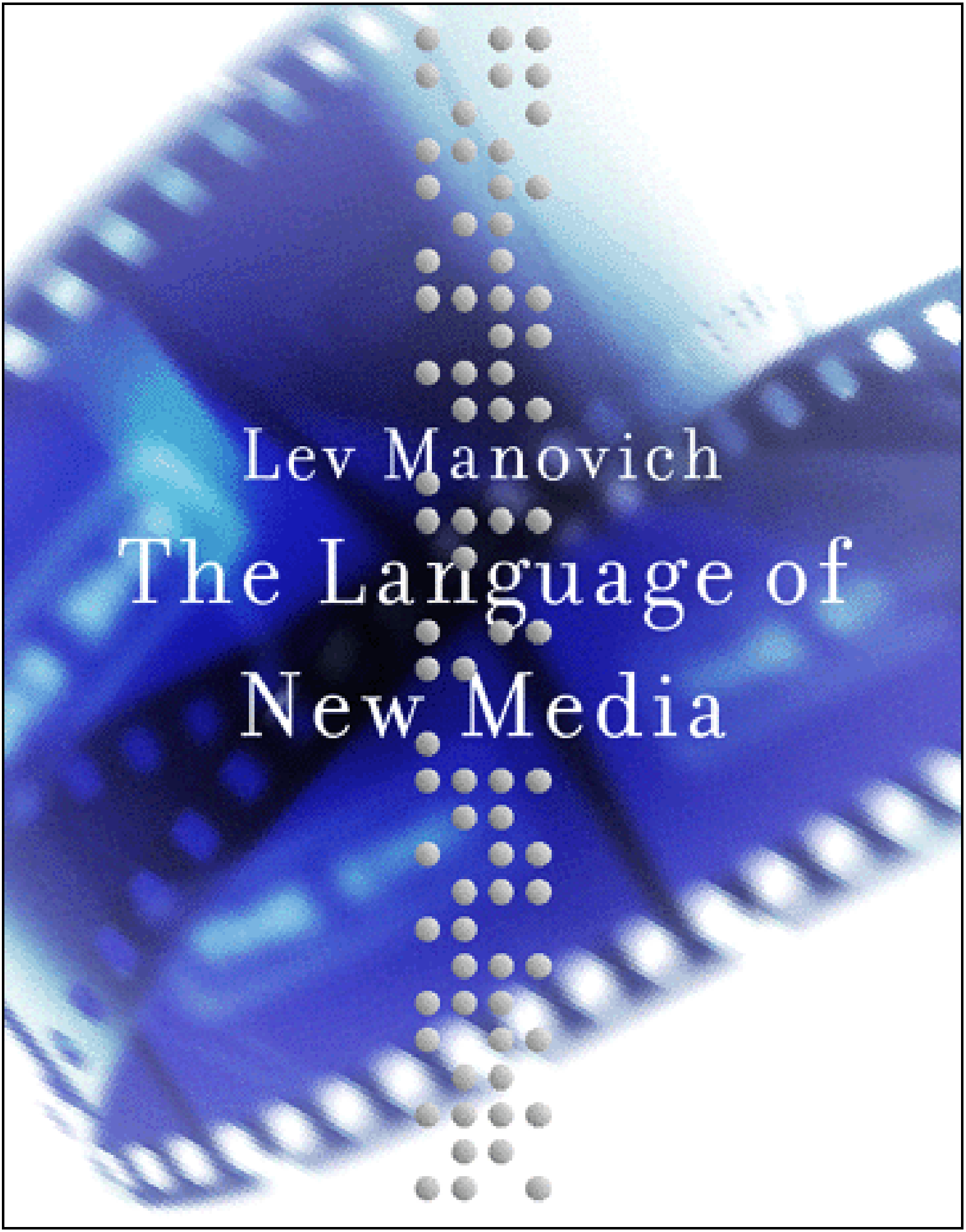
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The Language of New Media

V. The Forms

August 5, 1999. I am sitting in the lobby of Razorfish Studios, which was named by Adweek among 10 top interactive agencies in the world for 1998.[222] The company's story is Silicon Alley legend. It was founded in 1995 by two partners in their East Village loft; by 1997 it had 45 employees; by 1999 the number grew to 600 (this includes a number of companies around the world Razorfish acquired). Razorfish projects range from screen savers to Charles Shwabb online trading Web site. At the time of my visit, the studios are housed in two floors of a building on Grand Street in Soho, between Broadway and Mercer, a few blacks from Prada, Hugo Boss and other designer shops. Open space houses loosely positioned workspaces occupied mostly by 20-something (although I notice a busy programmer who can't be older then 18). The design of the space functions (intentionally so) as a metaphor for computer culture's key themes: interactivity, lack of hierarchy, modularity. In contrast to traditional office architecture were the reception area acts as a getaway between the visitor and the company, here this desk looks like just another workstation, set aside from the entrance. On entering the space you can go the reception desk or you can directly make your way to any workstation on the floor. Stylishly dressed 20-somethings of both genders appear and disappear in the elevator at regular intervals. It is pretty quite, except the little noises made by numerous computers as they save and retrieve files. One of the co-founders, still in his early 30s, gives me a quick tour of the place. Although Razorfish is the established design leader in the virtual world of computer screens and networks, our tour is focused on the physical world. He proudly points out that the workers are scattered around the open space regardless of their job titles: a programmer next to interface designer next to Web designer. He notes that the reception area composed of a desk and two semi-circular sofas mimics the image — Razorfish logo. He talks about Razorfish plans to venture into product design. "Our goal is to provide total user experience. Right now a client thinks that if he needs the design for buttons on the screen, he hires Razorfish; but if he needs real buttons, he goes to another shop. We want to change this."

The original 1970s paradigm of Graphical User Interface (GUI) emulated familiar physical interfaces: a file cabinet, a desk, a trash can, a control panel. After leaving Razorfish Studios, I stop at Venus by Patricia Field, a funky store on West Broadway where I buy an orange and blue valet which has two plastic buttons on its cover, an emulation of forward and reverse buttons of a Web browser. The buttons do not do anything (yet); they simply signify "computer." Over the course of twenty years, the culture came full circle. If, with GUI, the

physical environment migrated into computer screen, now the conventions of GUI are migrating back into our physical reality. The same trajectory can be traced in relation to other conventions, or forms, of computer media. A collection of documents and a navigable space, these traditional methods to organize both data and human experience of the world itself, became two of these forms which today can be found in most areas of new media. The first form is a database, used to store any kind of data — from financial records to digital movie clips; the second form is a virtual interactive 3D space, employed in computer games, motion rides, VR, computer animation, and human-computer interfaces. In migrating to a computer environment, a collection and navigable space were not left unchanged; on the contrary, they came to incorporate computer's particular techniques for structuring and accessing data, such as modularity, as well as its fundamental logic: that of computer programming. So, for instance, a computer database is quite different from a traditional collection of documents: it allows to quickly access, sort and re-organize millions of records; it can contain different media types, and it assumes multiple indexing of data, since each record besides the data itself contains a number of fields with user-defined values.

Today, in a perfect illustration of the transcoding principle (see Chapter 1), these two computer-based forms migrate back into culture at large, both literally and conceptually. A library, a museum, in fact, any large collection of cultural data are being substituted by a computer database. At the same time, a computer database becomes a new metaphor which we use to conceptualize individual and collective cultural memory, a collection of documents or objects, and other phenomena and experiences. Similarly, computer culture uses 3D navigable space to visualize any kind of data — molecules and historical records, files in a computer, the Internet as a whole, and the semantics of human language. (For instance, the software from plumbdesign renders English thesaurus as a structure in 3D space.[223]) And, with many computer games, the human experience of being in a world and the narrative itself are being represented as continuos navigation through space (think, for example, of Tomb Rider). In short, a computer database and 3D computer-based virtual space became true cultural forms — general ways used by culture to represent the human experience, the world, and human existence in this world.

Why does computer culture privilege these forms over other possibilities?[224] We may associate the first genre with work (post-industrial labor of information processing) and the second with leisure and fun (computer games), yet this very distinction is no longer valid in computer culture. As I already noted in the introduction to "Interface" chapter, increasingly the same metaphors and interfaces are used at work and at home, for business and for entertainment. For instance, the user navigates through a virtual space both to work and to play, whether analyzing scientific data or killing enemies in Quake.

We may arrive at a better explanation if we look at how these two forms are used in new media design. From one perspective, all new media design can be reduced to these two approach. That is, creating works in new media can be understood as either constructing the right interface to a multimedia database or as defining navigation methods through spatialized representations. The first approach is typically used in self-contained hypermedia and Web sites — in short, whenever the main goal is to provide an interface to data. The second approach is used in most computer games and virtual worlds. What is the logic here? Web sites and hypermedia programs usually aim to give user efficient access to information, while games and virtual worlds aim to psychologically "submerge" the user in an imaginary universe. It is appropriate that database has emerged as perfect vehicle for the first goal while navigable space meets the demands of the second. It accomplishes the same effects which before were created by literary and cinematic narrative.

Sometimes either of these two goals, information access and psychological engagement with an imaginary world, solely shapes the design of a new media object. The example of the former would be a search engine site; the example of a later would be games such as Riven or Unreal. However in general these two goals should be thought of as extreme cases of a single conceptual continuum. Such supposedly "pure" example of an information-oriented object as a Yahoo, Hotbot or other search sites aim to "immerse" the user in its universe, prevent her from going to other sites. And such supposedly pure "psychological immersion" objects as Riven or Unreal have a strong "information processing" dimension. This dimension makes playing these games more like reading a detective story or playing chess then being engaged with traditional literary and film fictional narrative. Gathering clues and treasures; constantly updating a mental map of the universe of the game, including the positions of pathways, doors, places to avoid and so on; keeping track of one's ammunition, health and other levels — all this aligns playing a computer game with other "information processing" tasks typical of computer culture, like searching Internet, scanning through news groups, pulling records from a database, using a spreadsheet, or data mining large data stores.

Often, the two goals of information access and psychological engagement compete within the same new media object. Along with surface versus depth, the opposition between information and "immersion" can be thought of as particular expression of the more general opposition characteristic of new media: between action and representation. And just as it is the case with surface and depth opposition, discussed in "Cultural Interfaces" and "Illusion, Narrative and Interactivity" sections, the results of this competition are often awkward and uneasy. For instance, an image which embeds within itself a number of hyperlinks offers neither a true psychological "immersion" nor easy navigation since the user has to search for hyperlinks. Appropriately, games such as Jonny Mnemonic (SONY, 1995) which inspired to become true interactive movies, chosen to avoid

either imbedding hyperlinks or displaying controls on the screen altogether, instead relying on a keyboard the sole source of interactive control.

Narratology, the branch of modern literary theory devoted to the theory of narrative, distinguishes between narration and description. Narration are parts of the narrative which move the plot forward; description are the parts which do not. The examples of description are passages which describe the landscape, or a city, or character's apartment In short, to use the language of information age, description passages present the reader with descriptive information. As its name itself implies, narratology paid most attention to narration and hardly any to description. But in the information age narration and description has changed roles. If traditional cultures provided people with well-defined narratives (myths, religion) and little "stand-alone" information, today we have too much information and too few narratives which can tie it all together. For better or worse, information access become a key activity of a computer age. Therefore, we need something which can be called "info-aesthetics" — a theoretical analysis of the aesthetics of information access as well creation of new media objects which "aestheticize" information processing. In the age when all design became "information design," and, to paraphrase the title of the famous book by the architectural historian Sigfried Giedion[225], "search engine takes command," information access is no longer just a key form of work but also a new key category of culture. Thus it demands that we deal with it theoretically, aesthetically and symbolically.

Database

The Database Logic

After the novel, and subsequently cinema privileged narrative as the key form of cultural expression of the modern age, the computer age introduces its correlate — database. Many new media objects do not tell stories; they don't have beginning or end; in fact, they don't have any development, thematically, formally or otherwise which would organize their elements into a sequence. Instead, they are collections of individual items, where every item has the same significance as any other.

Why does new media favor database form over others? Can we explain its popularity by analyzing the specificity of the digital medium and of computer programming? What is the relationship between database and another form, which has traditionally dominated human culture — narrative? These are the questions I will address in this section.

Before proceeding I need to comment on my use of the word database. In computer science database is defined as a structured collection of data. The data stored in a database is organized for fast search and retrieval by a computer and therefore it is anything but a simple collection of items. Different types of databases — hierarchical, network, relational and object-oriented — use different models to organize data. For instance, the records in hierarchical databases are organized in a treelike structure. Object-oriented databases store complex data structures, called "objects," which are organized into hierarchical classes that may inherit properties from classes higher in the chain.[226] New media objects may or may not employ these highly structured database models; however, from the point of view of user's experience a large proportion of them are databases in a more basic sense. They appear as a collections of items on which the user can perform various operations: view, navigate, search. The user experience of such computerized collections is therefore quite distinct from reading a narrative or watching a film or navigating an architectural site. Similarly, literary or cinematic narrative, an architectural plan and database each present a different model of what a world is like. It is this sense of database as a cultural form of its own which I want to address here. Following art historian Ervin Panofsky's analysis of linear perspective as a "symbolic form" of the modern age, we may even call database a new symbolic form of a computer age (or, as philosopher Jean-Francois Lyotard called it in his famous 1979 book Postmodern Condition, "computerized society"),[227] a new way to structure our experience of ourselves and of the world. Indeed, if after the death of God (Nietzche), the end of grand

Narratives of Enlightenment (Lyotard) and the arrival of the Web (Tim Berners-Lee) the world appears to us as an endless and unstructured collection of images, texts, and other data records, it is only appropriate that we will be moved to model it as a database. But it is also appropriate that we would want to develops poetics, aesthetics, and ethics of this database.

Let us begin by documenting the dominance of database form in new media. The most obvious examples of this are popular multimedia encyclopedias, which are collections by their very definition; as well as other commercial CD-ROM titles which are collections as well — of recipes, quotations, photographs, and so on.[228] The identity of a CD-ROM as a storage media is projected onto another plane, becoming a cultural form of its own. Multimedia works which have "cultural" content appear to particularly favor the database form. Consider, for instance, the "virtual museums" genre — CD-ROMs which take the user on a "tour" through a museum collection. A museum becomes a database of images representing its holdings, which can be accessed in different ways: chronologically, by country, or by artist. Although such CD-ROMs often simulate the traditional museum experience of moving from room to room in a continuous trajectory, this "narrative" method of access does not have any special status in comparison to other access methods offered by a CD-ROM. Thus the narrative becomes just one method of accessing data among others. Another example of a database form is a multimedia genre which does not has an equivalent in traditional media — CD-ROMs devoted to a single cultural figure such as a famous architect, film director or writer. Instead of a narrative biography we are presented with a database of images, sound recordings, video clips and/or texts which can be navigated in a variety of ways.

CD-ROMs and other digital storage media (floppies, DVD) proved to be particularly receptive to traditional genres which already had a database-like structure, such as a photo-album; they also inspired new database genres, like a database biography. Where the database form really flourished, however, is on the Internet. As defined by original HTML, a Web page is a sequential list of separate elements: text blocks, images, digital video clips, and links to other pages. It is always possible to add a new element to the list — all you have to do is to open a file and add a new line. As a result, most Web pages are collections of separate elements: texts, images, links to other pages or sites. A home page is a collection of personal photographs. A site of a major search engine is a collection of numerous links to other sites (along with a search function, of course). A site of a Web-based TV or radio station offers a collections of video or audio programs along with the option to listen to the current broadcast; but this current program is just one choice among many other programs stored on the site. Thus the traditional broadcasting experience, which consisted solely of a real-time transmission, becomes just one element in a collection of options. Similar to the CD-ROM medium, the Web offered fertile ground to already existing database

genres (for instance, bibliography) and also inspired the creation of new ones such as the sites devoted to a person or a phenomenon (Madonna, Civil War, new media theory, etc.) which, even if they contain original material, inevitably center around the list of links to other Web pages on the same person or phenomenon.

