Generative Processes in Art and Science

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1. Abstract

This paper will address my recent work as a visual artist and my exploration of generative art processes. I will also address some of the pedagogical strategies I have used in the classroom at Southern Illinois University Carbondale, where I am an Associate Professor of Digital Media Arts in the Department of Cinema and Photography. In the Fall of 2018, I co-developed and taught with my colleague Dr. Scott Hamilton-Brehm, an Assistant Professor in the Department of Microbiology, a University Honors course entitled *Creative Critical Thinking: Between Art and Science*. In this course we had the students explore the generative possibilities of an iterative process, while working collaborative on projects that involve both science and engineering as well as the aesthetic issues of art and design. Through creating generative art, students began to question previous assumptions about originality, creativity, and craft, as well as the role of creativity within the process of art and science.

For me teaching and research exists in a symbiotic relationship and my generative arts practice is a personal inquiry into fundamental questions about our values, ideas, fears and dreams. I am interested in how the humanities and technology shape our individuality and communities, and how the arts and humanities can inspire us to ask who we are and what our lives might mean.

2. Technological Reproduction Leading to Generative Art Processes

Let Art Flourish---and the World Pass Away

> "'Fiat ars---pereat mundus,' says fascism, expecting from the war, as
> Marinetti admits, the artistic gratification of a sense of perception altered by
> technology. This is evidently the consummation of *l'art pour l'art*. Humankind,
> which once, in Homer, was an object of contemplation for the Olympian
> gods, has now become one for itself. Its self-alienation has reached the point
> where it can experience its own annihilation as a supreme aesthetic
> pleasure. *Such is the aestheticizing of politics, as practiced by fascism.*
> *Communism replies by politicizing art."*   (Benjamin 42)

In the early 20th Century, Walter Benjamin witnessed the attempt of fascism to render politics aesthetic, seen in propaganda such as Hitler's mass rallies and ultimately in war, as expressed by the Italian futurist F. T. Marinetti. In the early 21st Century, we bear witness to the self-destructive aesthetic pleasure one feels watching 24 hour cable news, structured like reality television, presenting a world where what is truth and what is

falsehood is nothing more than a difference of opinion. Our own self-alienation has reached the point that we are watching a system that profits from telling us news stories of freak weather anomalies while so many deny climate change. We witness the dehumanization of immigrant children held in cages, and the perverse sense that our systems of government are no longer working, while so many believe government is no longer necessary. All these narratives are presented to us in an electronic hallucination on screens supported by technologies that once promised free expression, and yet ironically seem to only produce the tightening of already existing corporate and governmental control.

As a visual artist working in the early 21ˢᵗ Century, I would like to present some examples of my generative art while addressing a few ideas of Walter Benjamin. My art practice produces code-based automated art, live art performance, drawing, painting and sculpture, all of which examines the relentless flow of information on the Internet that quickly becomes digital leftovers, to reveal a relationship in which we don't simply consume media, but are also consumed by it. I explore the Internet as source material to be appropriated, taken apart, juxtaposed, and recycled, by writing computer code that is automated and runs on a 24/7 schedule producing a form of collage I call *Cruft*. The resulting digital artwork allows me to investigate broader issues of traditional concepts--- such as originality, creativity, authorship and eternal value.

The Internet has the ability to provide freedom by connecting us at great distances, democratizing the world's knowledge, and facilitating disruption and resistance to systems of power. It can also simultaneously provide control by restricting and regulating our thoughts and actions while propagating fear, divisiveness, surveillance and repression. My artwork delves into this very nature of the Internet, pulling at it's strengths and exposing the flaws, producing what has been coined Post-Internet art, that by definition references the "network" that we all inhabit, and ultimately, it's effects on our society and culture.

