THE BIRTH OF MEMORY FROM THE SPIRIT OF THE MACHINE

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The computer is a machine of the future – not only do we still attach to it the connotation of technological sophistication and future orientation, also in its function as an information processing machine it only deals with the present, calculating towards to future. In the project "Bleeding Through" we use a database structure and signifying chains to explore the past and the subconscious processes of meaning creation described by Lacan.

Bleeding Through – Layers of Los Angeles 1920-1986, 2002, Rosemary Comella, Norman Klein, Andreas Kratky, computer-based interactive installation, Copyright by the authors.

INTRODUCTION

The computer is an amnesic machine; and it is a machine of the future. It appears in most of the science fiction imaginations of the future – shaped different ways, sometimes giant, sometimes minuscule, sometimes steam-driven as in the steampunk imaginations – it always belongs to the future. The computer still has an association of "high-tech" joined to it. How can a machine that is so inherently linked to visions of the future be used as a conduit for a reflection of the past? And how can a machine that purges everything from memory when the power is off be used for a reflection on memory? In the interactive database novel "Bleeding through – Layers of Los Angeles 1920–1986" we are developing an interaction method embodying the process of memory and the interplay between personal and collective memory. "Bleeding Through" is conceived as an interactive DVD-Rom by Rosemary Comella, Norman M. Klein, and Andreas Kratky. [1] It is produced as a joint research project by USC's Labyrinth Project and the ZKM | Center for Art and Media.

The inspiration for the piece came from Norman M. Klein's book "The History of Forgetting", where he digs into the urban restructuring of Los Angeles and how traces of the old are remembered and forgotten. Klein uses the notion of 'simultaneous distraction' as a concept to describe how memory is constituted by a continuous and self-corrupting process of inscription and re-inscription – a "distracted imaginary, essentially a filing system where information disappears or reforms itself whenever you touch it." [2] This notion of a 'distracted' filing system is somewhat close to one of the central metaphors of the computer, which, besides its capacity to compute numbers, is in many applications a large storage unit or filing system. But what actually is the relationship of the computer and memory? This is one of the central questions motivating our research into how to represent the process of remembering and misremembering algorithmically. We explored this question with an excavation of the complex layering of past and present in one central area in Downtown Los Angeles. Guided by the story of Klein's fictitious character Molly, we built a comprehensive archive of photos from different time periods, re-photography, film, newspaper clippings, maps, interviews etc. that is assembled in a digital database, which can be explored by the viewer through a narrative interface. This paper discusses the process of conceiving the interface and traces the conceptual decisions behind its design.

COMPUTERS AND MEMORY

The person who coined the term "cyber", which has become the prefix to many of the computer-related concepts and contraptions, Norbert Wiener, describes the relationship of the computer to the past and memory as a function of two extremes: First, a very fast short term memory that is necessary in order to keep the values that are necessary for the ongoing calculation at hand. These intermediate results are of no use anymore once the process is completed and at this moment the memory used to store these values should immediately be emptied and made available for new calculations. And second, the opposite of this fast memory is the long term storage, the "memory which is intended to be part of the files, the permanent record." [3] Disregarding the long term storage, Wiener's view is focused solely on the processing unit that gets entirely emptied after a completed run of its process to make room for the next process to run on the machine uninhibited by previous results. The human, in contrast, never completely clears what is stored in memory and thus should be situated somewhere between the two extremes that Wiener describes, as "the analogue of a single run of such a machine." [4]

The engineering effort of Wiener concentrates on making the machine memory as precise as possible and keeping the information, once stored, intact and repeatable until it is intentionally erased. In this sense one of the predominant concerns of the cybernetics researchers was to identify a method of distinguishing discernible information from distorted information that disappears in noise and becomes unreadable. Noise in these information transmission systems is the influence of the environment: "It is unfortunate that certain things are added to the signal which were not intended by the information source. These unwanted additions may be distortions of sound or static, or distortions in shape or shading of picture, or errors in transmission." [5] The technological aspect of layering uncontrolled signals from the environment with the intended information can be seen as a parallel to the notion of memory "distraction" that Klein alludes to. Since the days of Wiener and Shannon the information processing machines have made great progress, the computer is a perfect amnesic machine that can forget everything on command and that got rather good at isolating the wanted bits of information from the unwanted. The machine has only two states: Either full recall or complete forgetting. For the human being it is not possible to simply forget everything. Most human beings are indeed somewhere between the two extremes: unable to recall everything and equally unable to forget everything. Klein also alludes to Borges' story of "Funes, His Memory", a man who has perfect recall. After an accident Funes has the