The open nature of the Web as medium (Web pages are computer files which can always be edited) means that the Web sites never have to be complete; and they rarely are. The sites always grow. New links are being added to what is already there. It is as easy to add new elements to the end of list as it is to insert them anywhere in it. All this further contributes to the anti-narrative logic of the Web. If new elements are being added over time, the result is a collection, not a story. Indeed, how can one keep a coherent narrative or any other development trajectory through the material if it keeps changing?

Commercial producers have experimented with ways to explore the database form inherent to new media, with offerings ranging from multimedia encyclopedias, to collections of software, to collections of pornographic images. In contrast, many artists working with new media at first uncritically accepted the database form as a given. Thus they became blind victims of database logic. Numerous artists' Web sites are collections of multimedia elements documenting their works in other media. In the case of many early artists' CD-ROMs as well, the tendency was to fill all the available storage space with different material: the main work, documentation, related texts, previous works and so on.

As the 1990s progressed, artists increasingly begun to approach database more critically.[229] A few examples of projects investigating database politics and possible aesthetics.are Chris Marker's "IMMEMORY," Olga Lialina's "Anna Karenina Goes to Paradise,"[230] Stephen Mamber's "Digital Hitchcock," and Fabian Wagmister's "...two, three, many Guevaras." The artist who have explored possibilities of a database most systematically is George Legrady. In a series of interactive multimedia works ("The Anecdoted Archive," 1994; "[the clearning]," 1994; "Slippery Traces, 1996; "Tracing," 1998) he used diffirent types of databases to create “an information structure where stories/things are organized according to mutiple thematic connections."[231]

Data and Algorithm

Of course not all new media objects are explicitly databases. Computer games, for instance, are experienced by their players as narratives. In a game, the player is given a well-defined task — winning the match, being first in a race, reaching the last level, or reaching the highest score. It is this task which makes the player experience the game as a narrative. Everything which happens to her in a game, all the characters and objects she encounters either take her closer to achieving the

goal or further away from it. Thus, in contrast to the CD-ROM and Web databases, which always appear arbitrary since the user knows that additional material could have been added without in any way modifying the logic of the database, in a game, from a user's point of view, all the elements are motivated (i.e., their presence is justified).[232]

Often the narrative shell of a game ("you are the specially trained commando who has just landed on a Lunar base; your task is to make your way to the headquarters occupied by the mutant base personnel...") masks a simple algorithm well-familiar to the player: kill all the enemies on the current level, while collecting all treasures it contains; go to the next level and so on until you reach the last level. Other games have different algorithms. Here is an algorithm of the legendary "Tetris": when a new block appears, rotate it in such a way so it will complete the top layer of blocks on the bottom of the screen making this layer disappear. The similarity between the actions expected from the player and computer algorithms is too uncanny to be dismissed. While computer games do not follow database logic, they appear to be ruled by another logic — that of an algorithm. They demand that a player executes an algorithm in order to win.

An algorithm is the key to the game experience in a different sense as well. As the player proceeds through the game, she gradually discovers the rules which operate in the universe constructed by this game. She learns its hidden logic, in short its algorithm. Therefore, in games where the game play departs from following an algorithm, the player is still engaged with an algorithm, albeit in another way: she is discovering the algorithm of the game itself. I mean this both metaphorically and literally: for instance, in a first person shooter, such as "Quake," the player may eventually notice that under such and such condition the enemies will appear from the left, i.e. she will literally reconstruct a part of the algorithm responsible for the game play. Or, in a different formulation of the legendary author of Sim games Will Wright, "Playing the game is a continuos loop between the user (viewing the outcomes and inputting decisions) and the computer (calculating outcomes and displaying them back to the user). The user is trying to build a mental model of the computer model."[233]

What we encountered is another example of the general principle of transcoding discussed in Chapter 1: the projection of the ontology of a computer onto culture itself. If in physics the world is made of atoms and in genetics it is made of genes, computer programming encapsulates the world according to its own logic. The world is reduced to two kinds of software objects which are complementary to each other: data structures and algorithms. Any process or task is reduced to an algorithm, a final sequence of simple operations which a computer can execute to accomplish a given task. And any object in the world — be it the population of a city, or the weather over the course of a century, a chair, a human brain — is modeled as a data structure, i.e. data organized in a particular

way for efficient search and retrieval.[234] Examples of data structures are arrays, linked lists and graphs. Algorithms and data structures have a symbiotic relationship. The more complex the data structure of a computer program, the simpler the algorithm needs to be, and vice versa. Together, data structures and algorithms are two halves of the ontology of the world according to a computer.

The computerization of culture involves the projection of these two fundamental parts of computer software — and of the computer's unique ontology — onto the cultural sphere. If CD-ROMs and Web databases are cultural manifestations of one half of this ontology — data structures, then computer games are manifestations of the second half — algorithms. Games (sports, chess, cards, etc.) are one cultural form which required algorithm-like behavior from the players; consequently, many traditional games were quickly simulated on computers. In parallel, new genres of computer games came into existence such as a first person shooter ("Doom," "Quake"). Thus, as it was the case with database genres, computer games both mimic already existing games and create new game genres.

It may appear at first sight that data is passive and algorithm is active — another example of passive-active binary categories so loved by human cultures. A program reads in data, executes an algorithm, and writes out new data. We may recall that before "computer science" and "software engineering" became established names for the computer field, it was called "data processing." This name remained in use for a few decades during which computers were mainly associated with performing calculations over data. However, the passive/active distinction is not quite accurate since data does not just exist — it has to be generated. Data creators have to collect data and organize it, or create it from scratch. Texts need to written, photographs need to be taken, video and audio need to be recorded. Or they need to be digitized from already existing media. In the 1990's, when the new role of a computer as a Universal Media Machine became apparent, already computerized societies went into a digitizing craze. All existing books and video tapes, photographs and audio recordings started to be fed into computers at an ever increasing rate. Steven Spielberg created the Shoah Foundation which videotaped and then digitized numerous interviews with Holocaust survivors; it would take one person forty years to watch all the recorded material. The editors of Mediamatic journal, who devoted a whole issue to the topic of "the storage mania" (Summer 1994) wrote: "A growing number of organizations are embarking on ambitious projects. Everything is being collected: culture, asteroids, DNA patterns, credit records, telephone conversations; it doesn't matter."[235] In 1996, financial company T. Rowe Price stored 800 gigabytes of data; by the Fall of 1999 this number rose to 10 terabytes.[236]

Once it is digitized, the data has to be cleaned up, organized, indexed. The computer age brought with it a new cultural algorithm: reality-> media->data-

>database. The rise of the Web, this gigantic and always changing data corpus, gave millions of people a new hobby or profession: data indexing. There is hardly a Web site which does not feature at least a dozen links to other sites, therefore every site is a type of database. And, with the rise of Internet commerce, most large-scale commercial sites have become real databases, or rather front-ends to company databases. For instance, in the Fall of 1998, Amazon.com, an online book store, had 3 million books in its database; and the maker of leading commercial database Oracle has offered Oracle 8i, fully integrated with the Internet and featuring unlimited database size, natural-language queries and support for all multimedia data types.[237] Jorge Luis Borges's story about a map which was equal in size to the territory it represented became re-written as the story about indexes and the data they index. But now the map has become larger than the territory. Sometimes, much larger. Porno Web sites exposed the logic of the Web to its extreme by constantly re-using the same photographs from other porno Web sites. Only rare sites featured the original content. On any given date, the same few dozen images would appear on thousands of sites. Thus, the same data would give rise to more indexes than the number of data elements themselves.

Database and Narrative

As a cultural form, database represents the world as a list of items and it refuses to order this list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events). Therefore, database and narrative are natural enemies. Competing for the same territory of human culture, each claims an exclusive right to make meaning out of the world.

In contrast to most games, most narratives do not require algorithm-like behavior from their readers. However, narratives and games are similar in that the user, while proceeding through them, must uncover its underlying logic — its algorithm. Just like a game player, a reader of a novel gradually reconstructs an algorithm (here I use it metaphorically) which the writer used to create the settings, the characters, and the events. From this perspective, I can re-write my earlier equations between the two parts of the computer's ontology and its corresponding cultural forms. Data structures and algorithms drive different forms of computer culture. CD-ROMs, Web sites and other new media objects which are organized as databases correspond to the data structure; while narratives, including computer games, correspond to the algorithms.

In computer programming, data structures and algorithms need each other; they are equally important for a program to work. What happens in a cultural sphere? Do databases and narratives have the same status in computer culture?

Some media objects explicitly follow database logic in their structure while others do not; but behind the surface practically all of them are databases. In general, creating a work in new media can be understood as the construction of an interface to a database. In the simplest case, the interface simply provides the access to the underlying database. For instance, an image database can be represented as a page of miniature images; clicking on a miniature will retrieve the corresponding record. If a database is too large to display all of its records at once, a search engine can be provided to allow the user to search for particular records. But the interface can also translate the underlying database into a very different user experience. The user may be navigating a virtual three-dimensional city composed from letters, as in Jeffrew Shaw's interactive installation "Legible City."[238] Or she may be traversing a black and white image of a naked body, activating pieces of text, audio and video embedded in its skin (Harwood's CD-ROM "Rehearsal of Memory.")[239] Or she may be playing with virtual animals which come closer or run away depending upon her movements (Scott Fisher et al, VR installation, "Menagerie.")[240] Although each of these works engages the user in a set of behaviors and cognitive activities which are quite distinct from going through the records of a database, all of them are databases. "Legible City" is a database of three-dimensional letters which make up the city. "Rehearsal of Memory" is a database of texts and audio and video clips which are accessed through the interface of a body. And "Menagerie" is a database of virtual animals, including their shapes, movements and behaviors.

Database becomes the center of the creative process in the computer age. Historically, the artist made a unique work within a particular medium. Therefore the interface and the work were the same; in other words, the level of an interface did not exist. With new media, the content of the work and the interface become separate. It is therefore possible to create different interfaces to the same material. These interfaces may present different versions of the same work, as in David Blair's WaxWeb.[241] Or they may be radically different from each other, as in Moscow WWWArt Centre.[242] This is one of the ways in which the already discussed principle of variability of new media manifests itself. But now we can give this principle a new formulation. The new media object consists of one or more interfaces to a database of multimedia material. If only one interface is constructed, the result will be similar to a traditional art object; but this is an exception rather than the norm.

This formulation places the opposition between database and narrative in a new light, thus redefining our concept of narrative. The "user" of a narrative is traversing a database, following links between its records as established by the database's creator. An interactive narrative (which can be also called "hyper-narrative" in an analogy with hypertext) can then be understood as the sum of multiple trajectories through a database. A traditional linear narrative is one,

among many other possible trajectories; i.e. a particular choice made within a hyper-narrative. Just as a traditional cultural object can now be seen as a particular case of a new media object (i.e., a new media object which only has one interface), traditional linear narrative can be seen as a particular case of a hyper-narrative.

This "technical," or "material" change in the definition of narrative does not mean that an arbitrary sequence of database records is a narrative. To qualify as a narrative, a cultural object has to satisfy a number of criteria, which cultural theorist Mieke Bal, the author of a standard textbook on narrative theory, defines as follows: it should contain both an actor and a narrator; it also should contain three distinct levels consisting of the text, the story, and the fabula; and its "contents" should be "a series of connected events caused or experienced by actors."[243] Obviously, not all cultural objects are narratives. However, in the world of new media, the word “narrative” is often used as all-inclusive term, to cover up the fact that we have not yet developed a language to describe these new strange objects. It is usually paired with another over-used word — interactive. Thus, a number of database records linked together so that more than one trajectory is possible, is assumed to be constitute "interactive narrative." But to just create these trajectories is of course not sufficient; the author also has to control the semantics of the elements and the logic of their connection so that the resulting object will meet the criteria of narrative as outlined above. Another erroneous assumption frequently made is that by creating her own path (i.e., choosing the records from a database in a particular order) the user constructs her own unique narrative. However, if the user simply accesses different elements, one after another, in a usually random order, there is no reason to assume that these elements will form a narrative at all. Indeed, why should an arbitrary sequence of database records, constructed by the user, result in "a series of connected events caused or experienced by actors"?

In summary, database and narrative do not have the same status in computer culture. In the database / narrative pair, database is the unmarked term.[244] Regardless of whether new media objects present themselves as linear narratives, interactive narratives, databases, or something else, underneath, on the level of material organization, they are all databases. In new media, the database supports a range of cultural forms which range from direct translation (i.e., a database stays a database) to a form whose logic is the opposite of the logic of the material form itself — a narrative. More precisely, a database can support narrative, but there is nothing in the logic of the medium itself which would foster its generation. It is not surprising, then, that databases occupy a significant, if not the largest, territory of the new media landscape. What is more surprising is why the other end of the spectrum — narratives — still exist in new media.

Paradigm and Syntagm

The dynamics which exist between database and narrative are not unique in new media. The relation between the structure of a digital image and the languages of contemporary visual culture is characterized by the same dynamics. As defined by all computer software, a digital image consists of a number of separate layers, each layer containing particular visual elements (see "Compositing" section for a discussion of moving image compositing and its use to simulate cinematographic look). Throughout the production process, artists and designers manipulate each layer separately; they also delete layers and add new ones. Keeping each element as a separate layer allows the content and the composition of an image to be changed at any point: deleting a background, substituting one person for another, moving two people closer together, blurring an object, and so on. What would a typical image look like if the layers were merged together? The elements contained on different layers will become juxtaposed resulting in a montage look. Montage is the default visual language of composite organization of an image. However, just as database supports both the database form and its opposite — narrative, a composite organization of an image on the material level (and compositing software on the level of operations) support two opposing visual languages. One is modernist-MTV montage — two-dimensional juxtaposition of visual elements designed to shock due to its impossibility in reality. The other is the representation of familiar reality as seen by a photo of film camera (or its computer simulation, in the case of 3D graphics). During the 1980s and 1990s all image making technologies became computer-based thus turning all images into composites. In parallel, a Renaissance of montage took place in visual culture, in print, broadcast design and new media. This is not unexpected — after all, this is the visual language dictated by the composite organization. What needs to be explained is why photorealist images continue to occupy such a significant space in our computer-based visual culture.

It would be surprising, of course, if photorealist images suddenly disappeared completely. The history of culture does not contain such sudden breaks. Similarly, we should not expect that new media would completely substitute narrative by database. New media does not radically break with the past; rather, it distributes weight differently between the categories which hold culture together, foregrounding what was in the background, and vice versa. As Frederick Jameson writes in his analysis of another shift, from modernism to post-modernism: "Radical breaks between periods do not generally involve complete changes but rather the restructuration of a certain number of elements already given: features that in an earlier period of system were subordinate became dominant, and features that had been dominant again become secondary."[245]

Database — narrative opposition is the case in point. To further understand how computer culture redistributes weight between the two terms of

opposition in computer culture I will bring in a semiological theory of syntagm and paradigm. According to this model, originally formulated by Ferdinand de Saussure to describe natural languages such as English and later expanded by Roland Barthes and others to apply to other sign systems (narrative, fashion, food, etc.), the elements of a system can be related on two dimensions: syntagmatic and paradigmatic.[246] As defined by Barthes, "the syntagm is a combination of signs, which has space as a support." To use the example of natural language, the speaker produces an utterance by stringing together the elements, one after another, in a linear sequence. This is the syntagmatic dimension. Now, lets look at the paradigm. To continue with an example of a language user, each new element is chosen from a set of other related elements. For instance, all nouns form a set; all synonyms of a particular word form another set. In the original formulation of Saussure, "the units which have something in common are associated in theory and thus form groups within which various relationships can be found."[247] This is the paradigmatic dimension.

The elements on a syntagmatic dimension are related *in praesentia*, while the elements on a paradigmatic dimension are related *in absentia*. For instance, in the case of a written sentence, the words which comprise it materially exist on a piece of paper, while the paradigmatic sets to which these words belong only exist in writer's and reader's minds. Similarly, in the case of a fashion outfit, the elements which make it, such as a skirt, a blouse, and a jacket, are present in reality, while pieces of clothing which could have been present instead — different skirt, different blouse, different jacket — only exist in the viewer's imagination. Thus, syntagm is explicit and paradigm is implicit; one is real and the other is imagined.

