The Community and the Algorithm

A Digital Interactive Poetics

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Foreword

What is this book about? Ostensibly, *computation and collaborative writing*. Esoterically? Collective embodiment. What is at stake here? Digital learning. Poetics. Possibly, the biosphere and humanity. What is key? Collaborating in untidy unity, with algorithms of cooperation, as the only path open, if sapiens is to survive and the Anthropocene is to be evaded.

Algorithms as communities. Society as play. Poetry as medicine. Learning as sharing. Inclusive creative education: *hacks, tips, tools, suggestions, and possibilities for optimizing* ***literary*** *life*. Community: 'care, accountability, and stewardship'.

Succinctly? Pedagogical Fluxus networked collaborative coded living systems communicating telepathic transparent creative, compassionate trust. That potential is the unanswered hope of techno-utopianism. Hybrid honey, hive mind.

Begin (as Andrew Klobucar - who has shepherded this compilation - states) *building an effective set of critical tools to help us engage, create, and dispute within a cybernetic state of unprecedented singularity*. Reimagine the literary classroom as a community inclusive of corporal and computational entities. Consider *swarm pedagogy*, bots of *humanist resistance*; *netprov* (inter**net** im**prov**isations) *binge play*; trans-mediated *text-sonification*; intimate *readings* of digital poetics; pathways *from satire to software*; *three-dimensional textual objects* in voice-activated VR; and a move *beyond zoom* into open source *collaborative thinking-writing*.

Each of the projects outlined/analyzed in this book originated from a collective, a cluster, a community; each was built using tools/code created by immense corporations and/or crowds. Every single cultural artefact, scientific theory or technological achievement is a *composite*. Just as our bodies are teeming modular repositories, so too are our digital tools. So too is language, a symbolic estuary of innovative impulses and ancient pressures; it carries us from isolated subjectivity into oceanic awareness; teaching emerges from its continuum.

Set aside career competition, it's time for new paradigms: cooperatism, collaboratism. Composites require collaborative sharing. Poetic permeability. Creative pedagogy is a crucial component in gestating a global civilization capable of recognizing earth (all its peoples, organisms, ecosystems and technologies) as a single cognitive-cardiac community circuit.

What if education were recognized as a public utility, a legally protected epistemological ecosystem implemented as open-source open-access non-profit github-wikipedia-etherpads? A version server of knowledge freely available, thriving with joyful contributions? Then perhaps society might avoid replicating old oligarchic hierarchical patterns of status and evolve altruistic shared repositories of luminous evolving helpful open-data.

Implicit within the notion of a *Community Algorithm* is a tension between crowds, computation, caring and critique. Critique originated as an unwillingness to be complicit (with corporations, branding, regimes, ideologies, hegemonies, etc.). Caring constitutes an empathic response, a shared vulnerability. Computation is communicative and analytic sinew. Connecting these threads, inviting crowds of readers, constitutes a relevant attempt to ensure that literature and literary education remains relevant and nourishing.

This epithet was written in spring 2021, as trillions of brood X cicadas emerged (distinct from the enigmatic internet *Cicada 3301: an edge of the field where the cicadas are silent, latent, timing us*). May their fascinating re-emergence remind us of cycles within time, inexorable explorations, and the power of instinct to re-ascend. Similarly, may the generous resonant ideas of community and cooperation contained explicitly and *subtly* in this book re-emerge to flourish, breed, and be of benefit. And finally, as is necessary within all relational ecosystems entering unknown territory, may we, as poetic-computation practitioners, recognize the necessity and power of forgiveness as an emotional subroutine enabling coherent communities to thrive.

David Jhave Johnston
Montreal, 05 2021

Acknowledgements

At a fundamental level, this book owes much of its focus to the growing range of research now looking at the influence of algorithmic programming on nearly all aspects of culture, whether we're producing or consuming it. References to current scholarship in what is popularly known as "algorithmic culture" appear throughout this very anthology in multiple papers, including my own; however, even more importantly, as a topic of investigation, the use of increasingly sophisticated algorithms to help shape and structure online cultural discourse continues to inspire live debates and workshop activities across the Humanities. I have been fortunate to participate in a variety of different forums, critical reading groups, as well as innovative platform launches, where artists and programmers work with each other to redefine art, performance, and writing in the digital era. As I note in my introductory essay, the seeds of this very project were sown at a media workshop I organized and directed with my wife, a learning designer for IBM, at the 2019 NeMLA convention held that spring in Washington D.C. At the time of completing this volume, that event still marks the last time NeMLA would be held at a single, physical location. There, I introduced my own writing platform The GTR Language Workbench, an online, drag and drop tool for generative text experiments alongside two other exciting media projects. Open workshops, as I had long come to learn, often prove to be the best format for bringing people together from a variety of different disciplines to explore exactly the kind of technology and practice-oriented issues featured in this anthology. Most of the chapters at some level, in fact, developed out of very similar interactive events, many of them designed as new and original technology demo sessions featuring highly innovative methods of use. I count among some of the more significant workshops that served as direct inspirations for this collection the always vibrant reading and writing series hosted month after month by The Kootenay School of Writing in Vancouver, Canada, as well as the vital Summer Institute offered every year by The Banff Centre for Arts and Creativity also in Canada. The Banff Centre has proven to be a unique and trusted resource for bringing researchers in the sciences and artists and critics from all disciplines together to work on independent projects, while engaging in stimulating dialogues and presentations. I attended one particularly important institute in the summer of 2005 with Workbench co-developer, David Ayre, developing the first programmable format of the tool as downloadable software. These events and the communities sponsoring them, compare well, I would also offer, to the thought-provoking media art and literary exhibitions held every year by The

Electronic Literature Organization as part of its annual conference. In general, showcasing media projects, whether in a single demo session before an audience or a more interactive workshop provides the dominant paradigm for most, if not all, discussions presented within the collection. The ongoing COVID-19 pandemic, and the havoc and fear it wrought throughout academic and creative communities over the past two years only made interactivity across digital networks seem more valuable as both a resource and format for engaging with one another and pursuing the dialogues we did. To this end, I want to recognize every contributor's individual effort to maintain an unparalleled intellectual community during this time, either together here, or with other equally respected organizations, sharing ideas, concerns, and encouragement. In numbers, there is strength!

