

# “Always Only Once:” The paradox of preserving performative digital works

Amy Alexander

University of California, San Diego  
La Jolla, California, USA

## Abstract

The 20th century saw various approaches to expanded cinema performance, including color organs and mixed media “psychedelic” light shows. These practices were difficult to document technically and were, to various extents, based on performance in the moment. Technically, archival 20th century visual performance documentation and preservation ranges from the non-existent to the surprisingly future proofed. But expanded cinema historian William Moritz summed up the unrepeatability of performance experience in a 1969 review of the mixed media performance ensemble Single Wing Turquoise Bird: “always only once.” Contemporary performative digital practice shares some parallels with these earlier performative practices: the work may be performed live by a performer, or an algorithm may perform the work automatically. In either case, preservation faces the paradox of recreating moments that were intended to happen “always only once.” Examining 20th century attempts to preserve the ephemeral can inform not only how we approach preservation of performative and process-based digital works, but also which works we attempt to preserve.

## Keywords

Digital preservation, digital archiving, expanded cinema, digital performance, algorithmic art, light shows, color organs, live coding, networked art

## From Object to Algorithm

A problem frequently arises in digital media art curation and preservation: the presumption that artworks are tangible, or at least static, is at odds with the realities of computational media practices. The contradiction was evident by the mid-to-late 1990s, at the point when the concept of net art (then often known as “web art”) first began to take hold. But, historically, when “new media” first emerge, they typically imitate the forms of their predecessors: early photography imitated painting; early cinema imitated theatre. Early “web art” was still popularly perceived as the placing of art objects – paintings, sculptures, photos, etc. – on the internet.

But net artists like Olia Lialina were already working beyond such assumptions; they were working with the form of the internet. Lialina’s 1996 “My Boyfriend Came Back from the War” was interactive and dynamic. [1] And it implicitly proposed a cinematic language specific to net art, using browser frames and space as narrative elements. The “art object” of “My Boyfriend Came Back from the War” was not an image: it was HTML code, written in dialogue with the rendering capabilities of 1996 browsers. As a dynamic, code-based work, “My Boyfriend Came Back from the War” presents different issues for exhibition and preservation than a static work. Perhaps not coincidentally, Lialina has gone on to become a prominent figure in pushing the thinking about preserving net-based works.

Yet “My Boyfriend Came Back from the War” in some ways still functions as an object. The code is self-contained and complete; it does not access external data or run any generative processes. The files are static data and HTML code; they are not executable. As a result, the archival issues are more about the display – the foreground – than the processes taking place in the background. This is something of an oversimplification. In fact, Lialina’s digital

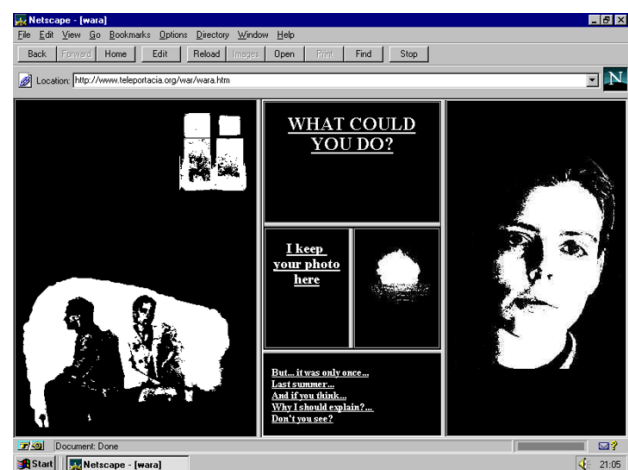


Figure 1 – Olia Lialina, "My Boyfriend Came Back from the War," 1996. Image courtesy Olia Lialina.

preservation work has often emphasized historical digital and exhibition context, including the ability of later browsers to properly interpret earlier HTML code like that in “My Boyfriend Came Back from the War.” But these computational concerns still focus primarily on the display, versus the generation of the content itself.

