**Judy Malloy:**

# Data and Process in Information-Centered Creative Practice

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## Introduction

*"Collected information informs not only by its specific content but also by the cultural meaning it conveys as a whole"* – Judy Malloy (1988)

As writers and artists explore the uses of data in contemporary creative practice, the ways in which they use data to create information art are increasingly significant. Noting that "online data are bound to be essential to our ability to fully understand twenty-first century society, " Filippo Trevisan suggests that search engines should be regarded not only as central objects of research, but also as fundamental tools for broader social inquiry" (2014).

The enormous amount of information now available on the internet has engendered uses of information by artists, who previously did not have access to professional sources of data. For instance, Canadian artist Nancy Paterson observed about her *Stock Market Skirt*: "The concept of controlling the length of a woman's dress by referencing stock market quotes in real time could only be put into practice as the Internet evolved to supply data I could access" (Malloy 2017).

The impact not only of availability of data but also of data visualization methods is emphasized by Franco Moretti and Oleg Sobchuk in a survey paper that explores 60 studies that have shaped digital humanities practice (2018). Taking a lead from their paper, but with a focus on uses of information in creative art practice, this information dense creative practice review paper explores the uses of information by artists and by writers of electronic literature, whose approaches to the use of information and data differ, yet in this evolving field build on or react to the work of their colleagues.



Hans Haacke: "News"
"As the printer groans and stutters, long loops of paper gather on the gallery floor..." @parisreview
theparisreview.org/blog/2018/03/2...
work created: 1969; @SFMOMA Exhibition: 2018 #InformationArt

theparisreview.org
News as Art in 2018
Hans Haacke's art installation 'News,' a telex machine that prints news from wires in real time, was revolutionary when it was first shown in …

Historically, in 1969, there was a play between Douglas Huebler's statement that "The world is full of objects, more or less interesting; I do not wish to add any more. I prefer, simply, to state the existence of things in terms of time and/or place" and Hans Haacke's first version of *The News* in which from a teletype on a table, pages continuously emerged and gathered in an unruly heap on the floor (Haigney 2018).

There was also a play between different ways of using process in work where

information was at the core.   For instance, in Japanese artist On Kawara's
*I Got Up*, the process of creating and sending information – in this case postcards to friends -- was at the core of the work (1968-1979). In Black artist Adrian Piper's *Calling Card (I am black),*  a process in which the artist created a series of cards she handed to people who made racist remarks in her vicinity was at the core of her work. (1986).
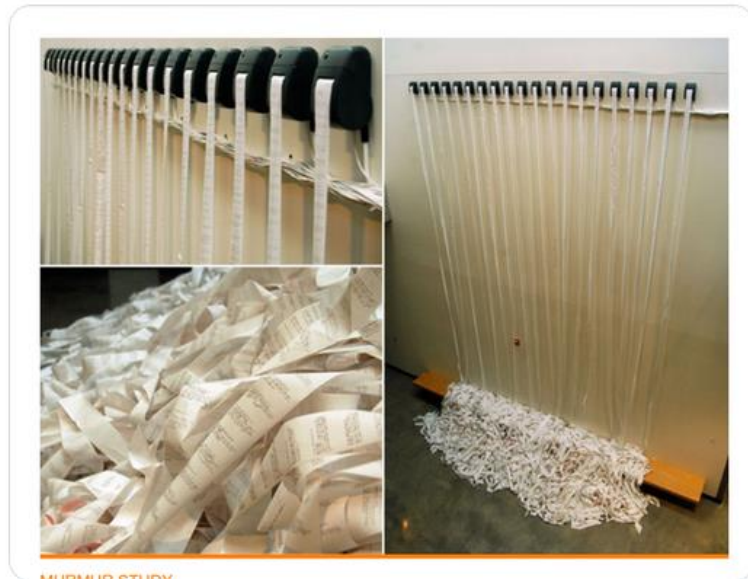


Christopher Baker and  Márton András Juhász:
"Murmur Study", Kitchen Budapest, 2010
Emerging from 30 thermal printers,   printed status updates from Twitter contained variations on emotional utterances, such as argh, meh or grrr.
christopherbaker.net/projects/murmu...
#InformationArt

In the 21st century, diverse approaches to the uses of information and data are reflected in the differences between the research and coding in the creation of  a sculptural object using data in Nathalie Miebach's *Boston Tides* (reed, wood, and data);  in the contemporary echo of Hans Haacke's *News* in Chris Baker's *Murmur Study* in which emerging from 30 thermal printers, status updates from Twitter contained variations on emotional utterances (Baker 2010); and in Maria Mencia's data and screen-based portrayal of the port of Hamburg, *Gateway to the World* (Mencia 2016).

With this in mind, from a creative practice point of view,  four sections in this paper address different aspects of information art:

1. When Documentation is Itself the art
2. The Role of Process
3, The Role of Research and Archives
4. The Role of Data in Shaping Objects and Texts

A concluding section addresses issues with using online data.