ability to remember everything, even the slightest detail, and in view of this immense amount of data he became unable to go through his recollection again, as it takes more time to go through everything that is remembered than it takes to live the event. Thus he only two or three times reconstructed an entire day. Funes came to the resolution that he should restrict his past days to a recollection of some seventy thousand moments ordered by numbers – but he realized that he would probably by his death be done with classifying his childhood memories and dropped this endeavor. [6] Voluntary forgetting and selective memory are hard to achieve. The human brain seems to be constructed to fulfill this filtering function completely by itself, without conscious intervention. This is a characteristic that would call for an 'imperfect machine' in the sense of Wiener and Shannon and the opposite of the 'pure machine' that Edgar Allan Poe develops in his analysis of the "Turk", a chess playing automaton made by the inventor von Kempelen. The chess automaton was a supposed mechanical machine that was able to play chess and that won most of the games it played, in very few occasions it lost. Poe states that a 'pure machine', would show no irregularities, and it would always win – therefore the chess automaton could not be a 'pure machine.' [7] As we know it was not a mechanism, but a human operating the "Turk" in reality, and it was the human brain that was able to establish this middle ground between absolute perfection and imperfection.

In his essay "A Note on the Mystic Writing Pad" Sigmund Freud describes a mechanical device that embodies the characteristic of this middle ground, a memory support that is able to harmonize the opposition between a lasting storage of information and the erasure in order to make room for new inscriptions. What he describes is a children's toy, a writing pad with a wax layer onto which a sheet of paper can be pressed by writing on it. The areas where the paper sticks to the wax will show the trace of writing, while the others wont. By lifting off the paper from the underlying layer of wax the writing becomes invisible on the surface, but it stays as an engraving in the wax underneath the paper. This combination of an always fresh writing surface, ready to take new inscriptions and a remaining trace, that gets altered each time new inscriptions are made but still preserves traces of the prior impressions is for Freud an allegory for the human capacity of memory. [8] What seems to be possible with the mechanical device is a serious challenge for the digital machine. As the computer is made to be precise and all its elements are designed with the goal of the 'perfect machine' in mind, this kind of unreliable inscription is hard to achieve – what would be an algorithm for selective forgetting, or what should be the heuristic to select what should be forgotten versus what should remain? What are the alterations that are produced through new inscriptions? Not only it seems that it is hard to design algorithms that are made to produce irregularities – as we know, even real randomness is almost impossible to achieve with the computer [9] – it also seems to be in the human psyche to not want to intentionally loose anything. All our tools are made to preserve and keep, from the stone inscription and the note pad, to the museum and the database.

CALCULATING THE UNCONSCIOUS

There is a different way of conceptualizing the relationship of the computer to the past: Another story of Borges, the "The Library of Babel" describes the idea of a complete library, a library that contains all books, all that have ever been written and those that will ever be written. In this library it is sufficient for a book to exist that it be possible [10] – the library is the hypothetical construction of the space of all possible recombinations of the set of the alphabet. The books are thus not seen as meaningful entities but as instances of a possibility space – where meaningful combinations might be the exceptions. This perspective of a library is without any past, as "it has existed ab aeternitate" [11] and will exist eternally – it is the tireless activity of a probably very simple recombinatory algorithm, which does not need to

keep any information about the past. Based on the transformation rules of the algorithm it is possible for every possible state to calculate the next state. The implication here is that every seemingly meaningful experience can be seen as a simple combinatory instance of such an algorithm.

The Russian mathematician Andrej A. Markov has investigated this idea and in a parallel to Borges' later story he used a book for his experiment. The inventor of the Markov chain, which, named after its inventor, later became an important mathematical device, determined in a detailed analysis of the pages of a book in long matrix calculations the probability for character sequences to follow each other. As his study object he used Alexander Pushkin's novel Eugene Onjegin, which for him became the abundant source of combinatory instances of character sequences. The probability chain that he identified represented a pattern that is sufficient to predict the continuation of the sequence without regard to the content of the surrounding text.