I am especially indebted to the critical, often creative feedback I routinely received from my colleagues at the New Jersey Institute of Technology, including the Digital Humanities group, as led by its current executive team, Rosanna Dent, Gabrielle Esperdy, and Burcak Ozludil. For the past two years, they've organized NJIT's annual Digital Humanities Showcase, delivering another extraordinary arena for debate and discussion around programming, design and literature. During this same time, as I planned the anthology, I continued to examine several of its principal issues with friends and colleagues, many of them working in very similar areas of research and tool development, such as Louis Wells, a great friend and an accomplished innovator in the art of improvisation as both a genre of performance and method of instruction. Louis worked with me at the original 2019 NeMLA convention alongside his partner, Maria Aladren, who also contributed an important essay to this very collection. Other equally influential colleagues include poet, musician and long respected electronic literature critic, Chris T. Funkhouser, environmental ethicist and philosopher of technology, Eric Katz, writing analytics specialist Norbert Elliot, and Information Systems specialist Osama Eljabiri, who continues to organize multiple capstone opportunities every academic year for senior NJIT Computer Science students to engage with private and public technology initiatives on all levels, ranging from large corporate enterprises to smaller, independent experiments like my own. Before the pandemic hit our institutions of higher education along with the rest of the world, I was personally able to take advantage of this project to help further develop the Language Workbench's interface. All told, NJIT university, and in particular, its Humanities Department, has continued to support my projects and many similar ventures in digital media development as part of its core mandate. I am specifically indebted to the Department's organization of its Fall colloquium series in 2020 for enabling me to discuss more formally other recently developed writing interfaces and online tools like the Language Workbench now shaping our writing practices. I am thankful for the efforts of

colleagues like Calista McRae and Vanessa Velez who showed much fortitude and a persistent generosity in maintaining the series through these extraordinary times. As with each set of seminars scheduled during an academic term, the Fall 2020 series gave me an opportunity to build an ultimately better, more collaborative writing workshop, this time using the now overly familiar technologies of video conferencing and remote learning that continue to dominate Higher Education across the country.

One indisputable fact available to some degree in every featured chapter is the enduring process of transformation literary studies and writing in general appear to be undergoing as fields of learning. Certainly, all writers in this collection would agree that the profound critical influence distributed networking and social media platforms seem to be having on contemporary writing practices did not begin with the pandemic. Such impact could be felt long before the SARS-CoV-2 virus had ever reached its first human host. Trends in technology that have been in development for decades are now merely accelerating to speed – perhaps even "warp speed." No doubt, serious research into what these trends portend for the literary arts, whether on or off-screen, is still in its infancy; yet, as I believe these essays show, some of the best critical insights have already been gained both spontaneously and collaboratively in the form of dynamic, often impromptu sandboxes, workshops, and interactive events. The past year has provided an unprecedented opportunity to actively engage and debate with colleagues around the world, screen to screen on questions we have had on our minds for at least two decades, often extending them into a variety of other fields, including programming, design, and visual presentation. In the year that has passed since the beginning of this project, we find ourselves in a startingly different media ecosystem. It is my sincere hope that these essays and the questions they raise provide useful starting points, perhaps a few loci of exploration, as we awake and step forward cautiously, yet bravely into our next new world.

Introduction. The Community and the Algorithm: A Digital Interactive Poetics

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Abstract: The introductory chapter begins with a theoretical overview of how collaborative, online tools are shaping culture across a variety of disciplines and social practices. Collaboration has a rich history in 20th-century art and writing, often driven by innovations in communication and media technology that allow for better interactivity across distributed networks. Very recent advances in programming and algorithmic processing in digital media have led to an array of fascinating interactive experiments in both the arts and literature. The fact that many of the chapters were written at the onset of the COVID-19 pandemic only seems to ensure the cultural relevance of the observations and critical methodologies they offer. Taken together, the chapters show how computational thinking combined with faster, more sophisticated algorithms can generate a host of unique, interactive devices for collaborative, creative work in the digital world. The introduction's additional aim is to provide readers with a detailed summary of the unique array of techniques and interface designs featured in each of the chapters. Linking these works directly with many well-known historical projects in combinatory, generative writing and improvisational methods in the arts, this volume hopes to provide numerous points of open dialogue and discussion in order to help writers, readers, and educators build new communities of shared practices in a world where the rules of personal interaction have become increasingly unstable and seemingly subject to constant reinvention.