But by the mid-1990s, process-based net-based art was also being created. My first net art piece, “The Multi-Cultural Recycler,” was a generative work based on my semi-ironic prediction of a near future web celebrity phenomenon. [2] My prediction, and the Recycler, were based on the growing popularity of early webcams; it would be almost ten years before YouTube launched. The project’s title is a pun on the early web’s awkward attempts at multi-culturalism – which were basically cultural homogenization – and the popular 90s phenomenon of cultural recycling.

The Multi-Cultural Recycler allowed users to choose live webcam images and recycle them into kitschy artworks. It ran server-side software that downloaded two to three live images from a continuously updated selection of internet webcams, then ran custom image processing routines that would generate collaged kitschy images.

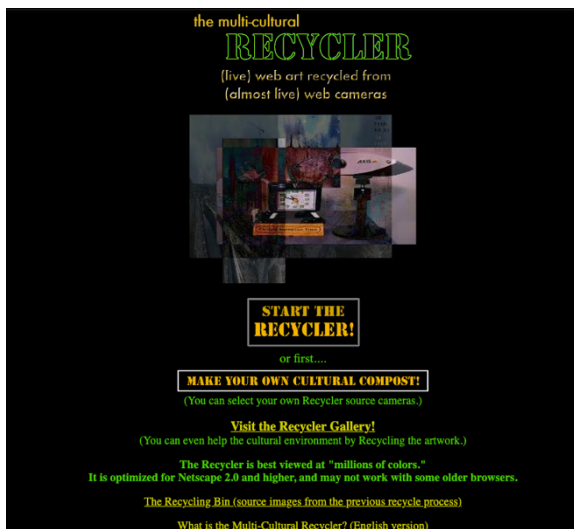


Figure 2 - "The Multi-Cultural Recycler," ca. 1997

The Recycler was always performing and always changing. This made preservation quite a challenge. I have the project documented with screenshots of various pages and images generated by the project on a handful of days. I also have a screen-capture video that I made in the late 90’s to document the navigation. But the video, like the screenshots, shows the site on a certain day and time in the 1990s. There’s no adequate way of archiving something that ran and changed

<sup>1</sup> The connections between Happenings and John Cage scores run deeper than mere similarity. An event organized by John Cage at Black Mountain College in 1952 featured several unrelated

performances by various artists that occurred in structured time brackets, sometimes simultaneously. The event is often considered by historians to be a direct predecessor to Happenings.

continuously over nearly twenty years. It’s durational and performative. The Recycler is no longer running. Ironically, although we usually worry about software obsolescence when we talk about digital preservation, it was the physical vulnerability of objects that did the Multi-Cultural Recycler in. It finally stopped running live in late 2015, when both the main server and backup servers were destroyed in a plumbing flood. So just like any artwork, digital artworks are vulnerable to their own physical fragility.

But net art performativity and process weren’t actually new in the 1990s. Networked art was performative as far back as 1980. “A Hole in Space,” by Los Angeles artists Kit Galloway and Sherry Rabinowitz, used satellite networks to transmit video, long before the days of webcams and video chat – or even public access to the internet. [3] The project transmitted and displayed life size video images of visitors at Lincoln Center in New York into a department store window in Los Angeles. Simultaneously, it displayed life size video images of visitors at the store window in Los Angeles to their counterparts at Lincoln Center.

The artistic focus of “A Hole in Space” was not the transmission of the images themselves, but the social interactions that happened over time across the network between people thousands of miles apart. If we think about the nature of networks as conduits across which things flow, it makes sense that duration and performativity would be more or less native to networked art.

“A Hole in Space” has unusually thorough video documentation for its day: some video was recorded by local news crews; other footage was created by the artists and their associates. So, video documents this particular work of performative early net art. But video cannot archive or preserve the event. It happened only once.