Markov's theory of signifying chains inspired later Jacques Lacan to formulate his theory of the unconscious as a chain of signifiers that determine the subject. A specific symbolic sequence akin to the Markov chain governs like a formal language such psychological effects as remembering and repression. [12] Lacan saw this chain also as the explaining principle for what Freud called the "Wiederholungszwang", the compulsion to repeat. He writes "we can find in the ordered chains of a formal language the entire appearance of remembering, and quite especially of the kind required by Freud's discovery." [13] Lacan sees the ordering principles inherent to this kind of formal language, expressed as a chain of probabilities for a specific sequence, as determinant for the acts and subconscious affinities. Rather than explaining these acts and associations as stemming from past experience, they are the results of a probability structure that is almost like a 'personal formula': "This could illustrate a rudimentary subjective trajectory, by showing that it is grounded in the actuality which had the future anterior in its present." [14] The intuition behind this formula relates directly to a computational approach and Lacan suggests that it would be possible to conceive of a modern calculating machine, a "thinking machine", to operate according to the specific formula that modulates a subject's choices. [15]

INTERFACE ALLEGORIES

For our design of the interface for the piece "Bleeding Through – Layers of Los Angeles 1920–1986" we were looking for an approach that could on both the functional level as well as the aesthetic level embody aspects of the "distracted imaginary" process of remembering between personal and collective memory, and fiction. Our goal was to conceive what I called an "allegorical interface," [16] an interface that constitutes a figurative or symbolic representation of the core aspects of the media text that is experienced through this interface. As in an interactive medium the functional dynamic aspects are an integral part of the experience, they are in extension of the visual, textual, and auditive elements conceived of as a procedural allegory that embodies aspects of the processes described in the media text.

The idea of a signifying chain formulated like an unfolding syntactic structure that develops based on an interplay between transition probabilities from one state to the next and the subjective acts of choice of the viewer is the central idea for the functioning principle of our interface. We conceived of this chain as a sequence of presences and absences that formulates a "scansion," [17] as Lacan calls it, a rhythm of 'slots' that are filled as the viewer navigates through the piece with elements from the database. The elements from the database take the role of associative presences that enable the viewer to fill in the absences, the gaps between the loosely composed elements, with his imagination. The act of imagining is thus initiated and guided by the succession of database elements and, framed by the story that Klein

invented, the imaginative activity of the viewer fills in the reading of these elements as possible characters of the story, possible places where the story may have taken place, or possible events that could have influenced the story. All the elements oscillate between their role as a document that shows places, people, and events in the real history of the city of Los Angeles, and the role they assume in the progression of the fictional story. In this way the imagination of the viewer is invited to interpret them in both ways, as historic traces as well as fictional elements, and contribute their background and experience to the multi-layered experience. As the viewer navigates through the materials, they line up in an endlessly cycling chain in which the succession of elements is determined by the choices of the viewer and a probability ranking based on a keyword system that we extracted from the story.

Visually this chain is implemented as an allegory for the act of strolling through a city where the viewer is exposed to a continuous succession of impressions that unfolds as he goes forward. A central panel shows one element from our database that can be explored in depth to reveal its historic context, such as a cross fade of historic images with their contemporary rephotographed view, further explorations of a specific location etc. Left and right from this central panel are images that are only partially visible, cut off by the borders of the screen, which stand for the elements in the peripheral field of view attracting the viewer to divert left or right. As he chooses one of them, this element swings into the middle position revealing another element on its side. In this way the elements succeed each other in an endless chain, which may show repetitions but repeated elements always appear in a different context so that the recombinant principle incites new readings and contextualizations even though elements appear familiar. We see this process as a re-encounter of a familiar object or image, which is always altered by the past experience and thus never the same as it was when it was first encountered, thus implementing an allegory for the simultaneous distraction of memory through the ongoing process of inscription and re-inscription.

The visual form of this interface is a long panoramic strip akin to the perspective of going through the city. On the other hand it evokes associations of a film strip or an editing machine underscoring the role of media and their representations in our memory process. In particular in a city like Los Angeles this latter association underscores the influence that media representations have on collective memory and individual perception.

CONCLUSION

The Markov chain implementation as the algorithmic principle behind the experience of "Bleeding Through" is compelling from a theoretical point of view and in practice delivered the anticipated results. We realized, though, during our production that a careful fine-tuning of the process was necessary to achieve the "middle ground" between mechanical perfection and 'subjective distraction'. Finding the right keywords, the right amount of keywords, and the correct probability weightings was a process of trial and error, which was not only restricted to the fine-tuning of the engine but also required us to make adjustments to the database. We also found that in order to make the process of memory inscription and erasure noticeable and develop the right narrative tension, we had to limit the amount of presented elements at a single viewing to a subset of the available database. Further it was necessary to implement several kinds of layering systems that introduce an additional superposition of images and meanings to add more depth to the recombination engine.

Through several user studies we found that the process of eliciting associations and stimulating the imaginative engagement of the viewer with the experience worked well. And even though the principles

that are at the basis of the combinatorial process of the work remain hidden to most viewers, it still is effective on the perceptual level and presents a compelling heuristic for design principles.

References and Notes:

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