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Bernard Stiegler, philosopher of automation and data science in the Anthropocene: A time to care and dream.

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Abstract

I focus my essay on the philosophy of Bernard Stiegler because I think he is the one philosopher who is thinking through the consequences of algorithms and data science. In what follows I give a brief summary of his thought and then discuss the content of his thinking about algorithms, or what he calls automated society, and data science. I then outline a few areas that we can begin to think about how we as professors, teachers, and students can live within the realm of algorithms and data without being authoritatively and completely coopted by them. The intellectual instinct of curriculum scholars is often to dismiss matters that pertain to technology and science as if we were entities separate from the world. The dismissal of algorithms and data science as something unworthy of our intellectual energy comes at a profound environmental, political, cultural, and educational risk. This is fundamentally one of Stiegler's philosophical points and certainly mine too.

Keywords: Bernard Stiegler, Pharmakon, Automated society, and statistical double.

The whole world today knows very well, however, that abandoning things to their course is, within our current situation, *suicidal*: the fact this epoch is *decadent* means that it has run its course...and to not act is to renounce life. (Stiegler, 2011, p. 95)

To care-fully think [panser] the anthropocene is to think from the perspective of a leap capable of *piercing the blocked horizon*. (Stiegler, 2018, p. 210)

I have often viewed my forays into curriculum studies as a matter of happenstance. I did not take any classes as a doctoral student at the University of Pittsburgh in curriculum theory. I was a comparative education student and my first book was on the restructuring of the East German University system and academic politics. I did not consider curriculum studies as a field of interest until after my dissertation defense

Noreen Garman told me to look up the two Bills (Pinar and Doll) as I began my first academic position at Louisiana State University in Shreveport in 1994. I did look them up and they encouraged me to attend Bergamo which at the time was being held in Tennessee. I did, and I have no regrets with my decision to move from comparative education to curriculum studies. In spite of being accepted by my curriculum studies colleagues, I have always felt like an outsider. This status never bothered me because I took it to mean what is it that I can bring from outside of the field to the current debates within curriculum studies? This is why my work has focused on cultural studies, science studies, posthumanism, and now algorithms and data. In each case I felt debates were happening around us that curriculum scholars could participate in, and ideas were circulating in those other fields that could inform our thinking about culture, society, and education. Although we are heavily indebted and influenced by the humanities, and I hope this legacy never wanes, I view the issue of algorithms and data science no different from when cultural studies, science studies, or posthumanism were something new for curriculum studies. Algorithms and data are more prevalent in our world each passing day and the consequences for education and the lives of all of us are never more alarming or stark than they are right now. And there is no hint of conditions getting better. If this does not grab your attention and warrant your intellectual curiosity, then I am afraid you will soon be lost and out of touch with our dystopic realities.

I focus my essay on the philosophy of Bernard Stiegler because I think he is the one philosopher who is thinking through the consequences of algorithms and data science. In what follows I give a brief summary of his thought and then discuss the content of his thinking about algorithms, or what he calls automated society, and data science. I then outline a few areas that we can begin to think about how we as professors, teachers, and students can live within the realm of algorithms and data without being authoritatively and completely coopted by them. The intellectual instinct of curriculum scholars is often to dismiss matters that pertain to technology and science as if we were entities separate from the world. I wish to end this introductory comment with a warning that the dismissal of algorithms and data science as something unworthy of our intellectual energy comes at a profound environmental, political, cultural, and educational risk. This is fundamentally one of Stiegler's philosophical points and certainly mine too.