The focus is primarily on works of art and electronic literature. Contingencies with the Digital Humanities are covered by Dene Grigar and James O'Sullivan in their Bloomsbury Press Book, *Electronic Literature as Digital Humanities* (2021).


## When Documentation Itself is the Art

*"Because the work is beyond direct perceptual experience, awareness of the work depends on a system of documentation."* - Douglas Huebler (1969)

In contemporary conceptual art, performance art, and art and technology fields, documentation that explains the concept of works and how they are created is routinely solicited by academics and curators.  But, "As artists generated more material production around the idea or event seemingly at the core of their project -- process frequently supplanting finished product -- it became less and less clear where and when the artwork stopped, and documentation of art began" (Berger and Santone 2016).

For example, in 1962, when Robert Rauschenberg forgot to make a work for the opening of Iris Clerts new gallery in Paris, he sent instead a Telegram stating "THIS IS A PORTRAIT OF IRIS CLERT IF I SAY SO ROBERT RAUSCHENBERG".  His telegram was included in the exhibition.

 For example, John Baldessari's *Painting for Kubler*, June 1969,  exhibited in the *Software - Information Technology* exhibition, curated by Jack Burnham at the Jewish Museum, consisted of a neutral background on which words that began "PAINTING OWES ITS EXISTENCE TO PRIOR PAINTINGS" were painted in black (Burnham 1971).

Work that used documentation not as museum-originated texts but as an artist-initiated part of a work itself is elegantly illustrated by Joseph Kosuth's  *One and Three chairs*. This work was created with three parts 1. An actual chair, 2. a photograph of the chair, and 3. a plaque that contained a dictionary entry for the word "chair" (1965).

About 10 years later in 1974, for *Sculpture in Three Parts*, at Hansen Fuller Gallery,  Chris Burden sat on a stool atop a sculpture pedestal to which was affixed this documentation: "I will sit on this chair from 10:30 AM 1974 until I fall off."  While photographers waited in shifts, Burden stayed on the chair for 43 hours before he fell off. A chalk outline was drawn around his body.  Then, he replaced the existing documentation on the pedestal with these words:   "I sat on this chair from 10:30 AM 1974 until  I fell off at 5:25 AM on 9/12/74" (Loeffler and Tong 1980 102).

In the 20th century,  sometimes code itself or flowcharts served as documentation for computer-mediated  art.   For example, *Cybernetic Serendipity*, the exhibition that Jasia *Reichardt* curated at the London-based Institute of Contemporary Arts, included flowcharts and excepts from code – notably the flow chart for Nani Balestrini's *Tape Mark I*  (1968 53- 62).

And, although commented code is seldom if never gallery exhibited, in the 2018 iteration of Creative Code Studies, the working commented code for the Apollo 11 Guidance Computer code written under the direction of Margaret Hamilton, was discussed because it itself was of cultural interest (Malloy 2018).

In the 21st Century, code for works of electronic literature is often too complex to be viable in an art space exhibition.  But, at some time in the future, It would be of interest to create an

exhibition of algorithms or flow charts  that underlie code for electronic literature along with the running works themselves.


## The Role of Process

*"I'm telling you it's good to be sitting just near the ball that rolls on asphalt without leaving any traces -  this is hd pen : an high-density pen in order not to write in miniature on the map but to draw signs directly on the territory, hd pen is the instrument cartographers of the Middle Empire would have liked to have…"* -- Luc Dall'Armellina (2014)

This section of "Data and Process in Information-centered Creative Practice" explores process -- not as the school sometimes called  Process Art (in which the work of Jackson Pollack played a defining part) but with information-based work -- that ranges from Robert Filliou's *The Frozen Exhibition* to Leonardo Flore's "it's complicated".
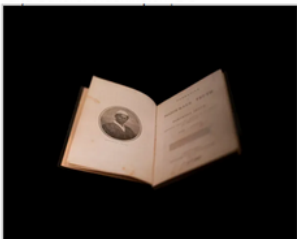
Wendel White
Manifest, 2015-
"I also intend the viewer to consider this informal reliquary as a  survey of the impulse and motivation to preserve history, memory and to  imbue the remnants of material culture with power" wendelwhite.com/projects /manif... #InformationArt @wendel_white
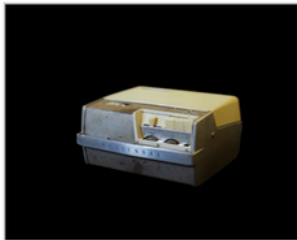
Tape recorder, Malcolm X, Smithsonian National Museum of African American History and Culture. Washington, DC

Zora Neale Hurston, Eyes Were Watching God Manuscript, Beinecke Library, Yale University.

Narrative of Sojourner Truth, Rubenstein Library, Duke University, NC

Drum, Dan Desdunes Band, Great Plains Black History Museum, Omaha, NE

Images from **Wendel White: Manifest**

Process is evident in photography-based series of works, such as Wendel White's *Manifest*, for which in public collections throughout the US he sought and photographed  documents, books, and objects  that conveyed African American history --  such as  Zora  Neal Hurston's sketch book (at a University of Florida Library) and Malcom X's typewriter (at the Smithsonian). *Manifest* could also be looked at in terms of the research that White undertook in order to create a meaningful series of photographs (White 2015).