Keywords: Algorithms, Computational Thinking, Digital Media, Collaboration, Interactivity

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Introduction

The Surrealist automatic writing exercise “the exquisite corpse shall drink the new wine,” often abbreviated to “Exquisite Corpse” bears some renown among the many Surrealist collaborative art experiments. Its exact historical origins remain obscure, but the amusing diversion maintains an ongoing popularity as an enjoyable party game or collaborative classroom writing exercise that’s easy to set up and quick to produce notable results regardless of how many contributors are involved. Its very title seems to testify to its ongoing mystique as a dependable method for generating captivating literary gems seemingly out of thin air. As one of the device’s originators, André Breton, routinely noted in various early avant-garde writings, collaborative activities like games could be compared to dreams as modes for unlocking creativity and alternative psychic states of awareness. To hear Breton tell it, this particular Surrealist phrase appeared one night at a gathering of friends in Montparnasse in 1925, where he along with the artists Marcel Duchamps, Jacques Prévert, Yves Tanguy and Benjamin Péret adapted the rules of the parlor storytelling game “Consequences” and began to write, while concealing, random phrases on a sheet of folded paper. The first results were shockingly different than any single expectation, leading them to believe that an additional voice had somehow entered the room through their own conjuration or sorcery.

There remain today many variations derived from multiple game rules. In one version, each collaborator adds to a composition in sequence, either by following a generic syntax template, such as "article adjective noun adverb verb preposition article adjective noun," producing guided impromptu statements like "The grey book slowly burned beneath the glowing coals." Other versions allow each subsequent contributor to work directly from the last two or three words provided by the previous writer. Regardless of the different rules of play, a standard concept prevails. The game supports easy participation with the barest of tools: a single sheet of paper and enough pens or pencils for each player to use. After a set time, the contest almost inevitably results in a single, collaborative text that is usually intriguing to read by all contributors. Just as easily, players can elect to produce an illustration of some sort, where participants collectively attempt to draw a single figure while being constrained to produce only one portion of the work at a time. The first Surrealists, in fact, adapted the activity to include sketches soon after “Exquisite Corpse” became a standard exercise at collective meetings. Whether the work is a text or drawing, the procedural rules behind it follow the same pattern. Individual expression in an artwork is to be subjected to a set technique with the aim of encouraging a collaboration of sorts over the interests of any one person. No participant is able to see or read previous

submissions when adding their own. The full manuscript or canvas is subsequently kept hidden from the group, revealing in the end a fantastic, usually fragmented set of lines or doodles to be read or seen together all at once as a coherent work of art.

The general appeal of this kind of activity doesn't seem complicated. Almost immediately, a messy, highly interactive group project takes shape, briefly shocking the contributors with its results, yet allowing each of them to escape full responsibility. Revelation inspires a particular delight in those who feel chosen and thus worthy enough to receive the final disclosure, especially having worked directly under the constraints of concealment. The works produced rarely compare with the literary expertise of a single writer working on a single set of ideas. Yet, a deeper significance seems to have been placed in the method, not the result. The work, in other words, is not so a message preconceived and then written, so much as a transmission duly received. A communication may have occurred, but the actual authoring now occurs on the receiving end, where the work appears fully encoded, ready to be deciphered. Breton, in fact, often compared the results to modes of fortune-telling, underscoring, perhaps, the movement's persistent interest in identifying some kind of metaphysical interaction with concrete reality as a core tenet. To explore what Breton termed the "Surreal" was not to abandon the concrete real for utter chaos, but to move beyond its supposed limits using alternative modes of reasoning. In his 1924 manifesto, he writes, "[i]t is not the fear of madness which will oblige us to leave the flag of imagination furled. … Surrealism is based on the belief in the superior reality of certain forms of previously neglected associations, in the omnipotence of dream, in the disinterested play of thought" (1969). Ludic or playful word association and the rules used to direct these language games quickly became a trusted mechanism for circumventing the standard, customary grammars that prevented the imagination from achieving its full potential as a source of creativity and "disinterested play." New constraints often designed ad hoc and for single occasions, Breton suggested, could lead to a "superior" realm of reason and whatever knowledge it might contain. This metaphysical rationale usually supported a collaborative, interactive approach to art and writing, allowing the Surrealists to exchange with each other strangely authoritative messages outside of any one participant's agency, immersing the final work in an aura of mystery.

Clearly, for Breton, part of the mystery derived from the prior feat of organising and imposing constraints on the individual tasks to follow, releasing each one from any preceding determination. Just how or why multiple moments of nonsense can lead to a superior, perhaps a strikingly imaginative layer of meaning always seemed to escape any subsequent attempt at fruitful analysis. Rather what amazed Breton was the broader

perspective he could draw from the collection after its formulation. Thus lay "the omnipotence of dream," where captured fragments are set in motion to be executed as a new collective operation. The fact that such writing practices signified, not just a set of chance operations, but possibly their ultimate fulfillment underwrote the very idea of a grander Surrealist singularity. The specific constraints or rules one used to achieve this singularity should hardly matter, Breton reasoned; what was significant in these games was the fact that they could be executed, i.e., set in motion to generate something beyond or "over" our present, limited, individual sense of reality.

Breton's christening of the first such event an "Exquisite Corpse" was also more than a chance procedure. If we compare the execution of the program's main event to the pattern of countless prior myths when a rebirth of sorts is thought to loom on the horizon, a death had, in fact, been scheduled to take place that very first evening. For Breton, the renewal in question concerned modern art's ongoing evolution as a new set of aesthetic ideas and theories across multiple media formats. The death of realism, of course, had already been summoned in modernist painting a few decades earlier with the emergence of impressionism; hence surrealism was in some ways simply carrying that project to its next logical limit. The corpse of realism would now be entreated to its additional preparation and given a new wine – the power of an open-ended, generative process to allow modernism to achieve superior aesthetic ends.