Literary and cinematic narratives work in the same way. Particular words, sentences, shots, scenes which make up a narrative have a material existence; other elements which form an imaginary world of an author or a particular literary or cinematic style and which could have appeared instead exist only virtually. Put differently, the database of choices from which narrative is constructed (the paradigm) is implicit; while the actual narrative (the syntagm) is explicit.

New media reverses this relationship. Database (the paradigm) is given material existence, while narrative (the syntagm) is de-materialised. Paradigm is privileged, syntagm is downplayed. Paradigm is real, syntagm is virtual. To see this, consider the new media design process. The design of any new media object begins with assembling a database of possible elements to be used. (Macromedia Director calls this database "cast," Adobe Premiere calls it "project", ProTools calls it a “session," but the principle is the same.) This database is the center of the design process. It typically consists from a combination of original and stock material distributed such as buttons, images, video and audio sequences; 3D objects; behaviors and so on. Throughout the design process new elements are added to the database; existing elements are modified. The narrative is

constructed by linking elements of this database in a particular order, i.e. designing a trajectory leading from one element to another. On the material level, a narrative is just a set of links; the elements themselves remain stored in the database. Thus the narrative is more virtual than the database itself. (Since all data is stored as electronic signals, the word "material" seem to be no longer appropriate. Instead we should talk about different degrees of virtuality.)

The paradigm is privileged over syntagm in yet another way in interactive objects presenting the user with a number of choices at the same time — which is what typical interactive interfaces do. For instance, a screen may contain a few icons; clicking on each icon leads the user to a different screen. On the level of an individual screen, these choices form a paradigm of their own which is explicitly presented to the user. On the level of the whole object, the user is made aware that she is following one possible trajectory among many others. In other words, she is selecting one trajectory from the paradigm of all trajectories which are defined.

Other types of interactive interfaces make the paradigm even more explicit by presenting the user with an explicit menu of all available choices. In such interfaces, all of the categories are always available, just a mouse click away. The complete paradigm is present before the user, its elements neatly arranged in a menu. This is another example of how new media makes explicit the psychological processes involved in cultural communication. Other examples include the already discussed shift from creation to selection, which externalizes and codifies the database of cultural elements existing in the creator's mind; as well as the very phenomena of interactive links. As I noted in Chapter 1, new media takes "interaction" literally, equating it with a strictly physical interaction between a user and a computer, at the sake of psychological interaction. The cognitive processes involved in understanding any culltural text are erroneously equated with an objectively existing structure of interactive links.

Interactive interfaces foreground the paradigmatic dimension and often make explicit paradigmatic sets. Yet, they are still organized along the syntagmatic dimension. Although the user is making choices at each new screen, the end result is a linear sequence of screens which she follows. This is the classical syntagmatic experience. In fact, it can be compared to constructing a sentence in a natural language. Just as a language user constructs a sentence by choosing each successive word from a paradigm of other possible words, a new media user creates a sequence of screens by clicking on this or that icon at each screen. Obviously, there are many important differences between these two situations. For instance, in the case of a typical interactive interface, there is no grammar and paradigms are much smaller. Yet, the similarity of basic experience in both cases is quite interesting; in both cases, it unfolds along a syntagmatic dimension.

Why does new media insist on this language-like sequencing? My hypothesis is that it follows the dominant semiological order of the twentieth century — that of cinema. As noted in the previous chapter, cinema replaced all

other modes of narration with a sequential narrative, an assembly line of shots which appear on the screen one at a time. For centuries, a spatialized narrative where all images appear simultaneously dominated European visual culture; then it was delegated to "minor" cultural forms as comics or technical illustrations. "Real" culture of the twentieth century came to speak in linear chains, aligning itself with the assembly line of an industrial society and the Turing machine of a post-industrial era. New media continues this mode, giving the user information one screen at a time. At least, this is the case when it tries to become "real" culture (interactive narratives, games); when it simply functions as an interface to information, it is not ashamed to present much more information on the screen at once, be it in the form of tables, normal or pull-down menus, or lists. In particular, the experience of a user filling in an on-line form can be compared to pre-cinematic spatialized narrative: in both cases, the user is following a sequence of elements which are presented simultaneously.

A Database Complex

To what extent is the database form intrinsic to modern storage media? For instance, a typical music CD is a collection of individual tracks grouped together. The database impulse also drives much of photography throughout its history, from William Henry Fox Talbot's "Pencil of Nature" to August Sander's monumental typology of modern German society "Face of Our Time," to the Bernd and Hilla Becher's equally obsessive cataloging of water towers. Yet, the connection between storage media and database forms is not universal. The prime exception is cinema. Here the storage media supports the narrative imagination.[248] Why then, in the case of photography storage media, does technology sustain database, while in the case of cinema it gives rise to a modern narrative form par excellence? Does this have to do with the method of media access? Shall we conclude that random access media, such as computer storage formats (hard drives, removable disks, CD-ROMs), favors database, while sequential access media, such as film, favors narrative? This does not hold either. For instance, a book, this perfect random-access medium, supports database forms, such as photo-albums, and narrative forms, such as novels.

Rather than trying to correlate database and narrative forms with modern media and information technologies, or deduce them from these technologies, I prefer to think of them as two competing imaginations, two basic creative impulses, two essential responses to the world. Both have existed long before modern media. The ancient Greeks produced long narratives, such as Homer's epic poems The Iliad and The Odyssey; they also produced encyclopedias. The first fragments of a Greek encyclopedia to have survived were the work of Speusippus, a nephew of Plato. Diderot wrote novels — and also was in charge of

monumental Encyclopédie, the largest publishing project of the 18th century. Competing to make meaning out of the world, database and narrative produce endless hybrids. It is hard to find a pure encyclopedia without any traces of a narrative in it and vice versa. For instance, until alphabetical organization became popular a few centuries ago, most encyclopedias were organized thematically, with topics covered in a particular order (typically, corresponding to seven liberal arts.) At the same time, many narratives, such as the novels by Cervantes and Swift, and even Homer's epic poems — the founding narratives of the Western tradition — traverse an imaginary encyclopedia.

Modern media is the new battlefield for the competition between database and narrative. It is tempting to read the history of this competition in dramatic terms. First the medium of visual recording — photography — privileges catalogs, taxonomies and lists. While the modern novel blossoms, and academicians continue to produce historical narrative paintings all through the nineteenth century, in the realm of the new techno-image of photography, database rules. The next visual recording medium — film — privileges narrative. Almost all fictional films are narratives, with few exceptions. Magnetic tape used in video does not bring any substantial changes. Next storage media — computer controlled digital storage devices (hard drives, removable drives, CD-ROMs, DVD) privilege database once again. Multimedia encyclopedias, virtual museums, pornography, artists' CD-ROMs, library databases, Web indexes, and, of course, the Web itself: database is more popular than ever before.

Digital computer turns out to be the perfect medium for the database form. Like a virus, databases infect CD-ROMs and hard drives, servers and Web sites. Can we say that database is the cultural form most characteristic of a computer? In her 1978 article "Video: The Aesthetics of Narcissism," probably the single most well-known article on video art, art historian Rosalind Krauss argued that video is not a physical medium but a psychological one. In her analysis, "video's real medium is a psychological situation, the very terms of which are to withdraw attention from an external object — an Other — and invest it in the Self."[249] In short, video art is a support for the psychological condition of narcissism.[250] Does new media similarly function to play out a particular psychological condition, something which can be called a database complex? In this respect, it is interesting that database imagination has accompanied computer art from its very beginning. In the 1960s, artists working with computers wrote programs to systematically explore the combinations of different visual elements. In part they were following art world trends such as minimalism. Minimalist artists executed works of art according to pre-existent plans; they also created series of images or objects by systematically varying a single parameter. So, when minimalist artist Sol LeWitt spoke of an artist's idea as "the machine which makes the work," it was only logical to substitute the human executing the idea by a computer.[251] At

the same time, since the only way to make pictures with a computer was by writing a computer program, the logic of computer programming itself pushed computer artists in the same directions. Thus, for artist Frieder Nake a computer was a "Universal Picture Generator," capable of producing every possible picture out of a combination of available picture elements and colors.[252] In 1967 he published a portfolio of 12 drawings which were obtained by successfully multiplying a square matrix by itself. Another early computer artist Manfred Mohr produced numerous images which recorded various transformations of a basic cube.

Even more remarkable were films by John Witney, the pioneer of computer filmmaking. His films such as "Permutations" (1967), "Arabesque" (1975) and others systematically explored the transformations of geometric forms obtained by manipulating elementary mathematical functions. Thus they substituted successive accumulation of visual effects for narrative, figuration or even formal development. Instead they presented the viewer with databases of effects. This principle reaches its extreme in Witney's earlier film which was made using analog computer and was called "Catalog." In his important book on new forms of cinema of the 1960s entitled Expanded Cinema (1970) critic Gene Youngblood writes about this remarkable film: "The elder Whitney actually never produced a complete, coherent movie on the analog computer because he was continually developing and refining the machine while using it for commercial work... However, Whitney did assemble a visual catalogue of the effects he had perfected over the years. This film, simply titled Catalog, was completed in 1961 and proved to be of such overwhelming beauty that many persons still prefer Whitney's analogue work over his digital computer films."[253] One is tempted to read "Catalog" as one of the founding moments of new media. As discussed in "Selection" section, today all software for media creation arrives with endless "plug-ins" — the banks of effects which with a press of a button generate interesting images from any input whatsoever. In parallel, much of the aesthetics of computerised visual culture is effects driven, especially when a new techno-genre (computer animation, multimedia, Web sites) is just getting established. For instance, countless music videos are variations of Witney's "Catalog" — the only difference is that the effects are applied to the images of human performers. This is yet another example of how the logic of a computer — in this case, the ability of a computer to produce endless variations of elements and to act as a filter, transforming its input to yield a new output — becomes the logic of culture at large.

Database Cinema: Greenaway and Vertov

Although database form may be inherent to new media, countless attempts to create "interactive narratives" testify to our dissatisfaction with the computer in the sole role of an encyclopedia or a catalog of effects. We want new media narratives, and we want these narratives to be different from the narratives we saw or read before. In fact, regardless of how often we repeat in public that the modernist notion of medium specificity ("every medium should develop its own unique language") is obsolete, we do expect computer narratives to showcase new aesthetic possibilities which did not exist before digital computers. In short, we want them to be new media specific. Given the dominance of database in computer software and the key role it plays in the computer-based design process, perhaps we can arrive at new kinds of narrative by focusing our attention on how narrative and database can work together. How can a narrative take into account the fact that its elements are organized in a database? How can our new abilities to store vast amounts of data, to automatically classify, index, link, search and instantly retrieve it lead to new kinds of narratives?

Peter Greenaway, one of the very few prominent film directors concerned with expanding cinema's language, complained that "the linear pursuit — one story at a time told chronologically — is the standard format of cinema." Pointing out that cinema lags behind modern literature in experimenting with narrative, he asked: "Could it not travel on the road where Joyce, Eliot, Borges and Perec have already arrived?"[254] While Greenaway is right to direct filmmakers to more innovative literary narratives, new media artists working on the database — narrative problem can learn from cinema "as it is." For cinema already exists right in the intersection between database and narrative. We can think of all the material accumulated during shooting forming a database, especially since the shooting schedule usually does not follow the narrative of the film but is determined by production logistics. During editing the editor constructs a film narrative out of this database, creating a unique trajectory through the conceptual space of all possible films which could have been constructed. From this perspective, every filmmaker engages with the database-narrative problem in every film, although only a few have done this self-consciously.

One exception is Greenaway himself. Throughout his career, he has been working on a problem of how to reconcile database and narrative forms. Many of his films progress forward by recounting a list of items, a catalog which does not have any inherent order (for example, different books in Prospero's Books). Working to undermine a linear narrative, Greenaway uses different systems to order his films. He wrote about this approach: "If a numerical, alphabetic color-coding system is employed, it is done deliberately as a device, a construct, to counteract, dilute, augment or compliment the all-pervading obsessive cinema interest in plot, in narrative, in the 'I'am now going to tell you a story school of film-making."[255] His favorite system is numbers. The sequence of numbers acts as a narrative shell which "convinces" the viewer that she is watching a narrative.

In reality the scenes which follow one another are not connected in any logical way. By using numbers, Greenaway "wraps" a minimal narrative around a database. Although Greenaway's database logic was present already in his "avant-garde" films such as The Falls (1980), it has also structured his "commercial" films from the beginning. Draughtsman's Contract (1982) is centered around twelve drawings being made by the draftsman. They do not form any order; Greenaway emphasizes this by having draftsman to work on a few drawings at once. Eventually, Greenaway's desire to take "cinema out of cinema" led to his work on a series of installations and museum exhibitions in the 1990s. No longer having to conform to the linear medium of film, the elements of a database are spatialized within a museum or even the whole city. This move can be read as the desire to create a database at its most pure form: the set of elements not ordered in any way. If the elements exist in one dimension (time of a film, list on a page), they will be inevitably ordered. So the only way to create a pure database is to spatialise it, distributing the elements in space. This is exactly the path which Greenaway took. Situated in three-dimensional space which does not have an inherent narrative logic, a 1992 installation "100 Objects to Represent the World" in its very title proposes that the world should be understood through a catalog rather than a narrative. At the same time, Greenaway does not abandon narrative; he continues to investigate how database and narrative can work together. Having presented "100 Objects" as an installation, Greenaway next turned it into an opera set. In the opera, the narrator Thrope uses the objects to conduct Adam and Eve through the whole of human civilization, thus turning a 100 objects into a sequential narrative.[256] In another installation "The Stairs-Munich-Projection" (1995) Greenaway put up a hundred screens — each for one year in the history of cinema — throughout Munich. Again, Greenaway presents us with a spatialized database — but also with a narrative. By walking from one screen to another, one follows cinema's history. The project uses Greenaway's favorite principle of organization by numbers, pushing it to the extreme: the projections on the screens contain no figuration, just numbers. The screens are numbered from 1895 to 1995, one screen for each year of cinema's history. Along with numbers, Greenaway introduces another line of development. Each projection is slightly different in color.[257] The hundred colored squares form an abstract narrative of their own which runs in parallel to the linear narrative of cinema's history. Finally, Greenaway superimposes yet a third narrative by dividing the history of cinema into five sections, each section staged in a different part of the city. The apparent triviality of the basic narrative of the project — one hundred numbers, standing for one hundred years of cinema's history — "neutralizes" the narrative, forcing the viewer to focus on the phenomenon of the projected light itself, which is the actual subject of this project.

Along with Greenaway, Dziga Vertov can be thought of as a major "database filmmaker" of the twentieth century. Man with a Movie Camera is

perhaps the most important example of database imagination in modern media art. In one of the key shots repeated few times in the film we see an editing room with a number of shelves used to keep and organize the shot material. The shelves are marked "machines," "club," "the movement of a city," "physical exercise," "an illusionist," and so on. This is the database of the recorded material. The editor — Vertov's wife, Elizaveta Svilova — is shown working with this database: retrieving some reels, returning used reels, adding new ones.

