The Database as System and Cultural Form: Anatomies of Cultural Narratives

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The term "database aesthetics" has become a catchword of the digital realm and poses interesting semantic questions that seem to outline the field of research and art relating to databases itself. What exactly do we mean by "database aesthetics"? In discourse on digital art, the term is frequently used to describe the aesthetic principles applied in imposing the logic of the database to any type of information, filtering data collections, and visualizing data. In that sense, database aesthetics often becomes a conceptual potential and cultural form—a way of revealing (visual) patterns of knowledge, beliefs, and social behavior. The term is seldom used to refer to the aesthetics of the database as structure itself, although it certainly implies that meaning and the structure of a database is inherently connected to the results produced by the filtering of the data contained in it and the nature of its visualization.

Database as System

While a database is now commonly understood as a computerized record-keeping system, it is essentially a structured collection of data that stands in the tradition of "data containers" such as a book, a library, an archive, or Wunderkammer. Every "container" of information ultimately constitutes a dataspace and information architecture of its own, even though its characteristics are quite different from the virtual, dynamic dataspace. As Selena Sol points out in "Introduction to Databases for the Web," the "data storehouses" of the oral cultures of the past were the elders who would pass down information from generation to generation: "Apparently, and according to vast archeological data, campfires were used (like command-line middleware) by the younger members of the community to access the information stored in the minds of the elders using API's such as public *String TellUsAboutTheTimeWhen(String s)*."[1]

What distinguishes digital databases from their analogue predecessors is their inherent possibility for the retrieval and filtering of data in multiple ways. Databases can be distinguished according to different "data models"—that is, data containers and the ways in which data are stored in and retrieved from them. Among the most common data models (some of them subsets of others and sometimes used in combination) are:
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- *Hierarchical Databases*, which arrange the data in hierarchies similar to a tree structure with parent/child relationships.

- *Network Databases,* which are still close to the hierarchical model but use "sets" to establish a hierarchy that allows children to have more than one parent and thus establishes many-to-many relationships.

- *Relational Databases*, the most common form, are based on the research of Dr. E. F. Codd at IBM in the late 1960s and rely on the concept of tables (so-called relations) that store all data. Contrary to hierarchical or network databases, relational ones do not require a close understanding of how exactly information within the database is structured since each table can be identified by a unique name that can be called and found by the database.
- *Client/Server Databases*, which come in various forms and allow multiple "clients" to remotely and simultaneously access and retrieve information from a database server around the clock.
- *Object-Oriented Databases*, which are designed to work well with object-oriented programming languages (such Java and C++) and make entries (objects) in the database appear as programming language objects in one or more languages.

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The data container itself is not by nature beautiful, but rather seems to be characterized by non- or anti-aesthetics: it consists of tables and structures that house discrete units that in themselves carry limited meaning but have the potential for multiple relational connections. Databases, however, do not consist of only the data container. A database essentially is a system that comprises *the hardware that stores the data: the software that* allows for housing the data in its respective container and for retrieving, filtering, and changing it, as well as the

users who add a further level in understanding the data as information.

Data models always contain a layer of mathematical algorithms and concepts. There is no digital art or new media object in the broadest sense that does not have a layer of code and algorithms, even if its physical and visual manifestation distracts from this underlying layer. Any visual, digital image—from print to video—has ultimately been produced by instructions and the software that was used to create or manipulate it. The digital medium is not by nature visual but always consists of a "back end" of algorithms and data sets that remain hidden and a visible "front end" that is experienced by the viewer/user, the latter being produced by the former. The results can range from complex visuals to very abstract communication processes. Some digital art is predominantly visual; other works are more focused on raw data and the database model. As Lev Manovich puts it, any new media object consists of one or more interfaces to a database of multimedia material, even if it does not explicitly point to its roots in a database.[2] The common understanding of "database aesthetics" seems to be more focused on the operations on the "front end"—the concept of the algorithms, its visual manifestations, and cultural implications—rather than the "back end" of the data container and its structure.

One of the inherent characteristics of digital art is the tension between the mostly linear and hierarchical structure of databases (or the Internet's territory as a multitude of servers with hierarchical directories) and instructions, on the one hand, and, on the other, the seemingly infinite possibilities for reproducing and reconfiguring the information contained within these structures. This tension between the data structure/stream and the visual form it can take is perfectly captured by the Radical Software Group's project *Carnivore* (2001–present).[3] The project is inspired by the software DCS1000 (nicknamed "Carnivore"), which is used by the FBI to perform electronic wiretaps and search for certain "suspicious" keywords via packet sniffing. While the Carnivore Server performs packet sniffing on a specific local area network and serves the resulting data stream, the "client" applications created by numerous artists interpret the data in visual ways. At the core of the *Carnivore* project are the unlimited possibilities of visualizing the server's data stream in a collaborative, "open source" way—allowing its users to create maps of the data stream that often remain detached from or obscure the original data source. Apart from illustrating the relationship between the back end of data and the visual front end, *Carnivore* also turns the client-server relationship of data into a metaphor for artistic creation.