In his 1936 essay entitled "The Work of Art in the Age of its Technological Reproducibility," Walter Benjamin discusses a shift in perception and its effects after the advent of film and photography.[1] He writes of the loss of aura through the reproduction of art. For Benjamin the aura represents originality and authenticity. A painting has an aura while a photograph does not. He states, "In even the most perfect reproduction, *one* thing is lacking: the here and now of the work of art---its unique existence in a particular place. It is this unique existence---and nothing else---that bears the mark of the history to which the work has been subject. This history includes changes to the physical structure of the work over time, together with any changes in ownership" (21). Digital information does not have an aura, as it usually never enters the world of atoms, and will always remain nothing more than computer bits existing nowhere and everywhere, displayed upon screens and stored on hard drives separated by large geographic distances. In the age of digital information which can be manipulated algorithmically, the separation between the here and now live event and its immediate documentation has completely blurred. Our social media habits reflect this compressed sense of time. While at some distant vacation destination, our family and friends will be able to immediately experience our documentation just moments after the live event. The Internet helps make these digital media objects ephemeral, ubiquitous, easily copied and freely available.

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1   I am using a recent translation of this essay which has changed the usual 'mechanical reproduction' to 'technological reproducibility' which is more useful for discussing Benjamin in the digital age.

An Aestheticizing of Political Life

> *All efforts to aestheticize politics culminate in one point. That one point is war.* War, and only war, makes it possible to set a goal for mass movements on the grandest scale while preserving traditional property relations. That is how the situation presents itself in political terms. In technological terms it can be formulated as follows: only war makes it possible to mobilize all of today's technological resources while maintaining property relations. It goes without saying that the fascist glorification of war does not make use of *these* arguments. *(41)*

In my lifetime, it was the attack on September 11, 2001 that created a mass movement of fear and anger, as technology, warfare and the visual collided. I was in lower Manhattan, as I saw a small cloud of smoke rising above the towers. I was oblivious to the two passenger planes that were being subverted into missiles. I was experiencing warfare and terrorism, though at the time, not fully aware, I simply wondered if I would be late for work. The media showed images of the planes, the impact, and the buildings collapse, over and over, in a repetitive loop. Our screens had become weapons of terror. The system of representation was hacked, much like the planes and through this spectacle we were forced to relive the moment in a never ending present. The main stream media controlled the message and the United States was going to war. I became frustrated with the way the media was presenting ideas and images that affected our world view. The ever present cable news cycle pushes a daily message of fear filled with political polarization. It was at this time that I began to think about how these digital images and text operated, one day influencing our daily discourse, the next day vanishing without a trace. Digital leftovers reminded me of redundant computer programming. Code that was once useful, but later forgotten and obsolete. It was these events, and my questioning of what happened to the images once they became digital leftovers, that lead me to making the auto-generated digital collages I call *Cruft*. To create this work,I write simple algorithms that an automated computer system follows. The instructions outline what websites to target, and the system then downloads selected images and text which are then used as source material, and remixed to create new artwork on a schedule that imitates the 24 hour cable news cycle.

The resulting endless war since September 11, 2001 has mobilized our technological resources as devices of fear and surveillance, that not only maintained property relations, but actually increased the speed of the wealth redistribution, which reached a fever pitch with the financial crash of 2008 and still continues to expand. The divisive rhetoric and the polarization of our current politics is the logical extension of Walter Benjamin's thoughts on the aestheticizing of political life. We live in a time of global anger, expressed in 2016 with the British vote to leave the European Union, known as Brexit, and the election of Donald J. Trump as the 45th president of the United States. *The aestheticizing of our political life is now complete.* The tools used to aestheticize our political life are the Internet, social media, computers, mobile phones and main stream media all of which have been weaponized to produce fearmongering, surveillance capitalism, and mind control. As an artist I use these very same tools subverting the fear, surveillance and mind control, to create art that is an act of resistance in an age of technological reproducibility.