Although I pointed out that film editing in general can be compared to creating a trajectory through a database, in the case of Man with a Movie Camera this comparison constitutes the very method of the film. Its subject is the filmmaker's struggle to reveal (social) structure among the multitude of observed phenomena. Its project is a brave attempt at an empirical epistemology which only has one tool — perception. The goal is to decode the world purely through the surfaces visible to the eye (of course, its natural sight enhanced by a movie camera). This is how the film's co-author Mikhail Kaufman describes it:

> An ordinary person finds himself in some sort of environment, gets lost amidst the zillions of phenomena, and observes these phenomena from a bad vantage point. He registers one phenomenon very well, registers a second and a third, but has no idea of where they may lead... But the man with a movie camera is infused with the particular thought that he is actually seeing the world for other people. Do you understand? He joins these phenomena with others, from elsewhere, which may not even have been filmed by him. Like a kind of scholar he is able to gather empirical observations in one place and then in another. And that is actually the way in which the world has come to be understood.[258]

Therefore, in contrast to standard film editing which consists in selection and ordering of previously shot material according to a pre-existent script, here the process of relating shots to each other, ordering and reordering them in order to discover the hidden order of the world constitutes the film's method. Man with a Movie Camera traverses its database in a particular order to construct an argument. Records drawn from a database and arranged in a particular order become a picture of modern life — but simultaneously an argument about this life, an interpretation of what these images, which we encounter every day, every second, actually mean.[259]

Was this brave attempt successful? The overall structure of the film is quite complex, and on the first glance has little to do with a database. Just as new media objects contain a hierarchy of levels (interface — content; operating system — application; web page — HTML code; high-level programming language — assembly language — machine language), Vertov's film consists of at least three levels. One level is the story of a cameraman filming material for the film. The

second level is the shots of an audience watching the finished film in a movie theater. The third level is this film, which consists from footage recorded in Moscow, Kiev and Riga and is arranged according to a progression of one day: waking up — work — leisure activities. If this third level is a text, the other two can be thought of as its meta-texts.[260] Vertov goes back and forth between the three levels, shifting between the text and its meta-texts: between the production of the film, its reception, and the film itself. But if we focus on the film within the film (i.e., the level of the text) and disregard the special effects used to create many of the shots, we discover almost a linear printout, so to speak, of a database: a number of shots showing machines, followed by a number of shots showing work activities, followed by different shots of leisure, and so on. The paradigm is projected onto syntagm. The result is a banal, mechanical catalog of subjects which one can expect to find in the city of the 1920s: running trams, city beach, movie theaters, factories...

Of course watching Man with a Movie Camera is anything but a banal experience. Even after the 1990s during which computer-based image and video-makers systematically exploited every avant-garde device, the original still looks striking. What makes its striking is not its subjects and the associations Vertov tries to establish between them to impose "the communist decoding of the world" but the most amazing catalog of the film techniques contained within it. Fades and superimpositions, freeze-frames, acceleration, split screens, various types of rhythm and intercutting, different montage techniques[261] — what film scholar Annette Michelson called "a summation of the resources and techniques of the silent cinema"[262] — and of course, a multitude of unusual, "constructivist" points of view are stringed together with such density that the film can't be simply labeled avant-garde. If a "normal" avant-garde film still proposes a coherent language different from the language of mainstream cinema, i.e. a small set of techniques which are repeated, Man with a Movie Camera never arrives at anything like a well-defined language. Rather, it proposes an untamed, and apparently endless unwinding of cinematic techniques, or, to use contemporary language, "effects," as cinema's new way of speaking.

Traditionally, a personal artistic language or a style common to a group of cultural objects or a period requires the stability of paradigms and consistent expectations as to which elements of paradigmatic sets may appear in a given situation. For example, in a case of classical Hollywood style, a viewer may expect that a new scene will begin with an establishing shot or that a particular lighting convention such as high key or low key will be used throughout the film. (David Bordwell defines a Hollywood style in terms of paradigms which are ranked in terms of probabilities.[263])

The endless new possibilities provided by computer software hold the promise of new cinematic languages, but in the same time they prevent such

languages from coming into being. (I am using the example of film but the same logic applies to all other areas of computer-based visual culture.) Since every software comes with numerous sets of transitions, 2D filters, 3D transformations and other effects and "plug-ins," the artist, especially the beginner, is tempted to use many of them in the same work. In such a case a paradigm becomes the syntagm. That is, rather than making singular choices from the sets of possible techniques, or, to use the term of Russian formalists, devices, and then repeating them throughout the work (for instance, using only cuts, or only cross-dissolves), the artist ends up using many options in the same work. Ultimately, a digital film becomes a list of different effects, which appear one after another. Witney's Catalog is the extreme expression of this logic.

The possibility of creating a stable new language is also subverted by the constant introduction of new techniques over time. Thus the new media paradigms not only contain many more options than in the old media but they also keep growing over time. And in culture ruled by the logic of fashion, i.e., the demand for constant innovation, the artists tend to adopt newly available options while simultaneously dropping the already familiar ones. Every year, every month new effects found their way into the media works, displacing the previously prominent ones and destabilizing any stable expectations which viewers could have begin to form.

And this is why Vertov's film has a particular relevance to new media. It proves that it is possible to turn "effects" into a meaningful artistic language. Why in the case of Witney's computer films and music videos are the effects just effects, while in the hands of Vertov they acquire meaning? Because in Vertov's film they are motivated by a particular argument, this being that the new techniques to obtain images and manipulate them, summed up by Vertov in his term "kino-eye," can be used to decode the world. As the film progresses, "straight" footage gives way to manipulated footage; newer techniques appear one after one, reaching a roller coaster intensity by the film's end, a true orgy of cinematography. It is as though Vertov re-stages his discovery of the kino-eye for us. Along with Vertov, we gradually realize the full range of possibilities offered by the camera. Vertov's goal is to seduce us into his way of seeing and thinking, to make us share his excitement, his gradual process of discovery of film's new language. This process of discovery is film's main narrative and it is told through a catalog of discoveries being made. Thus, in the hands of Vertov, a database, this normally static and "objective" form, becomes dynamic and subjective. More importantly, Vertov is able to achieve something which new media designers and artists still have to learn — how to merge database and narrative merge into a new form.

Navigable space

Doom and Myst

Looking at the first decade of new media — the 1990s — one can point at a number of objects which exemplify new media's potential to give rise to genuinely original and historically unprecedented aesthetic forms. Among them, two stand out. Both are computer games. Both were published in the same year, 1993. Each became a phenomenon whose popularity has extended beyond the hard core gaming community, spilling into sequels, books, TV, films, fashion and design. Together, they defined the new field and its limits. These games are Doom (id Software, 1993) and Myst (Cyan, 1993).

In a number of ways, Doom and Myst are completely different. Doom is fast paced; Myst is slow. In Doom the player runs through the corridors trying to complete each level as soon as possible, and then moves to the next one. In Myst, the player is moving through the world literally one step at a time, unraveling the narrative along the way. Doom is populated with numerous demons lurking around every corner, waiting to attack; Myst is completely empty. The world of Doom follows the convention of computer games: it consists of a few dozen levels. Although Myst also contains four separate worlds, each is more like a self-contained universe than a traditional computer game level. While the usual levels are quite similar to each other in structure and the look, the worlds of Myst are distinctly different.

Another difference lies in the aesthetics of navigation. In Doom's world, defined by rectangular volumes, the player is moving in straight lines, abruptly turning at right angles to enter a new corridor. In Myst, the navigation is more free-form. The player, or more precisely, the visitor, is slowly exploring the environment: she may look around for a while, go in circles, return to the same place over and over, as though performing an elaborate dance.

Finally, the two objects exemplify two different types of cultural economy. With Doom, id software pioneered the new economy which the critic of computer games J.C. Herz summarizes as follows: "It was an idea whose time has come. Release a free, stripped-down version through shareware channels, the Internet, and online services. Follow with a spruced-up, registered retail version of the software." 15 million copies of the original Doom game were downloaded around the world.[264] By releasing detailed descriptions of game files formats and a game editor, id software also encouraged the players to expand the game, creating new levels. Thus, hacking and adding to the game became its essential part, with new levels widely available on the Internet for anybody to download. Here was a new cultural economy which transcended the usual relationship

between producers and consumers or between “strategies” and “tactics” (de Certeau): the producers define the basic structure of an object, and release few examples and the tools to allow the consumers to build their own versions, shared with other consumers. In contrast, the creators of Myst followed an older model of cultural economy. Thus, Myst is more similar to a traditional artwork than to a piece of software: something to behold and admire, rather than to take apart and modify. To use the terms of the software industry, it is a closed, or proprietary system, something which only the original creators can modify or add to.

Despite all these differences in cosmogony, gameplay, and the underlying economic model, the two games are similar in one key respect. Both are spatial journeys. The navigation though 3D space is an essential, if not the key component, of the gameplay. Doom and Myst present the user with a space to be traversed, to be mapped out by moving through it. Both begin by dropping the player somewhere in this space. Before reaching the end of the game narrative, the player must visit most of it, uncovering its geometry and topology, learning it logic and its secrets. In Doom and Myst — and in a great many other computer games — narrative and time itself are equated with the movement through 3D space, the progression through rooms, levels, or words. In contrast to modern literature, theater, and cinema which are built around the psychological tensions between the characters and the movement in psychological space, these computer games return us to the ancient forms of narrative where the plot is driven by the spatial movement of the main hero, traveling through distant lands to save the princess, to find the treasure, to defeat the Dragon, and so on. As J.C. Herz writes about the experience of playing a classical text-based adventure game Zork, "you gradually unlocked a world in which the story took place, and the receeding edge of this world carried you through to the story's conclusion."[265] Stripping away the representation of inner life, psychology and other modernist nineteenth century inventions, these are the narratives in the original Ancient Greek sense, for, as Michel de Certau reminds us, "In Greek, narration is called 'diagesis': it establishes an itinerary (it 'guides) and it passes through (it 'transgresses").[266]

In the introduction to this chapter I invoked the opposition between narration and dsecription from narratology. As stated by Mieke Bal, the standard theoretical premise of narratology was that “descriptions interrupt the line of fabula.”[267] For me this opposition, in which description was defined negatively, as absence of narration, was always problematic. It automatically privileged certain types of narrative (myths, fairy tales, detective stories, classical Hollywood cinema), while making it difficult to think about other forms where actions of characters do not dominate the narrative (for instance, films by Andrey Tarkovskiy and Hirokazu Kore-eda, the director of Maborosi and After Life).[268] Games structured around first-person navigation through space further challenge narration-description opposition.

Instead of narration and description, we may be better off thinking about games in terms of narrative actions and exploration. Rather than being narrated to, the player herself has to perform actions to move narrative forward: talking to other characters she encounters in the game world, picking up objects, fighting the enemies, and so on. If the player does not do anything, the narrative stops. From this perspective, movement through the game world is one of the main narrative actions. But this movement also serves a self-sufficient goal of exploration. Exploring the game world, examining its details and enjoying its images is as important for the success of games such as Myst and its followers, as progressing through the narrative. Thus while from one point of view game narratives can be aligned with ancient narratives which also were structured around movement through space, from another perspective they are the exact opposite. The movement through space allows the player to progress through the narrative; but it is also valuable in itself. It is a way for the player to explore the environment.

Narratology's analysis of description can be a useful start in thinking about exploration of space in computer game and other new media objects. Bal states that descriptive passages in fiction are motivated by speaking, looking and acting. Motivation by looking works as follows: "A character sees an object. The description of reproduction of what it sees." Motivation by acting means that "The actor carries out an action with an object. The description is then made fully narrative. The example of this is the scene in Zola's La Bête in which Jacques polishes [strokes] every individual component of his beloved locomotive."[269]

In contrast to modern novel, action oriented games do not have that much dialog, but looking and acting are indeed the key activities performed by a player. And if in modern fiction looking and acting are usually separate activities, in games they more often than note occur together. As the player comes across a door leading to another level, a new passage, ammunition for his machine gun, an enemy, or a "health potion" he immediately acts on these objects: opens a door, picks up ammunition or "health potion," fires at the enemy. Thus narrative action and exploration are closely linked together.

The central role of navigation through space, both as a tool of narration and of exploration, is acknowledged by the games' designers themselves. Robyn Miller, one of the two co-designers of Myst pointed out that "We' are creating environments to just wonder around inside of. People have been calling it a game for lack of anything better, and we've called it a game at times. But that's not what it really is; it's a world."[270] Richard Garriott, the designer of classical RPG Ultima series, contrasts game design and fiction writing: "A lot of them [fiction writers] develop their individual characters in detail, and they say what is their problem in the beginning, and what they are going to grow to learn in the end. That's not the method I've used... I have the world. I have the message. And then the characters are there to support the world and the message."[271]

Structuring the game as a navigation through space is common to games across all the game genres. This includes adventure games (for instance, Zork, 7th Level, The Journeyman Project, Tomb Raider, Myst), strategy games (Command and Conquer) role-playing games (Diablo, Final Fantasy), flying, driving, and other simulators (Microsoft Flight Simulator), action games (Hexen, Mario), and, of course, first person shooters which have followed in Doom's steps (Quake, Unreal). These genres follow different conventions. In adventure games, the user is exploring an universe, gathering resources. In strategy games, the user is engaged in allocating and moving resources and in risk management. In RPGs (role playing games), the user is building a character, acquiring the skills; the narrative is one of self-improvement. The genre conventions by themselves do not make it necessary for these games to employ a navigable space interface. Therefore, the fact that they all consistently do use it suggests to me that navigable space represents a larger cultural form. In other words, it is something which transcends computer games, and in fact, as we will see later, computer culture as well. Just like a database, navigable space is a form which already exists before computers; however, the computer becomes its perfect medium.

Indeed, the use of navigable space is common to all areas of new media. During the 1980s, numerous 3D computer animations were organized around a single, uninterrupted camera move through a complex and extensive set. In a typical animation, a camera would fly over mountain terrain, or move through a series of rooms, or maneuver past geometric shapes. In contrast to both ancient myths and computer games, this journey had no goal, no purpose. In short, there was no narrative. Here was the ultimate "road movie" where the navigation through the space was sufficient in itself.

In the 1990s, these 3D fly-throughs have come to constitute the new genre of
post-computer cinema and location-based entertainment — the motion simulator.[272] By using the first person point of view and by synchronizing the movement of the platform housing the audience with the movement of a virtual camera, motion simulators recreate the experience of traveling in a vehicle. Thinking about the historical precedents of a motion simulator, we begin to uncover some places where the form of navigable space already manifested itself. They include *Hale's Tours and Scenes of the World ,* a popular film-based attraction which debuted at the St. Louis Fare in 1904; roller-coaster rides; flight, vehicle and military simulators, which used a moving base since the early 1930s; and the fly-through sequences in *2001: A Space Odyssey* (Kubrick, 1968) and *Star Wars* (Lucas, 1977). Among these, *A Space Odyssey* plays particularly important role; Douglas Trumbull, who since the late 1980s produced some of the most well-known motion simulator attractions and was the key person behind the rise of the whole motion simulator phenomenon begun his career by creating ride sequences for this film.

Along with providing a key foundation for new media aesthetics, navigable space also became a new tool of labor. It is now a common way to visualize and work with any data. From scientific visualization to walk-throughs of architectural designs, from models of a stock market performance to statistical datasets, the 3D virtual space combined with a camera model is the accepted way to visualize all information (see the section "The Language of Cultural Interfaces"). It is as accepted in computer culture as charts and graphs were in a print culture.[273]

Since navigable space can be used to represent both physical spaces and abstract information spaces, it is only logical that it also emerged as an important paradigm in human-computer interfaces. Indeed, on one level HCI can be seen as a particular case of data visualization, the data being computer files rather than molecules, architectural models or stock market figures. The examples of 3D navigable space interfaces are the Information Visualizer (Xerox Parc) which replaces a flat desktop with 3D rooms and planes rendered in perspective; [274] T_Vision (ART+COM) which uses a navigable 3D representation of the earth as its interface;[275] and The Information Landscape (Silicon Graphics) in which the user flies over a plane populated by data objects.[276]

The original (i.e. the 1980's) vision of cyberspace called for a 3D space of information to be traversed by a human user, or, to use the term of William Gibson, a "data cowboy."[277] Even before Gibson's fictional descriptions of cyberspace were published, cyberspace was visualized in the film *Tron* (Disney, 1982). Although *Tron* takes place inside a single computer rather than a network, its vision of users zapping through the immaterial space defined by lines of light is remarkably similar to the one articulated by Gibson in his novels. In an article which appeared in the 1991 anthology Cyberspace: First Steps Marcos Novak still defined cyberspace as "a completely spatialized visualization of all information in global information processing systems."[278] In the first part of the 1990s, this vision has survived among the original designers of VRML (The Virtual Reality Modeling Language). In designing the language, they aimed to "create a unified conceptualization of space spanning the entire Internet, a spatial equivalent of WWW."[279] They saw VRML as a natural stage in the evolution of the Net from an abstract data network toward a "'perceptualized' Internet where the data has been sensualized," i.e., represented in three dimensions.[280]

The term cyberspace itself is derived from another term— cybernetics. In his 1947 book Cybernetics mathematician Norbert Wiener has defined it as "the science of control and communications in the animal and machine." Wiener conceived of cybernetics during World War II when he was working on problems concerning gunfire control and automatic missile guidance. He derived the term cybernetics from the ancient Greek word *kybernetikos* which refers to the art of

the steersman and can be translated as “good at steering.” Thus, the idea of navigable space lies at the very origins of computer era. The steersman navigating the ship and the missile traversing space on its way to the target have given rise to a whole number of new figures: the heroes of William Gibson, the “data cowboys” moving through the vast terrains of cyberspace; the "driver" of a motion simulator; a computer user, navigating through the scientific data sets and computer data structures, molecules and genes, earth's atmosphere and the human body; and last but not least, the player of Doom, Myst and their endless imitations.