It's not difficult to compare Breton's intense, almost spiritual relationship to language games and their play to the respectful awe many writers currently feel toward algorithmic procedures and their increasing prominence in everyday media platforms. In fact, there is growing political and cultural interest among media theorists, along with many computer programmers, in algorithmic processing in relation to knowledge construction in general. Rather than the epitome of what should seem to be an almost mathematically precise neutrality, the algorithm easily inspires an almost mystical sense of power and intimacy in coded language, allowing a single online program to scan far too deeply into how our own thought processes seem to be working at any one time. The results can be unsettling, as if, as media users, we have somehow conjured up something much more malevolent than a lost Ouija spirit lurking amidst our Java syntax.

Media networks, whether based in the world of art or commerce, including high-tech start-ups, continue to foster collaborative modes of engagement, often highlighting the value of interdependent work environments over more traditional hierarchical arrangements. Just as significant, however, is the capacity of distributed networks to sponsor and better manage such activities through programmable, data-driven algorithms and computation in general.

Once employed, as demonstrated as early as Breton's original Surrealist meetings, algorithms may usefully machinate individual activities into a more unified, collective format without automatically denying us the promise of our separate imaginations, possibly even a dream or two. All that seems certain once networks become more of a standard structure for creative media practice is that the various ways or means we engage our imagination, whether collectively or individually, does seem significantly transformed. Throughout this volume, the precise methods and models being employed still evoke a certain level of mystery regarding how they may actually play out, despite how intricately detailed any algorithms in use happen to be. In many cases, the persistent sense of enigma haunting many collaborative, computational media experiments in terms of how they operate might even be enhanced by this intricacy. The innovation and creativity these networked projects sponsor seem plainly evident. One important question this volume seeks to address is whether such networks can actually help establish new forms of communities or communal environments outside individual cultural events, and if so, how might these communities function in an increasingly computation-driven, media-enhanced society.

The rapid postwar development of distributed network technologies and its influence on emerging counterculture art movements in the 1960s, especially in new media, remain a popular area of focus in art history and cultural criticism. Together, these two advances in media ecosystems provide a useful, perhaps even essential, context for many of the current advances shaping digital platforms in art and writing. Of specific note here are groups like the art media collective USCO (US Company) and Robert Filliou's and George Brecht's unique Fluxus-based experiment "The Eternal Network," both of which sought to bring together important social and even participatory elements into new media projects. In tandem with these art media projects, throughout the 1960s, similar experiments in literature, inspired, in part, by Breton and Surrealism, attempted to merge computation more formally with writing, as we see with poets like Brion Gysin, Jackson Mac Low, and, of course, members of the French artists collective "Oeuvres Litteraire Potential" or OULIPO. The "internet" in concept was still little more than a thought experiment to improve ways to share computer resources initiated by the United States Department of Defense, yet what is historically significant in the early 1960s is the growing cultural interest among artists and philosophers to reimagine computation as a mode of networked, creative collaboration. Studies of the historical and cultural dimensions of algorithmic processing cannot ignore the significance of distributed network technology and its development over the last 60 years. Once computer systems could be assembled into multi-terminal networks with more computational power as

was possible at the beginning of the 1960s, it seems that nothing less than a new paradigm of electronic communications emerged.

My own work and interest in developing more socially interactive digital writing tools for live collaborations in text generation and combinatory poetics owes much inspiration to each of these earlier projects and others like them. USCO and The Eternal Network demonstrate together a broader critical interest in shifting part of the focus in postwar creative media experiments from the art object itself to the actual process of its production, including the various roles artists and writers may take on when conceiving and developing a specific work for display. Filliou's and Brecht's vision of contemporary art practices in terms of an "eternal network" of shared ideas and resources, supplemented with effective feedback, did more than outline a more economically advanced distribution model; it actually proposed a fundamental re-conception of creativity as an interactive effort. Communication, these "networkers" eternally theorized, the capacity to connect people, not individual skill, would be the true source of imaginative invention regardless of genre or type of art materials in use. The primary communication model the two artists typically referred to when qualifying the sheer power they felt collaboration and interactivity in art could fuel was, in fact, telepathy.

As fantastical as telepathic intuition may seem as a mode of communication, the process speaks plainly to the level of intimacy and interpersonal trust Filliou and Brecht considered inherent in all creative practices. For Filliou specifically, as long as art emphasized individual effort over more collaborative gestures, it would remain tied to competitive struggles for personal primacy and cultural dominance. Artists routinely sabotaged each other as part of the profession, securing their aims to the rules of markets rather than the good of the project. Telepathy, he thought, offered a useful critique of this cultural model where reading minds became a kind of metaphor for a truly transparent social economy based upon honesty and cooperation rather than aggressive claims to authority.

André Breton did not likely consider Surrealist collaborations formal exercises in networking or even building a new kind of social collective. There is no record of him using such terms in any of his theoretical works; as a writing procedure, automatism was understood more in terms of psychological state, not a social one. Yet, clearly, by the time media projects like the Eternal Network and USCO are in play, we can see a much broader cultural interest to explore networking as a formal model for transforming individual art practices into collective structures. Computer programming, coding and networking developed into highly creative cultural practices in their own right. As well, the prioritization of technique and procedural constraints within these working collectives over individual expression aligns such initiatives with many core features of

modernism in general. From both a technological and modernist perspective, networks might best be understood as a formal means of communication independent of any message content. Key to this relationship, in fact, is the unique, often prodigious social tension it can generate between the combined efforts of collectives and those of individuals. In other words, the network showcases collective structures almost paradigmatically as living systems or constantly evolving environments. Networked collaboration, as we see throughout modernist formalism, is built upon an active in-process struggle to find structural harmony, and not simply a demand for personal surrender to whatever arrangement appears to be in play. The fact that such harmony remains typically elusive in the modernist form is actually one of the movement's core aesthetic strengths.

