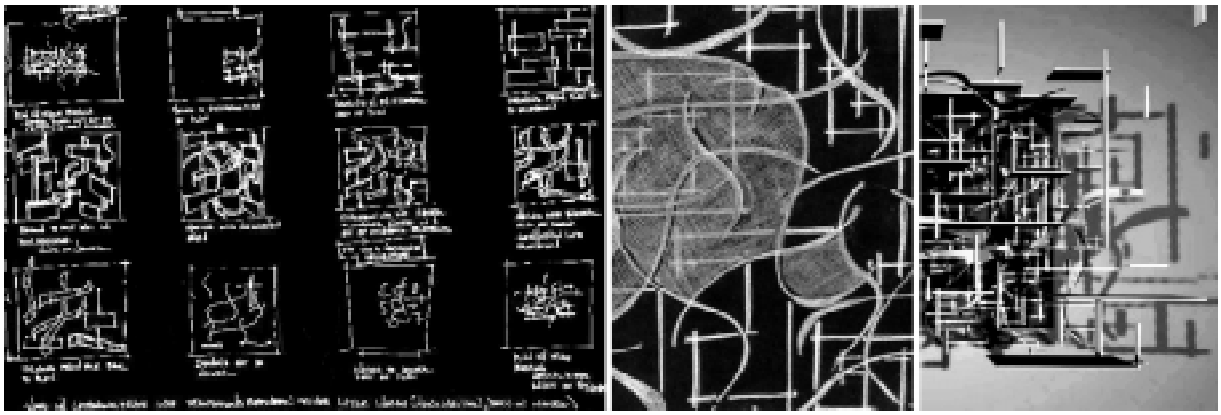
STRUCTURING AND RESTRUCTURING MEMORY IN ANIMATION



Abstract
Two issues are addressed in this digital design and analysis investigation: First, the device of sequential memory (accessed using animation) is employed in the construction and in the reading of audio-visual design messages. Second, three-dimensional Design Diagrams, audio-visual ideograms, are structured as memory schematics that are intended to organize an architectural digital/physical design schema. The accompanying presentation employs Memory Diagrams in audio-visual sequences demonstrating a methodology of structuring and restructuring memory in animation.

Robert H. Flanagan
University of Colorado
rflanaga@carbon.cudenver.edu

Syntesis image:
Kinetic Memory Diagram. Deborah Steckley.

Research/Theoretical Reflections

In conventional-print as well as in other tangible media, the poetic potential of the design message is contained in a fixed composition. For example, in traditional student design reviews, the jury may read and reread - even mentally restructure - the student's printed design message. Typically, a student's design concept is organized in a collection of sketches, models, and text. In contrast, Memory Diagrams employ a sequential audio-visual messages characteristic of film based compositions. Predictably, the linear nature of the animated media in Memory Diagrams readily accommodates the film based conceptual organization provided by storyboards and sequenced timelines.

Creativity at the Theoretical Limit of 19th Century Technology

With the invention of the daguerreotype in 1839 the technology to freeze time had been realized. Writer, teacher, and lecturer, Oliver Wendell Holmes reflected on photography in the June 1859 issue of the Atlantic Monthly magazine:

The next European war will send us stereographs of battles. It is asserted that a bursting shell can be photographed. The time is perhaps at hand when a flash of light, as sudden and brief as that of the lightning which shows a whirling wheel standing stock still, shall preserve the very instant of the shock of contact of the mighty armies that are even now gathering.

In practice, Etienne-Jules Marey's 1882 'cronophotographs' demonstrated that technology could capture human motion in multiple, rapid exposure, film frames. The Futurist photographer Anton Bragaglia in 1896 publicly exhibited extended exposure film techniques by etching motion/time events onto film recordings. In 1902, Edwin S. Porter in *Life of an American Fireman* demonstrated cut, paste and re-sequencing through basic film editing techniques. Technology had opened a new creative dimension to the artist – time [Kern 1983].