From one point of view, navigable space can be legitimately seen as a particular kind of an interface to a database, and thus something which does not deserve a special focus. I would like, however, to also think of it as a cultural form of its own, not only because of its prominence across the new media landscape and, as we will see later, its persistence in new media history, but also because, more so than a database, it is a new form which may be unique to new media. Of course both the organization of space and its use to represent or visualize something else have always been a fundamental part of human culture. Architecture and ancient mnemonics, city planing and diagramming, geometry and topology are just some of the disciples and techniques which were developed to harness space's symbolic and economic capital.[281] Spatial constructions in new media draw on all these existing traditions — but they are also fundamentally different in one key respect. For the first time, space becomes a media type. Just as other media types — audio, video, stills, and text — it can be now instantly transmitted, stored and retrieved, compressed, reformatted, streamed, filtered, computed, programmed and interacted with. In other words, all operations which are possible with media as a result of its conversion to computer data can also now apply to representations of 3D space.

Recent cultural theory has paid increasing attention to the category of space. The examples are Henri Lefebvre's work on the politics and anthropology of everyday space; Michel Foucault's analysis of the Panopticon's topology as a model of modern subjectivity; the writings of Frederick Jameson and David Harvey on the post-modern space of global capitalism; Edward Soja’s work on political geography.[282] At the same time, new media theoreticians and practitioners have come with many formulations of how cyberspace should be structured and how computer-based spatial representations can be used in new ways.[283] What received little attention, however, both in cultural theory and in new media theory, is a particular category of navigation through space. And yet, this category characterizes new media as it actually exists; in other words, new media spaces are always spaces of navigation. At the same time, as we will see later in this section, this category also fits a number of developments in other cultural fields such as anthropology and architecture.

To summarize, along with a database, navigable space is another key form of new media. It is already an accepted way for interacting with any type of data; an interface of computer games and motion simulators and, potentially, of any computer in general. Why does computer culture spatialize all representations and experiences (the library is replaced by cyberspace; narrative is equated with traveling through space; all kinds of data are rendered in three dimensions through computer visualization)? Shall we try to oppose this spatialization (i.e., what about time in new media?) And, finally, what are the aesthetics of navigation through virtual space?

Computer Space

The very first coin-op arcade game was called Computer Space. The game simulated the dogfight between a spaceship and a flying saucer. Released in 1971, it was a remake of the first computer game Spacewar programmed on PDP-1 at MIT in 1962.[284] Both of these legendary games included the word space in their titles; and appropriately, space was one of the main characters in each of them. In the original Spacewar the player was navigating two spaceships around the screen while shooting torpedoes at one another. The player also had to be careful in maneuvering the ships to make sure they would not get too close to the star in the center of the screen which pulled them towards it. Thus, along with the spaceships, the player also had to interact with space itself. And although, in contrast to such films as *2001*, *Star Wars*, or *Tron*, the space of Spacewar and Computer Space was not navigable — one could not move through it — the simulation of gravity made it truly an active presence. Just as the player had to engage with the spaceships, he had to engage with the space itself.

This active treatment of space is an exception rather than the rule in new media. Although new media objects favor the use of space for representations of all kinds, most often virtual spaces are not true spaces but collections of separate objects. Or, to put this in a slogan: there is no space in cyberspace.

To explore this thesis further we can borrow the categories developed by art historians early in this century. Alois Riegl, Heinrich Wölfflin, and Erwin Panofsky, the founders of modern art history, defined their field as the history of the representation of space. Working within the paradigm of cyclic cultural development, they related the representation of space in art to the spirit of entire epochs, civilizations, and races. In his 1901 Die Spätrömische Kunstindustrie ("The late-Roman art industry"), Riegl characterized mankind's cultural development as the oscillation between two ways of understanding space, which he called haptic and optic. Haptic perception isolates the object in the field as a discrete entity, while optic perception unifies objects in a spatial continuum. Riegl's contemporary, Heinrich Wölfflin, similarly proposed that the

temperament of a period or a nation expresses itself in a particular mode of seeing and representing space. Wölfflin's Principles of Art History (1913) plotted the differences between Renaissance and baroque styles along five axes: linear/painterly; plane/recession; closed form/open form; multiplicity/unity; and clearness/unclearness.[285] Erwin Panofsky, another founder of modern art history, contrasted the "aggregate" space of the Greeks with the "systematic" space of the Italian Renaissance in his famous essay Perspective as Symbolic Form (1924-25).[286] Panofsky established a parallel between the history of spatial representation and the evolution of abstract thought. The former moves from the space of individual objects in antiquity, to the representation of space as continuous and systematic in modernity. Correspondingly, the evolution of abstract thought progresses from ancient philosophy's view of the physical universe as discontinuous and "aggregate", to the post-Renaissance understanding of space as infinite, homogeneous, isotropic, and with ontological primacy in relation to objects — in short, as systematic.

We don't have to believe in grand evolutionary schemes in order to usefully retain such categories. What kind of space is virtual space? At first glance the technology of 3D computer graphics exemplifies Panofsky's concept of systematic space, which exists prior to the objects in it. Indeed, the Cartesian coordinate system is built into computer graphics software and often into the hardware itself.[287] A designer launching a modeling program is typically presented with an empty space defined by a perspectival grid; the space will be gradually filled by the objects created. If the built-in message of a music synthesizer is a sine wave, the built-in world of computer graphics is an empty Renaissance space: the coordinate system itself.

Yet computer-generated worlds are actually much more haptic and aggregate than optic and systematic. The most commonly used computer-graphics technique of creating 3D worlds is polygonal modeling. The virtual world created with this technique is a vacuum containing separate objects defined by rigid boundaries. What is missing from computer space is space in the sense of medium: the environment in which objects are embedded and the effect of these objects on each other. This is what Russian writers and artists call prostranstvennaya sreda. Pavel Florensky, a legendary Russian philosopher and art historian has described it in the following way in the early 1920s: "The space-medium is objects mapped onto space... We have seen the inseparability of Things and space, and the impossibility of representing Things and space by themselves."[288] This understanding of space also characterizes a particular tradition of modern painting which stretches from Seurat to Giacommetti and De Kooning. These painters tried to eliminate the notions of a distinct object and an empty space as such. Instead they depicted a dense field that occasionally hardens into something which we can read as an object. Following the example of Gilles

Deleuze's analysis of cinema as activity of articulating new concepts, akin to philosophy,[289] it can be said that modern painters which belong to this tradition worked to articulate the particular philosophical concept in their painting — that of space-medium. This concept is something mainstream computer graphics still has to discover.

Another basic technique used in creating virtual worlds also leads to aggregate space. It involves superimposing animated characters, still images, digital movies, and other elements over a separate background. Traditionally this technique was used in video and computer games. Responding to the limitations of the available computers, the designers of early games would limit animation to a small part of a screen. 2D animated objects and characters called sprites were drawn over a static background. For example, in Space Invaders the abstract shapes representing the invaders would fly over a blank background, while in Pong the tiny character moved across the picture of a maze. The sprites were essentially animated 2D cutouts thrown over the background image at game time, so no real interaction between them and the background took place. In the second half of the 1990s much faster processors and 3D graphics cards made it possible for games to switch to real-time 3D rendering. This allowed for modeling of visual interactions between the objects and the space they are in, such as reflections and shadows. Consequently, the game space became more of a coherent, true 3D space, rather than a set of 2D planes unrelated to each other. However, the limitations of earlier decades returned in another area of new media — online virtual worlds. Because of the limited bandwidth of the 1990s Internet, virtual world designers have to deal with constraints similar to and sometimes even more severe than the games designers two decades earlier. In online virtual worlds, a typical scenario may involve an avatar — a 2D or 3D graphic representing the user — animated in real time in response to the user's commands. The avatar is superimposed on a picture of a room, in the same way as in video games the sprites were superimposed over the background. The avatar is controlled by the user; the picture of the room is provided by a virtual-world operator. Because the elements come from different sources and are put together in real time, the result is a series of 2D planes rather than a real 3D environment. Although the image depicts characters in a 3D space, it is an illusion since the background and the characters do not "know" about each other, and no interaction between them is possible.

Historically, we can connect the technique of superimposing animated sprites over the background to traditional cell animation. In order to save labor, animators similarly divide the image between a static background and animated characters. In fact the sprites of computer games can be thought of as reincarnated animation characters. Yet the use of this technique did not prevent Fleischer and Disney animators from thinking of space as space-medium (to use Floresky's term), although they created this space-medium in a different way than the

modern painters. (Thus while the masses run away from the serious and "difficult" abstract art to enjoy the funny and figurative images of cartoons, what they saw was not that different from Giacommetti's and De Kooning's canvases.) Although all objects in cartoons have hard edges, the total anthropomorphism of the cartoon universe breaks the distinctions both between subjects and objects and objects and space. Everything is subjected to the same laws of stretch and squash, everything moves and twists in the same way, everything is alive to the same extent. It is as though everything — the character's body, chairs, walls, plates, food, cars and so on — is made from the same bio-material. This monism of the cartoon worlds stands in opposition to the binary ontology of computer worlds in which the space and the sprites — characters appear to be made from two fundamentally different substances.

In summary, although 3D computer-generated virtual worlds are usually rendered in linear perspective, they are really collections of separate objects, unrelated to each other. In view of this, the common argument that 3D computer simulations return us to Renaissance perspective and therefore, from the viewpoint of twentieth-century abstraction, should be considered regressive, turns out to be ungrounded. If we are to apply the evolutionary paradigm of Panofsky to the history of virtual computer space, we must conclude that it has not reached its Renaissance stage yet. It is still at the level of ancient Greece, which could not conceive of space as a totality.

Computer space is also aggregate yet in another sense. As I already noted using the example of Doom, traditionally the world of a computer game is not a continuous space but a set of discrete levels. In addition, each level is also discrete — it is a sum of rooms, corridors, and arenas built by the designers. Thus, rather conceiving space as a totality, one is dealing with a set of separate places. The convention of levels is remarkably stable, persisting across genres and numerous computer platforms.

If the World Wide Web and original VRML are any indications, we are not moving any closer toward systematic space; instead, we are embracing aggregate space as a new norm, both metaphorically and literally. The space of the Web in principle can't be thought of as a coherent totality: it is a collection of numerous files, hyperlinked but without any overall perspective to unite them. The same holds for actual 3D spaces on the Internet. A 3D scene as defined by a VRML file is a list of separate objects that may exist anywhere on the Internet, each created by a different person or a different program. A user can easily add or delete objects without taking into account the overall structure of the scene.[290] Just as, in the case of a database, the narrative is replaced by a list of items, here a coherent 3D scene becomes a list of separate objects.

With its metaphors of navigation and home steading, The Web has been compared to the American Wild West. The spatialized Web envisioned by VRML (itself a product of California) reflects the treatment of space in American culture

generally, in its lack of attention to any zone not functionally used. The marginal areas that exist between privately owned houses, businesses and parks are left to decay. The VRML universe, as defined by software standards and the default settings of software tools, pushes this tendency to the limit: it does not contain space as such but only objects that belong to different individuals. Obviously, the users can modify the default settings and use the tools to create the opposite of what the default values suggest. In fact, the actual muti-user spaces built on the Web can be seen precisely as the reaction against the anti-communal and discrete nature of American society, the attempt to substitute for the much discussed disappearance of traditional community by creating virtual ones. (Of course, if we are to follow the nineteenth century sociologist Ferdinand Tönnies, the shift from traditional close-knit scale community to modern impersonal society already took place in the nineteenth century and is an inevitable side-effect as well as a prerequisite for modernization.[291]) However, it is important that the ontology of virtual space as defined by software itself is fundamentally aggregate, a set of objects without a unifying point of view.

If art historians, literary and film scholars have traditionally analyzed the structure of cultural objects as reflecting larger cultural patterns (for instance, Panofsky's reading of perspective), in the case of new media we should look not only at the finished objects but first of all at the software tools, their organization and default settings.[292] This is particularly important because in new media the relation between the production tools and the products is one of continuity; in fact, it is often hard to establish the boundary between them. Thus, we may connect the American ideology of democracy with its paranoid fear of hierarchy and centralized control with the flat structure of the Web, where every page exists on the same level of importance as any other and where any two sources connected through hyperlinking have equal weight. Similarly, in the case of virtual 3D spaces on the Web, the lack of a unifying perspective in U.S. culture, whether in the space of an American city, or in the space of an increasingly fragmented public discourse, can be correlated with the design of VRML, which substitutes a collection of objects for a unified space.

The Poetics of Navigation

In order to analyze the computer representations of 3D space, I have used theories from early art history; but it would not be hard to find other theories which can work as well. However, navigation through space is a different matter. While art history, geography, anthropology, sociology and other disciplines have came up with many approaches to analyze space as a static, objectively existing structure, we don’t have the same wealth of concepts to help us think about the poetics of navigation through space. And yet, if I am right to claim that the key feature of

computer space is that it is navigable, we need to be able to address this feature theoretically.

As a way to begin, we may take a look at some of the classical navigable computer spaces. The 1978 project Aspen Movie Map, designed at the MIT Architecture Machine Group, headed by Nicholas Negroponte (which later expanded into MIT Media Laboratory) is acknowledged as the first publicly shown interactive virtual navigable space, and also as the first hypermedia program. The program allowed the user to "drive" through the city of Aspen, Colorado. At each intersection the user was able to select a new direction using a joystick. To construct this program, the MIT team drove through Aspen in a car taking pictures every three meters. The pictures were then stored on a set of videodiscs. Responding to the information from the joystick, the appropriate picture or sequence of pictures was displayed on the screen. Inspired by a mockup of an airport used by the Israeli commandos to train for the Entebbe hostage-freeing raid of 1973,Aspen Movie Map was a simulator and therefore its navigation modeled the real-life experience of moving in a car, with all its limitations.[293] Yet its realism also opened a new set of aesthetic possibilities which, unfortunately, later designers of navigable spaces did not explore further. All of them relied on interactive 3D computer graphics to construct their spaces. In contrast, Aspen Movie Map utilized a set of photographic images; in addition, because the images were taken every three meters, this resulted in an interesting sampling of three dimensional space. Although in the 1990s Apple's QuickTime VR technology made this technique itself quite accessible, the idea of constructing a large-scale virtual space from photographs or a video of a real space was never tried out systematically again, although it opens up unique aesthetic possibilities not available with 3D computer graphics.