Performative and artistic interventions may seem to fit naturally with electronically networked art, but of course they didn’t start there. Surrealist performances and Hugo Ball’s Cabaret Voltaire are recognized as early 20<sup>th</sup> century performance art precursors. [4] “Happenings,” launched by Allan Kaprow and others in the 1950s and 60s, were performance art interventions, usually intervening into public space. These events were generally scripted, with both artists and members of the public given instructions of what to do when. The performances were part theatre, and, like a John Cage score,<sup>1</sup> part instructional algorithm set into motion. In the case of the Happenings, what was ultimately important were the social outcomes that took place in the space of the social network between the participants. By the late 1960s and early 70s, the term “Happening” was used colloquially in the US as a general term to refer to the energy of free-flowing social interactions.

performances by various artists that occurred in structured time brackets, sometimes simultaneously. The event is often considered by historians to be a direct predecessor to Happenings.

As we think about archiving contemporary digital performance practices, we have a few problems to consider. Figure 3 shows the live coding group Reggaetron performing at an Algorave. [5] An algorave is a live coding event inspired by raves. At an algorave, attendees dance, party, drink, etc., to the sound and image of algorithmic music being coded live. The photo depicts performers, the performance, and the crowd. And importantly – the process: live coding. We can't experience the process directly because it's the artists' creative process. We experience its representation – its documentation – in what we see on screen and what we hear. At the performance, we experience this representation in real time as the performer creates it. In documentation, it's past tense.



Figure 3 - RGGTRN at International Conference on Live Coding, 2017. Image courtesy RGGTRN. Credit: Tatiana Durán.

But the crowd is important in the photo too; it suggests all that the image can't communicate. What about the event? The social interaction? The Happening? The Rave? You can try to take crowd video that captures the energy. But the Happening can only be represented – in the form of images and sound.

Live algorithmic performance doesn't just refer to live human performers, however. Algorithms are processes, which, once launched by their human creators, can continue to perform over time indefinitely. For example, in my recent project, "What the Robot Saw," algorithms continually curate newly uploaded videos from YouTube that have very few subscribers or views. [6] These are videos that search and recommendation algorithms often render invisible – so they might be seen only by online robots. Algorithms then edit, crop and sequence the curated videos into a collaged, livestreamed film. When human speakers (aka "talking heads") appear onscreen, "What the Robot Saw" labels them using Amazon Rekognition's marketing-oriented, neural net-based face analysis algorithms, which aim to determine demographic and emotion data.



Figure 4 - Still from "What the Robot Saw," 2020

The resulting algorithmic stream runs endlessly, and it's always in the moment. It's an endless performance: the algorithms are the performers. What to do about archiving that? You can document segments, but as with the Multi-Cultural Recycler, they are just snapshots in time. But performance – especially with time-sensitive elements like recent videos – is always in the moment. Archives will always be representations of an ever-receding past.

How can we think about this? Let's look to the past for guidance. Liquid light shows were a type of visual performance that mainly took place in the late 1960s. These were mixed media projections that were performed at concerts and other events. The events sometimes tied in with LSD experimentation and other deliberate attempts at conscious altering experiences. Light show ensembles projected combinations of films, slides, strobing colored gels, and colored oils onto the screen.

The Los Angeles light show ensemble, Single Wing Turquoise Bird were known for their intensely collaborative, multilayered projections. A high level of improvisational, intuitive collaboration between members was necessary for the individual performers to create a cohesive whole with one another's projections and with the music. The ensemble performed at a range of events from rock concerts to collaborations with avant-garde musicians.

### Always Only Once

Some of the writing from the time of Single Wing Turquoise Bird's performances can be useful toward thinking about current questions of performance preservation. Gene Youngblood wrote in his 1970 book, *Expanded Cinema*: "Unlike other light artists, The Single Wing Turquoise Bird has no definite program; each presentation evolves from the interacting egos of the group working in harmony. What we see cannot be called a work of art as traditionally conceived: a unique, perishable, nonreplaceable entity reflecting the talents of an individual. They don't produce an object in the sense that a movie is an object; they produce software, not hardware." [7]