Process is also evident in work such as Qiu Zhijie's 1990–95  *Writing the "Orchid Pavilion Preface" One Thousand Times,*  where information – in this case a canonic Chinese text -- is written over and over on the same sheet of paper – and the resultant work, in conjunction with video-taped documentation of the writing, conveys the way in which such texts integrate with and permeate lives, and in the process become a part of a nation's culture (Solomon R. Guggenheim Museum 2017).

It should be noted that works, such as Nathalie Miebach's *Boston Tides*, created by using data patterns collected at Boston Harbor, could also be looked in terms of process. However, since *Boston Tides* is clearly an object, it is also of interest as regards the role of data in shaping the form of objects and texts -- where, in this paper, Miebach's work is discussed. Categories in the arts are obviously to a certain extent imposed,

Five works in which process is integral are set forth below: Robert Filliou's *The Frozen Exhibition*; On Kawara's *I Got Up;* Cecile Le Prado's *The Triangle of Uncertainty*; Tiffany Holmes*' Fishbowl* ; and Luc Dall'Armellina's *HD pen.* They are joined by works -- by Nick Montfort, Allison Parrish, and Leonardo Flores -- that explore the role of process in generative electronic literature.

Robert Filliou
The Frozen Exhibition, 1962-1972
"The bowler hat containing the artworks was put inside a freezer bag...at the end of which time the bag would be opened and the artworks defrosted ..."



French Fluxus artist Robert Filliou was in the habit of walking the streets of Paris with a small collection of photographs and information, which he called a legitimate gallery and which he kept under his hat. Exploring the passing of time in an environment of changing art practice. in 1962 Filliou invited a group of artists. including Ben Vautier and Emmett Williams, to contribute small works of art, and documents that would be put into a bowler hat-shaped felt envelope, bagged in plastic, and then be frozen. After ten years had passed, the work would be exhibited.

Although not surprisingly along the way, something happened to some of this work, a version was defrosted and presented under the title *The Frozen Exhibition, Oct. 23, 1962-Oct. 22, 1972*. Additionally, 172 multiples of the hat and its contents were created. (Jean Brown papers). Primary in this work was the process of freezing art and art information in time, andthe issues that arose from this process – such as the difference that ten years could make in how works of art were considered and the impact of time in the meaning of information.

In 1968, On Kawara began what would be a ten year process. Every day, he sent different friends or colleagues a picture postcard. Each card was stamped with the time he got up that day. In this work, the information was created both by the artist himself and by the image on the postcards, most of which were of places in New York City and other cities where he walked. The process itself was core to the creation of a body of work that was not in one place but rather was composed with imagery and text that ultimately were in the hands of many people. Indeed, no one person or institution owns the complete "I Got Up" body of work. "With tremendous economy of means and a surprising visual elegance, Kawara creates a complex meditation on time, existence, and the relationship between art and life" (Metropolitan Museum of Art).
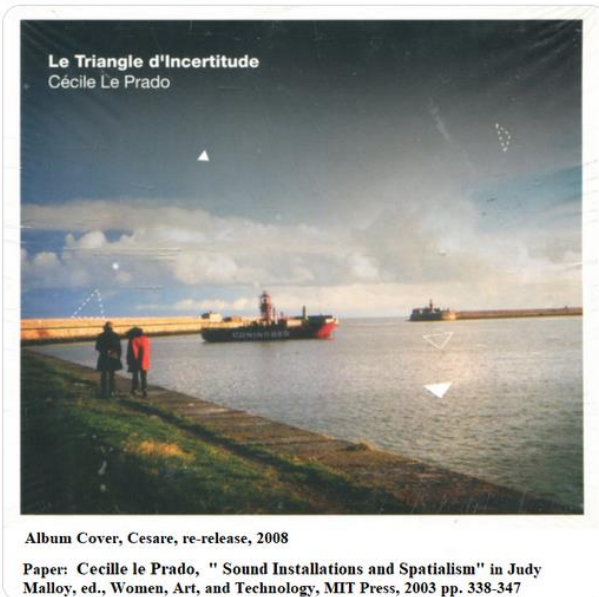
In 1996, French composer Cecile Le Prado composed *The Triangle of Uncertainty* . In her words: "This installation project is concerned with constructing a triangle of uncertainty in a fictive, virtual space on the basis of sound recordings made at the following locations -- the

Album Cover, Cesare, re-release, 2008

Paper: Cecille le Prado, " Sound Installations and Spatialism" in Judy Malloy, ed., Women, Art, and Technology, MIT Press, 2003 pp. 338-347

southern tip of Ireland (Fastnet Rock), the western edge of France (Brittany), and the westernmost point of Spain (Cap Finisterre, Galicia). In essence, the installation refers to the position of sound in space, constantly chopping and changing between orientation and uncertainty" (Le Prado 2003 343).