Jeffrew Shaw's Legible City (1988-1991), another well-known and influential computer navigable space, is also based on the exiting city.[294] As in Aspen Movie Map, the navigation also simulates a real physical situation, in this case driving a bicycle. Its virtual space, however, is not tied to the simulation of physical reality: it is an imaginary city made from 3D letters. In contrast to most navigable spaces whose parameters are chosen arbitrarily, in Legible City (Amsterdam and Karlsruhe versions) every value of its virtual space is derived from the actual existing physical space it replaces. Each 3D letter in the virtual city corresponds to an actual building in a physical city; the letter's proportions, color and location are derived from the building it replaces. By navigating through the space, the user reads the texts composed by the letters; these texts are drawn from the archive documents describing the city history. Through this mapping Jeffrew Shaw foregrounds, or, more precisely, "stages," one of the fundamental problematics of new media and the computer age as a whole: the relation between the virtual and the real. In his other works Shaw systematically "staged" other key aspects of new media such as the interactive relation between

the viewer and the image, or the discrete quality of all computer-based representations. In the case of Legible City, it functions not only as a unique navigable virtual space of its own, but also as a comment on all the other navigable spaces. It suggests that instead of creating virtual spaces which have nothing to do with actual physical spaces, or the spaces which are closely modeled after existing physical structures, such as towns or shopping malls, (this holds for most commercial virtual worlds and VR works), we may take a middle road. In Legible City, the memory of the real city is carefully preserved without succumbing to illusionism; the virtual representation encodes the city's genetic code, its deep structure rather than its surface. Through this mapping Shaw proposes an ethics of the virtual. Shaw suggests that the virtual can at least preserve the memory of the real it replaces, encoding its structure, if not aura, in a new form.

While Legible City was a landmark work in that it presented a symbolic rather than illusionistic space, its visual appearance in many ways reflected the default real-time graphics capability of SGI workstations on which it was running: flat-shaded shapes attenuated by a fog. Char Davies and her development team at SoftImage have consciously addressed the goal of creating a different, more painterly aesthetic for the navigable space in their interactive VR installation Osmose (1994-1995).[295] From the point of view of history of modern art the result hardly represented an advancement. Osmose simply replaced the usual hard-edge polygonal Cézanne-like look of 3D computer graphics look with a softer, more atmospheric, Renoir or late Monet-like environment made of translucent textures and flowing particles. Yet in the context of other 3D virtual worlds it was an important advance. The "soft" aesthetic of Osmose is further supported through the use of slow cinematic dissolves between its dozen or so worlds. Like in Aspen Movie Map and in Legible City, the navigation in Osmose is modeled on a real-life experience, in this case, of scuba diving. The "immersant" is controlling navigation by breathing: breathing in sends the body upward, while breathing out makes it fall. The resulting experience, according to the designers, is one of floating, rather than flying or driving, typical of virtual worlds. Another important aspect of Osmose's navigation is its collective character. While only one person can be "immersed" at a time, the audience can witness her or his journey through the virtual worlds as it unfolds on a large projection screen. At the same size, another translucent screen enables the audience to observe the body gestures of the "immersant" as a shadow-silhouette. The "immersant" thus becomes a kind of ship captain, taking the audience along on a journey; like the captain, she occupies a visible and symbolically marked position, being responsible for the audience's aesthetic experience.

Tamás Waliczky's The Forest (1993) liberated the virtual camera from its typical enslavement to the simulation of humanly possible navigation, be it walking, driving a car, pedaling a bicycle or scuba diving. In The Forest the

camera slides through the endless black and white forest in a series of complex and melancholic moves. If modern visual culture exemplified by MTV can be thought of as a Mannerist stage of cinema, its perfected techniques of cinematography, mise-en-scene and editing self-consciously displayed and paraded for its own sake, Waliczky's film presents an alternative response to cinema's classical age, which is now behind us. In this meta-film, the camera, part of cinema's apparatus, becomes the main character (in this we may connect The Forest to another meta-film, A Man with a Movie Camera). On first glance, the logic of camera movements can be identified as the quest of a human being trying to escape from the forest (which, in reality, is just a single picture of a tree repeated over and over). Yet, just as in some of the Brothers Quay animated films such as The Street of Crocodiles, the virtual camera of The Forest neither simulates natural perception nor does it follow the standard grammar of cinema's camera; instead, it establishes a distinct system of its own. In The Street of Crocodiles the camera suddenly takes off, rapidly moving in a straight line parallel to an image plane, as though mounted on some robotic arm, and just as suddenly stops to frame a new corner of the space. The logic of these movements is clearly non-human; this is the vision of some aliean creature. In contrast, in The Forest the camera never stops at all, the whole film being one uninterrupted camera trajectory. The camera system of The Forest can be read as a comment on a fundamentally ambiguous nature of computer space. On the one hand, not indexically tied up to physical reality or human body, computer space is isotropic. In contrast to human space, in which the verticality of the body and the direction of the horizon are two dominant directions, computer space does not privilege any particular axis. In this way it is similar to the space of El Lissitzky's Prouns and Kazimir Malevich's suprematist compositions — an abstract cosmos, unencumbered by either Earth's gravity or the weight of a human body. (Thus the game Spacewar with its simulated gravity got it wrong!) William Gibson's term "matrix' which he used in his novels to refer to cyberspace, captures well this isotropic quality. But, on the other hand, computer space is also a space of a human dweller, something which is used and traversed by a user, who brings her own anthropological framework of horizontality and verticality. The camera system of The Forest foregrounds this double character of computer space. While no human figures or avatars appear in the film and we never get to see either the ground or the sky, it is centered around the stand-in for the human subject — a tree. The constant movements of the camera along the vertical dimension throughout the film — sometimes getting closer to where we imagine the ground plane is located, sometimes moving towards (but again, never actually showing) the sky — can be interpreted as an attempt to negotiate between isotropic space and the space of human anthropology, with its horizontality of the ground plane and the horizontal and vertical dimension of human bodies. The navigable space of The Forest thus mediates between human subjectivity and the very different and ultimately alien logic of a computer — the ultimate and omnipresent Other of

our age.

While the works discussed so far all created virtual navigable spaces, George's Legrady interactive computer installation Transitional Spaces (1999) moves back from virtual into physical. Legrady locates already existing architectural navigable space (Siemens headquarters building in Munich) and makes it into an "engine" which triggers three cinematic projections. As regular office stuff and vistors move through the main entrance section and second level exit/entrance passage ways, their motions are picked up cameras and are used to control the projections. Legrady writes in his installation proposal:

> As the speed, location, timing, and number of individuals in the space control the sequence and timing of pojection sequences, the audience will have the opportunity to "play" the system, that is, engage consciously by interacting with the camera sensing to conrol the narrative flow of the installation.
>
> All three projections will comment on the notion of "transitional space" and narrative development. Images sequences will represent transitional states: from noise covered to clear, from empty to full, from open to close, from dark to light, from out of focus to in-focus.[296]

Legrady's installtion begins to explore one element in the "vocabulary" of navigable space "althabet": transition from one state to another. (Other potential elements, or rather dimensions, include the character of a trajectory; the pattern of user's movement — for instance, rapid geometric momevement in Doom versus wondering in Myst — the possible interactions between user and the space, such as the character acting as a center of perspective in Waliczky's The Garden (1992); and, of course, the architecture of space itself). While the definition of narrative by Mieke Bal which I invoked earlier may be too restrictive in relation to new media, Legrady quotes another, much broader defintion by literary theorist Tzvetan Todorov. According to him minimal narrative involves the passage from "one equilibium to another" (or, in diffirent words, from one state to another.) Legrady's installation suggests that we can think of subject's movement from one "stable" point in space to another (for insance, moving from an lobby to a building to an office) like a narrative; by analogy, we may also think of a transition from on state of a new media object to another (for instance, from a noisy image to a noise-free image) as a minimal narrative. For me, the second equisation is more problematic than the first, because, in contrast to literara narrative, it is hard to say what constitues a "state of equilibrium" in a typical new media object. Nethertheless, rather than concluding that in Legrady's installation does not really create narratives, we should recognize it instead is an important example of a whole trend among new media artists: to explore the minimal

condition of a narrative. In the later section “New Temporality: Loop as a Narrative Engine” I will discuss these investigations in relation to another new media convention: the loop.

The computer spaces just discussed, from Aspen Movie Map to Forest, each establish a distinct aesthetic of their own. However, the majority of navigable virtual spaces mimic existing physical reality without proposing any coherent aesthetic programs. What artistic and theoretical traditions can the designers of navigable spaces draw upon to make them more interesting? One obvious candidate is modern architecture. From Melnikov, Le Corbusier and Frank Lloyd Wright to Arhigram and Bernard Tschumi, modern architects elaborated a variety of schemes for structuring and conceptualizing space to be navigated by users. Using a few examples from these architects, we can look at the 1925 USSR Pavilion (Melnikov,), Villa Savoye (Le Corbusier), Walking City (Arhigram), and Parc de la Villette (Tschumi).[297] Even more relevant is the tradition of "paper architecture" — the designs which were not intended to be built and whose authors therefore felt unencumbered by the limitations of materials, gravity and budgets.[298] Another highly relevant tradition is film architecture.[299] As discussed in the "Theory of Cultural Interfaces" section, the standard interface to computer space is the virtual camera modeled after a film camera, rather than a simulation of unaided human sight. After all, film architecture is The architecture designed for navigation and exploration by a film camera.

Along with different architectural traditions, designers of navigable spaces can find a wealth of relevant ideas in modern art. They may consider, for instance, the works of modern artists which exist between art and architecture and which, like projects of paper architects, display spatial imagination not tied up to the questions of utility and economy: warped worlds of Jean Dubuffet, mobiles by Alexander Calder, earth works by Robert Smithson, moving text spaces by Jenny Holzer. While many modern artists felt compelled to create 3D structures in real spaces, others were satisfied with painting their virtual worlds: think, for, instance, of melancholic cityscapes by Giorgio de Chirico, biomorphic worlds by Yves Tanguy, economical wireframe structures by Alberto Giacometti, existential landscapes by Anselm Kiefer. Besides providing us with many examples of imaginative spaces, both abstract and figurative, modern painting is relevant to the design of virtual navigable spaces in two additional ways. First, since new media is most often experienced, like painting, via a rectangular frame (see “The Screen and the User”), virtual architects can study how painters organized their spaces within the constraints of a rectangle. Second, modern painters who belong to what I call the “space-medium” tradition elaborated the concept of space as a homogeneous dense field, where everything is made from the same “stuff” — in contrast to architects which always have to work with a basic dichotomy between

the build structure and the empty space. And although virtual spaces realized until now, with the possible exception of Osmose, follow the same dichotomy between rigid objects and a void between them, on the level of material organization they are intrinsically related to the monistic ontology of modern painters such as Matta, Giacometti, or Pollock, for everything in them is also made from the same material — pixels, on the level of surface; polygons or voxels, on the level of 3D representation). Thus virtual computer space is structurally closer to modern painting than to architecture.

Along with painting, a genre of modern art which has a particular relevance to the design of navigable virtual spaces is installation. Seen in the context of new media, many installations can be thought of as dense multimedia information spaces. They combine images, video, texts, graphics and 3D elements within a spatial layout. While most installations leave it up to the viewer to determine the order of "information access" to their elements, one of the most well-known installation artists, Ilya Kabakov, elaborated a system of strategies to structure the viewer's navigation through his spaces.[300] According to Kabakov, in most installations "the viewer is completely free because the space surrounding her and the installation remain completely indifferent to the installation it encloses."[301] In contrast, by creating a separate enclosed space with carefully chosen proportions, colors and lighting within the larger space of a museum or a gallery, Kabakov aims to completely "immerse" the viewer inside his installation. He calls this installation type a "total installation."

For Kabakov, "total" installation has a double identity. On the one hand, it belongs to plastic arts designed to be viewed by an immobile spectator — painting, sculpture, architecture. On the other hand, it also belongs to time-based arts such as theater and cinema. We can say the same about virtual navigable spaces. Another concept of Kabakov's theory which is directly applicable to virtual space design is his distinction between the spatial structure of an installation and its dramaturgy, i.e. the time-space structure created by the movement of a viewer through an installation.[302] Kabakov's strategies of dramaturgy include dividing the total space of an installation into two or more connected spaces; creating a well-defined path through the space which does not preclude the viewer from wandering on her own, yet prevents her from feeling being lost and being bored. To make such a path, Kabakov constructs corridors and abrupt openings between objects, he also places objects in strange places to obstruct passage where one expects to discover a clear pathway. Another strategy of "total installation" is the choice of particular kinds of narratives which lead themselves to spatialization. These are the narratives which take place around a main event which becomes the center of an installation: "the beginning [of the installation] leads to the main event [of the narrative] while the last part exists after the event took place." Yet another strategy involves the positioning of text

within the space of an installation as a way to orchestrate the attention and navigation of the viewer. For instance, placing two to three pages of texts at a particular point in the space creates a rhythmic stop in the navigation rhythm.[303] Finally, Kabakov "directs" the viewer to keep alternating between focusing her attention on particular details and the installation as a whole. He describes these two kinds of spatial attention (which we can also correlate with haptic and optic perception as theorized by Riegl and others) as follows: "wandering, total ("summarnaia") orientation in space — and active, well-aimed 'taking in' of partial, small, the unexpected."[304]

All these strategies can be directly applied to the design of virtual navigable spaces (and interactive multimedia in general). In particular, Kabakov is very successful in making the viewers of his installations carefully read significant amounts of text included in them — something which represents a constant challenge for new media designers. His constant emphasis on always thinking about the viewer's attention and reaction to what she will encounter — "the reaction of the viewer during her movement through the installation is the main concern of her designer… The loss of the viewer's attention is the end of the installation"[305] — is also an important lesson to new media designers who often forgot that what they are designing is not an object in itself but a viewer's experience in time and space.

I have used the word "strategy" to refer to Kabakov's techniques on purpose. To evoke the terminology of The Practice of Everyday Life by French writer Michel de Certeau, Kabakov uses strategies to impose a particular matrix of space, time, experience and meaning on his viewers; they, in their turn, use "tactics" to create their own trajectories (this is a term actually used by de Certeau) within this matrix. If Kabakov is perhaps the most accomplished architect of navigable spaces, de Certeau can very well be their best theoretician. Like Kabakov, he never dealt with computer media directly, and yet his The Practice of Everyday Life has a multitude of ideas directly applicable to new media. His general notion of how a user's "tactics" which create their own trajectories through the spaces defined by others (both metaphorically, and, in the case of spatial tactics, literally) is a good model to think about computer users navigating through computer spaces they did not design:

> Although they are composed with the vocabularies of established languages (those of television, newspapers, supermarkets of established sequences) and although they remain subordinated to prescribed syntactical forms (temporal modes of schedules, paradigmatic orders of spaces, etc.), the trajectories trace out the rules of other interests and desires that are neither determined**,** nor captured by**,** the system in which they develop.[306]

The Navigator and the Explorer

Why is navigable space such a popular construct in new media? What are the historical origins and precedents of this form?

In his famous 1863 essay "The Painter of Modern Life", Charles Baudelaire documented the new modern male urban subject — the flâneur.[307] (Recent history of visual culture, film theory, cultural history and writings on cyberculture has already invoked the figure of the flâneur much too often; my justification for invoking it once again here is that I hope to use it in new ways.) An anonymous observer, the flâneur navigates through the space of a Parisian crowd, recording and immediately erasing the faces and the figures of the passers-by in his memory. From time to time, his gaze meets the gaze of a passing woman, engaging her in a split-second virtual affair, only to be unfaithful to her with the next female passer-by. The flâneur is only truly at home in one place — moving through the crowd. Baudelaire writes: "To the perfect spectator, the impassioned observer, it is an immense joy to make his domicile amongst numbers, amidst fluctuation and movement, amidst the fugitive and infinite… To be away from home, and yet to feel at home; to behold the world, to be in the midst of the world and yet to remain hidden from the world." There is a theory of navigable virtual spaces hidden here, and we can turn to Walter Benjamin to help us in articulating it. According to Benjamin, the flâneur's navigation transforms the space of the city: "The Crowd is the veil through which the familiar city lures the flâneur like a phantasmargonia. In it the city is now a landscape, now a room."[308] The navigable space thus is a subjective space, its architecture responding to the subject's movement and emotion. In the case of the flâneur moving through the physical city, this transformation of course only happens in the flâneur's perception, but in the case of navigation through a virtual space, the space can literally change, becoming a mirror of the user's subjectivity. The virtual spaces built on this principle can be found in such films as Waliczky's The Garden and The Dark City (Alex Proyas, 1998).

