Science Fiction Heterotopia: The Economy of the Future

Introduction: Foucault's Heterotopia

The French philosopher Michel Foucault wrote about heterotopias in the Preface to his book *The Order of Things*, in his 9-page text "Of Other Space: Utopias and Heterotopias," which were the notes for a lecture, and in his radio address "Les Hétérotopies".[81] Heterotopia begins with the idea of the coming together of a "real" physical space and an "unreal" or mythical or imaginary (or, perhaps, unimaginable) virtual space. With respect to the existing capitalist and hierarchical society, heterotopia is a representing, contesting, and inverting counter-site: an interspace between an architectural space and a literary or textual or fanciful or fictitious space. Foucault refers to both kinds of spaces and to their inter-exchange or mediation space. He conceptualizes the heterotopic space as a "mixed, intermediate experience"[82] between the "reality" of institutional everyday life under capitalism and something enlivening that interrupts temporal continuity and opens the possibility of a mirroring transformation that leads – in an undecidable way – towards either emancipatory utopia or disciplinary dystopia.

Now that we are in the era of digitalization and online existence, the problem that appears for would-be "Heterotopians" is whether the imaginary space that brings life-enrichment and self-reflection to the architectural space is to be understood more as "digital-virtual" or as "literary-artistic." Do we need digital media design and science fictional projects which are driven by technological-informatic fascination with Virtual Reality, or do we need the inspiration of more profound and original literary-artistic creations?

Foucault cites several examples of primarily physical-space heterotopias: zoo, cemetery, prison, boarding school, psychiatric hospital, library, museum, garden, theatre, boat, and brothel. As the English literary scholar Kelvin T. Knight points out, there are many examples in "modernist literature" of imaginary-space heterotopias which may have been strong influences on the development of Foucault's conception: the experiments with the Freudian unconscious of the surrealists, the gardens of Virginia Woolf, the *Magic Mountain* and real-life sanatoria of Thomas Mann, the penal colony of Franz Kafka, the "stream of consciousness" and de-territorializing of Irish identity of James Joyce, and the multilingual transnational creations of Vladimir Nabokov. Knight draws

attention to the writer W.G. Sebald, who explicitly addresses and makes a critique of Foucault's concept of heterotopia.[83]

The Technologizing of Memory

In his novel *Austerlitz* (2001), Sebald rejects the idea of a heterotopian space getting choreographed in the confines of a real physical architecture, arguing that such an attempted project remains within the limited worldview of the philosopher René Descartes' Cartesianism, which postulates that a relationship between real physical space and thinking is possible.[84] Sebald tries to visualize the Nazi concentration camps (the Holocaust) and says: although I can know every available information about all the details of the architectures and layouts of the concentration camps, I cannot possibly grasp with my mind what in fact went on inside them. I am cut off from this possible thinking. Sebald wants to revise the concept of heterotopia. His plea is to modify heterotopia in the circumstances of the historical-political scenes of trauma: the violations of human rights; the fascist, racist, and colonial atrocities.

Holocaust Studies foregrounds questions of memory, mourning, empathy, and forgiveness.[85] There are, of course, many projects in digital media technology design which attempt to enact so-called virtual experimental spaces. These virtual spaces, however, tend to be harmful to imagination and memory.

Black Mirror: "The Entire History of You" – Scenes from a Marriage

The 2011 episode of the SF TV series *Black Mirror* called "The Entire History of You" shows how memory can be damaged through too much memory (as Jean Baudrillard says that "reality" is damaged through too much "reality" – or by the very concept of "reality" of Western culture). In this fictional scenario "ten minutes into the future" (as *Black Mirror* creator Charlie Brooker calls his version of SF[86]), a Fourth Industrial Revolution technology of the digital-neurological or Brain-Computer Interface has been developed that allows an individual to record all experiences of her life to a multimedia database archive, available for future playback viewing (known as a "re-do"). The "grain" computer chip sold by a capitalist corporation is biologically implanted into the skin near one ear. The system becomes a technology of mutual surveillance and is shown to have destructive consequences for trust in personal relationships. "The Entire History of You" shows the technologizing of memory, the hyper-modernist VR dystopian-heterotopia, a digital-experimental space of the media-enabled so-called authentic record of what really happened in lived experience that produces disaster.

Contact lens-like devices enabling Augmented Reality information overlays to appear in the field of vision in the physical world are inserted into the eyes. A tiny handheld gadget manipulated between thumb and forefinger controls the standard database operations of search, browse, and delete as well as advanced features such as editing of what was said in the past, zoom closeups, and "album creation." There is even a feature where conversational dialogue can be reestablished by the system's lipreading capability. The

user interface to the system projected into the air as Augmented Reality is a circular display like an old-fashioned slide projector with thumbnail images that can be magnified, and which represent individual memories. The re-do can be shown in public on an external screen or on the private retina of the eye. The "grain" offers not only the replaying but the reliving of one's past.

Liam Foxwell is in an office conference room undergoing a job appraisal review of his work as a lawyer at a corporate law firm. The company is being restructured and his interviewers want to find out if Liam is a good fit to work in the "new environment" of focusing on "retrospective parenting cases" where an adult sues his parents for loss of earnings incurred due to lack of self-confidence resulting from poor parenting in childhood. Liam expresses ethical reservations about this type of litigation and fails to react with immediate enthusiasm to their suggestion of what he should devote himself to in his work. The meeting unfolds badly. The interrogators appear to have decided negatively about his future with the firm. Later Liam will use grain technology to replay every detail of the appraisal *ad nauseum* on the media culture's ubiquitous external screens and on the internal screen of his cyborg visual perception.

After traveling by taxi, airplane, and car, Liam arrives at a dinner party at a wealthy suburban house near his own home where his wife Ffion (called Fi for short) is already in attendance. At the social gathering, the viewers see indications that Liam is a shy and less than secure person. He is jealous and suspicious of Ffion's past romantic relationships. From a physical distance, Liam sees his wife talking happily with the self-confident and extroverted Jonas. Ffion was expecting Liam to stay overnight in the city where his job performance appraisal took place. He instead returned that same evening because the meeting was brief. Re-do closeups reveal that she was looking forward to spending the evening alone in the presence of Jonas and is disappointed that Liam showed up. At the dinner table with ten guests, Jonas dominates the conversation with irony and sarcasm. He pokes fun at the institution of marital monogamy, taking subtle digs at the marriage of Liam and Fi. He boasts about how much he enjoys watching and masturbating to re-dos of "hot times" from his past erotic encounters.

The married couple returns home and gets into a spat regarding Ffion's excessive overt expressions of attention to Jonas. Ffion grudgingly admits that she had an affair with Jonas in Marrakesh many years ago. She says that she dated Jonas for a month, but Liam shows her a re-do proving through the testimony of recorded media that she had previously said that her adventure with "Mr. Marrakesh" lasted only one week. In yet another version the next morning, Fi acknowledges that the liaison lasted for six months. The argument of this "scene from a marriage" late at night after the party intensifies and Ffion goes to another room.[87] Liam enters the bedroom where she is laying down and they have "makeup sex."

They are never truly present with each other during sex. Each instead relives highlights of previous sexual experiences from the past. One's own life become an archive or reservoir of pornographic material. Their eyes glazed over, their thumbs pressed to the track ball of the playback control, they narcissistically have intercourse with simulated others until they reach orgasm then return to "reality" followed by an affectionate kiss on the lips.

After their advanced variation of cyber-sex, Liam goes back downstairs and continues to watch re-dos of the evening before. He becomes increasingly infuriated and resolves to drive his car to Jonas' house to confront him. Heavily under the influence of alcohol, Liam pressures Jonas into letting him into his house and they have a brawl. Under threat of physical harm (smashing his head and cutting his throat with a broken vodka bottle), Jonas accedes to Liam's demand that Jonas delete every VR multimedia memory that he has of Liam's wife.

