

Seeing Double: Emulation In Theory And Practice The Erl King Case Study

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Abstract

Conservators have explored many traditional and experimental strategies for dealing with works of an ephemeral nature. Among these strategies is a way to replicate obsolete or unavailable materials or hardware – emulation. To emulate a work is to devise a way of imitating the original look of a piece by completely different means. The term can be applied generally to a refabrication of an artwork’s components, but also has a specific meaning in the context of digital media, where emulation offers a powerful technique for running an out-of-date computer on a contemporary one. As part of a larger program called the Variable Media Network, the Guggenheim Museum, in collaboration with the Daniel Langlois Foundation for Art, Science and Technology, has investigated a series of case studies to formulate creative strategies for endangered works. One work chosen to test emulation is Grahame Weinbren and Roberta Friedman’s video piece “The Erl King” (1982-85). Heralded as one of the first works of interactive video art, “The Erl King” invites the viewer to control the work’s narrative structure through the use of a touch-screen monitor. Due to its unique combination of obsolete hardware (both off the shelf and custom made) and artist-written software, “The Erl King” presented itself as an ideal candidate for hardware emulation. This artwork however proved once again that there is no “miracle cure” for the conservation of electronic artworks. In conjunction with the artists, the Guggenheim conservation department employed computer programmers and technicians to inform the best practice for preserving “The Erl King”. The original work was exhibited side by side its emulated version in the exhibition “Seeing Double: Emulation in Theory and Practice” with a number of other digital artworks and their emulated counterparts. The exhibition and subsequent symposium, “Echoes of Art: Emulation as a Preservation Strategy”, provided forums for artists, preservation experts, and the public to put emulation to the test.

THE VARIABLE MEDIA CONCEPT

Hardware, software, code, proprietary file formats, compression rates, color palettes, protocols, and multiple combinations thereof, are all causing considerable challenges for producers, curators, conservators, and historians of contemporary art. The questions we ask of digital media in a preservation context overlap consistently with those of other works in the vast domain of contemporary art production. This is the basic tenant of the Variable Media Network – that conceptual art, performance and installation based works, and in some cases even painting and sculpture – all beg the same questions as digital media in regards to issues of context, variability, notation, documentation, distribution, and aesthetics.

Emerging from a discussion between artists, curators, conservators, and technicians was the notion that these art works cannot be discussed only by the sum of their physical parts, but that we need arrive at a vocabulary which would allow artists to talk about the way their art behaves, independent of medium. To envision what their work might look like once it is no longer viable in its current form. Engaging in a methodical exploration of these shared characteristics can insure the longevity of these virtual objects and allow for their inclusion in the historical record that goes beyond anecdote, photographic representation, "print screen," or the ultimate digital demise, printing to paper.

The behaviors as defined by the Variable Media Initiative are not permanent or fixed, but they give us guidelines for discussing the more ephemeral qualities of a work of art. To say that an artwork must be *installed* implies that its physical installation is more complex than simply hanging it on a nail. Are its dimensions fixed? Does it need to be in a room by itself? These questions cannot simply be recorded by a 'dimension' field in a collections management system. Does the work have a *performative* element - not only in the traditional notion of dance, music, theatre and performance art, but also for a work in which the process is as important as the product? A medium is *reproduced* if any copy of the original master of the artwork results in a loss of quality. Such media include analog photography, film, audio and video. Alternately, if a work is *duplicated* it is implied that a copy could not be distinguished from the original by an independent observer - applying not only to artifacts that can be perfectly cloned, as in digital media, but also to artifacts comprising readymade, industrially fabricated, or mass produced components.

Behaviors commonly, although not exclusively, applied to electronic media such as computer driven installations and websites, are *interactive*, *encoded* and *networked*. *Interactivity* also describes installations that allow visitors to manipulate or take home components of a physical artwork. To say that a work is *encoded* implies that part or all of it is written in computer code or some other language that requires interpretation (e.g. dance notation, or by extension a musical score). A *networked* artwork is designed to be viewed on an electronic communication system whether a Local Area Network or the Internet. It could also, however, be applied to a piece of mail art. Lastly, even paintings and sculptures can provoke prickly questions when some aspect of their construction alters or requires an intervention. Such works are *contained* within their materials or a protective framework that encloses or supports the artistic material to be viewed. Most contemporary art practice is a combination of two or more of these behaviors. Examination of these, in combination with careful notation of the physical components and their function will lead to a suitable strategy for preservation.¹

¹ A more complete discussion of the behaviors and strategies can be located in *Permanence Through Change The Variable Media Approach*. Alain Depocas, Jon Ippolito and Caitlin Jones Eds. Montreal: Solomon R. Guggenheim Museum and Daniel Langlois Foundation for Art, Science and Technology. 2003. Also available in PDF format at www.variablemedia.net.