Following European tradition, the subjectivity of the flâneur is determined by his interaction with a group — even though it is a group of strangers. In place of a close-knit community of a small-scale traditional society (Gemeinschaft) we now have an anonymous association of a modern society (Gesellshaft).[309] We can interpret the flâneur's behavior as a response to this historical shift. It is as though he is trying to compensate for the loss of a close relationship with his group by inserting himself into the anonymous crowd. He thus exemplifies the historical shift from Gemeinschaft to Gesellshaft, and the fact that he only feels at home in the crowd of strangers shows the psychological price paid for modernization. Still, the subjectivity of the flâneur is, in its essence, intersubjectivity: the exchange of

glances between him and the other human beings.

A very different image of a navigation through space — and of subjectivity — is presented in the novels of nineteenth century American writers such as James Fenimore Cooper (1789-1851) or Mark Twain (1835-1910). The main character of Cooper's novels, the wilderness scout Natty Bumppo, alias Leatherstocking, navigates through spaces of nature rather than culture. Similarly, in Twain's Huckleberry Finn, the narrative is organized around the voyage of the two boy heroes down the Mississippi River. Instead of the thickness of the urban human crowd which is the milieu of a Parisian flâneur, the heroes of these American novels are most at home in the wilderness, away from the city. They navigate forests and rivers, overcoming obstacles and fighting enemies. The subjectivity is constructed through the conflicts between the subject and nature, and between the subject and his enemies, rather than through interpersonal relations within a group. This structure finds its ultimate expression in the unique American form, the Western, and its hero, the cowboy — a lonely explorer who only occasionally shows up in town to get a drink at the bar. Rather than providing the home for the cowboy, as it does for the flâneur, the town is a hostile place, full of conflict, which eventually erupts into the inevitable showdown.

Both the flâneur and the explorer find their expression in different subject positions, or phenotypes, of new media users. Media theoretician and activist Geert Lovink describes the figure of the present-day media user and Net surfer whom he calls the Data Dandy. Although Lovink's reference is Oscar Wilde rather than Baudelaire, his Data Dandy exhibits the behaviors which also qualify him to be called a Data Flâneur. "The Net is to the electronic dandy what the metropolitan street was for the historical dandy."[310] A perfect aesthete, the Data Dandy loves to display his private and totally irrelevant collection of data to other Net users. "Wrapped in the finest facts and the most senseless gadgets, the new dandy deregulates the time economy of the info = money managers... if the anonymous crowd in the streets was the audience of the Boulevard dandy, the logged-in Net-users are that of the data dandy."[311] While displaying his dandyism, the data dandy does not want to be above the crowd; like Baudelaire's flâneur, he wants to lose himself in its mass, to be moved by the semantic vectors of mass media icons, themes and trends. As Lovink points out, a data dandy "can only play with the rules of the Net as a non-identity. What is exclusivity in the age of differentiation?...Data dandyism is born of an aversion of being exiled into a subculture of one's own."[312] Although Lovink positions Data Dandy exclusively in data space ("Cologne and pink stockings have been replaced by precious Intel"), the Data Dandy does have a dress code of his own. This look is popular with new media artists of the 1990s: no labels, no distinct design, no bright colors or extravagant shapes — a non-identity which is nevertheless paraded as style and which in fact is carefully constructed (as I learned while shopping in Berlin in

1997 with Russian net.artist Alexei Shulgin.) The designers who exemplify this style in the 1990s are Hugo Boss and Prada, whose restrained no-style style contrasts with the opulence of Versace and Gucci, the stars of the 1980s era of exess. The new style of non-identity perfectly corresponds to the rise of the Net, where endless mailing lists, newsgroups, and sites delude any single topic, image or idea — "On the Net, the only thing which appears as a mass is information itself... Today's new theme is tomorrow's 23 newsgroups."[313]

If the Net surfer, who keeps posting to mailing lists and newsgroups and accumulating endless data, is a reincarnation of Baudelaire's flâneur, the user navigating a virtual space assumes the position of the nineteenth century explorer, a character from Cooper and Twain. This is particularly true for the navigable spaces of computer games. The dominance of spatial exploration in games exemplifies the classical American mythology in which the individual discovers his identity and builds character by moving through space. Correspondingly, in many American novels and short stories (O'Henry, Hemingway) narrative is driven by the character's movements in the outside space. In contrast, in the 19th century European novels there is not much movement in physical space, because the action takes place in a psychological space. From this perspective, most computer games follow the logic of American rather than European narrative. Their heroes are not developed and their psychology is not represented. But, as these heroes move through space, defeating enemies, acquiring resources and, more importantly, skill, they are "building character." This is particularly true for Role Playing Games (RPG) whose narrative is one of self-improvement. But it also holds for other game genres (action, adventure, simulators) which put the user in command of a character (Doom, Mario, Tomb Rider). As the character progresses through the game, the user herself or himself acquires new skills and knowledge. She learns how to outwit the mutants lurking in Doom levels, how to defeat the enemies with just a few kicks in Tomb Rider, how to solve the secrets of the playful world in Mario, and so on.[314]

While movement through space as a means of building character is one theme of American frontier mythology, another is exploring and "culturing" unknown space. This theme is also reflected in computer games' structure. A typical game begins at some point in a large unknown space; in the course of the game, the player has to explore this space, mapping out its geography and unraveling its secrets. In the case of games organized into discrete levels such as Doom, the player has to systematically investigate all the spaces of a given level before he can move to the next level. In other game which takes place over one large territory, the game play gradually involves larger and larger parts of this territory (Adventure, War Craft).

This is one possible theory, one historical trajectory: from flâneur to Net surfer; from nineteenth century American explorer to the explorer of navigable virtual space. Although this section focuses on navigating a space in a literal

sense, i.e. moving through a 3D virtual space, this concept is also a key metaphor used to conceptualize new media. From the 1980s concept of cyberspace to the 1990s software such as Netscape Navigator, interacting with computerized data and media has been consistently framed in spatial terms. Computer scientists adopted this metaphor as well: they use the term navigation to refer to different methods of organizing and accessing hypermedia, even though a 3D virtual space interface is not at all the most common method. For instance, in his Elements of Hypermedia Design Peter Gloor lists "seven design concepts for navigation in dataspace": linking, searching, sequentialization, hierarchy, similarity, mapping, guides and agents.[315] Thus, "navigating the Internet" includes following the hyperlinks, using menus commonly provided by Web sites, as well as using search engines. If we accept this spatial metaphor, both the nineteenth century European flâneur and the American explorer find their reincarnation in the figure of the net surfer. We may even correlate these two historical figures with the names of two most popular Web browsers: the flâneur of Baudelaire — Netscape Navigator; an explorer of Cooper, Twain and Hemingway — Internet Explorer. Of course, names apart, these two browsers are functionally quite similar. However, given that they both focus on a single user navigating through the Web sites rather than more communal experiences, such as newsgroups, mailing lists, text-based chat and IRC, we can say that they privilege the explorer rather than the flâneur — single user navigating through an unknown territory rather than a member of a group, even is this group is a crowd of strangers. And although different software solutions have been developed to make Internet navigation more of a social experience — for instance, allowing remote users to simultaneously navigate the same Web site together; or allowing the user to see who already accessed a particular document — an individual navigation through the "history-free" data stilled remained the norm at the end of the 1990s.

Kino-Eye and Simulators

It is also possible to construct a different trajectory which will lead from the Parisian flaneurie to navigable computer spaces. In Window Shopping film historian Anne Friedberg presents an archeology of a mode of perception which, according to her, characterizes modern cinematic, televisual, and cyber cultures and which she calls a "mobilized virtual gaze."[316] This mode combines two conditions: "a received perception mediated through representation" and a travel "in an imaginary flanerie through an imaginary elsewhere and an imaginary elsewhen."[317] According to Friedberg's archeology, this mode emerged when a new nineteenth century technology of virtual representation — photography — merged with the mobilized gaze of tourism, urban shopping and flanerie.[318] As

can be seen, Friedberg connects Baudelaire's flâneur with a range of other modern practices: "The same impulses which send flâneurs through the arcades, traversing the pavement and wearing thin their shoe leather, sent shoppers into the department stores, tourists to exhibitions, spectators into the panorama, diaroma, wax museum, and cinema."[319] The flâneur occupies the privileged position among these practices because he embodied most strongly the desire to combine perception with motion through a space. All that remained in order to arrive at a "mobilized virtual gaze" was to virtualize this perception — something which cinema accomplished in the last decade of the nineteenth century.

While Friederg's account ends with television and does consider new media, the form of navigable virtual space fits well in her historical trajectory. Navigation through a virtual space, whether in a computer game, a motion simulator, data visualizations or a 3D human-computer interface, follows the logic of a "virtual mobile gaze." Instead of Parisian streets, shopping windows and the faces of the passers-by, the virtual flâneur travels through virtual streets, highways and planes of data; the eroticism of a split-second virtual affair with a passer-by of the opposite sex is replaced with the excitement of locating and opening a particular file or zooming into the virtual object. Just as the original flâneur of Baudelaire, the virtual flâneur is happiest on the move, clicking from one object to another, traversing room after room, level after level, data volume after data volume.

Thus, just as a database form can be seen as an expression of 'database complex,' an irrational desire to preserve and store everything, navigable space is not just a purely functional interface. Ii is also an expression and gratification of psychological desire; a state of being; a subject position — or rather, a subject's trajectory. If the subject of modern society was looking for refuge from the chaos of the real world in the stability and balance of the static composition of a painting, and later in cinema's image, the subject of the information society finds peace in the knowledge that she can slide over endless fields of data, locating any morsel of information with the click of a button, zooming through file systems and networks. She is comforted not by the equilibrium of shapes and colors, but by the variety of data manipulation operations at her control.

Does this mean that we have reached the end of the trajectory described by Friederg? While still enjoying a privileged place in computer culture, flanerie now shows its age. Here we can make an analogy with the history of GUI (Graphical User Interface). Developed at Xerox Park in the 1970s and commercialized by Apple in the early 1980s, it was appropriate when a typical user's hard drive contained dozens or even hundreds of files. But for the next stage of Net-based computing in which the user is accessing millions of files it is no longer sufficient.[320] Bypassing the ability to display and navigate the files graphically, the user resorts to a text-based search engine. Similarly, while a "mobilized virtual gaze," described by Friederg, was a significant advancement over earlier

more static methods of data organization and access (static image, text, catalog, library), in the information age its "bandwidth" is too limited. Moreover, a simple simulation of movement through a physical space defeats a computer's new capabilities of data access and manipulation. Thus, for a virtual flâneur such operations as search, segmentation, hyperlinking and visualization and data mining are more satisfying than just navigating through a simulation of a physical space.

In the 1920s Dziga Vertov already understood this very well. A Man with a Movie Camera is an important point in the trajectory which leads from Baudelaire's flanerie to Aspen Movie Map, Doom and VRML worlds not simply because Vertov's film is structured around the camera's active exploration of city spaces, and not only because it fetishizes the camera's mobility. Vertov wanted to overcome the limits of human vision and human movement through space to arrive at more efficient ways of data access. However, the data he worked with is raw visible reality — not reality digitized and stored in computer's memory as numbers. Similarly, his interface was a film camera, i.e. an anthropomorphic simulation of human vision — not computer algorithms. Thus Vertov stands half-way between Baudelaire's flâneur and computer user: no longer just a pedestrian walking through a street, but not yet Gibson's data cowboy who zooms through pure data armed with data mining algorithms.

In his research on what can be called "kino-eye interface," Vertov systematically tried different ways to overcome what he thought were the limits of human vision. He mounted cameras on the roof of a building and a moving automobile; he slowed and speed up film speed; he superimposed a number of images together in time and space (temporal montage and montage within a shot). A Man with a Movie Camera is not only a database of city life in the 1920s, a database of film techniques, and a database of new operations of visual epistemology, but it is also a database of new interface operations which together aim to go beyond a simple human navigation through a physical space.

Along with A Man with a Movie Camera, another key point in the trajectory, from the navigable space of a nineteenth century city to the virtual navigable computer space, is flight simulators. At the same time when Vertov was working on his film, young American engineer E.A. Link, Jr. developed the first commercial flight simulator. Significantly, Link's patent for his simulator filed in 1930 refers to it as a "Combination Training Device for Student Aviators and Entertainment Apparatus."[321] Thus, rather than being an after-thought, the adaptation of flight simulator technology to consumer entertainment which took place in the 1990s was already envisioned by its inventor. Link's design was a simulation of a pilot's cockpit with all the controls, but, in contrast to a modern simulator, it had no visuals. In short, it was a motion ride without a movie. In the 1960s, visuals were added by using new video technology. A video camera was mounted on a movable arm positioned over a room size model of an airport. The

movement of the camera was synchronized with the simulator controls; its image was transmitted to a video monitor in the cockpit. While useful, this approach was limited because it was based on physical reality of an actual model set. As we saw in the "Compositing" section, a filmed and edited image is a better simulation technology than a physical construction; and a virtual image controlled by a computer is better still. Not surprisingly, soon after interactive 3D computer graphics technology was developed, it was applied to produce visuals for the simulators by one of his developers. In 1968, Ivan Sutherland, who already pioneered interactive computer-aided design ("Sketchpad," 1962) and virtual reality (1967), formed a company to produce computer-based simulators. In the 1970s and 1980s simulators were one of the main applications of real-time 3D computer graphics technology, thus determining to a significant degree the way this technology was developed (see "Synthetic Realism as Bricolage.") For instance, simulation of particular landscape features which are typically seen by a pilot, such as flat and mountain terrain, sky with clouds, and fog, all became important research problems.[322] The application of interactive graphics for simulators has also shaped the imagination of researchers regarding how this technology can be used. It naturalized a particular idiom: flying through a simulated spatial environment.

Thus, one of the most common forms of navigation used today in computer culture — flying through spatialized data — can be traced back to the 1970s military simulators. From Baudelaire's flâneur strolling through physical streets we move to Vertov's camera mounted on a moving car and then to the virtual camera of a simulator which represents the viewpoint of a military pilot. Although it was not an exclusive factor, the end of the Cold War played an important role in the extension of this military mode of perception into general culture. Until 1990, such companies as Evans and Sutherland, Boeing and Lockheed were busy developing multi-million simulators. As the military orders dried up, they had to look for consumer applications of their technology. During the 1990s, these and other companies converted their expensive simulators into arcade games, motion rides and other forms of location-based entertainment. By the end of the decade, Evans and Sutherland's list of products included image generators for use in military and aviation simulators; a virtual set technology for use in television production; Cyber Fighter, a system of networked game stations modeled after networked military simulators; and Virtual Glider, an immersive location-based entertainment station.[323] As the military budgets continued to diminish and entertainment budgets soared, entertainment and military often came to share the same technologies and to employ the same visual forms. Probably the most graphic example of the ongoing circular transfer of technology and imagination between the military and the civilian sector in new media is the case of Doom. Originally developed and released over the Internet as a consumer game in 1993 by id software, it was soon picked by the U.S. Marine Corps who

customized it into a military simulator for group combat training.[324] Instead of using multi-million dollar simulators, the Army could now train soldiers on a $50 game. The Marines, who were involved in the modifications, then went on to form their own company in order to market the customized Doom as a commercial game.

The discussion of the military origins of navigable space form would be incomplete without acknowledging the pioneering work of Paul Virilio. In his brilliant 1984 book War and Cinema Virilio documented numerous parallels between military and film cultures of the twentieth century, including the use of a mobile camera moving through space in film in military aerial surveillance and cinematography.[325] Virilio went on to suggest that while space was the main category of the nineteenth century, the main category of the twentieth century was time. As already discussed in "Teleaction," for Virilio, telecommunication technology eliminates the category of space altogether as it makes every point on Earth as accessible as any other — at least in theory. This technology also leads to real time politics, which require instant reactions to the events transmitted at the speed of light, and ultimately can only be handled efficiently by computers responding to each other without human intervention. From a post-Cold War perspective, Virilio's theory can be seen as another example of the imagination transfer from the military to civilian sector. In this case, techno-politics of the Cold War nuclear arms equilibrium between the two super powers, which at any moment were able to strike each other at any point on Earth, came to be seen by Virilio as a fundamentally new stage of culture, where real time triumphs over space.