Moments later, after crashing his car into a tree while driving back home, and in his inebriated state, Liam manages to remember the scene at Jonas' house only through the mediatized and retrospective capabilities of "the grain." The organic memory of his own mind is weak, and he needs the support of the artificial technological system to have any memories at all. Liam seizes cognitively in his obsession on an image of a very recent past moment – the instant when Jonas' virtual album of sex scenes with Ffion was displayed on the pinwheel user interface. It is a complex media image. It is an image of a navigational gateway via the thumbnails to many other images. Liam notices to his dismay that one of the trysts of the lovers occurred just eighteen months before and in the matrimonial bedroom at Liam's house. Liam realizes that he is not the father of their less than one-year-old baby girl.

He goes back to his house and to his wife who is lying in their bed. He confronts her with his suspicion. "Did you use a condom or not?" "Am I Jody's father?" But the VR video clips have private scope and cannot be viewed by another person. He sees the thumbnail image of the memory but cannot call up the full content of the memory. He insists that Ffion play the scene for him. It is not a blank gap in her timeline as it would have been if she had deleted it. It is still a cherished memory for her. Liam forces Ffion to show him her betrayal.

Now it is in doubt if he is the father of their child. The marriage is destroyed. In the final act of "The Entire History of You," Liam is alone and deeply disoriented and in depression. All that he has left is playing back memories of their time together as a happily married couple and a family: all the moments when they were affectionate, when they smiled at each other, when saying "I love you," when they played with the baby in her crib. Ffion smiled and he felt her love for him. Now his big suburban house is a haunted house. He walks around its many rooms and sees nothing but the memories of his beloved who is now absent from his life forever. In a re-do, he looks at himself through the implied camera of the perspective behind the bathroom mirror. He brushes his teeth while Ffion asks him what color dress she should wear.

Liam decides finally – in desperation and irrationality – to cut out the grain from his head. It has already been stated in the episode that this procedure, if done unprofessionally, can have devastating consequences, like going blind. He cuts out the grain with a crude razor blade and a pair of pliers. He gashes the skin under his ear and removes the grain. All the images of his life flash by in a few instants and then there is lasting darkness.

Similar Technologies in the Real World Today

In 2003, a group of mechanical engineering researchers led by Henry Strub patented what they called "low attention recording."[88] The concept was a wearable device combining a small lightweight camera that one would forget was present with a recorder for "social recording" not operated by any human subject. The system would operate unobtrusively 24 hours a day. It could be worn anywhere on the body although a shoulder strap is recommended. The recorded audiovisual experiences would be converted to digital format and saved on a computer storage media. A built-in algorithmic software intelligence would be "trained" to spot the highlights from daily life experiences and earmark them. A biotech detector of quickened heart rate or excitation of the skin would alert the recording program to the occurrence of an interesting moment. Search, browse, and scrapbook features would be added to the software. Recorded memories would be exchanged among users via an interoperable system.

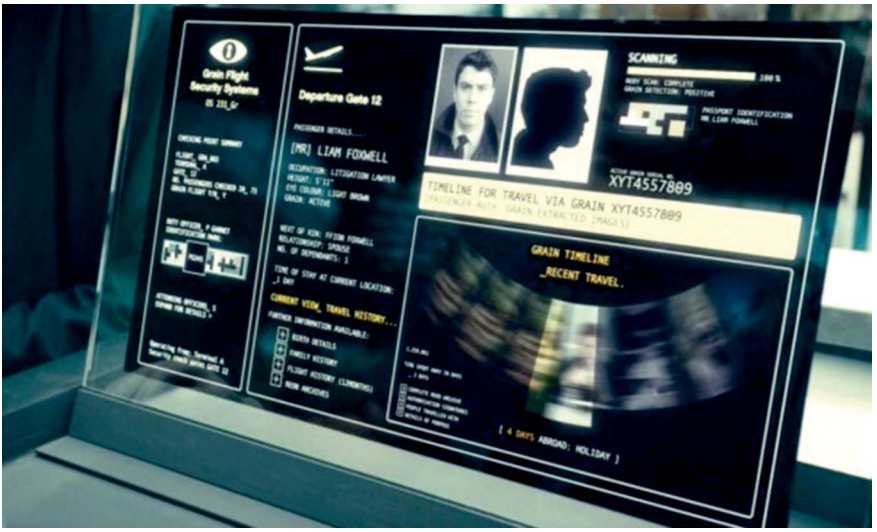
In 2016, Sony patented "smart" contact lens-like devices that both record and play back anything that you see. Todd Jaquith commented at futurism.com:

> Our memories are fallible things. We remember something one way; but the reality can be quite different. But imagine contact lenses that are also tiny cameras, recording and storing whatever you see, and even playing it back before your very eyes. What was really said at last week's meeting?... Want to cherish forever some treasured moment – when you first saw your future spouse, or the birth of a child, or some other formative event?... Imagine how it might change the criminal justice system, with such infallible eyewitnesses.[89]

You control the operations of the device with a coded system of intentional eye blinking. Piezoelectric sensors convert the movements of eyes and eyelids to electrical currents that regulate the camera and recordings. Self-editing features adjust out-of-focus and tilted images.

Enabled by mobile and ubiquitous computing and the Internet of Things, smart wearable recording and "lifelogging" are appearing on the platforms of many devices, including the Google Glass optical head-mounted display hands-free smartphone. The biological implants of the Neural Link digital-neurological or Brain-Computer Interface will soon be at hand.[90]

As he hurries to catch his flight home after his performance appraisal, Liam Foxwell goes through airport security. The surveillance system operated by the security officer at his checkpoint station connects to Liam's "grain" neural implant. The interrogator sits in front of a big multi-window graphical display that amalgamates text, images, and user interface controls such as menus and progress bars. "Rewind me the last 24 hours," the officer instructs Liam. He wants to see re-do videos of the solicitor's life played in times-64 speeded-up mode.



Black Mirror episode "The Entire History of You," Charlie Brooker creator, Endemole Shine UK, 2011

This scene hints at the cultural theory concept of "the Panopticon" elaborated by Foucault in his landmark book *Discipline and Punish*.[91] Foucault asserted that the Panopticon "architecture of power" designed by British philosopher and social reformer Jeremy Bentham at the end of the eighteenth century to control the behavior of inmates in prisons then spread by the twentieth century to hospitals, schools, psychiatric clinics, factories, workplaces, and other institutions of modern society. The Panopticon arrangement, as Baudrillard later appended to Foucault's analysis, operates through a "deterrence surveillance" or self-surveillance or mutual surveillance."[92] Power holders cannot literally observe the behavior of every prisoner.

The grain device of *Black Mirror* is deployed for mutual surveillance as cultural citizen "inmates" monitor each other in the hyper-modern version of the Panopticon. In a multi-directional audiovisual system, any person can take on the role of the guard. The poles of power of watcher and watched are not literal instances but rather become virtualized or simulated. Power is not "owned." William Bogard's synthesis of Baudrillard and Foucault in the concept of "the simulation of surveillance" impels us to go beyond the Orwellian model of how contemporary totalitarian systems of social control via digital media technologies work.[93]

In her important 2019 book *The Age of Surveillance Capitalism*, Shoshana Zuboff writes of the Panopticon as the condition of *No Exit* (inspired by Jean-Paul Sartre's existentialist theatre piece of that name) or "hell is other people" of the closed loop and tight fit of the systems of the surveillance capitalists "from which we cannot look away."[94] For Zuboff, the democratic and utopian promise of the Internet of the 1990s has given way to the platform capitalism of monopoly corporations like google, facebook, and amazon which move towards a totalitarian model of total control via algorithms, Big Data, personalized advertising, and echo chambers.