The hidden or protected back end of any project—be it a database or code—always makes an inherently political statement about access and its control, which is perfectly captured by the implications of client-server relationships. In this context, a peer-to-peer as opposed to a client-server relationship becomes a philosophical as well as political issue. Peer to peer is the promise of liberation from the server. A project explicitly addressing the issue of server access is *life_sharing* by the Italian artists at www.0100101110101101.org, whose work generally focuses on data access, document, and archiving models as well as the political, cultural, and commercial aspects of the network. With *life_sharing* (2001), 0100101110101101 turned their Web site into public property. The project consists of the organization's hard disk, published in its entirety on the Web (although in HTML format and not by providing anybody with access to the organization's server) and thus reproducible. The philosophy of free data and information exchange is also the driving force behind the open source (and "Copyleft") movement, which promotes unrestricted redistribution and modification of source code, provided that all copies and derivatives retain the same permissions.

Database as Meta-Narrative and Cultural Form
The aesthetics of a database are inherently relational, be it on the level of potential (the data container being its carrier) or the actual relationships established by the software component. Database aesthetics suggest the possibilities of tracing process—individual, cultural, communicative—in its various forms. The understanding of a database as the underlying principle and structure of any new media object delineates a broad field that includes anything from a network such as the Internet (as one gigantic database) to a particular data set.

Since the beginnings of the Internet, numerous art projects, most notably *WebStalker* and *netomat™,*[4] have questioned the conventions of exploring the Web through browsers such as Netscape and Internet Explorer, which function as portals to predesigned Web sites that are ultimately based on the page model of the printed book (or even the ancient format of the scroll). I/O/D's *WebStalker* single-handedly established the "medium" of alternative browsers by expanding the functionality of existing browsers in an aesthetic and creative form that revealed the Internet"s "database architecture" in a new way. In his essay "Visceral Facades: Taking Matta-Clark's Crowbar to

Software,"[5] IOD's <CP: IOD okay without slashes, as in notes and on most Google entries? YES>Matthew Fuller establishes a connection between the *WebStalker*'s approach to information architecture and American artist Gordon Matta-Clark's technique of literally "splitting" the existing architecture of buildings, an application of formal procedures that would result in a revelation of structural properties. Maciej Wisniewski's *netomat™* (1999–present) abandoned the page format of traditional browsers and treats the Internet as one large database of files. Retrieving text, images, and audio in response to queries and flowing them simultaneously onto the screen without regard to the display design of the data source, *netomat™* reveals how the ever-expanding network interprets and reinterprets cultural concepts and themes and takes visitors for a ride into the Internet's "subconscious." Both of the projects are characterized by their own distinctive "database aesthetics," which, in both cases, consist of a reconfiguration of the interface and front end through which we experience the files in the Internet's "database."

If any new media object constitutes one or more interfaces to a database of multimedia material, it ultimately always is a visualization of data, be it a "closed" database with a preconfigured, limited amount of materials or an open one that organizes real-time data flux. The visualization and "dynamic mapping" of real-time data streams has become a broad area of inquiry in digital art, and quite often several projects visualize a similar data set in distinctly different ways. Martin Wattenberg's *Map of the Market*, Nancy Paterson's *Stock Market Skirt*, Lynn Hershman's *Synthia*, and John Klima's *ecosystm*, for example, provide four radically different interfaces for understanding the stock market or financial data.[6] Each of the visualizations creates its own distinctive contextual framework for perceiving the data flux—an indication of how much "database aesthetics" depend on the algorithmic interpretation of data.

Apart from the visualizations of data sets in general, which often do not explicitly reveal the database as an underlying structure, a multitude of projects has been tracing cultural subtexts by means of arranging information in a database that then become a means of revealing meta-narratives about cultural values and conventions. As Lev Manovich puts it, "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."[7] According to Manovich, the database presents the world as a list of items that it refuses to order (which is certainly true on the level of the data container), while a narrative requires a protagonist and narrator, a text and story, and cause-and-effect relationships for seemingly unordered events. This is not meant to say that database and narrative are mutually exclusive forms. Computer games, for example, are often narratives whose constituent elements are still organized in a form of database structure. An interactive narrative or hypernarrative can be understood as "the sum of multiple trajectories to a database."[8] While interactive and open to a reshuffling of their constituent elements, these games and hypertexts still emphasize elements of traditional narrative over a database structure, which may support a narrative but does not naturally lend itself to generating one. However, databases do lend themselves to a categorization of information and narratives that can then be filtered to create meta-narratives about the construction and cultural specifics of the original material.