The process of sampling environmental sounds --  a foghorn, the whistle of a buoy, water gushing through a hole in a pier, overheard voices  -- was important as regards how -- for an ancient navigation technique that involved the use of landscape objects -- Le Prado substituted sound.  An additional factor was how this work was exhibited as an installation in which the placement of the speakers was an important part of the environment.

A different approach to mapping and navigation was explored when on his Harley Davidson motorcycle, Luc Dall'Armellina mapped voyages from places, such as his home in Montreal.  In this work, he sought to augment the process of annotating maps with pen in order

to draw without traces on the territory itself. *HD Pen* resulted in text that appeared in a video above the image of the bike moving on the territory itself. In his words: "This motorized sign-writing journey is showed by video, enriched by the background reading of a text discussing Jorge Luis Borgès' « On Exactitude Of Science » …In this text Borgès uses the tale genre to reflect on the relation between maps and the territories they represent…" (Dall'Armellina 2014).

Artists have also used process to echo contemporary surveillance environments. For instance, creating surveillance in an expected situation, and in the process asking questions about surveillance in public situations, Tiffany Holmes created a fish tank in which goldfish swam in a laptop controlled environment. In her words: "In Fishbowl, the goldfish controls the video data generated by four submersible surveillance cameras through its proximity to a particular camera" (2005). As data was displayed in four panels, (one for each camera), an archive of the videos was collected.

**Process in the creation of generative literature**

Process plays a core role in generative literature – when that term means that content is aleatorily generated from a database, and in a code-specified process, different variables are identified and displayed. In this historic process of random number generator and database content, unpredictable results are surprisingly informative. Three examples of generative literature conclude the process section of this paper: *Autopia* by Nick Montfort; Allison Parrish's *The Ephemerides*; and Leonardo Flores' contemporary-issue-addressing "It's Complicated".

Nick Montfort's *Autopia* is a text generator that on a racecourse-like track grid continuously and randomly displays sentences made from the names of automobiles. For example:

AZURE MOUNTAINEERS RALLY;
 FORESTERS PROBE SMART AVIATORS;
PHANTOM EXPLORER FOCUSES;
 HOMBRES ESCORT SUBURBAN AVIATOR.

 About his process, Montfort observes that " The automobile naming process may be more mysterious and opaque, but I would suggest that systems such as *Autopia*, as well as more conventional types of research and writing, can help us understand this non-human naming process, and its engagement with culture, as well" (2021) .

Contingently, Allison Parrish's, *The Ephemerides* is a Twitter and Tumbler bot that combines a randomly selected image from NASA's OPUS database, a repository of data from outer planet probes. and posts it to Twitter, accompanied by a computer-generated poem in which text is randomly displayed.
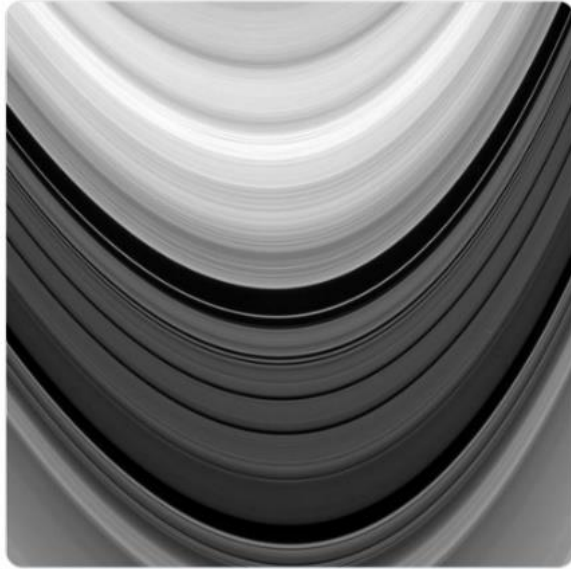
The text comes from two sources: *Astrology* by Sepharial and *The Ocean And Its Wonders* by R. M. Ballantyne.

And because the process combines two sets of data; results wildly unexpected:

"They ravaged to the shingly beach. The sea will redescend their own characteristics of generally very high million" (Parish 2019).

"It's Complicated" by Leonardo Flores is in his words "inspired by a lifetime of considering and debating the issue of Puerto Rico's status in relation to the United States and triggered by the recent Puerto Rico Status Act, which seeks 'to resolve Puerto Rico's political status' with a plebiscite that offers 'eligible voters a choice of independence, sovereignty in free association with the United States, or statehood'" (Flores 2023).

Now published by the *Los Angeles Review*, this bot itself has gone through a series of versions on Twitter and on Mastodon, as well as publication in *Taper*.

The *Los Angeles Review* version, of "It's Complicated" builds on both bot and *Taper* versions. Each generation takes 15 seconds to unfold: each emoji represents a hypothetical Puerto Rican, and in addition to the issue of statehood or not statehood, the issue of raising these questions is also discussed. Although the database clearly contains many examples, in the process, if the viewer runs it for a while, how what is generated impacts viewer understanding of this issue can vary substantially. Notably, in his documentation for this work, Flores invites readers to view the source code and explore how the code itself reveals his approach to the future of Puerto Rico.

