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Aller au sommaire du numéro

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Résumé de l'article

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Algorithm, Aphorism, and Alternatives

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Abstract:

The following paper revisited Gozzi Jr.'s (2002) probing of algorithmic and aphoristic thinking. Drawing on literature from media ecology, surveillance studies, and new materialism, the following paper argued that dichotomies between algorithmic and aphoristic thought reinforce a cartesian dualism between self and object that makes impossible meaningful discourse about, and subsequent alteration of, our data-driven technologies and policies. In his endorsement of the aphorism, Gozzi Jr. (2002) was careful to note that aphoristic thinkers did often employ algorithmic thinking in practice and principle, though the current data-driven nature of society drives a wedge deeper between these two modes of thought. Instead, a mode of thinking for the 21st century requires competency in both aphoristic thinking and ideation and algorithmic comprehension and application. Thus, the present paper explicated what is meant by the term "algorithmic society," outlined aphoristic and algorithmic modes of thought, and offered an alternative perspective that incorporated algorithmic and aphoristic thinking in a cyclical and systemic manner in order to create space for continued discourse.

Keywords: Media Ecology, Algorithm, Aphorism, Raymond Gozzi Jr.

Introduction

"*There was a fantastic universal sense that whatever we were doing was right, that we were winning…We had all the momentum; we were riding the crest of a high and beautiful wave…So now, less than five years later, you can go up on a steep hill in Las Vegas and look West, and with the right kind of eyes you can almost see the high-water mark—that place where the wave finally broke and rolled back*" –Hunter S. Thompson, Fear and Loathing in Las Vegas

"*When we react to an event, we are really reacting to what we've said to ourselves about it*" – Ward Farnsworth, The Practicing Stoic: A Philosophical User's Manual

The technological changes wrought in the 21st century have been expansive. The proliferation of digital media technologies, infrastructure, and applications has, at least in number, dwarfed the explosion of electronic technologies that began with the telegraph. No longer is the impetus of media to transport

information, nor is it to amass, store, and make available knowledge. With the advent and maturity of the world wide web, imperceptible amounts of information are available not just to the individual, but about the individual. (Andrejevic, 2013). The goal as the 21st century enters its exploratory 20s is to answer the question: what do we do with all this information?

By in large, the answer, as we can see in popular discourse, is to find ways to sort and make it useful. However, this is a task no human could reasonably accomplish using their own faculties. Thus, a primary way in which cognition occurs increasingly employs algorithms to help sort our increasingly large data reservoirs. State, public, private organizations spanning healthcare, housing, financial sectors, policing, welfare programs, and many more areas employ algorithms of varying complexity to make decisions integral to everyday human activity (Eubanks, 2018; Lippold-Cheney, 2017; Pasquale, 2017). Such programs are often touted as tools to increase efficiency, accuracy, and decrease human strife, yet it is scarcely explained how the algorithms work, nor do they have a 100% success rate. Moreover, these programs lead to increased personal information being recorded. To some extent, prosperity is accomplished for some, however, as argued by Pasquale (2017), the programs create a "black box society" in which "we can observe the inputs and outputs, but we cannot tell how one becomes the other" (p. 3). Such a system obfuscates the locus of responsibility for the conditions of human existence created. Moreover, it creates a sense of inevitability to the conditions of human existence. Thus, there must be a widespread and serious reflection on these practices.

Nearly twenty years ago, Raymond Gozzi Jr. (2002) argued that addressing an algorithmic society by way of algorithmic thinking was insufficient for dealing with the crises spawned by such a society. Instead, Gozzi Jr. (2002) argued that aphoristic thinking was needed to combat the issue, because "if we rely solely on algorithms, we lose our ability to assess a situation on its own terms" (p. 138). In addressing the "Black box society" created by "weapons of math destruction," Gozzi Jr. (2002) thought that

> "algorithmic systems were never to be applied mechanically. They were always ways to be under the care of a spiritually advanced leader or group of elders who would decide how to apply the rules in any given case. There was supposed to be flexibility and human control" (p. 137/138).