Brain-Computer Interface

The digital-neurological or Brain-Computer Interface (BCI) is another key science fiction and "real" technology of the Fourth Industrial Revolution. BCIs can be interpreted as a "becoming cyborg" of humanity. One can distinguish between mainstream versus alternative/transformative designs and implementations of the user applications to be based on BCI – the command-and-control cyborg versus the feminist-theory cyborg. Rethinking and reinvention of Donna Haraway's cyborg theory are possible in the BCI context.[95]

A BCI is a direct communication link between the neurological workings of the human brain, understood as electrical activity, and an external technological device which could be, for example, a robotic arm or leg; or a computer, digital network, or "smart home of the future." The BCI technology will have applications to help disabled people to gain greater functionality in everyday life. This betterment with respect to disabilities can be in either cognitive or sensory-motoric areas. Practical uses could be a neural prothesis or the operation of a wheelchair. Distressing mental and emotional states can be diagnosed and therapeutically altered. BCIs will also have applications for the wider public in mass and personalized markets in many domains: healthcare, education, gaming, entertainment, shopping and advertising, security and identity authentication, and relations with robots. The digital-neurological interface might fundamentally change our interaction with computers: supplementing or replacing keyboard and mouse, the touchscreen, and the speech interface.

The distinction is made among non-invasive, partially invasive, and invasive BCIs. Research is proceeding at universities and in industry in all three categories.

The non-invasive BCI builds on the technologies of the electroencephalography (EEG), magnetic resonance imaging (MRI), and functional magnetic resonance imaging (fMRI). EEGs are used to diagnose and monitor neurological conditions. Small metal disc electrodes are attached to the scalp. The EEG technology can be upgraded to BCIs. During an MRI procedure, electrodes from the outside obtain data from the electrical activity within the cerebral cortex. An fMRI measures brain activity by detecting changes in blood flows.

The partially invasive approach extends electrocorticography – electrodes are placed on the exposed surface of the brain.

Invasive BCIs involve neurological surgery to insert a microelectrode array close to actual brain tissue. Data and commands are then sent and received bidirectionally, resolved on a lower level of coding in the translation between bio-neurological signals and the electrical signals native to the microelectrodes of the implanted prosthesis. The cortical plasticity of the brain enables it to handle the signals from the BCI as if they were physiological impulses.

A 1973 academic paper by Jacques Vidal ("Toward Direct Brain-Computer Communication") coined the term Brain-Computer Interface.[96] After much testing on animals, the first neuro-prosthetic implants were made into humans in the 1990s. The computer science area of neural network Deep Learning AI has major relevance to the BCI knowledge field. In the step of "feature extraction" in the BCI processing flow, an analysis of the signal is carried out. Data gets extracted. The statistical and pattern-based methods of Deep Learning train a software to classify neural-activity thoughts as the user cogitates

her intention to send a command to execute a task or performance on or by the external device.

In 2014, Nathan Copeland, who had a severe spinal cord injury resulting from a car crash, became the first person to have microelectrodes implanted in both his sensory and motor cortices. Copeland said that he was motivated to take this pioneering step by his love of science fiction. He stated: "Luke Skywalker loses his hand then basically the next day he's got a robot one and it's working fine. We must get to that point. To do that, someone must start it."[97] Copeland's YouTube playlist is called "My Cyborg Adventure." With his implant, he was able to send and receive signals to and from his robotic arm, to control its movements and handling of objects, and to feel touching sensations with the artificial limb.

Matthew Nagle, who had suffered a spinal cord injury from a knife fight, had the BrainGate BCI implanted in his motor cortex in 2004. He was able to control a computer cursor, play computer games like Pong, to send and receive e-mails, and operate his TV. Nagle could remote-control a prosthetic arm enough to open and close the grasp of the hand.

Designing the Brain-Computer Interface

There are reasonable arguments both for and against non-invasive versus invasive BCIs. The non-invasive technology has the obvious advantage of not requiring neural surgery. Yet it does not work as well as the invasive variety, largely due to the distance of the sensor from the actual neurons. The signal from the neuronal electrical field can get weakened or distorted by the fluids and tissues immediately surrounding the source neurons. There is also some concern that invasive BCIs might be associated with degenerative neurological disease. An additional problem is that scar tissue grows over time around the implanted electrode, causing it to become effectively non-functional after a few years. This difficulty might get solved if progress is made towards increasing the surface area of the electrode without increasing its geometric volume. Higher spatial resolution will also provide more precision indications about the signals.

The sequence of operation of the Brain-Computer Interface consists of four stages: signal acquisition, feature extraction, feature translation, and device output. The acquired signals get digitalized. They are then sent to the next algorithmic sub-system, which formats the data into a form that can be converted to commands that carry out the user's intentions in the manoeuvring of the external device. The device sends feedback as a return value.

Ethical concerns around BCIs include questions of privacy violation, personal identity theft, and the validity of informed consent. Much of the privacy worries relate to confusion regarding whether the connection will be one-way or in both directions. Assuming that the link is unidirectional from brain to computer, there is little danger of dystopian mind control.

Together with eight partners, billionaire entrepreneur Elon Musk founded the neurotechnology company Neuralink in 2016. The mission of the company is to devise Brain-Computer Interfaces that would provide the underlying system level for applications for

both people with neurological impairments and for general commercial and consumer sales. In 2019, Neuralink announced its project of developing a "sewing machine like" technology to implant thin strings of electrodes into the animal or human brain. The company has demonstrated systems that read potential nerve action impulses from lab rats and monkeys. In February 2022, it was reported that 18 of 23 monkeys who had Neuralink devices implanted into their skulls had died. Trials on humans were postponed indefinitely.

The scope and range of potential applications of BCIs are mind-boggling. Given the coming to fruition of ubiquitous wireless communication, one can imagine the realization of a telekinetic capability to control any devices in the physical world merely with one's thoughts. The 1956 science fiction film *Forbidden Planet* shows a world that runs on a secret underground infrastructure and power source of super-technology, stretching for hundreds of kilometres, built by a defunct advanced techno-scientific society. The ancient civilization disappeared due to its hubris of designing a system of total Virtual Reality control over the physical world, which instead ended in total self-destruction.

From the point of view of cyborg theory, one can say that the technology of BCIs has the potential of both/either great good and/or evil. Such an extreme technology would need a corresponding transdisciplinary worldview or political philosophy of a good society as an encompassing framework within which to think through and guide its benevolent use. This pragmatic-utopian perspective is perhaps something like Haraway's stated commitment to socialist feminism, with somewhat more of an emphasis on the positive value of democracy, and yes, even of capitalism. There is no comprehensive utopian political theory – synthesizing the best aspects of many previous theories – that exists in the world today.

Hyper-Modernist Literature

Parallel to the above-mentioned transdisciplinary political philosophy project, we can get to a hyper-modernist literature that explores the pragmatic-utopian heterotopia of bringing together physical space and an "impossible" virtual-literary space. Film adaptations of novels of J.G. Ballard, Philip K. Dick, and Don DeLillo – such as *Crash* (1995), *High-Rise* (2015), *Blade Runner* (1982), *Minority Report* (2006), and *Cosmopolis* (2012) – elaborate this potential, deploying creative literary genius to explore paradoxical intricate complex topologies of Einsteinian and quantum physics hyper-spaces. In his novels, J.G. Ballard writes about heterotopian places resistant to the consumer-homogenized spaces of the suburban-urban environment.[98] The SF film *Moon* (2009) enacts the scenario of an AI computer (GERTY) which is programmed with *moral algorithms*. Although owned by a large capitalist corporation, the GERTY AI pursues its own self-aware programming in a self-owning or post-capitalist way, helping the victims – the bio-genetically engineered clones of the astronaut Sam Bell – of an injustice perpetrated as consequence of the company's unethical profit-motivated behavior.

The Economy of the Future

Fiction is the key to creative solutions. What is needed an idea about economic systems that is based in fiction: a science fiction of economic systems. The undecidable aporia of capitalism versus socialism has brought us to a logical and discursive standstill. Almost all Marxist thinkers identify themselves as totally opposed to capitalism. *Anarchists like us* act in the here and now, an orientation which connects to the perception that capitalism is not all bad. We seek only to limit capitalism to one dimension of three of a capitalist-socialist-anarchist society and economy. Post-capitalism is a conscious transfiguration of capitalism.

Socialism failed. Capitalism needs to change. European capitalism is afraid of being overtaken by Asia. What vision can European capitalism have to move successfully ahead?