A quick introduction and summary of Bernard Stiegler's thought on an automated society and the Anthropocene

Bernard Stiegler is without a doubt a very unique philosopher. Stiegler was not attracted to philosophy until he was serving time in a French prison for armed robbery

in the 1970s. He referred to prison as “asceticism *without end*” (Stiegler, 2009, p. 19, italics Stiegler’s). Through a prison outreach program Gerard Granel introduced him to French philosophy. Upon release he eventually found his way into a doctoral program where he began to apply the Greek term *Pharmakon*, meaning to heal and poison, to modern technology. His first works of note were interviews with Jacques Derrida *Echographies of Television* (2002) and his now famous trilogy *Technics and Time, 1: The fault of Epimetheus* (1998), *Technics and Time, 2: Disorientation* (2009), and *Technics and Time, 3: Cinematic time and question of malaise* (2011). It is in these works that he demonstrates the many ways that all forms of technology are a form of human healing and poisoning that is not alienating to human subjectivity but very much an extension of human creativity and living. Stiegler’s work on algorithm’s and data science is an extension of his work on other forms of technology. He committed suicide in 2020.

For Stiegler, Human life has reached a point of epochal and world destruction. We are at a blocked horizon in which we cannot think and dream a way out of the earth’s point of destruction. We are at a moment of perfect entropy in which we must find a negentropic horizon or face suicidal consequences for our inability to see past the present and move forward to another way. Most of the world’s population has become proletarianized in which their work is disconnected from their psychic individuation. Their work has not become life affirming but a job in which work is redefined as a process to gain access to the act of consumption. Even this state of (non) being is threatened by the rise of an automatic society in which there is little time to think or to care to think about what it is that defines the human world within the world beyond that of consumption and constant movement and the registration of data points. The speed of algorithms to collect, organize, and to present data as meaningful without human action renders human thought unnecessary. Human purpose in computational capitalismⁱ is to keep moving, keep generating data even when we are resting so the system can continue to collect, organize, and distribute. This state of computational capitalism creates a form of algorithmic governmentalityⁱⁱ in which a statistical double of psychic individuation (the individual) and collective individuation (society) and as a result transindividuation (past and future generations and our genetic heritage) takes the place of the real individuals, society, and future generations. Society moves on autopilot like a driver-less car except in a driver-less car the passenger must still sit behind the wheel. In the automatic world the doubled human need only produce data, nothing else is required. There is no need or room for thinking, caring, or dreaming. Just construct the statistical double, produce data points, and watch a world emerge. The data will provide humans with the choices and the algorithms will crunch the data.

This ordering of life as a statistical double in an algorithmic network need not be the predestined outcome of computational capitalism and the proletarianization of

humans. There is a negentropic alternative universe that can exist within the confines of industrial democracies. We, psychic individuation humans must think and dream it carefully. We must take the time to think and dream it. We must invent this possibility and construct a new art of life and we need not do it by destroying industrial societies, algorithmic networks, or even automatic worlds. We have to recognize the pharmacological nature of our world. The current state of affairs is suicidal as Stiegler's first epigraph warns and to not act is to renounce life. But we cannot accept that computational capitalism and algorithmic governmentalities are inevitable. They are powerful and deceptively convenient for the unthinking, but they are not givens. We can think a new cure to the current ailments of our world. It requires a new science, a new pedagogy, and a new commitment to thinking, caring, and dreaming so a collective individuation can emerge with a new energy that reinvigorates thinking and alternative ways of being develop that humans can pass onto the generations to come. A negentropic alternative to the entropic world we are inheriting requires us to travel through Bernard Stiegler's philosophy in order to understand the serious threat to all life the current state of affairs contains as an entropic culmination of one epoch and the need to think care-fully through an alternative that can reenergize and save the planet and human life for a new epoch of earthly being. This will require us to rethink our work as human beings and reconnect to the generations to come so they know that it is not good enough nor healthy enough at the individual, collective, and generational levels to not think through care-fully what it means to create and invent. We, as actualized humans, have to invent our being through data and algorithms in order to prevent our disconnection from our work.