Art projects frequently apply the principles and logic of the database to existing, often originally analogue information—ranging from a book to movies, television series, and postcards—to reveal relationships that remain unseen in the original format. W. Bradford Paley's *TextArc* (2002),[9] for example, treats the book—itself a data container—as a database and arranges it in its smallest units, words, and lines that can be filtered according to various principles. The texts processed by the project are publicly available through the Gutenberg library. *TextArc* (2002) is a visual model that represents an entire text on a single page. The text appears as a concentric spiral on the screen, with each of its lines drawn in a tiny, illegible font size around the outside. In a second spiral, each word is represented in a more readable size, and a pool of words appearing in the middle of the spirals forms the main organizing structure. Menus allow users to turn each word contained in the pool "on" or "off" and thus make it visible or invisible. In the central pool, words that appear more than once are located at the average position in which they are found in the spirals' text and frequently used words appear brighter, standing out from the background. If users select words, thin lines appear and connect the word to its positions in the text. A text-view window can show every line that uses the word, and a reading function allows the text "to read itself" by drawing a constantly moving line between the words as they appear in sequence. Part of *TextArc*'s beauty derives from the fact that the project creates a new form of data container and spatial model for the book on the visual front end. The representation of a novel's entire contents and its structural elements on a single page constitutes a radical break with the book's traditional spatial model and a shift in focus. The

narrative itself moves to the background, while the patterns of its construction become a focus of attention. What the project illuminates are structural patterns and symmetries that presumably are not very obvious during the reading (and writing) process. In *TextArc*'s reading of *Alice in Wonderland*, for example, the word Alice holds a central position, showing an even distribution through the book (as to be expected). *TextArc* also reveals that the focus on characters seems to shift from animals in the first half of the book (caterpillar, dogs, mouse etc.) to people in the second half (Duchess, King, Queen). A reading of Chapter 72, "The Monkey Rope," from Herman Melville's *Moby Dick,* exposes some astonishing symmetries in the constructions of the chapters. The words "harponeer" and "monkey-rope" (both of which obviously play a central role in the construction of the chapter's story) structure and frame the chapter in a distinctive and amazingly symmetrical way: the words "poison" and "peril" almost cut the chapter in half. It appears that *TextArc* illuminates the presumably unconscious level of the writing process and the construction of narrative.

A very different look at the construction of narrative, in this case visual or cultural, is provided by the works of Jennifer and Kevin McCoy, who experiment with a form of enhanced cinema that focuses on the construction of single shots and the messages they convey.[10] Using database logic as a formal strategy, their video installations *Every Shot Every Episode* (2001) and *How I Learned* (2002) carry the medium of film/video into the realm of digital art by fusing the inherent characteristics of the two. The works are presented as videos on CDs that are neatly stacked or arranged on the wall and can be chosen and played by the viewer in the "old-fashioned," hands-on interactive way. While the works appear to be video installations in the classical sense, they would not be possible without the digital medium's inherent possibilities for the classification and reconfiguration of existing materials in a database structure. *Every Shot Every Episode* literally consists of every shot in twenty episodes of the TV series *Starsky and Hutch*, broken down into a database of single units (such as "Every Zoom Out" or "Every Stereotype"). There is no reason to expect that this type of classification would result in the construction of an interesting new narrative in the traditional sense. What *Every Shot Every Episode* creates, however, is a record of the elemental aesthetics of familiar genres, the subtexts of stereotypes, and formulaic representation that the viewer otherwise would not necessarily perceive in this clarity. The project *How I Learned* exposes the cultural conditioning of learned behavior by structuring the Eastern-Western television series *Kung Fu* in categories such as "how I learned about blocking punches," "how I learned about exploiting workers," or "how I learned to love the land." Ranging from the ridiculous to the sublime, the database categories reveal the subliminal messages carried by visual narratives. Narrative structure, with an emphasis on time, became the focus of the McCoy's *201: A Space Algorithm* (2001), an online software program that allows viewers to reedit Stanley Kubrick's science-fiction film *2001: A Space Odyssey* by selecting individual shots and compressing or expanding viewing time.[11] Users not only control the spatial components of the narrative but also its temporal construction, questioning the time-and-space paradigms of cinema.