3. Recent Generative Art
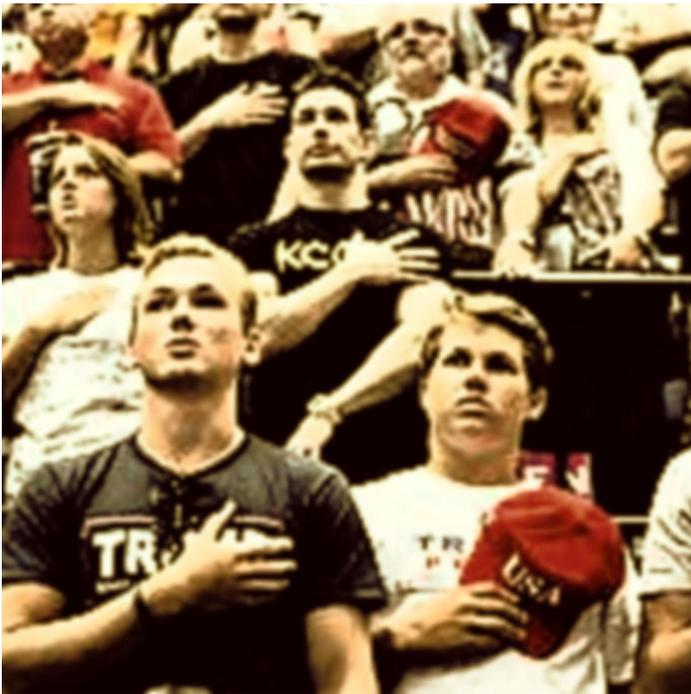
Darkling (an eye on dangerous) Cruft
http://www.robertspahr.com/work/darkling/
Created April 25, 2019 @ 04:47 AM,
Started in 2017 with daily updates at 47 minutes past every hour
Source: CCTV Cameras in the City of New York.
This cruft program creates an auto-generated image which updates every hour, capturing images from surveillance cameras watching the streets of New York City.

Compost Cruft (Pop! Goes the Weasel)
http://www.robertspahr.com/work/compost/
Created February 17, 2019 @ 08:53 PM
Updated at 17 minutes and 47 minutes past each hour.
Source: CNN.com, FOXNEWS.com, MSNBC.com
This cruft program started running every 30 minutes beginning on May 1st, 2018. Each new cruft becomes a layer on top of the old images, with the most recent news on top.

Value Meal Cruft
YouTube: https://youtu.be/7DjHxxvsQHU
Updates daily at 9:12 AM EST
Source: Donald J Trump, KABL960.com radio, WBUX-AM1670.com radio, & fast food images.
Auto-generated video from computational processes.

Ecce Homo: Trace Evidence #6
http://www.robertspahr.com/work/traceevidence/
Electrostatic print, charcoal, ink and acrylic, 48" x 36"
2018, Signed and dated on the back.
The source images of *Ecce Homo: Trace Evidence* were created by the Deservings Cruft.

In response to the intense pace and constant change happening online, my art practice includes a slower and thoughtful method of applying traditional media such as charcoal, paint, wax and ink, to prints of selected *Cruft* images creating an analog iteration of the original digital image. These mixed-media images are created over longer periods of time resulting in a meditative process that subverts the goals of speed, spectacle and distraction, offering an opportunity for slower looking and deeper thinking compared to the crushing overload of an endless stream of automated *Cruft*.

4. Generative Processes and an Iterative Methodology

As an educator I try to inspire learning and curiosity by creating a classroom environment were students can develop their imagination, creativity and innovation. I work to stimulate their imaginations and to help them understand that creativity is a process that strives to create original ideas of value, while innovation is simply putting creativity into practice. When I give generative art assignments, I use the following definition:

> **"Generative Art can be defined as any analog or digital art practice, that incorporates instruction-based, mechanical, organic, computer-controlled, and/or other external, random, or semi-random processes and/or apparatuses directly into the creative process, which is then set to motion with some degree of autonomy contributing to or resulting in a work of art."**

Students are exposed to the history and current practice of generative art, and to consider the use of chance and automation, which brings into question assumptions about originality, creativity and craft, as well as the role of the artist within the creative process.