Computational society and its pharmakon

The problem with our current social ordering, an Anthropocene society leading us to the brink of entropic death spiritually, environmentally, politically, economically, and culturally, is not capitalism, algorithms, data, work, or governmentality. It is how humans construct their (non)thinking around these issues. As Stiegler notes in *The Decadence of Industrial Democracies* (2011, p. 46) capitalism has always worked from the premise that it is an open system in which risk is required and the future is open but this promise has been threatened by computational capitalism and automation. Capitalism has become "hyper-industrial to the degree that it is hyper-computational, insofar as it is capable of transforming everything into numbers" and "is encountering its limit and entering into a zone of very great danger." Moreover, this hyper-computational society can do this at a speed that no human can maintain or keep up with. This state of affairs has created a new wave of proletarianization in which individuals are disconnected from their own knowledge. The new proletarianization has been presented as a given, something that cannot be changed except through sheer

individual will of an elite few. In fact, Stiegler reveals that purveyors of the current state of computational capitalism believe it marks the end of theory. The algorithms will do the theorizing for humans and we can trust them because they are neutral and do not carry the discriminatory baggage humans transmit into their theories. Algorithms are our friends and we can trust them. Stiegler offers a more nuanced approach to our computational society. For Stiegler proletarianization is indeed caused by the digitalization of society but the digital realm like any tertiary retention form (technological modes of human remembering and learning such as cinema, television, paintings, or algorithms) does not necessarily have to lead to the separation of humans from their work, their inventions and creations. Stiegler (2016, p. 32) notes “*the fact of proletarianization is caused by the digital, which like every new form of tertiary retention, constitutes a new age of the pharmakon.*” That is, the digital epoch very much can lead to further and deeper alienation of humans from their work as well as from their environment, local, and literally, global, but it is not a fact nor a given as capitalist apologists seem to insist no matter what the dire consequences may be. The digital can also be the cure, the therapeutics as Stiegler refers to them. But we must do the thinking through of the implications of a computational society and care-fully present alternative ways to dream a future that reconnects psychic individuals to their work. The problem is not that digitalization of life through data collection and algorithmic formations it is the assumption that the only way to order these life forms is to disconnect humans from their lives and ensure select humans will have unfettered access to their infinitely growing cash flow. In the digital industrial world this leads not only to extreme alienation of most humans from the good life of contemplation it threatens any form of democracy and all other species of life on earth.

Here is one area where curriculum scholars can make a difference in the discourses surrounding algorithms and data science. We can challenge the proletarianization of workers by creating a currere/ algorithmic project that reconnects the life projections of individuals with the knowledge they create. Algorithms in a currere project can enhance individuals' thinking by replacing the current plugging in and downloading experience of education that renders thinking a matter of cutting and pasting with an educational experience of sculpting and customizing to fit individual needs and interests.

A Currere/ algorithmic project would connect the shallow history of data accumulation and amalgamation with the in-depth history of individuals. Algorithms and data encapsulate history, human clicks, (more than) human activity, but this history is based on utility, an efficiency and expediency, which is why it is a shallow history. Individual histories are lived completely, never captured completely but of substance and meaning that algorithms and data never can capture. To put it another way

algorithms are efficient means of collecting information that can be quantified and is called data while currere is an in-depth, multidimensional forward and backward examination of the history, philosophy, psychology, sociology, anthropology, artistry and scientific matters of (more than) human life. If we, as curriculum scholars, leave algorithms and data alone we assure humans a less meaningful life. If we add the history of curriculum studies with its forays into philosophy, cultural studies, post-colonial thought, posthuman, anthropology, gender studies, queer studies, indigenous studies, and other (non)disciplinary traditions we can add the richness of life that our educational, political, economic, and cultural institutions require. Algorithms may be a fixture within contemporary societies and data may be everywhere, but they are never a guarantee of anything important or life affirming.