Computer programming evokes many of these same issues, especially in terms of designing collaborative models of interaction as living processes of social engagement. Chapter 8 of this anthology details the important alignments in programming, networking and modernist aesthetics that guided my own joint experiments with the algorithm as a collaborative writing tool over the past decade. The platform I co-developed with programmer and poet David Ayre, "The GTR Language Workbench," provides an online drag and drop interface to perform numerous algorithmic processes on texts, including several surrealist language games, allowing writers to explore and learn about combinatoric literature on screen. As with many of the contributors to this volume, programming gave me the opportunity as a teacher and literary critic working almost exclusively with digital media to investigate how algorithmic operations might be used to "network" creatively and credibly across many different writing formats. Our Workbench platform with its capacity to generate and make available an array of processors for collaborative writing exercises draws historically from the media experiments mentioned above, including Breton's own exquisite resurrection of the text via new wine. Other processors draw directly from various OULIPO language games, such as Jean Lescure's N+7 method where parts of speech in a source text, such as nouns, verbs, or adjectives, are replaced with counterparts taken from a standard dictionary according to a preset numbered position – usually seven words up or down the list. The resulting text will usually retain the general tone and meaning of the original, especially if the position variable is kept low, with multiple eccentric additions. The technical sophistication of this type of algorithmic instruction seems hardly comparable to the digital semantic technologies that have become available this past decade. Advances in online lexical databases like Wordnet and other text analysis tools, as well as Natural Language Processing (NLP) in general, have drastically transformed online writing. Scholarship in the relatively new academic field of the Digital Humanities continues to develop its own methodologies and resources in direct response to the expanding

significance of computation throughout the liberal arts. At the same time, the reconceptualization of the network as a creative, collaborative exercise in media art demonstrates how central algorithmic design has been to cultural modernism since its beginnings.

Several writing projects featured here, namely, Maria Aladren's Swarm techniques for teaching and Maria Lantin's experiments with VR and sound were presented alongside my own online platform, The GTR Language Workbench, in a special workshop hosted by the 2019 Northeast annual regional MLA conference (NeMLA), focused specifically on questions of networking, collaboration, and the algorithm in teaching writing. I organized the workshop together with Sharla Sava, the author of Chapter 8's more complete history of "The GTR Workbench," to explore various approaches to designing in-class collaborative exercises in online media as well as provide more research into how networks and networking have influenced developments in media art through the postwar era. Each presentation in the NeMLA workshop consistently demonstrated that software code and its execution rarely exemplified its stereotypical association with calculated precision and rigorous design; instead, the art of programming seems better understood as an ongoing, perhaps even interminable process of trial and error-driven by constant collaborative feedback.

Digital Utopianism and the *Whole Earth Catalog*

Despite the creative potential evident in early postwar forays into media art and programming, further research into distributed network culture also indicates that many of these same initiatives to foster collaboration and process-based interaction in art practices often succumbed to a much more problematic techno-utopianism by the late 1960s. Most studies of this historical tendency tend to showcase the WELL/*Whole Earth Catalog* movement as its clearest archetype. The *Whole Earth Catalog*, produced initially as a kind of contemporary almanac or newsletter for independently minded artists and thinkers, quickly became an international symbol for a new kind of technology-based cultural mindset. However, even when Stewart Brand began his publication in 1968, there is little doubt that he imagined he was setting in place nothing less than a community cornerstone with its own ideology. Brand, himself, declared in the inaugural issue that the periodical would foster communication and the sharing of "hacks, tips, tools, suggestions, and possibilities for optimizing your life" (Colman, 2011). While the projects explored throughout this collection continue to underscore computation and networking as process-based techniques for collaborative thinking, it seems suitable here to review how an unquestioned cultural conviction in digital technology's capacity to deliver rationalist, data-led worldviews has also

developed from very similar collective initiatives in media art and writing. Historians agree that it remains no exaggeration to characterize *Whole Earth Catalog*'s general readership as a very successful and unified cultural movement due to the shared sensibility it explicitly promoted. To subscribe to this tool, as Brand called it, was to openly profess a profound dissatisfaction in mainstream culture, whether delivered via government, the education system, or the private sector. Instead, the *Whole Earth Catalog* promised access to superior, alternative sources of information and knowledge. Rui Torres and Daniela Côrtes Maduro in their chapter "Wreadings: Digital Poetry and Collaborative Practice" draw an important historical line between the original *Catalog* and the first complete hypertext work of fiction, Judy Malloy's network-as-novel *Uncle Roger* (1986-), crediting its original design and publication to the Electronic BBS Art Com Electronic Network, a project associated with the *Catalog*'s later digital version, the WELL. Yet, as progressive as this pronouncement may have seemed at the time, studies like Janet Kraynak's recent book, *Contemporary Art and the Digitization of Everyday Life* (2020), argue that Brand's *Catalog* exemplifies how countercultural perspectives on media networking and collaboration abandoned interests in political contention and live debate for an array of utopian precepts and ideological positivisms (Kraynak, 2020). For her, projects like the *Whole Earth Catalogue*, although progressive in its attempt to apply information and media tools to art practices, also sponsored a much broader compromise between core democratic precepts and the neoliberal, technocratic model of social networking that flourished between the 1970s and the first decade of the current century. Fred Turner's important 2006 critical history of the *Whole Earth Catalog, From Counterculture to Cyberculture*, appearing just before the 2008 financial crash, provides a similar overview of how media networks fostered ideologies that, in turn, contributed to current economic and social developments in digital media that appear simultaneously capable of promoting and inhibiting progressive calls for action in the name of democracy. During the time of social protests in the mid-1960s, almost 30 years before the emergence of the World Wide Web, he reminds his readers, "computers had been the tools and emblems of the same unfeeling industrial-era social machine whose collapse they now seemed ready to bring about" (1). This persistent duality in both form and function remains a fundamental point of contention in contemporary considerations of computational culture and digital media. Social perspectives across a variety of contexts easily deem algorithms as almost universal symbols of objectivity and precision; at the same time, their growing use in the arts and social sciences demonstrates highly complex, often unpredictable processes constantly subject to the demands of collective input and whatever instances of cultural bias, data error, and, at times, simply blind faith that may accompany this input.