Both *TextArc* and the McCoy's works use different ways of filtering to highlight structural elements in the construction of narrative. A broader look at cultural values and representation unfolds in the projects of George Legrady, who has consistently explored the archive and database as cultural record. His project *Pockets Full of Memories* (2001), an installation with an accompanying Web site,[12] explicitly focuses on the "mechanics" of database construction and the way in which we arrive at levels of evaluation though linguistic description. *Pockets Full of Memories* creates an "anatomy" of personal value by inviting visitors to digitally scan an object in their possession at a scanning station and answer a set of questions regarding the object, rating it according to certain attributes (old/new, soft/hard, natural/synthetic, functional/symbolic, personal/nonpersonal, useful/useless, and so on). An algorithm (the Kohonen self-organizing algorithm) classifies the scanned objects in a two-dimensional map based on similarities in their descriptions and attribute ratings. The Kohonen map generates a grid with random values for each point in the grid and all the data categories for each object. The algorithm classifies one object after the other and positions it where it finds the closest values for the respective object, so that over time all the objects are positioned in proximity to the ones with similar values. Users can review each object's data and add their own personal comments and stories. The result of the project is a growing map of relations between items that range from the merely functional to a signifier of personal value. The mapping of these objects illuminates how each object is contextualized by its surrounding data and points, to the potentiality and absurdities of classifying objects endowed with personal meaning. The project operates on the threshold between logical classification and meanings that seem to elude quantifiable values.

Legrady's interactive CD-ROM/installation *Slippery Traces* (1997) invited viewers to navigate

through more than 240 linked postcards—ranging from tourist sites to personal, military, or industrial images—that were categorized according to topics such as nature, culture, technology, morality, industrial, and urban environments. Viewers first choose one of three quotes appearing on the screen, each of which embodies a different perspective—anthropological, colonialist, or media theory—and thus provides an interpretive angle for the experience of the project. Each of the postcards encountered in *Slippery Traces* contains five hot spots linked to other related images. Legrady uses postcards as a ready-made expression and trace of cultural memory, reflecting on mediated memory as it is captured in visual reproduction. Postcards are photographic memories that, as a representation of an "original," are always inscribed with an ideology, or at least a perspective. While this system may apply to any photograph, the postcard as a representation of time and place (and often, quite specifically, culture) seems to be even more inclined to transport an agenda. Because of the categorization of the material, cultural subtexts—such as colonialization, the exoticizing of the "foreign" and Other, and cultural stereotypes, for example—become a consistent visual meta-narrative. This narrative is obviously very much dependent on the database system as a whole—the interplay between the container, the algorithm, and the interpretation of the user. Database categories and the algorithms filtering them are never value-free but always are inscribed with an interpretative angle. As with most of the projects discussed here, *Slippery Traces* makes the mechanisms of its classification (its database categories) transparent for viewers, allowing them to take a critical look at how the project itself constructs its meta-narrative.

The characteristics of the database as a collection of information that can be structured according to various criteria and result in a meta-narrative in many ways differ from the concept of the traditional narrative (in the broadest sense) as it unfolds in a book, film, or even a single visual image. While narratives can be driven by many different strategies and factors—among them character development, cause-and-effect relationships between events, spatiotemporal movement—they generally establish a sequence of events or defined relationships (for example, in an event or "scene" depicted in a photograph). Many of the projects I discuss here (*TextArc,* the McCoy projects, *Slippery Traces*) impose database logic onto traditional forms of narrative. A project that visibly juxtaposes and fuses the "narrative engines" of the database and photography/moving images is Natalie Bookchin's CD-ROM, *The Databank Of The Everyday* (1996). Bookchin's project, a conceptually infinite database of life itself in all its mundane activities, uses elements of the computer database and an image catalogue and identifies the loop as a narrative engine driving both of them. The loop is not only inherently connected to the roots of cinema and moving images, which first took the form of a flip-book-like loop of images, but is also a central element of programming and algorithms, which frequently use commands such as "if/then," "while/wend," "do/until," "for/next," and "repeat/while" to create their (visual) narrative. On a more metaphorical level, the redundancy of daily activities constitutes its own ever-repeating loop. In one segment of *The Databank of the Everyday*, the screen is divided into two frames, one of them showing a looping video of a woman shaving her leg, while the other one shows code and instructions corresponding to the movement of the woman's arm. The segment thus exposes the algorithms that drive a visual representation, moving the usually hidden background of code to the visible foreground.