Speed Kills

The pharmakon of algorithms and data requires humans to create solutions to their speed addiction. Algorithms and its surrogate, computational capitalism, are seen as fact and cemented realities because they seemingly do everything we humans want to do. “The process of transindividuation [transferring culture, social norms, economic ideals, political beliefs, religious rites from generation to generation] and the transindividual [next generation], for Stiegler (2016, p. 149), are replaced by the transdividual and transdividuation [the statistic double of the human for example], *automatized and concealed by the speed of their production* and founded on this high speed.” This speed appears to be convenient and harmless but it is transforming individuals, societies, and coming generations into something else that is emptied of knowledge, thought, care, and vision for possible different futures. Our task as humans is to create and invent ways to think against the current of speed without thinking it is possible or necessary to think as fast as algorithms. Algorithms will always think faster—faster than my ability to type accurately my thoughts on this page as I fumble for the right words and correctly spell in a grammatically correct form to convey my concerns. Just because algorithms move faster in our society does not mean algorithms do not have limits. This is where humans come into play and need to come ready to play. Humans need to think care-fully, and slowly the limits of algorithmsⁱⁱⁱ. What are algorithms hiding even as their spokespeople promise human neutrality in the creation of non-discriminatory algorithms? If algorithms are free of human discriminatory “flaws” then why do facial recognition systems more often fail to recognize people of color and erase them from history much as Europeans and European-Americans have often tried

throughout modern history? Why are people of color still eliminated faster and without cause from algorithms that determine bank applications for home loans? The algorithms might do a bank loan officers job faster and may satisfy a potential homeowners need for a loan faster, but it will be slower care-fully thinking humans who will need to point out the limits of these systems so people are not erased or ignored in societal systems. These limits can be probed but only if we care-fully wish to probe them. If the controllers of computational capitalism and their managers of algorithmic governmentality are not interested in opening their minds, and the hegemonic forces of the majoritarian groups are not willing to fully care for the rethinking of societal ideals of justice and equality then they are not willing to think care-fully with their fellow human beings and are less willing to think care-fully about the entropic potential of the digital world to usher in a suicidal anthropocentric epoch. This unwillingness will block the horizons for negentropic potentials for a different pharmacological future free from suicidal anthropocentric pacts. The speed of the digital can be used to usher in a new epoch but the human will have to do the work, to think again, requires an immediate commitment to accept the challenge at hand to think care-fully not hastily and carelessly. This will require humans to think within the digital realm, with algorithms and certainly with data. How humans interact within the digital realm of life will determine a different negentropic world that is not on the brink of destruction but on the verge of reemergence.

Thinking, Care-fully, and Dreaming

Part of the pharmacological process that humans live in and with is we have learned that in order to live it is necessary, but not necessarily better, to live inorganically. This has been a consistent theme with Stiegler's thought since the 1970s. What this means is in order for organic living creatures such as humans to live we have learned to invent, construct, adapt the inorganic to enhance our lives. Stiegler has referred to this as organology. Stiegler (2018, p.166) provides an example when he writes: "This organology is composed of sets of instruments equipping and improving upon the organs of perception—such as microscopes and telescopes—as well as instrumental augmentations of the capacities for understanding." When early modern Europe was ravaged by microorganisms microscopes allowed them to see the origins of these illnesses were not a god's will, spontaneous generation, or a miasma. An inorganic microscope allowed humans to extend their vision to see a world that existed within and because of and a result of their own worlds. This inorganic device allowed organic humans to extend their lives and understanding of the earth. The rise of microscopes was part of the analogue epoch. The digital epoch has since replaced the analogue epoch and we are just beginning to interact with the digital to understand

how this organology in the form of computer networks, algorithms, and data are shaping our organic lives. As Stiegler has pointed out this new epoch can very well lead to the proletarianization of more people alienated from their work and their creations, but it also can usher in a new organic/inorganic relationship between humans and the technological. This relationship is never in a state of fact unless it is on a collision course of stagnation or entropy like the Anthropocene, but even then it only appears to be settled and cemented as a fact by the ideologues who suffer from myopia.

The task at hand then for we humans who wish to move slowly in spite of the speed all around us and to work with the digital epoch in an automated society driven by computational capitalism, and algorithmic governmentality is to create a negentropic alternative to a current entropic Anthropocene that is blocking our horizon to envision a future. To understand how we might unblock our vision of a possible different future it is important to begin with what Stiegler means by to think, care, and dream.