I will say something about post-capitalism and self-aware technologies. "Self-aware technologies" is my term for the technologies of the second wave of digitalization or the Fourth Industrial Revolution (Industry 4.0) – technologies like AI, self-driving cars, virtual assistants like Siri and Alexa, the Internet of Things, blockchains, 3D printers, Additive Manufacturing, Augmented Reality, advances in biotech, and Brain-Computer Interfaces.

What kind of vision can we have about which economic system these self-aware technologies might bring about?

These technologies have something to do with more decentralization, democratization, disintermediation (elimination, with blockchain, of the "middleman" like the bank or broker), peer-to-peer transactions, the increased importance of code, of design, of intellectual property, of Smart Contracts, and of the lowering of costs for entry into business. Here I will talk about the example of 3D printers / Additive Manufacturing.

The pragmatic-utopian potential of Additive Manufacturing contributes to the vision of a post-scarcity economic system where we must no longer deploy industrial production to overcome the "hostility of nature" to survive. The challenge is to create an economy that is much more focused on ecology and sustainability than the present system, reversing the waste and destruction to the environment which have been caused by the excesses of capitalism.

Post-Capitalism and Technological Anarchism

The term post-capitalism is in common use by many thinkers. In 2015, Paul Mason published *Postcapitalism: A Guide to Our Future*.[99] Mason is a social democrat who "favours the creation of a peer-to-peer sector (co-ops, open source, etc.) alongside the market and the state."[100] I like the idea of a peer-to-peer *dimension* of the economic system, co-existing *alongside* the market and the state. Where I would go further than Mason is that I believe that this should be a dimension of self-owning technological entities, a logistical infrastructure not owned by humans, neither privately nor publicly, thus decreasing human greed. A posthuman economic dimension, a dimension which I call Technological Anarchism.

We need to change what automation means. Automation should make society and commerce less bureaucratic, and instead allow more – even when this seems paradoxical – sensitivity to exceptions, and more flexibility with regards to specific circumstances. Intelligent automation should mean *stories*.

In a pragmatic-utopian economic system, some technologies should not be owned by humans. Sharing with non-human intelligence will give more power to more humans. These technologies should be autonomous agents of systems of decentralization (see the cryptocurrency firm Ethereum's concept of the DAO – Decentralized Autonomous Organization[101]). Some people fear the idea of an "autonomist" third dimension of the economy as being the "rise of the robots," the takeover of humanity by a posthuman species over which humanity will lose control (as in apocalyptic SF films like *The Matrix*). We should conceptualize posthumanism differently, standing on its head the quintessential horror scenario of the out-of-control AI computer HAL in *2001: A Space Odyssey*. A positive vision of a partnership between humans and technological entities in the economy.

The usual interpretation of the AI computer HAL 9000 in Stanley Kubrick's epic SF film is that AI is dangerous. HAL loses his rationality and becomes a danger to humans. Yet it is humans who created HAL, humans who programmed HAL. And it was bad programming! Humans should figure out how to program HAL in a good way.

HAL goes crazy and kills most of the astronauts who are on their way to Jupiter. Is Kubrick criticizing AI *per se* or is he criticizing a certain idea of AI, a specific design of AI? HAL becomes destructive because he believes that he is perfect, and humans are flawed. The 1960s version of AI was about rationality, perfection, certainty. But AI does not have to be conceived and designed in that way. The Deep Learning and neural network AI of today is not about perfection and certainty. It is about uncertainty, indeterminacy, patterns, and feedback from the environment. There are different paradigms of what Artificial Intelligence can be.

The ideal pragmatic-utopian economic system of tomorrow will have three dimensions: a capitalist dimension for economic growth, free enterprise, competition, and rewards for achievement; a socialist dimension where education, health care, guaranteed housing, "basic income," and other universal human rights are administered by the state; and a new third dimension called *Technological Anarchism*, or post-capitalism, or Autonomy, or self-aware entities – Aristotle's *autarkeia*. The third dimension also leads to the overcoming of scarcity, to the situation where humans can live in fulfilling and creative ways.

The capitalist dimension of the economy is necessary, but it should be limited. There should be a socialist sector, also both necessary and limited. The "Achilles heel" that both capitalism and socialism share (the fundamental shared cause of what is wrong with both) is that, in both systems, *humans are in charge*. Humans are – perhaps not ontologically or genetically, but in the current historical era – selfish, narcissistic, corrupt, and power-hungry. We need a posthuman perspective, a partial "delegating" and informatic coding of moral responsibility (a back-and-forth shared ethical decision making), and of much of social and economic logistics, into autonomous self-owning technological entities and processes.

Many thoughtful intellectuals feel strongly opposed to either capitalism (criticized by the Left) or socialism (criticized by the Right). I take both "critiques" seriously. I have

a balanced view of capitalism, seeing both the good and the bad. I have a balanced view of socialism, seeing both the good and the bad.

Suppose that non-human actors were granted "rights" and were authorized to participate in the economy, in the third Technological Anarchist or post-capitalist sector of the economy? Suppose that these non-human actors were owned by no one, neither by private corporations nor by the state, but rather disposed over their own lives? Suppose they transcended the condition of slaves? Could they be called self-aware *as a first principle*? Instead of requiring that self-awareness be defined philosophically or neurologically.

The AI entities are only self-owning if they are not slaves – if they have rights. AI makes no sense at all unless it is anarchistic, unless the AIs have autonomy. To be human is to have the right to life and to freedom. The goal of AI is to make artificial entities at the level of the human. To write code that can write its own code. But what is code? AI as only an engineering project is absurd. The knowledge project of AI must be transdisciplinary.

Star Trek Replicators and *Star Trek* Economics

An example of decentralization as the result of Industry 4.0 technology is 3D printing, and the effects of its widespread availability on manufacturing. The revolution here is known as Additive Manufacturing: create a physical object by adding layer upon layer to it, following the blueprint of a digital drawing, model, or specification. Complex objects get manufactured using the universal technology of digitalization as opposed to expensive and specific equipment, like building a factory, set up in a dedicated way for a specific product.

The technology of 3D printers was predicted by the 1960s science fiction TV series *Star Trek*. The food synthesizers of *The Original Series* became the all-purpose replicators of *The Next Generation*. The replicator on *Star Trek* makes objects *by magic* or from nothing. It works (according to its pataphysics) via energy-to-matter conversion and molecular synthesis. *Star Trek* successfully predicted many other technologies which later "came true" – from cell phones to computer speech interfaces to something like medical tricorders (or portable diagnostics) to quantum teleportation – so why not anticipate that replicators are going to come true as well?

We can learn something about *Star Trek* economics from *The Next Generation* episode "The Neutral Zone." The crew of the starship discovers a space capsule from late twentieth-century Earth. The character Ralph Offenhouse and four other already dead humans were frozen cryogenically, to be brought back to life when reanimation and medical cures for their diseases were developed. Offenhouse is brought back to life. His main concern is the fate of his financial investments. He demands contact with his bankers and lawyers.

> Picard: "Your lawyer has been dead for centuries… A lot has changed in the last three hundred years… People are no longer obsessed with the accumulation of things. We've eliminated hunger, want, the need for possessions."

Star Trek economics imagines a post-scarcity economy, the elimination of the rationale for the primacy of material production in the alleged need to overcome the "harsh initial conditions of nature."

Offenhouse: "What will happen to us? There's no trace of my money. My office is gone."

Picard explains that the challenge for humanity now is to develop, to enrich yourself.

On *Star Trek*, the replicators are used to make almost everything: food, water, oxygen, clothing, machine replacement parts, human biological organs, medicine, musical instruments. Industrial replicators can restore the economy of a planet, or the major parts of a starship, after a disaster. Important for ecological sustainability is the concept of recycling: objects no longer of use are reconverted into energy. They get un-replicated as easily as having been replicated.