Film historian William Moritz reviewed one of the group's performances in 1969 for Los Angeles's *Weekly Planet*. After describing the various visual elements of the show, Moritz, adopting a Gertrude Stein-like syntax, wrote: "These words are not telling it all because it is a 1960s thing and most English words are a 14th or 16th century thing and if Single Wing Turquoise Bird could be writing it they would be writing it, but they are showing it and always only once because Friday January 17, 1969 was not like Saturday January 18, 1969, even though many things about them seemed to be being the same and if you did not see Friday January 17, 1969 when it happened you will not have a chance now because it was living not writing and this is just writing you are doing now...." [8]

Moritz's "always only once" might be a good approach to how we think about archiving of contemporary media performance as well. The "happening" can be represented and documented, but never really archived or preserved. And from a practical perspective, it can be quite difficult to capture good sound and image in a live audiovisual performance setting with the type of inexpensive setup available to most non-commercial performing artists. It might be tempting to give up. But the problem is, historicization depends on documentation.

Single Wing Turquoise Bird was a real light show. But the images (Figures 5 and 6) are from a Hollywood film. In the late 1960's, Hollywood director James Bridges attended some of Single Wing Turquoise Bird's performances, having learned about the ensemble from the painter Sam Francis, who was a patron of the ensemble. [9] When Bridges co-wrote and directed the 1970 feature, "The Baby Maker," he included a scene that takes place at a light show, with Single Wing Turquoise Bird performing and appearing as the light show ensemble.



Figure 5 - Still from Single Wing Turquoise Bird performance in the 1970 National General Pictures film, *The Baby Maker*. Photo courtesy Michael Scroggins.

Creating film documentation of their visual performance was impossible for Single Wing Turquoise Bird themselves. Pointing an available 1960s movie camera at a projection screen would not have produced a satisfactory result. For "The Baby Maker," the movie production company worked with the light show members to shoot and composite layers of their performance, producing a high-quality clip that was inserted into the film. Since the ensemble appears in the film performing their visuals, the scene in which they appear also serves as documentation of the performance itself, albeit fictionalized.



Figure 6 - Still from Single Wing Turquoise Bird performance in the 1970 National General Pictures film, *The Baby Maker*. Photo courtesy Michael Scroggins.

Single Wing Turquoise Bird were a highly regarded light show that received significant critical attention during the period they were active. But they are also one of the few 60s light shows for which there is adequate documentation for historians to view and analyze. This has likely helped them to become better historicized over the years than some of their peer light shows who lack strong documentation.

The existence of Single Wing Turquoise Bird's documentation is due in part to luck. Although they were clearly a prominent light show, they were also in the right place – Los Angeles – at the right time and with the right connections to appear in a film. But we also understand that the film is just documentation at best. As Youngblood and Moritz's texts point out, the light shows were "always only once" and could never be preserved. Anything performative never can be.

Sixties light shows were a form of "expanded cinema," a term coined in 1966 by the American experimental filmmaker Stan VanDerBeek. Gene Youngblood went on to make the term "expanded cinema" famous in 1970 with his book by the same name, which I have mentioned previously. Youngblood's book, which was influential in establishing the field of media arts, proposed that cinema had expanded beyond film to incorporate television, video art and computer art.

Despite the term's 1960s origins, broad views of expanded cinema can encompass earlier forms of non-

narrative moving image, often invented by independent artists, inventors, and tinkerers. Contemporary practices we've been discussing, like live coding, live audiovisual performance, and algorithmically generated cinema can also be considered expanded cinema performative practices.

Now that we've looked at some of the issues around documenting 1960s liquid light shows, let's consider some even earlier cases of expanded cinema performance documentation practices. Histories of modern visual performance often begin with the color organ. Color organs comprise a broad category of visual instruments that have taken various forms. However, most involve some sort of a machine that is designed to be performed with a keyboard, but which produces colored light instead of pitched musical sounds.

Credit for the first color organ usually goes to Father Louis-Bertrand Castel's 1700s invention, the ocular harpsichord, which generated colored light using candles. Various color organs were developed over the next two hundred years, but development became more active in the early 1900s when access to electricity became more widespread.