## The Role of Research and Archives

*"With increasing aggressiveness one of the artist's functions I believe is to specify how technology uses us"* -- Jack Burnham (1969 55)

*"Scientific and technical research should be viewed more broadly than in the past: not only as specialized technical inquiry, but as cultural creativity and commentary, much like art. It can be appreciated for its imaginative reach, as well as in disciplinary or utilitarian purposes. Like art it can be profitably analyzed for its subtext, its association to more general cultural force, and its implications as well as its surface rationales."* - Stephen Wilson (2003 3)

As Burnham and Wilson's different approaches in different eras indicate, when art and technology began to seep more thoroughly into art practice, many artists were entranced by the potential of uses of technology (Kac, 2019). Thirty five years after Jack Burnham wrote "Systems Esthetics", in his MIT Press book *Information Arts*, Stephen Wilson explored information art as art that not only utilized information but also was research-based and was produced with some form of technology.

"Data and Process in Information-centered Creative Practice" does not attempt to so radically define information art, but in this section, it focuses on art where the research itself is prominent in the resultant work of art. Five artists and their work are included in this section: Judy Malloy's OK Research series; Antoni Muntadas: *The File Room;* Tim Collins, Reiko Goto, Bob Bingham, and team's *Nine Mile Run*; JR Carpenter's: *The Gathering Cloud,* and Maria Mencia's *Gateway to the World* and *Winnipeg, el barco de la Esperanza.*



Judy Malloy
OK Research, 1980-1981
"... I collected over 1,000 pieces of information by contacting scientific equipment vendors, visiting companies in Silicon Valley, going to trade shows and consulting technical libraries..."
muse.jhu.edu/article/600773
#InformationArt

Judy Malloy, Technical Information, Site, San Francisco, March, 1981
`Installation was partially funded by the NEA

Beginning in 1981, using a performative identity role as President of OK Research, I (Judy Malloy) collected hundreds of pieces of information. The process involved contacting scientific equipment vendors, visiting companies in Silicon Valley, going to trade shows and consulting technical libraries. The information I amassed included vendor literature, articles from technical journals, charts, graphs, photographs, technical reports, etc.

For a 1981 installation at SITE in San Francisco,  I built shelves  around the perimeter of the gallery, and laid out most of the information on these shelves. In the inner circle of the gallery, I built a hexagonal structure buttressed with wooden newspaper racks that held sheets of ricepaper with drawings, photos, and text derived from the information.  The "newspapers´ could be taken down and read  (Malloy 1982 1988).

Inside the structure,  were artists books, for example an electromechanical book, read by pushing buttons that selected "pages", which consisted of xerox prints made by placing scientific instruments on a black-and-white xerox machine.  Influenced both by Jack Burnham's ideas and by my work in technical libraries, (Nyhan, 2016) an overall purpose was to look at science and technology from the point of view of an  artist for whom dual knowledge  of technical information organization and contemporary art practice were integral parts of her work.

Along the way, my work began to veer from exploring how STEM represents itself to creating computer-mediated literature.



Antoni Muntadas
The File Room, 1994
"A temporary physical installation and a permanent, expandable database in the virtual, interactive and multimedia space of the internet and the world wide web, all of it referring to censorship..."
medienkunstnetz.de/works/the-file...
#InformationArt

Originally initiated by the Randolph Street  Gallery in Chicago,  Antoni Muntadas' *The File Room* encompassed both an installation, that served a place for  public access and the continued creation of a database of examples of censorship. primarily of art and of artists such as Dred Scott and David Wojnarowicz.

An installation at the Chicago Cultural Center in 1994 was created with walls of black file cabinets  and with terminals that allowed access to the database. – at that time on Randolph Street servers and containing about 400 entries compiled by Randolph Street staff.  Work on the database was continued. Hosted by Rhizome since 2016,  it is open to entries from the public (Petito 2016).

With a research approach to artistic inquiry, Tim Collins and Reiko Goto have been working together since 1985. In their words, their work "has focused on the cultural aspects and experiences of environmental change with specific attention to ecosystems such as forests, trees, rivers and landscapes." (2014 4) Beginning in 1988, when Tim was asked to co-develop a waterfront art plan for the San Francisco waterfront and Reiko was working with natural urban interface projects, Collins and Goto have also explored natural-centric reclamation uses of abandoned industrial sites, in works such as *The Nine Mile Run Project* in Pittsburgh.



Tim Collins, Reiko Goto, Bob Bingham, and team
Nine Mile Run, 1996-
"... information tools to help the public understand the complexity ...The reclamation of urban, post-industrial or brownfield sites..."
nmr.collinsandgoto.com
#InformationArt

Tim Collins, Reiko Goto et. al: Nine Mile Run,
CMU Regina Miller Gallery, January 20- March 3, 2000

Once a city park, the Nine Mile Run stream valley was bought by a steel industry, resulting in issues, such as environmental pollution caused by the disposal of slag. Under the auspices of the Carnegie Melon University Studio for Creative Inquiry and co-directed by Bob Bingham, based in the Nine Mile Run watershed, the *Nine Mile Run Project* modeled sustainable approaches to urban open space, taking into account cultural and aesthetic components, as well as developing methods to communicate complex environmental problems to the public (Collins and Goto 1997). Work which began in 1996, was the focus of an information-dense installation at the Miller Gallery in 2000. Information in this installation included graphic charts, photographs by local and known photographers, living plants, videos including an overview of the Monongahela River, and opportunities for public participation. Importantly, a gallery situation was used to present information to the public and in the process to make a case for creative involvement in restoration projects.