Our workshop on computation and collaborative writing in the digital classroom carried forward similar questions and concerns regarding programming as a cultural practice, drawing from many prior experiments in media art and the examples of creative play and interactive dialogue these projects generated. It is in the algorithm's capacity to fuel active debate in the pursuit of coherence, we argued, that gave the algorithm its cultural significance, not its mythological status as some imagined pinnacle of empirical objectivity. Not surprisingly, as algorithmic computation continues to permeate more and more modes of cultural interaction, an increasing number of studies also makes clear its many inherent flaws as a source of unquestioned certainty. The recent work of researchers like Safiya Umoja Noble (*Algorithms of Oppression,* 2018) and Cathy O'Neil (*Weapons of Math Destruction*, 2016) show that data routinely used for machine learning inevitably reflect existing social and political predispositions in many subsequent outcomes and cannot for this reason be considered pure results of applied formula. Companies like Predictive Policing (PredPol®) currently use algorithms to recommend where best to allocate police and security forces in neighbourhoods anticipated as being vulnerable to criminal activity. Their target market consists primarily of companies in commercial districts ready to subscribe to information services that show with supposed algorithmic precision where potential liabilities may exist. PredPol®'s technology page shows the algorithm it uses, listing the behaviour variables inputted into different equations: namely, instances of "repeat victimization", "near-repeat victimization, and "local search" data (PredPol®). It's not surprising to suppose that private security companies will become increasingly dependent on this type of market. If, however, as both Noble and O'Neil maintain, the reporting and inputting of criminal activity is racially biased, the corresponding results PredPol® algorithms determine cannot possibly be as objective as they claim. At the very least, critics also point out, predictions listing specific geographic locations will likely discourage initiatives in planned financial and social investment needed to improve these same locations over time, thus creating the very conditions the algorithms originally predicted. Essays in the first "Foundations" section of this anthology, such as Charles Baldwin's intriguing narrative "Cicada" and Taeyoon Choi's thoughtful "Community Code: A thing, something, everything and nothing" detail some of the more critical cultural effects directly related to the growing influence of algorithmic computation on social interaction, many of them rooted in an unquestioned faith in information technology as a means to objective knowledge.

Computation and Late Finance Capital

An expanding range of critical research over the past five years continues to argue for a much more complex, often less secure model of how algorithms work. And yet, the more problematic stereotype of computational reason as a device of objective precision still persists. In fact, the very foundation of late finance capital in many ways continues to herald the power of the algorithm as a progressive, ultimately more exact as well as exacting device for major financial decisions. Algorithmic models of consumer activity, some of them openly proposing alternatives to traditional industrial models of programmatic utility in social interaction, continue to be popular across many new markets. Alex Rosenblat's recent work on the algorithm and labour, *Uberland: How Algorithms are Rewriting the Rules of Work* (2018), contends that some of today's most successful technology companies have "created a fundamental shift in what it means to be employed" across the globe (15). Rosenblat does not attribute this development to any specific advances in hardware, despite the innovations we see in robotics and media tools now enhancing industrial production. The most significant change, as the title makes clear, derives directly from algorithmic computation due to its unparalleled capacity to redefine market relations from both the consumer's and producer's perspective. The prototypical company for Rosenblat's analysis is, of course, Uber, a transportation company that has somehow managed to redefine itself as a completely new kind of consumer service with almost no employees. This unique transformation, it seems, is due primarily to Uber's creative use of algorithmic technology as the essential tool or device being purchased by both drivers and their customers from an equal position to use as they see fit. Whereas a customer in need of a driver may subscribe to the service to find the ride they need at an apt time, the driver also subscribes to the same amenity to find the ride they desire to serve with equal utility. The profound economic shift Rosenblat refers to for his core thesis derives, it seems, from the algorithm's unprecedented economic capacity to eliminate employees, not by downsizing, but rather by making everyone a consumer.

As Rosenblat makes clear, algorithmic processes do more than simply increase market growth; they have initiated changes in the very structure of the modern social economy. Using computation to rationalize consumption patterns, late finance capitalism presents perhaps less prospects for productive labour in this economy, but clearly more opportunities to preview our purchasing habits and respond to them with greater and greater accuracy. An algorithmic market grows by surveilling and then managing increasingly personal – even intimate – aspects of our private and professional lives. The rapid spread of these technologies into nearly all aspects of our culture prompts other critics like Jonathan Roberge and Robert Seyfert to consider