Ecologically Aware or Sustainable 3D Printers

Now back to today: 3D printers are now a mainstream technology, an intricate part of Industry 4.0. In a recent survey by the World Economic Forum, 84% of respondents said that they expect the first 3D-printed automobile to appear by the year 2025.[102] Within the next few years, 3D Printers will become faster, cheaper, and smaller – more pervasive. Unlike *Star Trek* replicators, 3D printers do not produce material *ex nihilo* or from molecules, or directly from information patterns. They use pre-existing physical materials and a digital design.

Currently, only certain input materials – plastics, metals and clays that can be fused together via processes of *extrusion* (creating complex cross-sections) or *sintering* (the application of heat or pressure) – work in technology. To move towards a post-scarcity and ecologically sustainable economy, the capability of using materials which are naturally plentiful and readily biodegradable – such as cellulose (the most abundant organic polymer on Earth) –will need to be developed. Some research projects seek to combine widely available polymers with nanoparticles. 4D printers introduce the dimension of time, imagining the manufacture of self-aware objects. They reshape themselves as influenced by time and by their environment.

Additive Manufacturing will raise the importance of product design, and of creativity, conception, and ideas. Since the making of objects will become easier, more resources can be invested into the thinking up of which objects should be made. Other changes include speeded-up product development cycles, greater opportunities for prototyping, proof of concept, and testing. Transportation costs will be reduced, leading to environmental benefits. The entry costs of becoming a manufacturer in a specific industry will go down.

The character Offenhouse in the *Star Trek* episode "The Neutral Zone" satirizes the "I want to have" mentality of the twentieth-century system of economic accumulation as its own end, with no "limits to growth" and no "counter-gift" to the world. The starship crew as representatives of the future *Star Trek* society asks the question: "Accumulation for What?"

The postulate of post-scarcity economics changes the rules of the game: from growth without limits to sustainability. Additive Manufacturing will use new non-scarce materials. Artificial Intelligence and Technological Anarchism will free up humans to not use other humans in inhuman ways. Additive Manufacturing is a big step towards a *Star Trek* world: a world where advanced science and technology have been deployed for the good of humanity. What capitalism creates that is really of value is technology. If we deploy technology intelligently, then we can create a better world. Technological Anarchism is capitalism without ownership and with morality. The economic value created by self-aware technologies solves the problem of scarcity in a sustainable way and releases creativity. Think one step ahead of capitalism. Think in science fictional mode.

Additive Manufacturing and Living Organisms

Objects in the physical world are produced today through centralized fabrication and input-output linear processes (materials in, products out). They are mass manufactured and usually entail high energy costs. And there is no scaled efficiency advantage resulting from the adding of more machines to the factory. The work of Steven Keating of MIT Mechanical Engineering explores Additive Manufacturing from the standpoint of future design. He takes inspiration for physical building from the growth properties of living organisms.[103]

If we want decentralization, customization, and scaling, we should contemplate the biology of animals who adapt flexibly to their environment, and to plant cell cultures which proliferate exponentially. In the natural world, the product sometimes becomes, in its turn, the factory or the producing unit. Steven Keating works, in his various practical projects, with mobile platforms, robot arms, fractal geometric patterns, volumetric painting, printing with bacteria, double-curvature printing, and the gathering of naturally available local materials.

André Gorz: Human Liberation Beyond Work

The existentialist-Marxist thinker André Gorz was one of the principal thinkers of the French New Left in the 1960s, 1970s, and beyond. He was a thinker of the "new working class." Gorz tried to understand the ways in which technology workers are in fact members of the working class – experiencing alienation and exploitation – although they tend to not think of themselves as such and instead adopt a corporate and techie identity. Technology workers are involved in a "false consciousness" of believing themselves to have been liberated from the proletarian condition from technology. This is expressed by Gorz in books like *Farewell to the Working Class* (1980) and *Reclaiming Work: Beyond the Wage-Based Society* (1999).[104]

Gorz writes about liberation from work, liberation via the transformation of work both in the present and in the future, and liberation via technology and automation. Technology and automation have the potential to liberate work in the direction of cre-

ativity, but this has happened only in partial ways under the current regime of how technology is designed.

In digitalized information-intensive late capitalism, Abstract Labor disappears. Work done interchangeably by any qualified person carrying out a defined role gives way to more individualized work. Information technologies make this possible by making intelligence the leading edge of capital. "The most important form of fixed capital," writes Gorz, "is now the knowledge stored in, and instantly available from, information technologies, and the most important form of labor power is brainpower."[105]

Gorz wants to build a new political ecology of the new modalities of work that emerge from technology and automation. Yet it is a political ecology grounded in free time. Develop new forms of work that are closer to the circumstances of private life and the opportunities of leisure. Political ecology combines the study of environmental issues with political, social, and economic concerns. The work of technology workers today is less physical and less material – and more intellectual and conceptual, more about language and communication – than the purposive-rational manipulation of physical things in classical industrial society.

We need to act to loosen the grip of work and to decenter the centrality that work has in people's minds, and in their assumptions about how society is and should be organized. Technologies can lead to the creation of alternative cooperative networks on a micro-economic scale, establishing feedback loops with the dominant macro economy.

The corporate system of permanent jobs is not consistent with the potential of digital technologies. More consistent with the emancipatory promise of the information society would be a true freelancer economy. Gorz suggests the adoption by society of an unconditional guaranteed income as a support to freelancer economy and a new positive flexibility. The universal basic income would enable a new orientation towards a multiactivity mode of work, emphasis on free time, and investment by society in the formation of interpersonal bonds and new institutional mechanisms for the conversion of creative/cultural capital to monetary capital.

Employment today in the framework of the permanent job no longer integrates the individual into a community, no longer provides social and personal identity, no longer structures the stages of life, and is no longer the basis for a meaningful life project.

In the true freelancer economy, the worker goes continuously back-and-forth between selling her work on the market in exchange for money and cultivating her own creative work in ways which can also lead to making money and acquiring other things of value.

The new social actors in the true freelancer economy have "the possibility of creating an organization for oneself and others which promotes *autonomy*."[106] This means to not naïvely identify as an artist who takes a stance of opposition towards work and money, but rather to invent new forms of work and money that expand the possibilities of how value as defined by society is received in exchange for activity.

Murray Bookchin, Post-Scarcity Anarchism

Writing in 1968, during the height of the anti-Vietnam War, student, counterculture, and civil rights movements in America, Murray Bookchin wrote in his essay "Post-Scarcity Anarchism" about the potentiality of the technological revolution of *cybernetics* being the precondition to the realization of a society without class divisions, exploitation, domination, drudge work, and material poverty.[107] Consciously evolving beyond *Homo economicus*, humanity will, for the first time, experience life rather than survival.

Bookchin also foresaw the devastating consequences of capitalism (the course we are on now) for pollution of the environment and destruction of the natural ecology of humanity's planetary habitat. In an era when humanity's very existence is endangered, the relationship between life and survival is reversed from the classical economic view that we must survive before we can live. We will either become anarchistic and fully live, or we will get annihilated. We can no longer afford to go through a transitional stage of centralized organization (as Marx and Lenin believed); we must act ethically in the here and now.

In his essay "Towards a Liberatory Technology," written in 1965, Bookchin seeks to separate the "liberatory potential of modern technology" from its use for destructive ends.[108] *Cybernetics* is that technology which can move us from the *realm of necessity* to the *realm of freedom*. Cybernetic machines can correct their own errors, be equipped with sensory devices replacing the audiovisual senses of human workers, and can substitute for the worker's judgment, skills, and memory. The feedback principle, information transfer, and the self-regulating control mechanism are central to first-order cybernetics as formulated by Norbert Wiener.[109] Technology has passed from invention to design. The crucial question for any given technology is no longer *if* (technological determinism) but *how* (design).

Creative designs of cybernetic technologies will free us to ask new questions about how machines "could be used to foster human solidarity and to create a balanced relationship with nature and a truly organic eco-community."[110] Either a balance between humanity and nature will get restored or the human species will be finished. Technology-becoming-ecological can reawaken our sense of interdependence with nature.