Thus, the following article considers the implications of aphoristic and algorithmic thought in a society now dominated by algorithms. That is the wrinkle; at the time of Gozzi Jr.'s writing, the algorithm society was in its infancy. In his initial writing, Gozzi Jr. (2002) lamented the dominance of algorithmic thinking and called for increased use of aphorism as a mode of thinking about our world and its issues. Twenty

years later, our the algorithm society has matured. Digital media forms, and the data-driven processes and practices that they spawn, have proliferated and employed in healthcare, transportation, commerce, economics, policing, welfare and many more industries (Cheney-Lippold, 2017; Eubanks, 2018; Noble, 2018; O'Neil, 2016; Pasquale, 2016; West & Allen, 2020). The type of thinking feared by Gozzi Jr. has now been institutionalized to an even greater extent, despite well-reasoned pleadings over twenty years ago. Thus, we must ask if algorithmic, aphoristic, or some alternative way of thinking can best address inequities created by institutionalized algorithms?

To answer the above questions the following paper will seek to achieve three major goals. First, an explication of what exactly is meant by "algorithm society." Second, algorithmic and aphoristic thought will be outlined, with reference to scholars inside and outside of the media ecology tradition. Third, and finally, a third perspective will be offered as a way of incorporating algorithmic and aphoristic thinking into our assessment of the problems spawned algorithm society.

The Algorithmic Society

Before outlining modes of thought, it is necessary to delve a bit deeper the so-called "algorithm society" that we live in, as well as the political, social, and personal consequences of such a society. While not entirely synonymous, we can think of the algorithm society in the larger scope of the increasingly technologized, data-driven world. A number of scholars across a variety of disciplines have commented on the practices and implications of increased collection, monitoring, analysis, and operationalization of data (Krupiy, 2015; Marx, 2015; Lyon, 2022). Algorithms and the society that have been spawned from them have gone by a variety of terms such as the information society, the black box society (Pasquale, 2015), technopoly (Postman, 1992), weapons of math destruction (O'Neil, 2016), republic 2.0 (Sunstein, 2009), as well as others. Each of the above monikers, and the work behind them, alluded to the negative assessments of the societal shift of a data-driven world. While there are certainly positive effects to these functions, the following section briefly focuses on select issues that such practices do present.

Of primary concern to the article at hand is the monumental changes that data-practices bring to the individual's conceptualization of self, their relation to and with others, and their entanglement with the environment writ large. As noted by Cheney-Lippold (2015), "most of what we do in this world has at least the capacity to be observed, recorded, analyzed, and stored in a database" (p. 4). With so much information available about people dislocated from the people themselves, cartesian dualism appears unsatisfactory. Per McLuhan (1964), it is important to note that no technology is merely additive;

whenever a new media is introduced to an environment in entirely transforms the environment in which it is placed. Thus, it has been argued humans become “digital dossiers” (Cheney-Lippold, 2015), “online brains” (Firth et. al, 2019), cyborgs” (Haraway, 1991) in which they are some amalgamation of physical and digital properties. In short, the line between the human and the technological has become further blurred.

The consequences of the digital transformation of humanity described above has widespread implications for both individual and society. Shelby et. al (2022) provided a comprehensive taxonomy of potential sociotechnical harms that arise from increased datafication including representational harms (stereotyping, alienation, erasure, etc.), allocative harms (opportunity/economic loss), quality of service harms (increased labor, benefit loss), interpersonal harms (loss of agency, tech-facilitated violence, diminished health/well-being, privacy violations), and social system/societal harms. While harm is a broad concept and none of the above categories are necessarily mutually exclusive, increasingly complex data practices across innumerable facets of human life exacerbate the possibility of such to varying degrees. For instance, substantial evidence has been proffered showing how survey analysis and search engine optimizations disproportionately targets different individuals and groups ostensibly automating racial and economic inequality under the guise of the neutral ubiquity of algorithmic processes (Eubanks, 2018; Krupiy, 2015; Noble, 2018; O’Neil, 2016). Additionally, the advent of “smart cities” wherein the infrastructure has been transformed into a monitoring device creates “surveillance cities” transforming public living spaces into spaces of consumption (Galic, 2022; McLoed Rogers, 2021; Melgaco & van Brakel, 2021; Wood, 2015).