One twentieth century color organ inventor was Mary Hallock Greenewalt. Greenewalt was born in Syria but moved to the US as a child, where she lived most of her life in Philadelphia. Greenewalt trained as a classical pianist, then decided to devote herself to development of the art of performing colored light. Greenewalt named the performance instruments she invented – the color organs



Figure 7 - Mary Hallock Greenewalt, half-length portrait, at electric light "color organ", which she invented, 1925, Underwood & Underwood. Library of Congress, Prints & Photographs Division, LC-USZ62-93477.

<sup>2</sup> After World War II, Wilfred developed several larger, self-playing Lumia systems as museum and commercial commissions. Yale University Art Gallery restored several of these for a 2017

themselves – “Sarabet,” after her mother. She called the art of color light play that she was developing, “Nourathar.”

Greenewalt's contemporary and rival color organ developer Thomas Wilfred was born in Denmark and spent most of his life in New York City. Like Greenewalt, he gave the art of color-light performance he developed a name distinct from that of his color organ inventions. He referred to his color organ as the “Clavilux,” and he referred to the art of color light play that he developed as “Lumia.”

Wilfred has been better historicized over the years than Greenewalt. Although Greenewalt's work has received increased attention in the past few years, up until recently it was difficult to find much written about her work at all. Although both Greenewalt and Wilfred presented and performed publicly, Wilfred has been cited within visual performance histories far more consistently than Greenewalt.

Wilfred received attention from the contemporary art world during his lifetime, which Greenewalt did not. As a result, Wilfred received more substantive press attention than Greenewalt, who was typically treated as a novelty performer in press reviews. So, it is easy to see why Wilfred's work would be treated differently by historians. But it is difficult to discern how much of the difference in their access to performance venues and critical attention during their lifetimes derived from their work vs. personal attributes like gender and demeanor.

There may be another factor that facilitates discussion of Wilfred's work by a larger number of contemporary historians. Like Single Wing Turquoise Bird, Wilfred's work benefits from fortuitous documentation beyond what would have ordinarily been available at the time. Wilfred, Greenewalt, and most other color organ inventors continually tried to figure out ways to make a living from their work. Wilfred had tried both exhibiting his Clavilux in the art world and performing it in the music world. Eventually, he had an idea to develop a home version of Clavilux he could sell to consumers. This version would play automatically, rather than having need for a performer. Wilfred called this system the Clavilux Junior.

The Clavilux Junior operated through the use of hand painted glass records, each with an opus number. Light was projected through the records, reflected off various surfaces within the machine, and eventually projected onto the screen. The user could use the keyboard to make various adjustments to the light as the records played.

There are several Clavilux Juniors known to still be extant, mostly in private collections. Those that are operational can play their glass records, so the units can be exhibited as video sculptures in contemporary exhibitions.<sup>2</sup> In addition, their screens can be recorded with modern video

exhibition. Yale has produced high quality video documentation of the output of these later systems. As with Clavilux Junior documentation, the Yale documentation is available online. [12]

equipment. So, Wilfred’s original 1930’s time-based light works are now documented in contemporary high-definition video.

Operating the Clavilux Junior machine ninety years later recreates the original “algorithmic” performance, rather than merely representing it. The marks painted on the glass disks function as executable software code that generates time-based visuals – and the software can still be run. So, we find ourselves able to view contemporary high-definition video documentation of generative work from the 1930s. Doing so feels like time travel.



Figure 8 - *Thomas Wilfred at Clavilux Keyboard*, ca.1930. Image: Thomas Wilfred Papers (MS 1375). Manuscripts and Archives, Yale University Library.

Clearly, the success of this approach emanates from the fact that Clavilux Junior was a self-contained hardware system that was produced in some quantity and distributed to people in various geographic locations, providing redundancy against loss or damage of individual units. That said, Clavilux Junior’s painted records are essentially rare software disks recorded on very fragile media: it’s fortunate that a number of the glass records have survived. In any case, Clavilux Junior shows us the advantages of keeping our eyes open to the possibility of time travel.