algorithmic thinking itself as one of the primary discourses guiding 21st century social relations. On one level, it has allowed a more flexible, service-based consumer economy to emerge across traditional class and race identities. At the same time, the intrusion of the algorithm into capital markets has led to the gradual erosion of these very same identities which in turn brings on feelings of community disorientation and personal isolation. In their recent anthology of essays *Algorithmic cultures: Essays on Meaning, Performance, and New Technologies* (2016), Roberge and Seyfert begin by noting that "[t]he current, widespread dissemination of algorithms represents a double challenge for both our society and the social sciences tasked with studying and making sense of them. Algorithms have expanded and woven their logic into the very fabric of all social processes, interactions and experiences that increasingly hinge on computation to unfold" (1). To understand algorithms both as a tool and an abstract concept, Roberge and Seyfert cite the logician and computer scientist Robert Kowalski's original description of them as mechanisms of "logic and control" (1979). A better grasp of their ideological and economic roles, however, requires one to look deeply beyond their initial relationship to sequential ordering and its regulation. When traditional social spaces of interaction and cultural identity, like different neighborhoods, public city zones, and even our home environments are being managed computationally – usually to maintain constant real estate growth and quick market turnovers – an entirely new algorithmic community begins to emerge. In this community, social interaction is not a natural outcome of organic neighborhood development but is instead the result of finely tuned economic constraints executed by an even larger programming apparatus. Whatever capabilities this apparatus may demonstrate for control, its faculties for automatically determining equity and justice as social aims seem limited.

Theorists like David Harvey have long provided important critiques of the postwar political economy's failure to provide proper government oversight for algorithmic markets, qualifying this breakdown specifically as a central ideological feature of neoliberalism. In Harvey's view, advances in information technology from the 1970s onward are unequivocally designed to "bring all human action into the domain of the market" driven primarily by our growing digital "capacities to accumulate, store, transfer, analyze, and use massive databases to guide decisions in the global marketplace" (3). We may tacitly accept our predetermined role in this new ecosystem as one of its growing number of consumers/employees; yet it can still seem especially challenging to gather a working perspective on just how these technologies may be transforming our own cultural relations, never mind the underlying economic structure driving the many transitions we see around us. For artists, teachers, and even coders, the tools we use, the increasingly complex media resources

now indispensable to our reading and writing practices frequently appear wholly alien in terms of how they are shaping our interactions and general ability to communicate with each other. All that seems certain is that we are in the midst of an unprecedented, possibly interminable state of evolution. In fact, one of the most consistent observations appearing throughout this collection ardently acknowledges how little we still know as writers and readers about how algorithms function as part of digital communication networks.

From Surrealism onward through many modernist movements, the lack of predetermined aims within a collaborative, networked approach to media artworks remains a defining aesthetic feature. To adopt such procedures is to accept various liberating features that rules and constraints can bring to creative projects. The persistent opacity in how many algorithms often seem to function may also testify to their capacity to move beyond individual interests and personal observations in any artistic endeavour. The circuitous pathways of interactivity and exchange they exhibit also reveal countless procedural options for a variety of different data patterns and objectives. Certainly, Kowalski's emphasis on logic and control remains central to an algorithm's design, but, as we'll see throughout this volume, key to their overall complexity in form and structure is their capacity to collect and organize multiple points of input into meaningful transmissions. At the same time, algorithms can all too easily convince their users, whether they be artists or financial managers, into imagining new levels of universal meaning offered by objective calculation. Identify patterns and functions via algorithms, and suddenly any number of mysterious affiliations, both organic and inorganic, suddenly seem possible. As one critic, Ed Finn, points out in his study *What Algorithms Want* (2017), taken together, the constraints and rules that make up algorithms might best be thought of as a "critical frame that is interpreting objects which is also interpreting you" (55). Clearly, both the structure and utility of algorithms present together two fascinatingly distinct forms: on one hand, we have a novel technique for deciphering persistent quandaries by determining larger patterns and combinations; at the same time, we have powerful tools for rendering new objects, new "boxes" that, in turn, must also be similarly deciphered. Finn also usefully lays out three levels of algorithmic activity according to the intricacy of the rules and constraints in operation. If we assign algorithmic activity at its most basic level to any sequential procedure used to determine a single preset aim or goal, then multiple, more variable aims automatically infer more elaborate algorithm designs. True to form, as these designs become even more complex, the constraints and rules guiding them are able to execute an increasing number of unique outcomes above and beyond any original purposes. Increase the level of interactive intricacy in an algorithm's configuration, and suddenly its output begins to resemble intelligent, reasoned determinations.

With so many different levels of interaction possible, it's not surprising that the algorithm continues to confound any easy theorizations. Its devices seem to embody while simultaneously rebuffing pure precision in rational thought. Shintaro Miyazaki's recent essay "Algorhythmic Ecosystems: Neoliberal Couplings and Their Pathogenesis 1960-Present" (2016) seems to capture some of the duality we see in their simultaneous use as both a creative networking tool and a method of decipherment. The essay begins by recalling the algorithm's ongoing economic function in our current era of late finance capitalism, where social relations remain inexorably dependent upon complex, time-based interactions with built-in response mechanisms to ensure aim-driven efficiency and economic profit. An alternative ecosystem to neoliberalism, Miyazaki argues, reconsiders computation as a mode of physical "signal processing," downplaying traditional associations with calculation in favor of dynamic feedback and constant interaction. Put another way, the algorithm isn't confined to specific aims or goals in Miyazaki's view; rather, it is an ongoing process, materially generating new practices of learning and conceptualization. Working with algorithms, thus, almost inherently involves collaboration, especially given the importance of reflection and response when pursuing cognitive growth. As Miyazaki notes, to understand algorithmic computation primarily in terms of "signal processing", aligning it with the "rhythms of 'spacetimematterings'," is to move it beyond its more typical restrictions as a time-based sequence of ordered calculation (129). The term Miyazaki uses to qualify his sense of meaning as a transmitted pattern arrives by way of feminist theorist and quantum physicist Karen Barad. Barad conjured the phrase out of quantum physics in order to underscore precisely how a quantum-based understanding of reality might help us build a more progressive, if not accurate, materialism in terms of ontology and epistemology. For Barad, quantum theory's unique conception of objects, in fact, matter, itself, calls into being a reality that is by nature physically indefinite, demanding, in turn, a much more open, less categorically fixed sense of individual agency. Bereft of any last word on how reality actually functions, Barad argues, no individual or social group can place their perspective as scientifically superior over another. With this model, a revised social ethos, where whatever role humans play in controlling or even identifying causation in the universe, seems better understood as a part of a broader entanglement of multiple material forces. Miyazaki uses the term similarly to acknowledge the many indeterminable, impermanent aspects of algorithmic meaning. No single device prioritizes one conclusion over another: "[M]achines not only speak or watch one other, but rather – to formulate it in a more technologically accurate way – listen for and detect one another's signals and their rhythms" (129). The very patterns of computational processes, it seems, bear a certain level of meaning for the machines producing them distinct from any quantified information