4.1 Selected Student Work of Generative Art

Net Art, CP470D
Kate Collins
Net.Art, HTML/CSS/Javascript, 2019
http://www.robertspahr.com/teaching/studentwork2/kcollins/

Media Arts Performance, CP300D
Hannah Friedman & Thomas Bickel
The Fabric of Time - Performance Art with Clothing, 2018
YouTube: https://youtu.be/vPM7W3VXq_s

Media Arts Performance, CP300D
Generative Art Walk, 2018
A mindful walk exploring the generative possibilities of nature, architecture, sound, space and color.

In these generative art assignments students might explore the use of chance and randomness, as well as computational art using Javascript, Processing and/or Raspberry Pi computers. We also explore historical precedents and contemporary artists using generative processes. The students explore issues of modularity, automation, and variability, as well as the creative possibilities of the computer interface, computer operations, and the database, as well as analog processes of live art performance.

The work ranges from a web based work of Net.Art that embraces the interactivity and agency of the viewer, as well as random processes that produce a work of art that is very different each time it is viewed.

In the Media Arts Performance class, students explore the role of the artist and the work, while thinking about what they control, and what they do not control. They write simple performance scores as the algorithm of the live event, developing methods that produce varying amount of artistic control over the details. One of the goals is for the students to become more receptive to happy accidents, looking for them in places they might not except to find them.

In the Generative Art Walk, the students take a mindful walk across the campus, slowing down and looking at life with the same mindfulness that one looks at a work of art. Students think about the language of art, and the principles of organization, making connections between the design of nature and architecture, listening, looking, and feeling. This walk is then used as a generative process to develop an awareness and mindfulness that will then lead to new works of art through discussion and an associative method of connecting ideas.
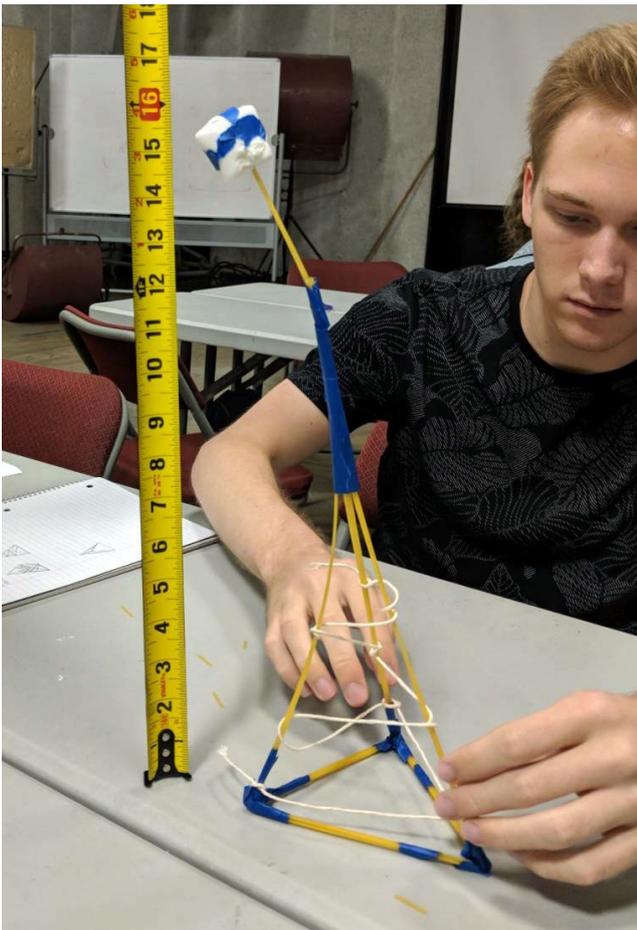
4.2 Generative Processes Between Art and Science

In the Fall of 2018, I co-developed and taught with my colleague Dr. Scott Hamilton-Brehm, and Assistant Professor in the Department of Microbiology, a University Honors course entitled Creative Critical Thinking: Between Art and Science. Although many view Art and Science as opposites with different practices and artifacts, our course explored the common creative processes that are the starting point of both endeavors. We looked closely at the ways the arts help give us insight into the human condition and how science can help explain the workings of the natural world. The students addressed a variety of problems from both a science and arts perspective. We developed a creative iterative approach to critical thinking to achieve an empirically driven solution to fitness problems as it applied to both art and science.