There’s comparatively little visual documentation of Mary Hallock Greenewalt’s Sarabet output. I am not aware of an extant, functioning Sarabet that can generate the work, and there’s also little photographic documentation from the time. But there is a great deal of documentation of Greenewalt’s process. She gave lectures and performances,

and those were reviewed in newspapers. But she also did an extensive amount of self-archiving. As her papers reveal, during her career she continually seemed to feel she was not receiving the credit she deserved for her inventions. Apparently for this reason, she saved and often annotated a vast quantity of materials documenting and discussing her work. She continued this self-archiving over the course of her career. In 1936, she began donating the materials from her archive to the Historical Society of Pennsylvania. She continued these donations until 1949, a year before her death. [10]

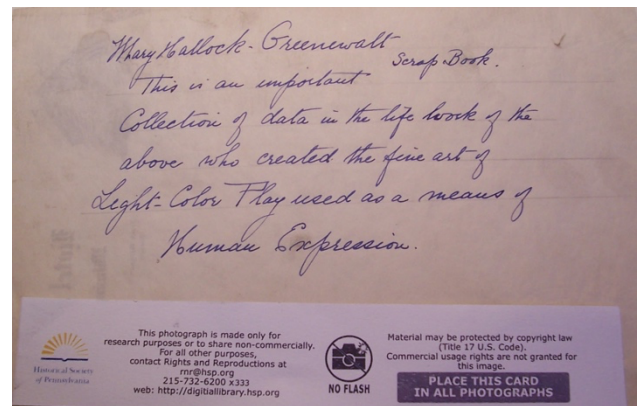


Figure 9 - Handwritten note, Mary Hallock Greenewalt, *Mary Elizabeth Hallock Greenewalt papers* [0867]. Describes a scrapbook within her archives. Photo by the author. Reproduced with permission from the Historical Society of Pennsylvania.

The Historical Society of Philadelphia’s *Mary Hallock Greenewalt papers* collection contains thirty-five boxes, which the public can request to review a few boxes at a time. The boxes contain thousands of pieces of paper that historicize Greenewalt’s practice and research: newspaper press clippings, technical diagrams, lecture notes, jotted ideas, letters to vendors, notes from the many times she challenged what she felt were infringements on her intellectual property. While being able to operate and document Wilfred’s Clavilux Junior has value, there is something in the vastness of Mary Hallock Greenewalt’s archive – the obsessive performance of self-archiving – that archives Hallock Greenewalt’s work in a way no machine, nor film of a performance, could do.

That Greenewalt’s archive is preserved at Historical Society of Pennsylvania is no doubt fortunate; one guesses that the materials likely would have otherwise been destroyed. But with the archive housed in boxes in Philadelphia, the materials are invisible to most of the world. So, over the past several years, I’ve been endeavoring to make them more visible. I periodically travel to Philadelphia and photograph as many items in the Historical Society archive as possible. I then post the images in a public online archive I call the Mary Hallock Greenewalt Visibility

Project. [11] The visibility project itself is in some ways performative: the posting of the multitude of images mirrors Greenewalt's performative, almost compulsive compilation of the vast archive that documents her process in a way she knew nobody else would.