The brief notes above on a data-driven society about raise concerns for personal identity and surveillance of individuals, as well as how we employ data about people to create the algorithms that are engrained in our technological processes. Scholars across a wide variety of disciplines have expressed concerns with technology and data practices since the 20th century, yet we are still faced with many of the same questions pointed at different technologies (Ellul, 1965; Foucault, 1975; Lauer, 2021; Monahan & Wood, 2018; Postman, 1992). Unfortunately, the technologies and functions described above are only the tip of the iceberg. As quantum computing matures in the coming decades, the possibilities of the application of algorithmic functions will grow exponentially (Brandimarte, 2022; Gangwar et. al, 2022; Johnson, 2019). Thus, it is more pressing than ever to reevaluate the manner in which we conceptualize problems and solutions to the so-called “algorithm society” as it continues to morph and transform.

Modes of Thinking

Algorithmic Thinking

An algorithm is classically defined as “a procedure for solving a mathematical problem in a finite number of steps that frequently require repetition of an operation” (“Algorithm,” 2021). The origins of mathematical algorithms can be traced back to notes of Abdullah Muhammad bin Musa al-Khwarizmi, largely known as the father of algebra, in the 9th century (“History of Algorithms,” 2021). At their conception, algorithms were created, applied, and solved via pencil and paper. Such processes have now expanded to a macro-level; collecting and embedding disparate algorithms within innumerable, interrelated computer programs.

As a result, algorithms can no longer be understood fully by the logician or mathematician with a pen and pencil. Instead, for one to understand the functions of an algorithm in depth a new set of competencies is necessary. According to Fuschek (2006) argued that to successfully construct and understand algorithms in computer science an individual must have

> “the ability to analyze given problems; ability to specify a problem precisely; the ability to find the basic actions that are adequate to a given problem; the ability to construct a correct algorithm to a given problem using the basic actions; the ability to think about all possible special and normal cases of a problem; the ability to improve the efficiency of an algorithm” (p. 160).

Within the realm of computer science, knowledge is constituted both theoretically and practically. While Gozzi (2002) originally outlined algorithmic thinking as a *way of thinking*, it is important to remember that an algorithm is also something that is *done.* However, thinking and doing are not synonymous. As argued by Schmidt (2016), “what an algorithm does is distinct from…how it does it” (p. 1). Thus, algorithmic thinking is not necessarily synonymous with an algorithmic society, despite similar logics undergirding their conceptualization, creation, implementation, and transformation.

Aphoristic Thinking

In contrast to algorithmic thinking, aphorisms are often short, pithy statements that make a profound exclamation or argument about the workings of the world. The use of aphorisms within media ecological studies is primarily attributed to Marshall McLuhan, who described his works at probes, or explorations into the world that were not be taken merely at face value (McLuhan, 1964). Probes, as

the intellectual version of aphorism, served as the basis for McLuhan's arguments surround the technological advancement that he saw in the world. Many of the probes turned out to carry much more truth that McLuhan's detractors would like to admit. While some points are hotly contested in academic circles, one need look no further that Carson and McLuhan's (2011) collection of McLuhan's probes to find evidence of their continued applicability. Prescriptions made by McLuhan foregrounded not only specific technological changes that would take place well after his writings, but also foregrounded philosophical theories that would attempt to make sense of the proclaimed postmodern society.

Building on this notion, Gozzi (2002) argued that aphoristic thinking used to play a larger role in the everyday decision-making processes of human beings. As an open-ended, capacious tool, aphorism can help guide individuals thinking without marrying them to positions and processes (Gozzi, 2002). To which we are left with the question: Which way of thinking, or to put it more aptly, what combination of these modes of thought, will be most effective in combatting the algorithmic society outlined above?

Transforming our thinking in a data-driven society

We are living at a curious time in which there has been massive social upheavals in the United States. Upheaval signals awareness, but awareness does not always translate to policy. The quote at onset of this article described the progress of the 1960s as wave that built up height and breadth, but ultimately receded back into the ocean leaving matters largely unchanged. Thus, in order to avoid the 21st century wave from cresting over, there must be not only a critical and reflexive look at what we think, but why and how we think it.