For Stiegler we are an amalgam of people that are simultaneously psychic individuations who have dreams, hopes, and visions for a future that make us unique from other individuations. We are also collective individuations or societies who share their cultures, beliefs, and histories with others and live through these creations and then pass them onto transindividuations who represent the generations to come. Humans pass these forms of individuation onto one another via retentions. There are primary retentions or experiences individual humans accumulate through direct unconscious experiences and genetic, accumulated experiences that shape our reactions and experiences to the outer worlds. Secondary retentions are our memories that make it to our conscious level and shape our direct experience with ourselves, others, and the environments that surround us. Tertiary retentions are hypomnesic^{civ} that shape our memories through exosomatic technology of any kind including the first known versions of paintings on cave walls but they can also take the form of writing, cinema, and digital technologies. All of these hypomnesic retentions are forms of organology. As humans we cannot live without them and cannot avoid their impact on our noetic (rational, thinking) lives. To deny the influence of organological systems in our lives is to deny life. The organological systems are pharmacological in that they can create poisons or they can heal. When Stiegler discusses the need to think he is referring to the unavoidable necessity to think with(in) and alongside of organological systems. How humans think and what humans think shapes the relationship humans have with their organological systems. The issue for Stiegler in the new epoch of digital systems, computational capitalism, and automated governmentality is how do we create a new way of thinking that is not blocking our horizon to think the future and contributing to an Anthropocene order that is suicidal?

To think for Stiegler is to challenge the reduction of life to economic exchanges. That is, the reduction of life to a belief system that proclaims all human experiences are possible economically profitable data points, and the only possible way to succeed in life is to accept that algorithms control our society for the better. There are alternative ways to think within our digital epoch. We can rethink what knowledge is. "Knowledge takes time. It takes nighttime to sleep and dream," Stiegler (2016, p.84) suggests, "and daytime to think, reflect and act by determining the contents of good and bad nightdreams in order to materialize and transmit them and to receive them from others, and also to struggle: to learn what results from dreams and reveries, the reflections, theories and inventions of others." Thinking requires humans to remove themselves from the 24/7 (a phrase Stiegler adopts from Jonathan Crary's work (2014)) world in which there is no end to a job, no sleep just production of data for algorithms to constantly turn into points, metadata, and a perfectly ordered society with working traffic lights, targeted advertisements, instant gratification, and consumer citizens. The removal from a 24/7 algorithmic society is not complete or permanent but the removal creates the time to think what it means to be human in a more than human world, and more importantly this time to think allows individuals to dream something new and unique into existence that can help define individuality and construct a new horizon that is not suicidal or repressive. To think is to care for one's self, others, and the worlds that exist on earth. "To think [penser]," Stiegler (2018, p. 205) notes, "in order to care [panser] is to 'try to live' ...as Georges Canguilhem treated it [panse] when at the beginning of *Knowledge of Life*, he stated, as a starting point and as a point of method, that is a way of opening a path". To think is to dream, to open a new path of thinking in order to create a new horizon of what can and should be. Can you think of a different way to aggregate the data to point to a new method, a new way of ordering the world, that does not always point to positivistic claims of empirical monopolies that erase all voices that are outliers? (This is where a currere project can challenge the assumption that algorithms and data are given and dictate a certain path in which humans need not think or dream, just click.) Can you open a path to a new horizon that breaks the epistemological and ontological backs of the suffocating binary of quantitative and qualitative research in education? Certainly in the analogue epoch of binary, positivistic thinking there was thinking but is it now just good enough, protocol-following thinking or is it care-fully thought out thinking? A new pathway leading to a new horizon requires care-fully thought out thinking. This does not mean we cannot or should not act until we know exactly what we are doing and know exactly what is going to happen as soon as we launch our new pathway, our new methods, and our new way of thinking. This would not be a new pathway. It would be madness. Stiegler has already shared with us what to think care-fully means. It means to recognize that our current computational capitalistic system is taking the earth to the brink of environmental suicide and has already crushed the spirit of billions of people who have stopped living,