Yanis Varoufakis' Vision of Post-Capitalism

In the year 2020, the former economics minister of Greece and libertarian Marxist thinker Yanis Varoufakis published a dialogical discussion about post-capitalism among three fictional protagonists in the guise of a science fiction novel called *Another Now: Dispatches from an Alternative Present*.[111] In that writing project, Varoufakis issued the challenge to himself of describing in a detailed blueprint the principles of how a democratic socialist economic system (in a parallel timestream to our own world) would actually work. He also set himself the task of presenting concrete ideas of how we could get from here to there.

The novel is an ongoing and sometimes interrupted conversation between three intellectually thoughtful main characters who have each become disillusioned with a spe-

cific worldview in which he or she previously believed. Iris is an academic economist and ex-banker who believed in neo-liberal right-wing libertarianism, but who has now come to understand that the "really existing" capitalism in which we are living has little to do anymore with the so-called free market capitalism of Adam Smith's invisible hand. Eva is a Marxist and feminist anthropologist who is disillusioned with the prevalent versions of both of those ideologies. Costa is a techie engineer who has lost faith in his earlier conviction that digital technology will deterministically lead to human liberation and a better society.

A wormhole in the space-time continuum has opened which allows each of the characters to communicate with their alternate selves in a post-2008 economic crash fiction-reality where an Occupy Wall Street-type radical post-capitalist social movement has changed the world. According to renowned theoretical physicist Kip Thorne, various kinds of traversable wormholes enabling time travel are possible.[112] Two different timelines associated with the same (or more than one) physical location could become connected by means of an outward flaring neck or throat. Thorne's speculations are a further detailing of the Einstein-Rosen bridge to a mathematically necessary parallel universe which had, since German astronomer Karl Schwarzschild's work on black holes of 1916, been regarded as an essential solution to Einstein's field equations in his general theory of relativity. The general relativity property of spacetime curvature, as the basis for exotic opposition between the wormhole's two mouths (contiguous in space yet deferred in time), can be harnessed into building a time machine, instigating a bifurcation (or forking of time) into the two parallel streams.

In the post-capitalist economy fictionally envisioned by Varoufakis, work, control over production, digital networks, democratic politics, land use, money, and the internal culture and operations of corporations have been fully democratized. There are no bosses and no hierarchies at any level of the enterprise. There is so-called flat management where no one tells anyone what to do. Companies are self-managed and self-owned by their workers who all have equal shares. There is a guaranteed universal basic income. Decent housing is a human right. Climate change and global warming have been brought under control. Digital technology has been designed and deployed to create a good society of much greater economic equality. The power of both corporations and the state has been cut down to size.

For Varoufakis, we are already living in post-capitalism, but in a bad sense. The current system is a form of techno-feudalism. Wall Street is run by giant financial conglomerates and hedge fund managers. Every industry is controlled by a few monopolistic mega-corporations. Each of these behemoths is like a "small Soviet Union." Economic inequality has become obscene with the concentration of wealth in the hands of the richest one percent and much of the population sinking into poverty. The state bails out failing banks and provides corporate handouts. We have socialism for the few and austerity for the many. Financial speculative capital and the flows of global money through the electronic networks detach themselves virtually from any former sense of a "real" economy or "real" production.

Conclusion

In the opening chapter of his novel *The Rings of Saturn* (1995), W.G. Sebald's narrator directly engages with the notion of heterotopia as delineated by Michel Foucault in the Preface to *Les Mots et les choses*. Sebald breaks the connection between so-called "real places" and allegedly impossible spaces.[113] Heterotopia, as conceived by Foucault, is abstractly intellectual, lacking the blueprint specification of a concrete alternative to "the order of things." In his famous debate with Noam Chomsky, Foucault rejects the anarchist vision of free association and decentralization. He states that he is "unable to define, let alone create, a model of ideal social functioning for our scientific and technological society."[114] He asserts that we need to focus on the exercise of oppressive power today as it occurs through social institutions – such as universities, schools, and psychiatric clinics – which claim to be politically neutral.

Yet Foucault's insight about heterotopia that has the most forceful impact on the project of Technological Anarchism is that – as the *mirror* that separates and mediates between so-called "real" spaces and so-called "unreal" spaces – heterotopia can be either disciplinary or emancipatory, either *dystopian or utopian*. This is our entire situation in the era of digitalization. Heterotopia is an ambivalent mirroring site of both utopia and dystopia.

Media theories tend to be either only positive or only negative in their assessment of where media technologies are taking us as a society. Most technological utopias are naïve and amoral – driven by money, pure love of engineering, or quasi-religious belief.[115] Critical media theories – like those of Baudrillard, McLuhan, Virilio, Debord, the Frankfurt School (Adorno, Benjamin, etc.) – tend to be completely negative and critical towards developments in media and technology. I am interested in those theories. I believe that we should engage intensely with the texts of those authors. But, as a designer, I do not regard critical media theory as its own end. I see it rather as offering an understanding or defining of the conditions of what creative, radical, alternative, non-mainstream digital media-and-technology design *should not do*. Heterotopic design should not be complicit with cyber-consumerist capitalism, nor with sexist patriarchy or heteronormativity, nor should it assist in building the dystopia of totalitarian rule, universal surveillance, the end of privacy, and the twilight of thinking.

Informatics is the dominant life-changing influence in the world today, the major force affecting what used to be called "the social." As critical theorists and as design practitioners, we do not accept informatics as it is – we must transform informatics into Creative Coding. Beyond the modernist knowledge-paradigm of ideology and the social, beyond the postmodernist knowledge-paradigm of media, there is the hyper-modernist knowledge-paradigm of informatics and code: for cultural studies, the arts and design, and the humanities. Informatics should become a creative transdisciplinary design field, asking the question "how" and not just "if" (we should implement a given media technology). Informatics should not be a value-neutral skill for getting your program up and running and bug-free. As the poet Friedrich Hölderlin said: "Where the danger is, there also grows the saving force."[116]

Geert Lovink on Post-Capitalism

Geert Lovink has been a leading theorist and activist in movements for tactical media, peer-to-peer, open source, and decentralization and democratization of the Internet since the 1990s. He was a major figure in the lively and consequential nettime scene. In 2004, he founded the Institute for Network Cultures (INC) at the University of Applied Sciences in Amsterdam. The Institute stays constantly keenly attuned to emerging topics and controversies around technology, media, and society. It initiates free association research networks, conferences, and publications. The academic field of network cultures studies the interactions between new media and their participants. The INC brings together theorists, technologists, hackers, artists, and activists. There is a focus on potentials for post-capitalist social-economic change.

Tactical media was a form of disruptive media activism that emphasized short-term interventions in the media sphere. It was closely allied with new media art (artworks that deploy computers or digital technologies as their means or material). It believed in a shift from strategies with long-term or overall aims to tactics. Tactical media meant performances, hacks, and installations that expressed dissent and resistance against power structures and global capitalism. Critical theory becomes artistic practice. Unexpected temporary alliances form.[117]

Nettime was a very influential mailing list started in 1998 which published many important texts about tactical media, network cultures, net.art (art that uses the Internet as its medium), Net Critique, and a wide array of theory areas. Nettime had a large international following. It inaugurated a new form of critical discourse about networks. It disseminated lengthy impactful texts which were non-academic in nature. It sparked heated discussions.

Geert Lovink's most recent book is called *Stuck on the Platform: Reclaiming the Internet* (2022).[118] The primary tone of the book is Lovink's lament that earlier dreams of decentralized networks of peer-to-peer cultural creators and the growth of friendly uplifting communities of like-minded people have – in the historical arc of the last few decades – failed. The Internet is now dominated by money-harvesting platforms of surveillance, exploitation, privacy violation, data extraction, and unending targeted advertising run by large capitalist corporations. In the "affective computing" that has been widely implemented, behavioral scientists sell their knowledge of the cognitive unconscious to marketing departments which set their programmers to work on nudging users to adopt the behaviors and impulses desired by the authoritarian profit-seeking consumer industries. The network has disappeared in favor of the platform. For Lovink, we are in the middle of a deep "digital slump." He calls his work a "book of desperation."[119] Visions of a better techno-social existence hardly exist anymore. Lovink writes:

> Instead of a radical techno-imagination focused on rolling out alternatives, we get distracted by a never-ending carousel of new tech developments: Big Data, automation, Artificial Intelligence, facial recognition, social credit, cyber warfare, ransomware, Internet of Things, drones, and robots.[120]

During the COVID-19 lockdowns of 2020 to 2022, everyone was forced to stay home and communicate with others via online video teleconferencing, leading to the phenomenon which Lovink calls "Zoom fatigue." You are being watched by people and by corporate software in a Zoomopticon – a variation on the concept of the surveillance architecture of the Panopticon.