In the *Creative Critical Thinking* course, we had the students explore the generative possibilities of an iterative process, while working collaborative on a project that involves both science and engineering as well as aesthetic issues of art and design. For this course we adapted a team building exercise called *The Marshmallow Challenge*. Students work in small groups using 20 sticks of dry spaghetti, three feet of string, three feet of tape, and one marshmallow. In 18 minutes each group attempts to build the tallest structure that will support a marshmallow. We did three iterations of this challenge, the first attempt very few groups even can build a structure that does not collapse. This exercise set the stage for discussing creativity and design based on nature.
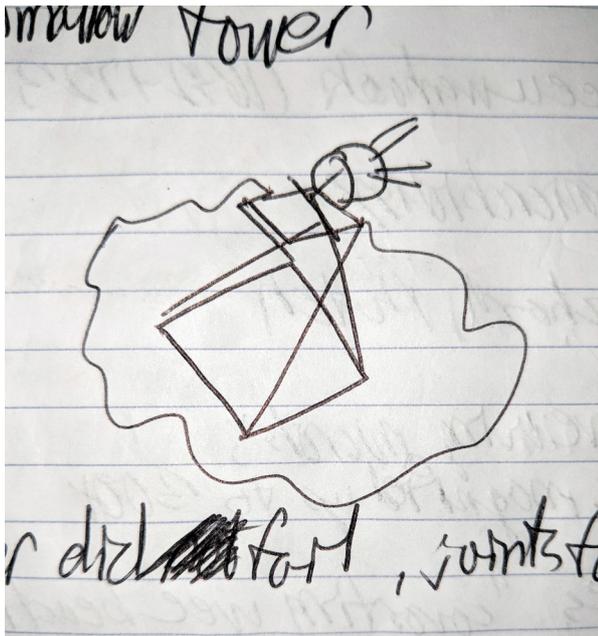
Creative Critical Thinking, UHON 351
Observations of the Iterative Process, 2018

Creative Critical Thinking, UHON 351
Marshmallow Challenge, 2018
Alex Menke

5. Conclusion: The Role of Generative Processes

Generative Processes are an important component of creativity. In my recent classes, both art and science students have explored their creative practice and have developed the tools to allow them to work in an iterative way, stress testing their solutions and then further developing their prototypes. This process also included consciously embracing chance, allowing the process itself to present solutions that the students would not have easily discovered, either due to preconceived solutions, or self imposed constraints. The generative exercises developed for my students have allowed them to explore solutions with a freedom and a sense of experimentation, as well as forcing them to work quickly with very little self-consciousness; to consider their role as either artist or scientist within their creative process.

For me teaching and research exists in a symbiotic relationship and my generative arts practice is a personal inquiry into fundamental questions about our values, ideas, fears and dreams. I am interested in how the humanities and technology shape our individuality and communities, and how the arts and humanities can inspire us to ask who we are and what our lives might mean.

6. References

Benjamin, Walter. *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*. Edited by Michael W. Jennings et al. Translated by Edmund Jephcott et al., The Belknap Press of Harvard Univ. Press, 2008.

Spahr, Robert. "The Field Guide." *The Here and Now of the Work of Art*, MediaCommons, 13 Apr. 2019, mediacommons.org/fieldguide/content/here-and-now-work-art. Some of the ideas in this paper were first published in this essay published by MediaCommons.