stopped hoping for a new generation to be nurtured and prepared for their future. This too is madness. To think care-fully is to accept that a new horizon must be broached and new ways of approaching that horizon are needed as we begin this new digital epoch. To Think care-fully is to think pharmakologically. Algorithms need not lead to better test scores, better job placements, better lesson plans, or better classroom management. To think care-fully can mean to unleash students to accumulate and aggregate data on their own and for their own purposes. What kind of schools would students and teachers create if they were allowed to do anything with any data they accumulate in order to create a learning environment? How different would schools look if students and teachers were taught to create their own algorithms? The horizon these students and teachers would be creating I could not predict, but I do know they would be on a new path of thinking care-fully.

They would be dreaming. They would be taking the time to dream a different relationship with the algorithmic world. It would be “a matter of working to develop *noetic* circuits of digital transindividuations, which are currently still severely lacking...Such a programme is a dream...This dream *programme* posits that *tertiary retention [hypomnesic retentions] proceeds primordially from dreaming*, and from a specific type of dream: the *noetic* dream such that it may become thought...The *dream that thinks* leads to *realizations* (technical inventions, artistic creations, political institutions, economic enterprises, movements of all kinds)” (Stiegler, 2016, p. 71-72). To dream is to work with the automatic society and still create rational, thinking inventions that are dependent on technological assistance and only possible through organological contributions but nonetheless they would be psychic individuation creations that help define the uniqueness of one psychic individuation or individual who then could pass their inventive spirit onto the next transindividuation or generation so they can learn how to dream with the organological world that surrounds and inhabits them. This is what Stiegler (2018, p. 253) refers to as the “reinventing an ‘art of life’” from the very organological worlds that gave rise to the suicidal Anthropocene of calculation, automatization, and 24/7 data collection from human activity. It is a matter of “reinventing interpretative tools...It is not a question of *resisting*...but of *inventing*.” (Stiegler, 2018, p. 254)^v

This inventing requires a new science to emerge. Just as new fields of knowledge emerged as the industrial and analogue epochs ushered in new fields of knowledge such as economics, engineering, chemistry, and biology so too the digital epoch needs to invent new fields of knowledge and new branches within old fields of knowledge. “It is a question of thinking,” Stiegler (2016, p. 196) suggests “science, opened up as *open science*. Such an open science is necessarily a work of science—a transformation, and in this sense an *energeia*. We conceive it as both *skhole* and *otium*, which are not the

opposite of *negotium*." This new science is not like Robert Boyle the aristocrat who helped create modern science in his leisure time because "real, manual" work was beneath him. It is a science of freeing organological humans from the calculation of automation. It would be new sciences that would create a stronger and more natural bond between science and democracies that value all life. The post world war relationship between science and democracies was accidental and born of necessity and these ties are being eroded daily by multinational corporations and the reduction of science to economic manipulations exposing the current arbitrary and opportunistic connections between science and democracy. A new science needs to be invented that becomes a foundation for thinking care-fully of how the digital epoch can free organological humans from the suicidal tendencies of the Anthropocene and the lifelessness of automation that requires nothing from humans except constant data production. This is life without life and new sciences can help reestablish bonds between human life, a vibrant livable earth, and the digital realm of technology. These new sciences are already emerging in the form of critical data studies and in the work of Safiya Umoja Noble (2018) and Ruha Benjamin's (2019) work on racism, algorithms, and technology, Catherine D'Ignazio and Lauren Klein's (2020) work *Data Feminism*, and Rob Helfenbein's (2021) work *Critical Geographies of Education* in curriculum studies. There is another way a new, open science needs to emerge in relation to leisure that Stiegler notes. Any new science has to be open to a constantly shifting environment in which not only are experts contributing to the data bank of knowledge but so are "amateurs"^{vi} who are reinventing the configuration, collection, and meaning of data to construct a different way of looking at the data and more importantly a different way of living in the world and living within a field of knowledge. A new science will have to demolish another binary, the quantitative versus qualitative one. It will have to reconfigure what is meant by an expert and an amateur, and experts will have to be less defensive in who is allowed into their inner-circles of knowledge creation and promote more porous borders to allow more people into to their inner circles of knowledge construction.