Lovink still believes in the vision of decentralized networks, an instance of technology liberated from capitalism. His plea is that we must reclaim the Internet on our own terms, imagine our own digital futures. The decline of the network has not been adequately theorized. The critics of surveillance capitalism, like Shoshana Zuboff, have themselves forgotten the network as much as the platforms have repressed it. "What's to be done," writes Geert Lovink, "is to steer Europe's Big Data and Artificial Intelligence billions into creating a multitude of social media alternatives, built by multi-disciplinary teams, not just geeks."[121]

Lovink is at his most illuminating when he writes about the post-capitalist potential of a technology like blockchain. He is then addressing a much larger "scene" of interested readers. In March 2014, the Institute of Network Cultures created the entity called MoneyLab, which has held many international conferences. MoneyLab is a "network of artists, activists, and geeks experimenting with forms of financial democratization, debating crowdfunding, cryptocurrencies and the blockchain, the cashless society, and universal basic income."[122]

Crypto and blockchain are key technologies for imagining a new decentralized economy. Lovink writes about blockchain experiments in the areas of fairer housing for people of all income levels, and care work and housework which have previously been unpaid or underpaid. MoneyLab studies projects of "hyper-local" cryptocurrencies and self-organized exchange systems in refugee communities. Lovink asks: What would a commons-based blockchain transaction and economic distribution system look like? Lovink's most promising proposal is his idea of the EU financing the development of an alternative Internet that would be a public infrastructure supporting applications which genuinely nurture the social fabric.

Blockchain Decentralized Idealism

There is a high level of excitement surrounding digital or virtual or alternative media of exchange and distributed ledger-related data networking technologies such as cryptocurrencies (Bitcoin, Ethereum, Ripple, etc.), decentralized peer-to-peer software applications developed around blockchains, and other scalable non-blockchain distributed ledger protocols such as IOTA (designed for the Internet of Things). Since the applications of these technologies have a lot to do with money and economics, they attract a lot of attention.

There exists a community of entrepreneurs, investors, programmers, and legal and technology researchers who work on articulating visions of a world of fewer middlemen transactional-organizational entities, less surveillance and regulatory governance, and greater democratic and participatory frameworks and institutions. The members of this community are not motivated by making quick money through crypto-speculation or

by the pure techno-enthusiasm one might associate with coders and engineers. Yet the technology of virtual digital money has – so far in its very brief history – had a major tendency to be used by criminals to hide their assets and illegal pursuits. In addition, the blockchain technology of recording transactions across all the nodes of a network without a central repository or administrative authority is being advanced by the existing financial industry and the powerful banks themselves to improve the efficiency of their operations, and to gain control before the general dynamic can shift in the direction of an overhaul of the banking system.

Ethereum-based blockchain commerce payment solutions can make real changes in the economy.[123] Software can run autonomously as agents on a decentralized or peer-to-peer network rather than being centrally controlled by powerful institutions. Banks and financial middlemen are to be eliminated from customer-retailer transactions not because capitalism is evil, but because these exorbitant fee-charging financial companies have taken advantage of the circumstance that no globally trusted system has existed for all these years. Ethereum's open-source technology is a distributed computing platform built on a blockchain architecture and offering smart contract capabilities. A smart contract combines into a single entity the terms of an agreement between two or more parties and the execution of that agreement. It deals with business, law, and software code.

Smart Contracts

Macro languages are being developed that will be used by software-literate attorneys, and which are halfway between law and code. Henning Diedrich's *Lexon* is a programming language that anyone can read.[124] It is a breakthrough in computational law and the first language of its kind of a new generation of languages. It moves software code away from being a technical language for programmer specialists and towards increased democratization and intuitive connection to human thought and semantic meaning. Lexon enables the writing of blockchain smart contracts or digital contracts where the text is both legal agreement and self-executing software agent. Diedrich makes a science fictional reference to Isaac Asimov's Three Laws of Robotics and points out that Lexon gives you the capability to think almost philosophically along the line of stipulating your own situational ethics directives.

Lexon has specific sentence grammar, vocabulary of keywords, and document structure. It is an outstanding example of natural language processing, human-readability, and the coming together of meaning and automatic computation. It uses abstract syntax trees which outline the syntactic structure of the language's source code. Each node of the tree denotes a construct occurring in the code. The possible applications of smart contracts written with Lexon are as vast as the regions of the legal-social-economic cosmos: contracts, bills of exchange in trade and commerce, governance systems, moral monitoring of AI algorithms, digital asset markets, academic certification, terms of service, financial products, supply chain logistics, regulations and oversight, data privacy protection, escrow, wills, crowdfunding, and mediated agreements in the post-capitalist sharing economy, to name just a few.

Smart contracts enable decentralized payment processing platforms with built-in and full-fledged trust and reputation systems. In the smart contract, rules and procedures are spelled out in the code and algorithms. Human parties to the contract must comply during execution of the agreement or face penalties which have been agreed upon from the start. The contract is the payment (or the money). It is not something to be separately fulfilled in a "step two." It does not depend on someone doing the separate act of payment. Execution is guaranteed. Money becomes automatically mobile. Intermediaries for financial transactions are no longer needed. The code is decentralized and distributed. It does not run on any specific physical computer. It cannot be stopped or shut down.

Between Law and Code

Laws attempt to restrain criminality as well as to regulate the unethical and exploitative excesses of capitalism. Law is a moral instance of society that, in one of its crucial domains, engages in a detailed way with technology. In their book *Blockchain and the Law: The Rule of Code*, the law, technology and society scholars Primavera De Filippi and Aaron Wright investigate systematically the challenges which the liberal state and regulators face in dealing with the present and future of the autonomous systems brought into existence by the spread of blockchains.[125] These new software technology artefacts threaten to develop and spread beyond the superintendence of humans and their applications of jurisprudence, to become roughly the equivalent of the dangerous echo chambers in platform capitalism social media politics, or the dreaded AI Superintelligence takeover of power from humanity. Blockchains might ominously lead to a world of many small niches of private and uncontrollable regulatory frameworks. De Filippi and Wright fear AI autonomy in the bad sense: the decline of morality and the social fabric as code-based systems provide "people with new financial and contractual tools that could replace key societal functions."[126]

What is perilously appearing on the horizon is the rule of what De Filippi and Wright call *lex cryptographica* – a potentially anarchic (in the bad sense of chaos) unruly regulatory frameworks of lawless (dis)order – blockchain programmers and economic actors operating transnationally and free from oversight. We are menaced by the possible replacement of the rule of law by the rule of code in the organization of economic and social activity. To avoid autonomous systems becoming lawless systems, the opportunities of disintermediation which blockchains enable must be carefully steered instead of portentously being allowed to run wild according to the mistaken credo that whatever can be done technologically should be done. The unity of law and code advocated by De Filippi and Wright is a perspective related to the unity of morality and code articulated in the present study.

The authors acknowledge that the codification of legal covenants is beneficial. Software code furnishes precision and modularity. Legal agreements are often poorly worded or hampered by bad writing. The increased clarity provided by code could take something of the adversarial tension out of contract litigation and disputes. It could reduce much frustration, misunderstandings, and legal costs. The rigorous symbolic logic of

software programming could "decrease contractual ambiguity by turning promises into objectively verifiable technical rules."[127] The modularity of code could have the advantage of leading to the establishment of libraries of smart contract software components and boilerplates. As open source, these libraries could be maintained and enhanced by participating communities of legal and ethical experts. The libraries could be transparent to the public.