Conservators have long explored many traditional and experimental strategies for dealing with ephemeral works and their behaviors. As part of the Guggenheim's collaboration with the Langlois Foundation for Art, Science and Technology, a series of case studies testing various preservation strategies were undertaken. Among these strategies has emerged a promising way to replicate obsolete or unavailable materials and hardware – *emulation*. To emulate a work is to devise a way of imitating the original look and feel of the piece through completely different means. The term can be applied generally to any refabrication of an artwork's components, but it also has a specific meaning in the context of digital media, where emulation offers a powerful technique for running a program from an out-of-date computer on a contemporary one. Proving to be a viable strategy in library systems and the gaming industry, we decided to test the promise emulation held for the preservation of computer-based artworks. The artwork chosen for the case study would need to be threatened due to obsolete hardware, it would also need to consist of numerous variable media behaviors, and the artist must have a deep level of understanding of the technical issues and be willing and possibly most important, interested in working with the Variable Media group.

THE ERL KING AND THE PROCESS

(A detailed outline of the process, written by programmer Isaac Dimitrovsky is available on-line at www.variablemedia.net. I will touch on the broader elements of his report as they relate to the wider framework of the Variable Media Network.)

One work that fit our above criteria was Grahame Weinbren and Roberta Friedman's *The Erl King* (1982-1985) a combination of obsolete hardware, artist-written software and custom made components. Heralded as one of the first works of interactive video art, *The Erl King* invites the viewer to control the work's narrative structure through the use of a touch-screen monitor. Still functioning in its original form, *The Erl King* was presented side-by-side with its emulated counterpart in the exhibition "Seeing Double: Emulation in Theory and Practice." The exhibition, with *The Erl King* as its anchor, presented seven works from the 1960s through 2004, paired with versions of what that work could look like in the future if its original hardware is no longer available. By inviting a wide range of preservation experts and the public to directly compare both versions the ultimate success of these 'emulations' was put to the test.

The Erl King explores the relationship between two nineteenth century texts: Freud's *The Burning Child* dream, and Goethe's *Erkönig*. Put to Schubert's music of Goethe's poem, the viewer is invited to discover their own connection between the two texts. The viewer, or in this case 'editor' is able to control the narrative flow and create their own cinematic experience with the possibility of unlimited connections. The physical system is comprised of an aggregate of off-the-shelf and custom built hardware -- a 1982 SMC-70 computer (z80 processor running at 8mhz, 64K of RAM with 250K dynamic (cache) storage cp/m operating system, custom built video switcher, three laser disc players, Carroll touch screen, CRT monitors and laser discs.

Working closely with the artists we outlined behaviors and medium independent elements identified as being essential to the work. Not particularly attached to any

specific *installation* of the work, they were able to articulate the elements of the physical construction. To avoid the appearance of a kiosk, or ATM machine, the artists intentionally used unlikely materials, chain link fencing, PVC pipe, or cardboard to build the containing structures. Another element to be observed is how the physical construction of the installation affected the *interactive* behavior. Construction has to allow the piece's "editor" to be somewhat sheltered from the rest of the public, not crowded by other people looking over their shoulder and to feel comfortable enough to sit and explore the narrative at ease.

The *reproducible* elements, in this case three laser discs, had already been transferred from 16mm film to 1" video to laserdisc. The artist welcomed the idea of migrating to a digital format, with the express concern that the quality not be adversely altered, and that the unique frame numbering system of the original laser disc (to which the original code spoke) could be retained. The *duplicable* components of *The Erl King* would apply to both the code, and the equipment. The physical equipment itself was unimportant to the artists the code however was not. The behavior of *The Erl King* that collectively was decided must be retained in its original form was the *encoded*. The code was written in a CP/M version of Pascal called MT+Pascal. Given that it was written by the artists (in collaboration with computer programmers), and also that it was essential to retain the relationship to the frame numbering of the video, keeping the original code intact was a high priority.

For over a year, in tandem with the artist, we partook in numerous discussions with technicians, conservators, and computer programmers to identify all the components, and their functional relationship to the work of art itself. The function of the equipment has a direct relationship with the final experience of the artwork as a whole. As stated by Grahame Weinbren himself, "physical limitation of the components of the early 80's was embedded in the program of *The Erl King* to such an extent that they became determinants of the way it produced meaning." ² As stated earlier, although the physical equipment held no particular importance to the artists, these limitations must be clearly understood before any effective treatment of this work was begun.

From the outset, the chosen programmer, Isaac Dimitrovsky, told us that our plan to emulate the SMC-70 computer would be too difficult given the time-frame. The original proposal by Jeff Rothenberg and our own preliminary research had led us to believe that a 'readymade' emulator would be available on the net.³ Many emulators are developed by gaming enthusiasts who want to play old videogames no longer viable on the original systems, and while there were many emulators for the CP/M operating system, one that would work with the SMC-70 was not available. The number of outputs or

² Grahame Weinbren, "Navigating the Ocean of Streams of Story." (unpublished, earlier versions appear in *Millennium Film Journal*. No. 28, 1995, and *Future Cinema*. Jeffrey Shaw and Peter Weibel Eds., Cambridge, MA: ZKM/MIT Press.