J. R. Carpenter, 2017
"The Gathering Cloud"
Uniform Books
colinsackett.co.uk/thegatheringcl...
"Archival material from the Met Office Archive and Library in Exeter has been studied and sifted, along with classical, medieval, and Victorian sources..."
@jr_carpenter #InformationArt
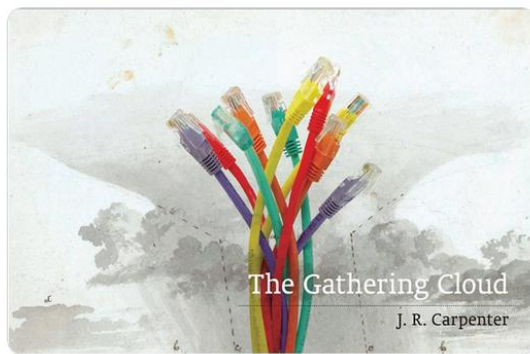
Bringing together "cloud storage" and clouds in the sky and in the process asking questions about the workings and use of cloud storage, in a research-informed hybrid web and print publication, JR Carpenter's *The Gathering Cloud* (Carpenter 2017) incorporates fragments of text from Luke Howard's 1803 *Essay on the Modifications of Clouds*, as well as from ancient sources, such as Lucretius, *On the Nature of Things*, and more contemporary sources, such as Petre Moore's 2015 *The Weather Experiment*. In an era, where print and web publication are in flux, combining research with contemporary computer-mediated collage, *The Gathering Cloud* encompasses a potent analogy, and in the process, this work itself is innovatively

composed. For instance, in the web version, plates in historic books are simulated when receding/recurring animated images – cloud formations, elephants, ducks, birds, storage devices -- slowly fill the screen. But once assembled, these plates are static, and the ephemeral animations that lead up to them are memorable yet elusive.



Maria Mencia
Gateway to the World, 2014
"using open data from the maritime database to visualise the routes of the vessels arriving to and from the Port of Hamburg...they act as writing tools"
mariamencia.com/pages/gatewayt...
#InformationArt @mariaFmencia

In her paper "Data Visualization Poetics", Maria Mencia points out the expanding role of data visualization in communicating data as evidenced in her work of electronic literature *Gateway to the World*., where -- using open data available in maritime databases, she researched the flow of vessels in and out of the port of Hamburg, Germany, one of the largest ports in the world (2016). In the resulting computer-mediated display, the routes of the vessels arriving to and from the Port of Hamburg poetically move on the screen, their names mapped to Wikipedia entries. The result is an evocative hybrid of electronic literature and data visualization. Additionally, as Mencia observes "The vast and busy port served as a metaphor for the immensity of the Internet, the flow of information and its meaning of openness and outreach to the World Wide Web."

Subsequently in *Winnipeg, el barco de la Esperanza* (2019) working from a family story, Mencia utilized maritime databases, research -- and the authoring work she had done for *Gateway to the World* -- to create a web-based work that tells the little known story of how in 1939, the Chilean poet Pablo Neruda, worked to bring 2,200 Spanish civil war exiles (after Franco took Barcelona) from a concentration camp situation in France to safety in Valparaiso, Chile. The name of the boat was *Winnipeg* and aboard that boat were Mencia's grandfather and his brother. For this work not only did she create "a poetic visualisation of the ships traveling to Latin America during the month of August 1939", but also the site she created is a continuously interactive place to collect and expand information about the refuges who were on that journey, In this way, Mencia created a lively interactive work of information-based art that was research based -- and poetically enlivened a meaningful story.

## The role of data in shaping objects and texts

*"A 'sculpture' that physically reacts to its environment is no longer to be regarded as an object. The range of outside factors affecting it, as well as its own radius of action, reach beyond the space it materially occupies. It thus merges with the environment in a relationship that is better understood as a 'system' of interdependent processes. These processes evolve without the viewer's empathy. He becomes a witness. A system is not imagined, it is real"* - Jack Burnham (1968 14)

*"Data portraits depict their subjects' accumulated data rather than their faces. They can be visualizations of discussion contributions, browsing histories, social networks, travel patterns..."*-- Judith Donath (2010)

The role of data in shaping objects and texts could be looked at as early as paintings that included details of environments,  such Vermeer's *The Music Lesson* or Jan Steen's *Drawing Lesson*.  It could also be looked at in the many boxes with objects created by Fluxus artists,  For example, Black experimental musician Benjamin Patterson's *Hooked*, a tackle box filled with fishing trip residue that include fishing lures, a harmonica, a tiny book of fishing tips, a miniature bottle of J&B Scotch. and a hotel room key (Jean Brown Archives).

