture challenges traditional "off-line" formats. To use a metaphor from computer culture, new media turns all culture and cultural theory into "open source." This "opening up" of all cultural techniques, conventions, forms and concepts is ultimately the most positive cultural effect of computerization — the opportunity to see the world and the human being anew, in ways which were not available to A Man with a Movie Camera.

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