³ Jeff Rothenberg, "Revisions 2: Issues Concerning the Erl-King Emulation Project", 8/7/2003. (unpublished, available for download as Appendix to Isaac Dimitrovsky's "Final Report: The Erl-King Project." April 2004.)

“hooks” that would be needed to control all of the external devices would make altering one of these existing emulators a daunting task. A new emulator would have to be written, and given the time frame, in the words of Isaac Dimitrovsky our programmer, the prospect “seemed very hairy.”

It is really important to interject at this point a note as to the relationship between theory and practice. We can talk about how we would ideally recreate or preserve an artwork with an unlimited budget and zero time constraints, but until that theory is tested in a real environment it is just that- a theory. Due to an unavoidably shortened schedule we were not going to be able to test emulation as originally theorized, but there were elements in place which would be hard to replicate. These were: the generous funding and support of the Langlois Foundation, an opening in the Guggenheim’s hectic exhibition calendar which would allow us to present our work to a wide audience, a proposal that didn’t suggest changing the original code at all, and most importantly an artist that was willing to dedicate himself to the process. After further discussion a compromise was reached. Although the original SMC-70 system wouldn’t be emulated in the strict sense, the artist’s original code would remain intact. The programmer began working on a system that “would emulate the external hardware devices, but interpret the original Erl-King software at the Pascal code level instead of emulating the object code.”⁴

The video and audio components were digitized into a series of uncompressed bitmap files and uncompressed audio files. A playback device replacing the original laserdisc players would have to be capable of running up to three streams of video and audio simultaneously. As well, it would need to represent a complex system of frame numbers which the original system used in order to avoid pausing on, or switching to, a mixed frame of video. Due to compression issues, replacing the hardware with at DVD setup would not allow for the smooth switching and random access that the original players facilitated. Rather than replacing the laserdisc players with other hardware devices, the decision was made that the work would remain closest to its original function if we emulated the function of this original hardware with software. Thus also eliminating the need for additional external devices.

Many times a line had to be drawn at where to modify the original systems behavior and where to replicate the system warts and all. For instance, the original system had errors that would cause it to crash. Is this something that is necessary to emulate? Would it compromise the authenticity of the work if we eliminated potential system failure? In other cases improvements to the system were unacceptable. For example, the new system had a considerably faster response time from when the viewer touched the screen and the cut in the film was made. According to the artist “it was so fast that one could not believe that one’s action had had an effect on the system, and the power and complexity of the piece dissolved into an arbitrary porridge with no distinction between the viewer-caused changes and those built in.”⁵ The artist advised that the speed degraded the viewer’s experience, so the system was slowed to match the original

⁴ Isaac Dimitrovsky, “Final Report, Erl-King Project.” (unpublished, April 2004)

⁵ Grahame Weinbren, “Navigating the Ocean of Streams of Story.”

speed, replicating the right balance of delays and waits and “distinguishing between those caused by disc search time and the time required for the computer to communicate with the laser disc players and the touch screen.”⁶ Another example was a “simple RGB overlay system in the SMC-70 that enabled text and simple graphics to appear on the input screen and not the public viewing screen.”⁷ This simple output function of the SMC-70 was not possible on the new system. As this peculiarity of the original hardware had developed into an integral part of the art work, two separate streams of video had to be run out of the new system in order to adequately replicate the original experience.

THE RESULT

As an *installed* artwork the elements of construction connecting the viewer’s physical situation and their interaction with the piece was documented and remained intact. The system’s response time, which was not articulated as an essential element of the *interactive* behavior, until the new version had begun, was emulated through the new code. The touch screen remains, and the old was simply replaced with a new one which did exactly the same thing. At one time the possibility of using a mouse was discussed, but as touch screens are still readily available, unnecessarily replacing it with something new was deemed detrimental to the experience at this point. The *reproduced* element of the work - the video- was migrated to an uncompressed video format which will allow it to continually be migrated forward, with the image quality maintained. As well, the *encoded* element - the original code has been retained exactly as was written, and now it along with the new code, can both be migrated (or emulated more simply) in the future.

We have forsaken the equipment - an important factor in placing this work in a historical moment. And surely emulating this equipment was not the only preservation option. One could scour eBay and the world for more SMC-70 computers, and for the money spent on a computer programmer a whole new system could possibly have been built. However this solution would be doomed to suffer the same fate of the original hardware. The aura of the original would still be lost and by this point the behavioral aspects of the original, identified as essential by the artists, could be lost. Careful study of the still working original equipment enabled a more accurate replication for the future. If the function of the hardware can be saved, and there is no attachment to the physical materials other than historic curiosity, emulating the hardware with software, with the guidance and blessing of the artists themselves, insures that we will be able to replicate the authentic experience regardless of its physical components.

⁶ Ibid

⁷ Isaac Dimitrovsky, “Final Report, the Erl-King Project.”