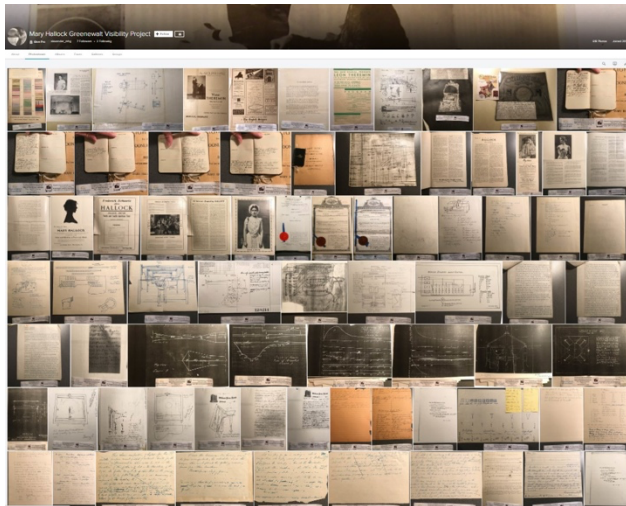


Figure 10 - Partial screenshot of Flickr "Photostream" view of Mary Hallock Greenewalt Visibility Project website.

Part of my process involves displaying lengthy streams of unlabeled images, to document the extensiveness and eclectic nature of Greenewalt's archive. But I also organize the items using keyword tags, so that the public can discover new connections and networks between the many disparate items in the archive. My database is very crude and incomplete; it is limited by time and resources. But the act of producing an online archive of scrap clippings compiled by an artist who died in 1950 always feels to me like another act of time travel. As with Wilfred's *Clavilux Junior*, I think it's always useful to look for these less obvious opportunities to connect preservation and historicization of the present to the work of the past.

### Lessons of the Past

What might we learn from these past expanded cinema practices that can be useful in thinking about archiving of process-based computational work?

#### "Always only once."

Although a half century of consumer recording technology might confuse us into thinking otherwise, reflecting on William Moritz's description of the unrecordable, performative and social energy of Single Wing Turquoise Bird's events should give us some clarity. We can consider the failures of adequately preserving processes,

performance and happenings a success.

#### **But don't let the "always only once" paradox of preservation stop us from documenting and historicizing.**

We can consider how alternate forms of documentation and archiving can function to represent practices for which the process is more important than the display.

#### **Alternate approaches can be especially important in increasing visibility of historical and contemporary practices that might otherwise be overlooked.**

Considering how visibility impacts history, we can try to think proactively – and retroactively – about how we can make hidden histories more publicly visible. Are/were groups underrepresented within their practices also underrepresented in access to traditional forms of documentation and archiving?

#### **We can consider an artist's attempts to historicize their practice as an archived work in itself.**

The performance of archiving may be as significant as the archive that's created. Broadening our thinking about what constitutes an archive, as well as ambiguity between practice and archive, can allow us to broaden our recording and understanding of the histories with which we engage. Always look for opportunities for time travel.

### References

- [1] Olia Lialina, "My Boyfriend Came Back from the War," 1996, accessed January 16, 2022, <http://www.teleportacia.org/war/>.
- [2] Amy Alexander, "The Multi Cultural Recycler" (documentation website), accessed January 16, 2022, <https://amy-alexander.com/projects/internet-art/the-multi-cultural-recycler.html>.
- [3] Kit Galloway and Sherrie Rabinowitz, "Hole-In-Space, 1980," accessed January 16, 2022, <http://www.ecafe.com/getty/HIS/index.html>.
- [4] Kirstie Beaven, "Performance Art: The Happening," *Tate*, accessed January 16, 2022, <https://www.tate.org.uk/art/art-terms/h/happening/happening>.