reserved for their human counterparts. Most significantly, these rhythms may also avoid the political implications discussed earlier since they occur outside preset algorithmic instructions and biases guiding the input of the original data. Miyazaki's creative algorhythmic model helps us reimagine computational interfaces as highly complex, socially collaborative modes of interaction, and not merely a means of systemic instruction to acquire information. Both formally and physically, the screen seems to transform into a much more dynamic, if labyrinthine, database of media files and synchronous interactivity. In effect, we have learned via these devices to read anew with our fingertips as modes of collaborative processing. In Miyazaki's words, "[w]hen an algorithm is executed, processes of transformation, and of transduction from the mathematical realm into physical reality, are involved. These processes are not trivial. They have been designed to appear simple, but the becoming of an algorithm, its unfolding and metamorphosis into an algorhythm, often involves issues, problems, frictions and breakdowns" (135). The concept of information as rhythm and flow becomes easier to imagine when it occurs digitally given how instantaneous its ongoing transformation can seem. The result of this rhythm seems also well described here as an unfolding, invoking the same style of gradual revelation enacted in Surrealist language games like "Exquisite Corpse". Unfoldings in many ways capture how algorithms tend to convey their results, few of them being singularly determined by fixed rules or routines. Algorithmic computations unfold gradually, as data transmit and transform through procedures, patterns emerging via internally generated rhythms.

Computation, Conflict, and Collaboration

Distributed networks and their continued development over the past half-century have resulted in a startlingly rich field of cultural analysis, ranging in part from the social history of Douglas Kellner to the explorative, turn-of-the-century work on hypertext media by writers like George P. Landow, Jay David Bolter, and Matthew Kirschenbaum, as well as the more experimental cybernetics of Sadie Plant and Donna Haraway. Current media theory, as we've seen, continues to focus on the rapid evolution of digital interface technologies and their ongoing transformation of telecommunication, while emphasizing the consistent advance of an algorithm-driven, diffusion-based relationship to culture in general. One common feature shared between theories of distributed networking and algorithmic processing remains the inherently fluid nature of any computational environment operating as an open system, which is to say as a system with feedback or response mechanisms. Algorithmic processing, consistent with distributed networks in general, is built around system routines able to manage data with a near-endless variability in form or content. The algorithm, like computation in

general, may have emerged culturally as a tool associated with control and monological reasoning; but it quickly came to signify more organically multifarious modes of analysis.

Two related fields of study recently developed within the Digital Humanities, electronic literary criticism and software studies, continue to advance research into networks and network technology as cultural phenomena. As writing and reading practices, as well as distribution methods, continue to adopt interactive, network-based platforms for more diverse, digital audiences as a primary literary apparatus, it seems increasingly relevant to cultivate more creative and critical relationships between programmers and authors in general. Electronic literature (e-lit) critic Leonardo Flores considers social media networks distinct to an entire new generation of media artists and authors emerging in the second decade of the 21st century. Calling them a third wave of innovators, Flores decides the current online environment has transformed digital authorship beyond its initial pre-web stage leading up to the mid-1990s, as well as all web-based experiments appearing before 2010. For Flores, once platforms and network-based apps are adopted in literature, an unprecedented wide range of electronic literary works "such as bots, electronic poetry, videopoetry, hypertext fiction, mobile and locative works, virtual reality, augmented reality … are revitalized as they find new forms" (2019). However, these new relationships between computation and the literary arts are ultimately determined, network technology clearly remains a key formative factor. Cultural theorist Christopher Vitale, in fact, looks specifically at networks as the basis for a new philosophy in his 2014 book *Networkologies* in order to develop a working set of principles and possible viewpoints based on their structure. Fittingly, distributed networking continues to supply one of the more effective paradigms for understanding collaborative, computationally driven literary projects and cultural theory. Flores's work in electronic literature is particularly useful for expanding the literary arts by focusing on individual works in interactive fiction, whether they are categorized in any one of the three generations he lays out. Looking at the third, most recent age, we are invited to apply many of the more traditional literary tools of criticism, including the practice of close reading, to devices like Twitter bots and poetry generators attached to the online neural net software. Software studies overall follow a similar approach, respecting programs and even single lines of code as independent works available for critical readings. At the same time, the field can benefit from the philosophical perspective scholars like Vitale provides in order to understand software and programming practices within broader epistemologies and ontological frameworks much as prior lineages of modern reasoning help situate analogue technologies. While acknowledging these methods, this collection seeks to diversify critical thinking in digital media even further by

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