Inquiring about data-practices

Several leading scholars across a wide variety of fields have provided key questions that the scholar should ask themselves as they attempt to address the current state of our data-driven society. Notably, boyd and Crawford (2011) offered six major areas in which we should question. Specifically, boyd and Crawford (2011) argued that we must 1) acknowledge how big data changes the definition of knowledge 2) understand how statistical notions of objectivity and accuracy can be misleading 3) not equivocate bigger data sets with better data sets 4) situate data within their contexts 5) beware of mistaking accessibility for ethicality and 6) address the notion that the increasing complexity and opacity of these systems to both the socio-economically disadvantaged and the technically inept creates a system in which access to the inner-workings are restricted. Altogether, these six areas create transdisciplinary questions, yet the central notion governing the questions we ask about big data and how we answer what is asked, per boyd and Crawford (2011), that "we should consider how the tools participate in shaping the world with us as we use them…that we start questioning the

assumptions, values, and biases" (p. 675). Put another way by Smuha (2020), society must ask "whom does the claimed beneficial purpose of AI systems serve, and who might be impacted in potentially harmful ways" (p. 21). These questions can serve as a starting point for thinking about ethical implementation of data practices.

Inherent within the above provocations, as well as concerns with a data-driven society, are those which concern personal information. In surveillance studies, this is often the primary concern. Marx (2018), posed four questions, in the forms of ratios, for considering how to manage personal information as data-practices continue to proliferate throughout society that asked

> "1. What is the ratio of what a technology is capable of to how extensively is it applied? (surveillance slack ratio) 2. What is the ratio of what is known about a person to the absolute amount of personal information potentially available? (personal information penetration ratio) 3. What is the ratio of what individuals wish to keep to themselves to how able they are able to do this, given the technology, laws, and policies? (achieved privacy ratio) 4. What is the ratio of what superordinates know about subordinates to what subordinates know about superordinates? (reciprocity-equity ratio)" (p. 304).

It is important to note that none of these ratios exist in a static state. Throughout history they have been continually in flux with both perceived ideal measures and actual measures continually varying. A key factor in altering these ratios is the technologies which are introduced into any environment. Therefore, the following pages seek to provide a way of thinking about addressing the provocations and finding an amenable ratio.

Aphoristic ideation

Perhaps the starting point for approaching the above questions and thinking about the proposed ratios should be how we think about self. As argued by Anton (2020), humans, their parts, and their environments are inherently relational. Even our most basic anatomical structures exist to be related to other. We ingest the environment around us, we ourselves are contain billions of microorganisms breaking down what we ingest, and ultimate we excrete such waste back into the universe. In this sense, we are indeed what we eat. This statement itself illuminates how issues might be first be addressed: through aphorism. With the open-ended approach, no single position is nailed to the wall. There are endless possibilities if we were to try to make sense of the statement "you are what you eat." This short, pithy statement may lead one to comment about biology, economics, medicine, farming practices, or any other angle from which one might approach the saying which is contingent on their own intellectual and cultural biases. In a preceding section we will briefly apply it to the algorithm society outlined above.

The above aphorism (as well as many aphorisms in general) also has a posthuman inclination,

whether intentional or otherwise. Coming from the field of physics, Barad (2007) argues for the collapse of dichotomous relationship between self and other in order to further create an understand of matter and meaning as entangled to a degree that separating them is intellectually irresponsible. In a sense, Barad's (2007) seminal work is based in aphorism itself. The starting point for Barad is the gedankenexperiments of Einstein and Bohr. Gedankenexperiment, or "thought experiment," was a tool used to explore concepts in physics prior to the invention of the apparatuses that are actually necessary to test them. At its core, the idea of exploring an idea that cannot yet be tested or proven is nearly synonymous with the probing work of Marshall McLuhan. Moreover, such lines of thought are emblematic of the capaciousness nature of aphorism. Taken a step further, thought experiment and probe both perhaps leave audiences with ambiguous conclusions and potentially unavailable answers. Per Conolly (2013), studies, such as Barads, in posthumanism and new materialism attempt to push our understandings of time and space, subject and object, and self and world past what might be comprehensible. It is this form of aphoristic thinking that has the ability to push the bounds of knowledge and create new possibilities for understanding the human condition.