Time: Traditional Media verses Film Concepts

In film, persistence of vision explains the apparent continuous motion perceived by the brain in sequential film frames. Technological innovation made viable the sequencing and re-sequencing of events in time recordings, "... temporal order could be modified at will." [Johnson 1992]. At the start of the twentieth century, two significant trends emerged in recognition of time as a dimension in the arts. In the first, fixed media artists circumvented the complications of rudimentary, often clumsy, and always expensive film technology by infusing or inducing time through technique. Jean Metzinger, the Cubist painter, in 1911 opined on cubism, "Formerly a picture took possession of space, now it reigns also in time." [Kern 1992]. Regardless, of the Cubist's intentions, the media does not *actually* incorporate time, a requirement of multimedia content.

A more direct approach to time and the arts emerged in film, but the financial requirements of the new technology remained extravagant even after a century of technological development. Hardware and software, and digital-vi-

deo technology finally converged in the late 1990's to provide quality, affordable access to digital sequencing technology. In the companion issue of human perception, the cognitive sciences lacked even the rudimentary sophistication of the technological sciences. But, after generations of development in print, radio, film and television, the ever present media message has evolved into a sophisticated multimedia language in which today's students are immersed.

Evolution and Development of Memory Diagrams

Memory Diagrams have evolved from student design exercises begun in 1992. Paintings of twentieth-century abstract artists were symbolically decomposed, geometrically substituted, and spatial recomposed into digital, spatial diagrams. A key strategy was to establish a systemic DNA-like structure in the design model [Flanagan 1996]. One significant problem was that conceptual authorship remained with the original artist i.e. Kandinski, since the spatial diagrams were derivatives of the original artist's work.

In an effort to convey titled authorship to the student as well as to regulate design content, a Design Diagram, based on the symbolic negotiation of text, was introduced in 1997. Unlike the previous transformational diagrams, the original 'artwork' is derived from the negotiation of text in conflict; the meaning of the text and the resultant graphic are not coincidental [Flanagan,1999]. Both conceptual and practical authorship are the property of the student designer; the processes of decomposition, substitution and decomposition are unchanged.

In the Design Diagram, the sketch concept is formalized through a reanalysis of form and design logic; the objective is to use the most efficient (elegant) means to geometrically represent the concept with digital symbolic content. In this case, a simple square is used since scale, location (xyz), color and rotational angle are individual component variables. The DNA-like structure imposes self-similar design logic on the entire geometric composition; in both cases, systemic changes to the design sequence affect all components. This would allow the substitution of three-dimensional cubes for all two-dimensional squares. The result is a layering and sequencing of design components along a timeline that permits the incorporation of music, photographs, sketches, animation, and text messages.

Cognitive Concepts of Animation in Architecture

Symbol + Message + Time = Memory

The objective of the Design Diagram is the development of geometric and spatial schematics in digital media. Memory Design Diagrams, introduced in 2000, are similar to Design Diagrams except for the time dimension. Time is a significant factor; just as film media transformed still photography in the early twentieth century, time-based design concepts exhibit the potentially to transform the meaning of architecture, unlocking Goethe's *frozen music*. Predictions to this effect are evidenced in Moholy-Nage's 1945 address of kinetic potential in abstract imagery, "Vision in Motion is a synonym for simultaneity and space-time; the means to comprehend the new dimension." While various theoretical issues remained unresolved or even in conflict, a fundamental understanding of the potential of time in 'real design' and not as film concepts was firmly in hand at that time.

Creating and Composing Spatial Memories

The diagrammatic sequence of student designer Kevin Baxter [Figures 1 – 4] illustrates the development of a design concept in a Memory Diagram. The hand sketch [Figure 1] is the initial graphic representation of the symbolic conflict represented by the meaning in the words *Engaged* and *Anticipation.* In this version of the Design Diagram, intangible conflicts in language are negotiated through the symbolic interaction of 'sticks' (rules) and 'seeds' (ideas) [Flanagan 1999]. *Engaged and Anticipation* are the 'seed' words and are each represented by a single graphic symbol. These rules are variables that impart organizational design logic i.e. always perpendicular, never intersecting etc. Individual symbols hold little individual significance; it is their development, configuration, and resolution in the symbolic diagram that imparts meaning [Figure 2]. Seeds are symbols that project meaning; the words are further contextualized by the author's layered reference to armed conflict in the American Civil War [Figure 4]. Note similar spatial qualities in the Design Diagram [Figure 3] relative to the photograph [Figure 4].