Historically the work of Helen and Newton Harrison was the groundwork for information-based work in which a system that integrated research into a work of art was a platform to move off exhibition walls into environmental practice.  In *The Lagoon Cycle*, research-derived maps and texts, narrative, poetry, and photographs were incorporated into a 350-foot-long mural, which explored both the survival of species and the state of the waters in the Pacific rim  (Harrison 2003).  In its complexity and scale,  *The Lagoon Cycle* was a manifesto for art that  explored landscape in terms of environmental issues, as well as an example of a poetic use of information that was steeped in research practice.

In this paper, how data is used in creating interactive or interactively created works is also explored in the works of Nancy Paterson; Pamela Z and Chistina McPhee; Nathalie Miebach; and Camille Utterbach; and in *The LA Flood* netprov. (Mark Marino: Creative Director)

Nancy Paterson
Stock Market Skirt, 1990-1998
"The concept of controlling the length of a woman's dress by referencing stock market quotes in real time could only be put into practice as the Internet evolved to supply data I could access." narrabase.net
/Stock_Market_S...
#InformationArt

One of the first works to utilize online data, Nancy Paterson's  cyberfeminist *Stock Market Skirt*, (1990- ) consists of a blue velvet party dress worn by a dressmaker's mannequin, attached to a length-controlling mechanism and  installed beside computer monitors connected to this mechanical system.  On the monitors, continuously updated stock prices control movement of the skirt.  The work was based on theories that women's clothing is related to economic activity.  In her words: "This project has the potential to be interactive with the global flow of information by responding to a dynamic feed of data. We are not merely voyeurs, watching the hemline quiver, rise and fall. A viewer might influence the mediawork by making a call to their broker, to buy (or sell) shares in whatever company the skirt is currently tracking. Or, this might be accomplished through online trading. If the stock or composite being tracked is bought/sold as a result of automatic trade execution, then *Stock Market Skirt* becomes interactive with the flow of data…" (Malloy 2017).
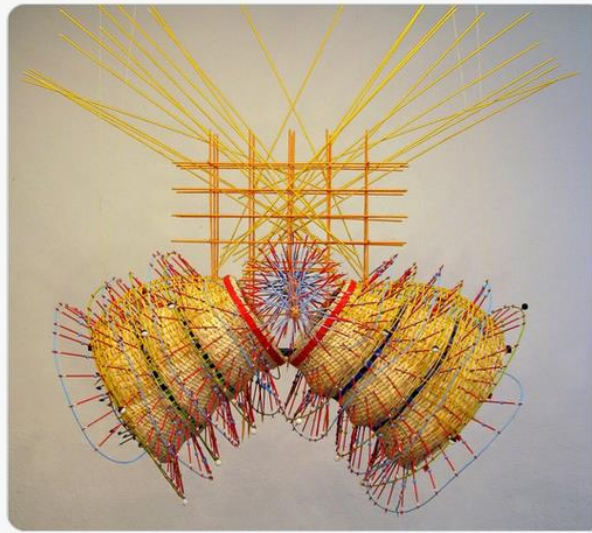
Nathalie Miebach
Changing Weather, 2008 (Reed, wood, data )
"During 2006-2008, I spent two years on Cape Cod, recording weather
and ocean data from Herring Cove Beach, which were then translated into
the sculptures..."
nathaliemiebach.com/work/new-portf...
"InformationArt

Using basket weaving technologies and underlying coding systems, Nathalie Miebach explores weather and climate by collecting data and then working with coded systems to create three dimensional objects. For instance, to create *Changing Weather* (2008, Reed, wood, data), from October 2007 – March 2008, Miebach recorded weather and data on a Cape Cod beach.   Certain elements were  coded – the color of the beads for instance, and materials were used in such a way that although a system underlies these works, without a key the viewer cannot decipher the precise underlying numbers,  and the whole is interpretable as an evocative work of sculpture -- behind which lurks the mysteries of weather and climate change.

Contingently,  *Carbon Song Cycle* -- a collaboration between composer Pamela Z and visual artist Christina McPhee that consists of 10 movements scored for voice with live processing, bassoon, viola, cello, percussion, and live, multi-channel video  -- creates a hauntingly effective work in which words extracted from research  blend effectively  with vocals and instrumental passages. The whole is an effective lament for the potential of human impact on the carbon cycle process.   Documentation for *Carbon Song Cycle* states that "Pamela knitted together melodic motifs inspired by scientific data around the carbon cycle and texts referencing environmental balance and imbalance – playing on the idea of the natural exchange of elements by passing sonic material between the players and exploring audio elements related to the imagery in Christina's video material" (Z 2013).