It is important here to note that the aphorism, despite its capacious nature, operates in an often opaque manner. This point is evidenced by some of the most serious criticisms of Marshall McLuhan; particularly regarding his methods and writing style (Chandler, 2012; Fishman, 2006; Jacobs, 2011). In a manner eerily similar to algorithmic thinking, aphoristic thinking can be paradoxically opaque to certain populations. If we take Marshall McLuhan's most famous aphorism – "the medium is the message" – and show it to mathematicians, biologists, or even select social scientists, there may be misapprehension or complete ignorance of the saying and, consequently, dismissal of the effects to which are being spoken of. The tradition of media ecology as a whole will find similar objections to their moniker – itself an aphoristic metaphor of sorts – from individuals in the natural sciences. Moreover, as discussed above, the statement "you are what you eat" may carry entirely different connotations – from prophetic to ridiculousness – within different contexts. If aphorism relies on interpretation by a wise elder, as it operated in antiquity, the echo chambers and digital tribalism of the 21st century all but promise misapplication.

While there is a positive element here in the ability to create a wide variety of perspectives on an issue, the practicality of aphoristic thinking has the potential to lose its catalytic nature. Each though becomes a drop in a bucket or another voice in the crowd. Thus, aphorism may have a higher ability to stimulate thoughts and conversations across a wide variety of disciplines and a higher propensity to fail as a form of practically applying ideas within different fields. It is one thing to argue that an algorithm should not discriminate against minorities. It is an entirely different process to create an algorithm that does not discriminate against minorities.

To be clear, the characteristics of aphoristic thinking have different exigencies for success than

other forms of thinking. For aphoristic thinking to be successful in producing substantial ideas and solutions to problems it must resonate. In other words, aphorisms are successful insofar as they can either be proven correct through experience and/or evidence – if one is to distinguish between the two. This is the difficulty of the aphorism, particularly in the age of information glut – it is not finding the information that is the most taxing task at hand, but instead it is the decipher of what exactly that information means (Andrejevic, 2013). Thus, the aphorism is taken as a starting point in the digital era, as opposed to the guiding logic by which decisions are made.

Algorithmic Applications

However, when it comes to approaching the issue of big data, simply saying that we are entangled with our environments is not enough for substantial critique and creation of change. We have shown that algorithms can be used to open up discussion, but find ourselves at an impasse as far as implementation is concerned. Importantly, Bogost (2015) argued that it is more important for humanities scholars to understand the effects of technological developments as opposed to the inner workings of the developments themselves. Moreover, it has been argued that humanities scholars risk hackneying the subjects they study by comprehending minimally yet purporting widely. For many, to expect humanities scholars to fully understand the technologies they are studying would be inappropriate because, as artist Labatut (2020) stated that "it's not just the regular folks; even the scientists no longer comprehend the world" (p. xx). However, lack of understanding often translates to fear and overly negative treatments of data-practices. As highlighted by Susser (2022),

> "orientations toward surveillance, and toward the data-driven technologies enabling it, share at least one important feature: an aversion, or if that's too strong, a hesitation, to articulate a positive vision. Few describe what a good data-driven society might be" (p. 297).

With any new system comes hesitation; Socrates thought written-word would degrade human intelligence (Halverson, 1992; Yuzwa, 2019). Today, such a complaint would land you in the looney bin. It is a well-documented physiological principal that increased understanding reduces fear and opens up opportunities for action. Even though, as stated above, what an algorithm does is distinct from how it does it (Schmidt, 2016), perhaps there some opportunities for the general populace begin building up the knowledge necessary to understand the intricacies of the systems which constitute our infrastructure and enable and constrain our everyday interactions.

But, can we conceivably expect even partial comprehension at the current stage of technological advancement? There are three primary hurdles to algorithmic thinking in the 21st century. First, is the language of algorithms itself: linear algebra. If algorithms are the building blocks of computation, the linear algebra is the materials used to create those blocks. Any meaningful conversation about the actual construction of algorithms – undergirding any process from searching

online to piloting a rocket – is contingent upon some rudimentary knowledge of linear algebra. One need not necessarily be able to deconstruct Shor's polynomial-time quantum algorithm, but should at the very least not shudder at the sight of mathematical notation. Second, success is contingency on the accuracy and simplicity of the algorithm, as well as the result itself, and potential alternatives to the result. Consider the algorithmic process of tying one's shoes: swoop, loop, and pull. At its core, this is a three-step process from securing ones show to one's foot. But, how secure is the shoe? How long did it take to complete the process? Is this the most user-friendly way to secure the shoe for the greatest number of users? Does this process work with all lace materials? Even the simplest of algorithmic functions has many other factors to consider. Third, and finally, organizations are not actually mandated to release their algorithms and how specifically they function, so the success of understanding is contingent on the transparency of corporations.