Persistence of Memory

Time is the new dimensional component of memory diagrams, "... a forth dimension, not the forth dimension" A Memory diagrams is described by location (xyz) plus time (t) [Banchoff 1990]. Animated diagrams are dependent on memory, they can be played forward and backward repeatedly, but the sequenced media resists the comparative reading of print media._In the world of the cinematographer, "The desire of the fiction filmmaker – or any artist who creates an imaginary world - is that the audience will accept the symbolic truth of his situation and characters." [Giannetti 1972]. Construction of this memory also requires filtering, "The truth of the matter of course is that an event must be perceived, and the very act of perception involves distortion. Relevant and significant facts must be sorted out from the vast multitude of irrelevant details." [Giannetti 1972].

Design Functions of Sound

Sound is the glue that binds and organizes the message in memory. Sound (music in this case) layers the message in the Memory Diagram with the explicit and implicit message of the music. The sound-layer can add texture or even reverse visual meaning; Wagner's *The Ride of the Valkyries* performs all three tasks when used to overlay the helicopter cavalry assault sequence in Francis Ford Coppola's classic film "Apocalypse Now." Sound also provides an ordering structure to

the visual message; at the component (individual instrument level), music can also control, pace and sequence visual events.

Musical training is a more potent instrument than any other, because rhythm and harmony find their way into the inward places of the soul, on which they mightily fasten, imparting grace, and making the soul of him who is rightly educated graceful ... - *Plato, Republic, Book III (c.375-368 B.C.)*

In the students' projects that accompany this research, it is difficult to quantify the contribution of sound since the experience is only capable of existing in memory. It's persistence in memory leaves "... a trace – an engram..." that can even last a lifetime [Johnson 1991]. Just as long forgotten song lyrics are coxed from memory by playing the tune in memory, Memory Diagrams benefit from a similar recall phenomenon.

Conclusions:

Demystifying Creative Authorship

The question inevitably arises over where Memory Diagrams belong in the design process – this requires a re-evaluation of the role of the designer. While authorship is clearly defined in film and music, with credits for writing, directing, composing, acting, and editing, in architecture, it is not. Without proper design accountability, principals (owners), project architects (managers), and sometimes teams (collaborations) are identified as designers, clouding creative authorship. These experiments require unambiguous responsibility; therefore two creative roles have been delineated. The Conceptual Designer's role approximates titled authorship in a book or musical composition – the conceptual designer's responsibility is the creation of the Memory Diagram. The Project Designer's role approximates titled screen writer or directorial credit – the Project Designer's responsibility to interpret the Memory Diagram into design schematics. In the next phase, the Memory Diagram will extend beyond Conceptual and Schematic Design Development into Architectural Design Development.

In Summary, Memory Diagrams are idea oriented, layered, symbolic, schematic diagrams from which all design implementations flow. Memory Diagrams are described by the coordinates xyz + t (time); construction along a timeline allows the incorporation of sound and other time based variables. Memory Diagrams are capable of incorporating detailed modeling of animated design concepts, using both film and geometry – however, the design concept is only fully realizable in memory. In a related development, architects Jacques Hertzog and Pierre de Mueron are designing "an optical instrument", a house (and film repository) where film images float on curved walls [Economist, 2001]. Projecting the physical realities of the Memory Diagram far out into the future suggests the emergence of an architecture wrapped in multimedia experiences – not necessarily a better future – but a different future.

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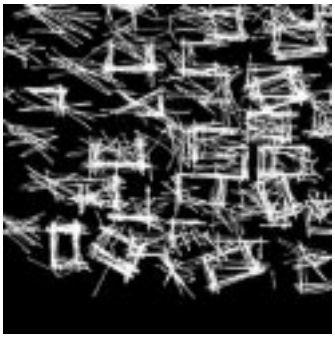

Sketch/text development

Formalized 2-dimensional composition

Spatial elaboration

Visual layering. all by Kevin Baxter.