Although Virilio did not write on computer interface, the logic of his books suggests that the ideal computer interface for a culture of real time politics would be the War Room in Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb (Stanley Kubrick, 1964) with its direct lines of communication between the generals and the pilots; or DOS command lines with their military economy of command and response, rather than the more spectacular but inefficient VRML worlds. Yet, uneconomical and inefficient as it may be, navigable space interface is thriving across all areas of new media. How can we explain its popularity? Is it simply a result of cultural inertia? A left-over from the nineteenth century? A way to make the ultimately Alien space of a computer compatible with humans by anthropomorphizing it, superimposing a simulation of a Parisian flanerie over abstract data? A relic of Cold War culture?

While all these answers make sense, it would be unsatisfactory to see navigable space as only the end of a historical trajectory, rather than as a new beginning. The few computer spaces discussed here point toward some of the aesthetic possibilities of this form; more possibilities are contained in the works of modern painters, installation artists and architects. Theoretically as well, navigable space represents a new challenge. Rather than only considering

topology, geometry and logic of a static space, we need to take into account the new way in which space functions in computer culture: as something traversed by a subject, as a trajectory rather than an area. But computer culture is not the only field where the use of the category of navigable space makes sense. I will now briefly look at two other fields — anthropology and architecture — where we find more examples of "navigable space imagination."

In his book Non-places. Introduction to an Anthropology of Supermodernity French anthropologist Marc Auge advances the hypothesis that "supermodernity produces non-places, meaning spaces which are not themselves anthropological places and which, unlike Baudelairean modernity, do not integrate with earlier places."[326] Place is what anthropologists have studied traditionally; it is characterized by stability, and it supports stable identity, relations and history.[327] Auge's main source for his distinction between place and space, or non-place, is Michel de Certeau: "Space, for him, is a 'frequent place,' 'an intersection of moving bodies': it is the pedestrians who transform a street (geometrically defined as a place by town planners) into a space"; it is an animation of a place by the motion of a moving body.[328] Thus, from one perspective we can understand place as a product of cultural producers, while non-places are created by users; in other words, non-place is an individual trajectory through a place. From another perspective, in supermodernity, traditional places are replaced by equally institutionalized non-places, a new architecture of transit and impermanence: hotel chains and squats, holiday clubs and refugee camps, supermarkets, airports and highways. Non-place becomes the new norm, the new way of existence.

It is interesting that as the subject who exemplifies the condition of supermodernity, Auge picks up the counterpart to the pilot or a user of a flight simulator — an airline passenger. "Alone, but one of many, the user of a non-place has contractual relations with it." This contract relieves the person of his usual determinants. "He becomes no more than what he does or experiences in the role of passenger, customer or driver."[329] Auge concludes that "as anthropological places create the organically social, so non-places create solitary contractuality," something which he sees as the very opposite of a traditional object of sociology: "Try to imagine a Durkheimian analysis of a transit lounge at Roissy!"[330]

Architecture by its very definition stands on the side of order, society and rules; it is thus a counterpart of sociology as it deals with regularities, norms and "strategies" (to use de Certeau's term). Yet the very awareness of these assumptions underlying architecture led many contemporary architects to focus their attention on the activities of users who through their "speech acts" "reappropriate the space organized by the techniques of sociocultural production" (de Certeau).[331] Architects come to accept that the structures they design will be

modified by users' activities, and that these modifications represent an essential part of architecture. They also took up the challenge of "a Durkheimian analysis of a transit lounge at Roissy," putting their energy and imagination into design of non-places such as an airport (Kansai International Airport in Osaka by Renzo Piano), a train terminal (Waterloo International Terminal in London by Nicholas Grimshaw) or a highway control station (Steel Cloud or Los Angeles West Coast Gateway by Asymptote Architecture group).[332] Probably the ultimate in non-place architecture has been one million square meter Euralille project which redefined the existing city of Lille, France as the transit zone between the Continent and London. The project attracted some of the most interesting contemporary architects: Rem Koolhaas designed the masterplan while Jean Nouvel built Centre Euralille containing a shopping center, a school, a hotel, and apartments next to the train terminal. Centered around the entrance to the Chunnel, the underground tunnel for cars which connects the Continent and England, and the terminal for the high speed train which travels between Lille, London, Brussels and Paris, Euralille is a space of navigation par excellence; a mega-non-place. Like the network players of Doom, Euralille users emerge from trains and cars to temporarily inhabit a zone defined through their trajectories; an environment "to just wander around inside of" (Robyn Miller); "an intersection of moving bodies" (de Certeau).

EVE and Place

We have come a long way since Spacewar (1962) and Computer Space (1971) — at least, in terms of graphics. The images of these early computer games seem to have more in common with abstract paintings of Malevich and Mondrian than with the photorealistic renderings of Quake (1996) and Unreal (1997). But whether this graphics evolution was also accompanied by a conceptual evolution is another matter. Given the richness of modern concepts of space developed by artists, architects, filmmakers, art historians and anthropologists, our computer spaces have a long way to go.

Often the way to go forward is to go back. As this section suggested, the designers of virtual spaces may find a wealth of relevant ideas by looking at twentieth century art, architecture, film and other arts. Similarly, some of the earliest computer spaces, such as Spacewar and Aspen Movie Map, contained aesthetic possibilities which are still waiting to be explored. As a conclusion, I will discuss two more works by Jeffrey Shaw who draws upon various cultural traditions of space construction and representation probably more systematically more than any other new media artist.

While Friedberg's concept of virtual mobile gaze is useful in allowing us to see the connections between a number of technologies and practices of spatial

navigation, such as Panorama, cinema and shopping, it can also make us blind to the important differences between them. In contrast, Shaw's EVE (1993 —) and Place: A User' Manual (1995) emphasize both similarities and differences between various technologies of navigation.[333] In these works, Shaw evokes the navigation methods of Panorama, cinema, video and VR. But rather than collapsing different technologies into one, Shaw "layers" them on side by side. That is, he literally encloses the interface of one technology within the interface of another. For instance, in the case of EVE the visitors find themselves inside a large semi-sphere reminiscent of the 19th century Panorama. The projectors located in the middle of the sphere throw a rectangular image on the inside surface of the semi-sphere. In this way, the interface of cinema (an image enclosed by a rectangular frame) is placed inside the interface of Panorama (a semi-spherical enclosed space). In Place: A User' Manual a different "layering" takes place: Panorama interface is placed inside a typical computer space interface. The user navigates a virtual landscape using first-person perspective characteristic of VR, computer games and navigable computer spaces in general. Inside this landscape are eleven cylinders with photographs mapped on them. Once the user moves inside one of these cylinders, she switches to a mode of perception typical of Panorama tradition.

By placing interfaces of different technologies next to each other within a single work, Shaw foregrounds the unique logic of seeing, spatial access and user's behavior characteristic of each technology. The tradition of the framed image , i.e. a representation which exists within the larger physical space which contains the viewer (painting, cinema, computer screen), meets the tradition of the "total" simulation, or "immersion,' i.e. a simulated space which encloses the viewer (Panorama, VR).

Another historical dichotomy staged for us by Shaw is between the traditions of collective and individualized viewing in screen-based arts. The first tradition spans from magic lantern shows to twentieth century cinema. The second passes from the camera obscura, stereoscope and kinescope to head-mounted displays of VR. Both have their dangers. In the first tradition, individual's subjectivity can be dissolved in a mass-induced response. In the second, subjectivity is being defined through the interaction of isolated subject with an object at the expense of intersubjective dialogue. In the case of viewers' interactions with computer installations, as I already noted when talking about Osmose, something quite new begins to emerge: a combination of individualized and collective spectatorship. The interaction of one viewer with the work (via a joystick, a mouse, or a head mounted sensor) becomes in itself a new text for other viewers, situated within the work's arena, so to speak. This affects the behavior of this viewer who acts as a representative for the desires of others, and who is now oriented both to them and to the work.

EVE rehearses the whole Western history of simulation, functioning as a kind of Plato's cave in reverse: visitors progress from the real world inside the space of simulation where instead of mere shadows they are presented with technologically enhanced (via stereo) images, which look more real than their normal perceptions.[334] At the same time, EVE's enclosed round shape refers us back to the fundamental modern desire to construct a perfect self-sufficient utopia, whether visual (the nineteenth-century panorama) or social. (For instance, after 1917 Russian Revolution architect G.I. Gidoni designed a monument to the Revolution in the form of a semi-transparent globe which could hold several thousand spectators.) Yet, rather than being presented with a simulated world which has nothing to do with the real space of the viewer (as in typical VR), the visitors who enter EVE's enclosed space discover that EVE's apparatus shows the outside reality they just left. Moreover, instead of being fused in a single collective vision (Gesamtkunstwerk, cinema, mass society) the visitors are confronted with a subjective and partial view. The visitors only see what one person wearing a head mounted sensor chooses to show them, i.e. they are literally limited by this person's point of view. In addition, instead of a 360^{o} view they see a small rectangular image — a mere sample of the world outside. The one visitor wearing a sensor, and thus literally acting as an eye for the rest of the audience, occupies many positions at once — a master subject, a visionary who shows the audience what is worth seeing and at the same time just an object, an interface between them and outside reality, i.e., a tool for others; a projector, a light and a reflector all at once.

Having examined the two key forms of new media — database and navigable space — it is tempting to see their privileged role in computer culture as a sign of a larger cultural change. If we use Auge's distinction between modernity and supermodernity, the following scheme can be established:

- modernity — "supermodernity"
- narrative (= hierarchy) — database, hypermedia, network (= flattening of hierarchy)
- space — navigable space (trajectory through space)
- static architecture — "liquid architecture."[335]
- geometry and topology as theoretical models for cultural and social analysis — trajectory, vector, flow as theoretical categories

As can seen from this scheme, the two "supermodern" forms of database and navigable space are complimentary in their effects on the forms of modernity. On the one hand, a narrative is "flattened" into a database. A trajectory through events and/or time becomes a flat space. On the other hand, a flat space of

architecture or topology is narrativized, becoming a support for individual users' trajectories.

But this is only one possible scheme. What is, however, clear, is that we have left modernity for something else. We are still searching for names to describe it. Yet the names which we come up with — "supermodernity," "transmodernity," "second modern" – all seems to reflect the sense of the continuity of this new stage with the old. If the 1980s concept of "post-modernism" implied a break with modernity, we now seem to prefer to think of cultural history continuos trajectory through a single conceptual and aesthetic space. Having lived through the twentieth century we learned all too well the human price of "breaking with the past," "building from scratch," "making new" and other similar claims — be it in the case of an aesthetic, moral or a social systems. The claim that new media should be totally new is only one in the long list of such claims.

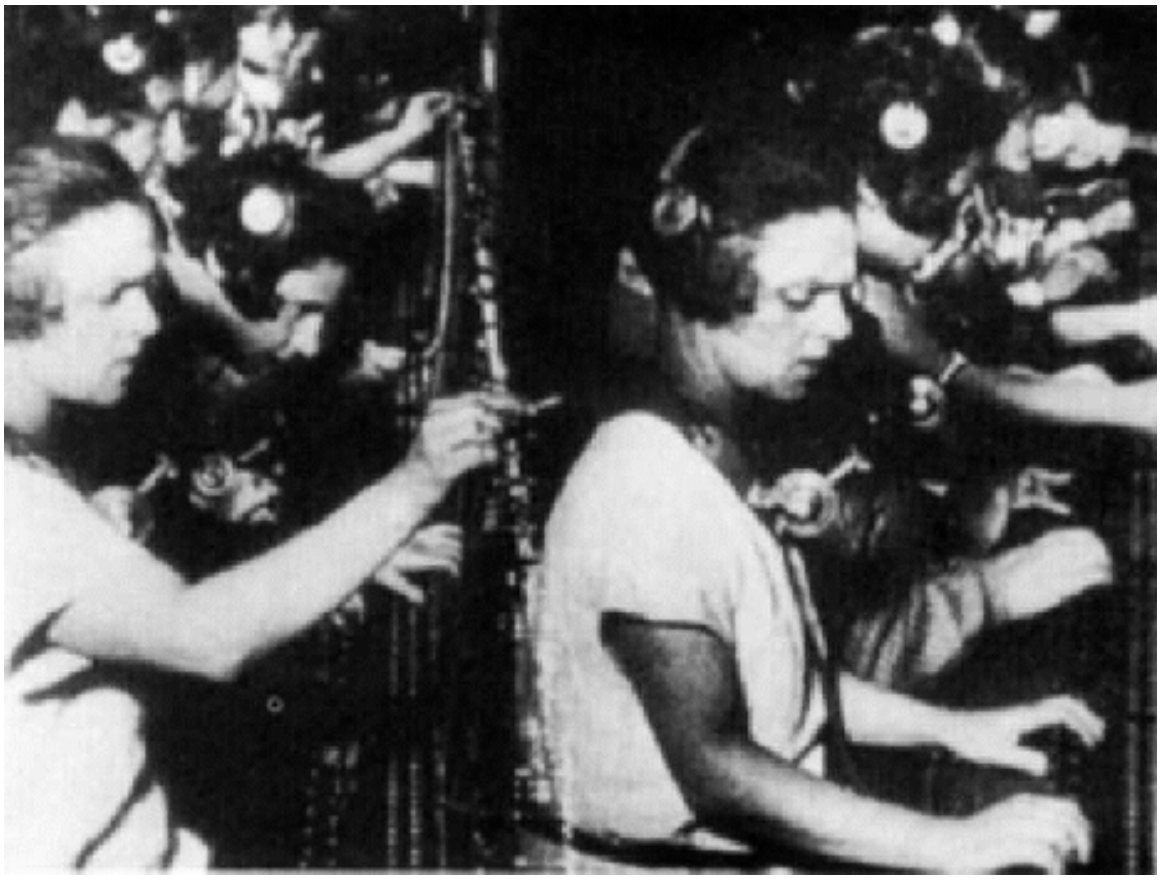
Such notion of a continuos trajectory is more compatible with human anthropology and phenomenology. Just as a human body moves through physical space in a continuos trajectory, the notion of history as a continuos trajectory is, in my view, preferable to the one which postulates epistemological breaks or paradigms shifts from one era to the next. This notion of Michel Foucault and Thomas Kuhn articulated in the 1960s belong to the aesthetics of modernist montage of Eisenstein and Godard rather than to our own era of the aesthetics of continuity as exemplified by compositing, morphing and navigable spaces.[336]

They also seem to have projected onto a diachronic plane of history the traumatic synchronic division of their time — the split between the Capitalist West and the Communist East. But, with the official (although not necessary actual) collapse of this split in the 1990, we have seen how history reasserted its continuity in powerful and dangerous ways. The comeback of nationalism and religion; the desire to erase everything associated with the Communist regime and to return to the pre-1917 or pre-1945 (in the case of Russia and Eastern Europe, respectively) are only some of the more dramatic signs of this process. The price of radical break with the past is that the historical trajectory suddenly stopped in its development simply keeps accumulating potential energy until one day its reasserts itself with new force, breaking up into the open and crushing whatever new was created while it was stopped.

In this book I have chosen to emphasize the continuities between the new media and the old, the interplay between historical repetition and innovation. I wanted to show how new media appropriates old forms and conventions of different media, in particular cinema. Like a river, cultural history can't suddenly change its course; its movement is that of a spline rather than a set of straight lines between points. In short I wanted to create trajectories through the space of cultural history which would pass through new media thus grounding it in what came back before.

Figure for Page 194 Top

(Image from http://www.manovich.net/LNM/index.html)



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