Putting it all together: Cyclical oscillation of algorithm and aphorism

Aphoristic and algorithmic modes of thinking have strikingly different characteristics and exigencies for success. While the open-ended, capacious nature of aphorisms has shown utility for idea generation it has presented minimal substantive value to the conversation regarding implementation of generated ideas. Conversely, algorithmic thinking is predicated on the notion of discrete, continuous, and linear functions wherein success is contingent on specificity and accuracy. The two modes of thinking, as outlined in Gozzi Jr.'s original article may appear to be mutually exclusive and potentially entirely contradictory. However, each of these modes of thinking are not only necessary for conceptualizing, designing, and implementing 21st century technologies, but also imperative to charting a path to positive relations with our technological condition.

In this revisitation of Gozzi Jr.'s (2002) article I wish to propose a third mode of thinking that incorporates elements of each. This third alternative mode of thinking requires a systemic and cyclical oscillation between aphoristic and algorithmic modes in order to harvest the best properties of each in a manner that leads to the development of a humanistic algorithm society. The intellectual tradition of media ecology heavily aids the conceptualization of such an approach. In particular, the structure of Marshall McLuhan's thinking aids in conceptualizing what an oscillation between aphorism and algorithm might entail. Pruska-Oldenhof and Logan (2017) examined agued that the structure of Marshall McLuhan's thinking and writing was at times characterized by a spiral structuring. Per Pruska-Oldenhof and Logan (2017),

> "The spiral structure of purely physical and biological phenomena is primarily played

> out in physical space, whereas the spiral structures of philosophy, culture, human thought, scholarship and artistic expression involve the time dimension. The movement back and forth in these domains entails the transitions from the present back to the past or forward into the future and vice-versa from the past and the future to the present. The spiral structure unites the past, the present, and the future (p. 3)".

In essence, the electronic epoch of media made – more than ever before – humans conscious of times past and with that newfound consciousness any examination of media effects necessitated a continually shifting between past, present, and future (Pruska-Oldenhof & Logan, 2017). McLuhan's view of extensions/servomechanisms, environments/anti-environments, figure/ground, laws of media, and cause/effect are all implicitly guided by a spiral structure of thinking (Pruska-Oldenhof & Logan, 2017). To be clear, the third alternative being presented in this section does not present the content of Marshall McLuhan's thinking, nor the heuristic tools he created, as wholesale solutions to the problem which is being addressed. Instead, the spiral structure of thinking can be used as a way to conceptualized the uniting of algorithm and aphoristic thinking together in the same conceptual genome.

So, what does spiral algorithmic-aphoristic thinking look like in practice? The first step is conceptual and requires us to envision an algorithm before its creation, as opposed to its consequences once complete. Jaton (2021) illuminated this process showing through the development of algorithms humanity is reflected not simply controlled. Humans create the structure and content of algorithms. With this understanding, we can inject aphorism at each stage of the development of the aphorism. Traditionally, developers may primarily be concerned with how long it takes to complete a task (time-complexity), how much computer memory it uses (space complexity), and how much energy it uses (energy complexity) (Mueller & Massaron, 2022). However, there must be a fourth category – the name of which can be left to the more quippy of the scholars. This fourth category involves thinking about what this means for humans. We have already outlined the questions that will populate this repository from which developers can pull: boyd and Crawfords (2011) questions about data and Marx's (2018) ratios about surveillance. At each stage of the development of the algorithm – design, analysis, implementation, and experimentation – we can use the above as heuristics from probing the true possibilities of algorithms, not just their speed, storage, and energy requirements. Thinking meaningfully *during* the design may be considered tedium ad nauseum to the developer, but will save time on the back end when dealing with unintended negative consequences of the code written. \