A new, open science will be more poietic than perhaps science has ever been before or perhaps more than it was willing to recognize anytime before. "'True' work," borrowing from Oskar Negt, Stiegler (2016, p. 215) notes, "is a poiēsis that responds to the 'need the individual feels to appropriate the surrounding world, to impress his or her stamp upon it and, by the objective transformations he or she effects upon it, to acquire a sense of him- or herself [and themselves] as an autonomous subject possessing practical freedom.'" This would require science to allow anyone who expresses an interest to "play" with data and to construct it in ways that current standards of science might not call reliable or valid. Science would have to be open to the possibility that a new way to look at data is possible and this new way that was constructed is in fact

reliable and valid but in a different, paradigmatic shifting way. This playing with data would by its nature be a life affirming act defined as a poetic expression of one person's life. In turn this one life affirming act would be nurtured by the science community and other possible communities so as to encourage other individuals to do the same with data in order to construct meaning for themselves and potentially others.

To go with this new science there is a need for a new pedagogy to emerge, and a currere project can create this new pedagogy. Like most philosophers since Plato Stiegler has been interested in pedagogical issues from the beginning of his career. In his co-authored book with Jacques Derrida *Echographies of Television* (2002, p. 54) Stiegler asks Derrida pedagogically how might television be utilized. Derrida responds with this answer: "What is possible and, in my opinion, desirable are not legislative decisions concerning the production and distribution of whatever it is, but open programs of education and training in the use of this technology, these technical means. You would have to do everything possible so that, citizens or not, the users of these technical instruments might themselves participate in the production and selection of the programs in question." In other words, teachers and students would learn to work with these technologies and produce what they find important in regards to television programming. This approach to technology and education has never left Stiegler's thought processes. In regards to the tertiary retentions Stiegler refers to as hypomnesic such as the digital, data, and algorithms, he has a specific vision for primary, secondary, and tertiary education. For Stiegler (2015, p. 214) the university should "become the principal partner of public power in reviewing audiovisual and digital media policy, and, more generally, it must prescribe new editorial functions made possible by digital retention." The university needs to become a place of experiment and invention where digital systems of retention are created but not for the professors, university, and some start-up company to create a profit for themselves. The university should be experimenting and inventing in order to demonstrate to all individuals how digital retentions can be utilized to create new modes of thinking and living with(in) the earth. He argues for the same thing for primary and secondary teachers. "Teachers," Stiegler (2012, p. 214) believes, "should become practitioners of the apparatus of production of academic tertiary retentions in each of their disciplines, just as they should be trained in the study of the role of tertiary retention in general." Teachers have done this for a long time. A tertiary retention for teachers and students in a literature class, for instance, would be a book and it has been societal expectations that when preparing to become a teacher literature classes would be an integral part of their education. For a digital retention society Stiegler is referring to more than these traditional forms of retention. Teachers should be trained how to help students create digital poetry and novels, how to create poetry from data, and how to use data to create new forms of literature. Implicit in any disciplinary approach to learning about digital retentions is the idea that

teachers would learn how to live in an anthropocentric, automated, calculated, algorithmic society in order to teach how to live beyond these dead ends and create a negentropic world filled with life affirming pathways out of the abyss.