- [5] RGGTRN, "RGGTRN," accessed January 16, 2022, <https://rggtrn.github.io/indexES.html>.
- [6] Amy Alexander, "What the Robot Saw," 2020, accessed January 16, 2022, <https://what-the-robot-saw.com>.
- [7] Gene Youngblood, *Expanded Cinema* (New York: Dutton, 1970), 394.
- [8] David James, "Expanded Cinema in Los Angeles: The Single Wing Turquoise Bird," *Millenium Film Journal*, vol. 9, no. 31, (2005): 19.
- [9] Michael Scroggins (Single Wing Turquoise Bird member), Email to author, March 7, 2021.
- [10] Historical Society of Pennsylvania Archives Department. Email to author, March 30, 2022.
- [11] Amy Alexander, "The Mary Hallock Greenewalt Visibility Project," accessed January 16, 2022, [https://www.flickr.com/photos/alexander\\_research/](https://www.flickr.com/photos/alexander_research/).
- [12] Mike Cummings, "Installation That Once Enchanted MoMA Guests Resurrected at Yale's 'Lumia' Exhibit," *Yale News*, 2017, accessed January 16, 2022, <https://news.yale.edu/2017/03/10/installation-once-enchanted-moma-guests-resurrected-yale-s-lumia-exhibit>.
- Galloway, Kit and Sherrie Rabinowitz. *Hole-In-Space, 1980*, accessed January 16, 2022, <http://www.ecafe.com/getty/HIS/index.html>.
- Greenewalt, Mary Elizabeth Hallock. *Mary Elizabeth Hallock Greenewalt papers*. Manuscript/Mixed Material. Held at Historical Society of Pennsylvania.
- Historical Society of Pennsylvania Archives Department. March 30, 2022. *Email to author*.
- James, David. 2005. "Expanded Cinema in Los Angeles: The Single Wing Turquoise Bird," *Millenium Film Journal* 9 (31): 19.
- Lialina, Olia. 1996. *My Boyfriend Came Back from the War*, accessed January 16, 2022, <http://www.teleportacia.org/war/>.
- Moritz, William. 1969. "A Weekend in L.A." *Weekly Planet (Los Angeles)*, January 24: 4-5.
- RGGTRN. *RGGTRN*, accessed January 16, 2022, <https://rggtrn.github.io/indexES.html>.
- Scroggins, Michael. March 7, 2021. *Email to author*.
- Underwood & Underwood, 1925. *Mary Hallock Greenewalt, half-length portrait, at electric light "color organ", which she invented*, accessed January 16, 2022, <https://www.loc.gov/item/93511221/>.
- Wilfred, Thomas, 1889-1968. Undated. *Home model*, Box 10, folder 144, accessed March 29, 2022, <https://collections.library.yale.edu/catalog/10015230>.
- Youngblood, Gene. 1970. *Expanded Cinema*. New York: Dutton.

## Bibliography

- Alexander, Amy. *The Mary Hallock Greenewalt Visibility Project*, accessed January 16, 2022, [https://www.flickr.com/photos/alexander\\_research/](https://www.flickr.com/photos/alexander_research/).
- Alexander, Amy. *The Multi Cultural Recycler (documentation website)*, accessed January 16, 2022, <https://amy-alexander.com/projects/internet-art/the-multi-cultural-recycler.html>.
- Alexander, Amy. 2020, *What the Robot Saw*, accessed January 16, 2022, <https://what-the-robot-saw.com>.
- Beaven, Kirstie. "Performance Art: The Happening," *Tate*, accessed January 16, 2022, <https://www.tate.org.uk/art/art-terms/h/happening/happening>.
- Cummings, Mike. "Installation That Once Enchanted MoMA Guests Resurrected at Yale's 'Lumia' Exhibit," *YaleNews*, 2017, accessed January 16, 2022, <https://news.yale.edu/2017/03/10/installation-once-enchanted-moma-guests-resurrected-yale-s-lumia-exhibit>.

## Author Biography

Amy Alexander has been making computational art projects since the 1990s. She is a Professor of Computing in the Arts in the Visual Arts Department at UC San Diego. Alexander has worked in performance art, installation, software, and online media, generally employing custom software to generate real-time video that reflects on cultural issues. She has written and lectured on topics including software art, historical and contemporary audiovisual performance, algorithmic bias and algorithmic determinism, and media preservation. She has served as a reviewer for festivals and commissions for new media art and computer music.

Alexander's projects have been performed and exhibited at venues ranging from The Whitney Museum, Prix Ars Electronica, Transmediale, SIGGRAPH, ISEA, NIME, and the New Museum to club performances at Sonar (Barcelona), First Avenue (Minneapolis) and Melkweg (Amsterdam). She has also performed on the streets of Los Angeles, San Diego, San Jose, Zürich, and Aberdeen, Scotland.