Camille Utterback
Vital Current: Seeking the San Lorenzo, 2016
Santa Cruz Museum of Art & History
"a visceral experience of interacting with archival and contemporary
images and videos of the San Lorenzo River"
camilleutterback.com/projects/vital...  #InformationArt

Camille Utterback
Vital Current: Seeking the San Lorenzo, 2016
site specific interactive installation, the Santa Cruz
Museum of Art & History lobby

Conversely, a  public art approach to research and information-based art is evidenced in the lobby of The Santa Cruz Museum of Art & History*,* where Camille Utterback's *Vital Current – Seeking the San Lorenzo* invites viewers to explore the past, present, and future of this river that flows through Santa Cruz.

Utterback collaborated with archivists, librarians, historians and the Santa Cruz community to create layers of information that consist of both historic and contemporary words and images, including videos that Utterback took as she developed this work (2016).

For viewers,  the act of putting hands into the river reveals information that is relevant to the place accessed by this action.

It should also be noted that once in a while, there are works in which fictional information is important in creating works of art that call attention to issues with information itself, such as my *Bad Information* (1986), in which participant-written "bad information" calls attention to the problems with accepting computer-produced information as true;  such *The La Flood*, a collaboratively written Netprov in which under the creative direction of Mark Marino a flood in the City of Los Angeles is fictionally developed by LAinundación, a group of artists and writers.

In a review, Leonardo Flores observes that:

"The city's boundaries aren't the only things spilled over in this flood of multimedia texts, but also those of literature because this work uses language in as diversely as it uses online services. To name a few leading formats, this work is in audio, video, text, prose, verse, geotags, Twitter, Google Maps, and more. The recorded voices of flood survivors sometimes play like radio talk show hosts, interview subjects, oral histories, or dramatic monologues. The written texts (or are they transcripts?— What came first?) are written in prose and verse, Tweets (prose or verse?), captions, tags, and so on. Notions of authorship are also washed over given the scope of this collaborative piece, inviting contributions to form international collective netprov events" (2012).

## Conclusion

In the Introduction to *The Un/Necessary Image*, (originally designed as an installation at MIT and including Hans Haacke's "On Social Grease", General Idea, Hal Fischer's "Gay Advertising", Les Levine, Judy Malloy, Judith Barry, and the editors themselves) Peter D'Agostino and Antonio Muntadas write that  *"Utilizing methods ranging from critical analysis and commentary to forms of direct appropriation and deconstruction, the artists offer readings and re-readings of commonly recognizable information in the public domain. As a consequence, these works provide new ways of looking at ourselves within the context of mass culture"*  (1982).

Approaching information art in the context of mass culture, their words return this paper to public contemporary Internet-based sources of information/data and to the need to conclude with issues in using commercial databases as sources of information.

For instance, regarding the "Digital Divide", smartphones have greatly lowered the gap as concerns access to the internet, but as regards connection and available content, many issues remain.  Speaking for Native communities, Randy Ross (Ponca Tribe of Nebraska and Otoe Missouria)  observes the difference between information available in pre-web computer networks hosted by Native Americans and what is available on smart phones. In his words:

"Innovation in Silicon Valley brought about a new wave of hope for an information society that would shift not only economic influence, but the great hope of a great electronic democracy ended in an illusion for many. The media technology and commercial ownership changes that accompanied network advancements and innovations seemed to have reduced the vision of an "Information Super Highway" to that of profit-making and ownership,.." (2016).

And, in *Algorithms of Oppression*, examining search results from 2009 to 2015,  Safiya Umoja Noble documented racial and gender issues in Google in searches (2018). In her words in a paper on the same subject, Noble observes that:

"Search is one of the most under-examined aspects of power and consumer protections online, and regulation in the provision of information to the public through the Internet. I contend that there is value in expanding the discourse about search engine results by examining its intersecting racial and gendered bias" (2018).

In addition to the importance of taking sources of data into account, as artists look to how "big data" might inform their work in the future, a suggested book is Matthew J. Salganik's *Bit by Bit: Social Research in the Digital Age*.  This book was written primarily for social scientists and data scientists, but if, as Salganik points out, the approaches of these two groups have in the past been different, the approaches of information artists might be considered radically different. Nevertheless, Salganik's book addresses research design, ethical considerations,  and importantly an understanding of how "the  digital age provides us with different opportunities for collecting and analyzing data"  (Salganik 2019).

Looking to the future, the potential for information art has become apparent in my classes at the School of the Art Institute of Chicago.  For instance, from 2022-2023, Ziai Guo combined research, environmental activist goals, and computer-mediated design to explore environmental issues.  With an emphasis on urban waterways,  Guo researched and explored the hazards and sources of pollution in ocean rivers and in the process created innovative graphic charts, utilized social media platforms to publish her work,  and interactively on social media platforms sought meaningful creative solutions.

*"...a powerful strategy in the future will be to enrich big data sources, which are not created for research, with additional information that makes them more suitable for research"*, Matthew Salganik observes. (2019).

**Notes:**

For educational purposes, the images that accompany the Electronic Literature Organization 2023 Conference initiation of this paper  (Coimbra, Portugal,  July 12-14) were documented on Twitter at https://twitter.com/JudyMalloy where each tweet references their sources.  Using the hashtag #InformationArt, this method was instrumental in creating an original and continuing history of  information art.  Other histories are needed and welcome -- JM

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