References

- Benjamin, R. (2019). *Race after technology*. Malden, MA: Polity.
- Berg, M. and Seeber, B. (2016). *The slow professor: Challenging the culture of speed in the academy*. Toronto: University of Toronto Press.
- Crary, J. (2014). *24/7: Late capitalism and the ends of sleep*. Brooklyn, NY: Verso.
- Despret, V. (2016). "Cosmological sheep and the arts of living on a damaged planet." In *Environmental Humanities* (8:1), pp. 24–36.
- Despret, V. (2022). *Living as a Bird*. Malden, MA: Polity.
- D'Ignazio, C. and Klein, L. (2020). *Data feminism*. Cambridge, MA: MIT press.
- Helfenbein, R. (2021). *Critical geographies of education: Space, place, and curriculum inquiry*. New York: Routledge.
- Noble, S. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York: NYU press.
- Stengers, I. (2018). *Another science is possible: A manifesto for slow science*. Malden, MA: Polity
- Stiegler, B. (1998). *Technics and Time, 1: The fault of Epimetheus*. Stanford, CA: Stanford University Press.
- Stiegler, B. (2002). *Echographies of television*. Malden, MA: Polity.
- Stiegler, B. (2009). *Acting Out*. Stanford, CA: Stanford University Press.
- Stiegler, B. (2009). *Technics and Time, 2: Disorientation*. Stanford, CA: Stanford University Press.
- Stiegler, B. (2011). *Technics and Time, 3: Cinematic time and the question of malaise*. Stanford, CA: Stanford University Press.
- Stiegler, B. (2011). *The decadence of industrial democracies*. Malden, MA: Polity.
- Stiegler, B. (2015). *States of shock: Stupidity and knowledge in the 21st century*. Malden, MA: Polity.
- Stiegler, B. (2016). *Automated society: The future of work*. Malden, MA: Polity.
- Stiegler, B. (2018). *The Neganthropocene*. Daniel Ross (Trans.). London: Open Humanities.

ⁱ By computational capitalism Stiegler means a replacement of consumer capitalism in which there is not a redistribution of wealth of any kind and the unequal distribution of wealth is governed by computer technologies that help increase the productive of those workers who remain on the payroll while increasing the wealth of the

financial elites and uniquely skilled who understand how to interpret and manipulate algorithms and data produced. Stiegler also refers to it as mafia capitalism.

ⁱⁱ Algorithmic governmentality is in reference to Foucault's notion of governmentality but with a technological feedback loop in which new iterations of resistance to the state and capitalist control is constantly swallowed up by hegemonic forces. For instance, when a system is hacked in the name of transparency or public knowledge, the hackers are often recruited to create the next generation of government or corporate I.T. systems in the constant state of war in technological diplomacy and capitalism. For Stiegler the solution is not a constant reinvention of resistance to attempts to control access to data, but rather it is to create more "hackers" or more people who are able to create their own algorithms and data in order to define reality on their own terms.

ⁱⁱⁱ I purposely use the word slowly so as to connect my work with the slow science and slow professor movements. See Isabelle Stengers *Another science is possible: A manifesto for slow science* (2018) and Maggie Berg and Barbara Seeber *The slow professor: Challenging the culture of speed in the academy* (2016).

^{iv} By Hypomnesic Steigler is referring specifically to current forms of technology that are connected to algorithmic governmentality. In *Automatic Society, Volume 1: The future of work* (Stiegler, 2016, p. 19-20), hypomnesic is a manifestation of the digitization of life that "are today generated by interfaces, sensors, and other devices, in the form of binary numbers and hence as *calculable* data, forming the base of an automatic society in which *every* dimension of life becomes a functional agent for an industrial economy". These hypomnesic retentions shape who humans are and how they process reality.

^v Stiegler's idea of invention is very similar to Michel Serres'. They both center invention as the most important aspect of thinking. Stiegler, however, weds invention with critique while Serres sees critique as unproductive and academic gamesmanship.

^{vi} The idea of an amateur should not be placed into a hierarchical binary with expertise. I am thinking here more of Vinciane Despret's (2016; 2022) notion of amateur in which an expert without academic credentials such as a sheep herder or a non-university credentialed bird watcher can provide important insights into animal behavior. In this vein amateur data collectors and creators of algorithms can teach us how to create meaning from data and how to utilize algorithms for our own goals. In this way any student in a classroom who collects data or creates their own algorithm is by definition an amateur but they are creating meaning from this process and defining what the data can mean and how it will be used. These acts disrupt hierarchical power dimensions at the political, economic, societal, and intellectual levels, and these disruptive acts should be encouraged at all levels of learning.