A very different and original approach to moving the background to the foreground unfolds in *The Secret Life of Numbers* by Golan Levin, with Martin Wattenberg, Jonathan Feinberg, Shelly Wynecoop, David Elashoff, and David Becker. The project does not take an existing "story" as its source but studies the relative popularity of every integer between zero and one million. By means of custom software, data from public search engines, and statistical techniques, the artists determined the popularity of numbers and expose their "secret life"—patterns of associations that reflect cultural interests. The mathematical tool and system that provides the basis for programming is turned into the object of analysis and reveals its own "values." As the artists put it in their statement:

> Our present relationship with numbers reveals both a highly developed tool and a highly developed user, working together to measure, create, and predict both ourselves and the world around us. But like every symbiotic couple, the tool we would like to believe is separate from us (and thus objective) is actually an intricate reflection of our thoughts, interests, and capabilities. One intriguing result of this symbiosis is that the numeric system we use to describe patterns is actually used in a patterned fashion to describe.[13]

The interactive visualization consists of two interfaces: a histogram where the popularity of

numbers is indicated by the length of lines protruding from them, and a graph consisting of cells that make up a grid arranged in rows of one hundred where the more popular integers have brighter cells. A menu indicates the value of popularity for any chosen number and reveals its "associations" (such as historical dates). As to be expected, the number ten and its multiples show a higher popularity because they are driven by the base-ten numbering system. It also does not come as a surprise that, in terms of calendar years, people generally seem to be more interested in the present than in the past. Other numbers that stand out are those corresponding to important historical dates, area codes, or relating to pop-cultural phenomena such as the television show *90210*.

The fact that the data were gathered largely through Web-based statistics also becomes a reflection of people's interest within this particular environment. It is notable that the relative "importance" of the model numbers of products—ranging from cars and cameras to computer processors—by far outweighs that of historical events. Applying an additional filtering mechanism, *The Secret Life of Numbers* could probably be configured into a history of commercial products and their success. The project succeeds in delivering what the artists refer to as a "numeric snapshot of the collective consciousness,"[14] a revealing portrait of our interests as they manifest themselves in the descriptive systems we use.

Given the fact that database structure in the broadest sense lies at the root of digital media, it is only natural that database aesthetics play a major role in digital art and culture. The 1990s were a decade of major digitization, when libraries, archives, and museum collections were translated into digital format, allowing for new forms of filtering and relational connections. However, it seems that "database aesthetics" in the broadest sense has become emblematic of our time, extending beyond the digital realm and transcending the traditional archives of the library and museum. The notion of relational databases as an organizational model seems increasingly to infiltrate culture. *Documenta XI,* for example, featured an enormous amount of nondigital archival projects—numerous archives of photographs documenting a journey, place, condition, memories (cultural and personal); an archive of "Insomnia Drawings" by Louise Bourgeois; Feyzdjou's boutiques, a Wunderkammer of personal history and identity; several room-size installations that were transplants of artists' studios, archives of notes, drawings, scrapbooks; On Kawara's *One Million Years*, a database; Sanja Ivekovic's archive *Searching for My Mother*, a lexical/semantic inventory of the dictionaries of the Brothers Grimm.[15] Largely brought about by digital technologies, database aesthetics itself has become an important cultural narrative of our time, constituting a shift toward a relational, networked approach to gathering and creating knowledge about cultural specifics.

Notes

1. Selena Sol, "Introduction to Databases for the Web: Pt. 1." http://www.databasejournal.com/sqletc/article.php/1428721.
2. Lev Manovich, *The Language of New Media* (Cambridge, Mass.: MIT Press, 2001), 227.
3. http://www.rhizome.org/carnivore.
4. IOD, *WebStalker*, http://www.backspace.org/iod.
Maciej Wisniewski, *Netomat*. http://www.netomat.net.
5. http://www.backspace.org/iod/Visceral.html
6. Martin Wattenberg, *Smart Money*'s "Map of the Market." See http://www.smartmoney.com/marketmap;
Nancy Paterson, *Stock Market Skirt*, http://www.bccc.com/nancy/skirt.html;
Lynn Hershman, *Synthia*, http://www.lynnhershman.com/synthia;
John Klima, *ecosystm*, http://www.cityarts.com/lmno/ecosystm.html.
7. Manovich, *Language of New Media*, 225.
8. Ibid., 227.
9. http://www.textarc.org.
10. http://www.mccoyspace.com.
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12. http://www.pocketsfullofmemories.net.
13. Ibid. http://www.turbulence.org/Works/nums/.
14. Ibid.
15. Kassel, Germany, June 8–September 15, 2002.