Conclusion

It may have been perplexing as to why a quote from an infamously intoxicated writer and a lawyer were included at the beginning. The former discussed how the re-election of Richard Nixon in 1972 punctuated the rising progressive policies in the 1960s just as a wave crests high and then collapses, receding to the sea. Essentially a comment on progress made and progress lost, it is applicable to our current algorithm society insofar as there is widespread awareness of the potentially nefarious exploitations of our data as well as some well-developed ideas for conceptualizing and protecting ourselves going forward. Yet words are not actions; our condemnations of data-practices and technological developments will not stymie their growth. Though some may conceive our data-driven society being seemingly in its infancy, more and more information is being collected, stored, and employed in financial, social, political, and other sectors. The debate is not whether the information can be collected anymore; rather it is who is in possession of the information and what can be done with it. After a tumultuous time in the United States, society runs the risk of watching its own wave break and roll back, leaving the beach all but unaltered. Asking questions of data-driven policies and processes that become further engrained in our society is an important start. Expressing outrage with certain injustices and incompatibilities is another significant step. These conversations and actions open up debate, but that is where things need to be pushed one step further. Aphoristic thinking gives people the tools to think about and question what should be done. boyd and Crawford's (2011) provocations about big data give us a starting point for inquiry. Marx's (2018) ratios give us a more specific way for thinking about how to balance the role of big data in our lives. It is now the time that those creating the questions learn – or at least attempt to learn – how to answer them as well. When we talk about the black box society, what is the point of asking to see in the box if we have not the slightest idea what we are even looking at?

The latter quote, a summary of a central tenet of stoic philosophy, presented adversity not as an immutable truth, but as a situation to which we can choose how to respond. While it is true that technology has advanced to such a degree that it is not feasible – or even possible – to expect every individual to understand quantum computing and mechanics, it has become of the utmost importance to at least give it the ol' college try. Postman and Weingartner (1968) argued that "Once you have learned to ask questions – relevant and appropriate and substantial questions – you have learned how to learn and no one can keep you from learning whatever you want or need to know (p. 23)". In this spirit, one need not be timid in the face of the complexity of algorithms and their functions, despite being told comprehension is out of reach. Instead, transforming our thinking about the subject in a more positive manner will result in a better ability to learn – even if only partially. We've told ourselves that

understanding is beyond us – it is time we told ourselves we must be able to reach it.

Above, we outline the structure of thinking necessary to accomplish such a tall task. Pulling from surveillance studies and media ecology, this article argued that spiral structured thought process that oscillates between aphoristic and algorithmic thought has the ability to conceptualize and craft meaningful solutions to the problems of the algorithm society. But it is still important to understand that this type of thinking must be institutionally supported. This involves a renewed commitment to the humanities that enable and empower the type of aphoristic probing of the world that has such grand potential for insight. It also – in equal measure – involves an increased emphasis on mathematic and computational education in primary and secondary schools. All of this pushes towards a truly interdisciplinary education at multiple levels that will serve to empower the next generation. Again, from Postman (1982) – perhaps the unabashed moralist of the media ecology bunch – "children are the living messages we send to a time that we will not see (p. xi)".

In sum, the above article was not intended to serve as a refutation of Gozzi Jr.'s (2002) original argument. The original argument of Gozzi Jr. (2002) was that

> we must conceptually rise above the algorithm, and return to the wisdom encoded in the aphorism. Then we can apply those aspects of both aphorism and algorithm that are appropriate for this situation, in all its uniqueness, here and now" (p. 138).

This sentiment is more important than ever before as humans careen at an even faster rate into the algorithm society. However, twenty years later I hazard to argue that the inability of the wisdom of the aphorism to enact a change in the development of our technologies has been demonstrated time and time again as our technologies plunge further and further from human intelligibility. Coupling explicit knowledge of algorithmic functions with systematic aphoristic reflection may offer a middle-ground for conceptualizing that includes not only unthinkable technological ingenuity, but also the humans that stand behind them. Gozzi (2002) noted the importance of an elder's wisdom in guiding the implementation of algorithms; this article demonstrated that the competencies of this elder must be altered for the 21st century. Of course, this is no small feat. The above article asks software developers to be philosophers and vice versa. It is a tall task on both sides; yet it is integral to the survival of our humanness in the coming decades.

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