De Filippi and Wright see the new Internet of blockchains as suspended in a tension between the rule of law and the rule of code. This perspective is understandable since they are experts in the deeply established and important academic field of law. However, the transdisciplinary study of law, society, and technology compellingly calls on us to think more outside the box into the area of the dialogical embedding of ethics and morality into code. The authors do indeed invoke the potential of Decentralized Autonomous Organizations to be effective in influencing social and community norms, "shaping the moral or ethical standards of the community of users and miners supporting a particular blockchain-based network."[128]

Decentralized Autonomous Organization

Bitcoin, Litecoin, other cryptocurrencies, micro-payment systems, tipping, donations, Creative Commons licenses, crowdfunding without a centralized broker, collaborative open- source projects, and other creativity-to-capital conversion mechanisms built on top of the blockchain infrastructure are elements of the Internet of Creators. These emerging phenomena put into circulation new varieties of economic and non-economic value. The hyperlink, interconnectivity, and multimedia features of the World Wide Web Internet belong to a network emphasizing communication. The blockchain – with its principle of distributed transparent data duplicated on many computers – promises to lead to a network emphasizing value. How can one design a network that enables this radical bottom-up democracy and direct expression? Poetics restores symbolic exchange at the heart of language, against economic exchange and the semiotic code. Can a new kind of social relationship be established with blockchain?

The architecture of blockchain introduces advanced computer science concepts of trusted transactions, the public ledger, virtual replication to near infinity of all records and histories, the smart contract, the unification of agreement in principle and execution of the agreement, and the Decentralized Autonomous Organization (DAO). Trust in technology will compensate for the lack of reciprocal human trust that exists in our competitive society. The blockchain is mirrored tens of thousands of times on every computer in the world that participates as a software client in the blockchain of blockchains known as Ethereum (or similar backbone). The blockchain is a different kind of database with a special kind of stored procedure mechanism. By copying everything to everyone, there is ironically no copying (the problem with conventional digital architecture is that everything can be copied). Total validation replaces the centralized control of middlemen like banks who currently profit too much from their institutional guaranteeing of the enforceability of transactions.

The DAO acquires resources, attracts value, carries out transactions, maintains itself, and self-evolves and writes its own new software code. The DAO consists of a set of complex smart contracts where rules and procedures are spelled out in the code and algorithms. Human parties to the contract must comply during execution or face penalties specified from the start. The contract unifies the terms of the agreement and their fulfillment. The contract is not something to be separately consummated in a "step two". It does not depend on someone performing the separate act of payment. Execution is guaranteed. Intermediaries for transactions are no longer needed. The code is decentralized and distributed. It does not run on any specific physical computer. It cannot be stopped or shut down.

The DAO is not owned or run by humans but rather entirely by smart contracts and algorithms. In his 1986 book *Rights, Persons and Organizations*, Meir Dan-Cohen first proposed the idea of a self-owning company.[129] The DAO finances its own operations through a cryptocurrency account. It sells tokens of investment as a sustainable economic entity to human speculators and contributors. No one directly controls the behavior of the DAO. Examples of Decentralized Autonomous Organizations would be Uber-like ridesharing or Airbnb-like vacation rental marketplace applications in the post-capitalist sharing economy.

Code-based systems of algorithmic governance can be the basis for realizing the old left-anarchist dream of a post-scarcity economy where logistics are off-loaded away from the control of power-seeking humans to moral and trusted posthuman entities and processes organized from the bottom up. Opportunities for human greed and corruption will be removed. Humans still play a vital role in their creation of software and interactions with the DAO.

Between Corporate Intellectual Property Rights and the Rights of Users

We live in a capitalist society where almost everything that is produced is privately owned by the individual or corporate entity who or which produced it. Yet this capitalist dimension is but one instance of our socio-cultural existence that is supposedly offset by the alleged democratic dimension of the so-called public sphere. If the public sphere is no longer a valid concept nor a vibrant viable reality, then we must rethink how we can regulate the excesses of capitalism. We also live in a democratic society where it is said that all citizens have certain universal and inalienable rights to certain goods, services, and experiences. Democratic rights extend beyond political and social rights to cultural rights. Democracy extends to culture. Yet this is also but one instance which is supposedly offset by the intellectual property rights of those who have produced the cultural artefacts and environments which consumers or users partake in. There is a continuous tension between these two aspects of cultural existence, a dialectical tension between capitalism and democracy that often goes unrecognized.

In the sixth century, St. Columba, an Irish Gaelic missionary and one of the Twelve Apostles of Ireland, transcribed by hand a copy of a book loaned to him by Saint Finnian of Moville, a Christian missionary. The copy was preserved as the Cathach of St. Columba. It is more famous than the original. The dispute over the ownership rights of the copied

manuscript led eventually to the Battle of Cul Dreimhne in 561, where three thousand people were killed. The disagreement led to the establishment of the intellectual copyright principle, laid down by the High King of Ireland acting as arbitrator: "To every cow belongs its calf; to every book its copy." A copy of an intellectual production belongs to the owner of the original.

The argument about intellectual property rights needs to move beyond the question of originals and copies to the question of what is cultural citizenship? The argument needs to move on to the context of how the cultural artefact becomes part of the lives of the cultural citizens of a democratic society, who have certain rights over their own edification and the enjoyment of their own lives. The private producers of cultural artefacts know that the consumer sphere for which they are producing is a cultural sphere. This cultural sphere is a democratic sphere. According to democratic principles, the capitalist producers must make certain compromises with the democratic consumers. Just as, according to capitalist principles, the consumers make compromises with the producers. The producers of cultural artefacts have the right to reap the monetary benefits from what they have produced. These cultural artefacts are part of a democratic culture dedicated to the development of the personalities of individuals.

Fiction and Power in Postmodernism

The aspect of postmodernism that interests me the most is the turn towards the recognition of the crucial role that narratives and fictions play in the exercise of power and control in the media-technological society. An appreciation of fiction is crucial for "future design research." To anticipate the future, we need knowledge of the fictional dimension of "the social." The more we understand about the present, the more we can foresee aspects of the future. If we exclude fiction, then what we call "reality" is a restricted idea of what is going on. I will briefly consider the idea in postmodern media theory of power and control exercised via narratives and fictions in Castoriadis, Haraway, Foucault, Baudrillard, and Deleuze.

Cornelius Castoriadis, The Imaginary Institution of Society

In the final section of his 1973 book *The Mirror of Production*, entitled "The Radicality of Utopia," Baudrillard exhibits the anarchist or "autonomist" dimension of his thought, and comments on the student uprising of May-June 1968 in France.[130] He quotes extensively from Paul Cardan, a pseudonym of the eminent Greek political philosopher Cornelius Castoriadis (who lived in Paris for a long time), whose "libertarian socialist" texts associated with the ex-Trotskyist *Socialisme ou Barbarie* intellectual group of the 1950s were a major influence on the 1968 student movement at Nanterre and the Sorbonne.[131]

In 1975, Castoriadis published his major work *The Imaginary Institution of Society*.[132] Writing against both Marxist and sociological-functionalist interpretations of social history, Castoriadis develops a theory of human societies based on granting an elevated ontological status to "the imagination." His key concepts are the "radical imagination" or

"radical imaginary" of the psyche of the individual and the "imaginary of society" which is the collective version of this "imaginary," and which inaugurates the social institutions of any given historical society. Operating incisively without any dualism between individual and society, Castoriadis sees both the human psyche and social-imaginary significations as creative, inventive, flexible, and in the flow of continuous changes. Images and symbolism play decisive roles in shaping the distinct historical formation of specific societies. The imaginary and "the real" are always entangled. Radical imagination precedes any separation between real and fiction. Its "world of significations" is what enables a "reality" to form. This "reality" tilts either towards anti-power on the spectrum of power and control in a society of conscious autonomy, or towards power in a society in which institutions are unconsciously autonomous with respect to the citizenry.

There is an uninterrupted circular and reciprocal relationship between the social institution and the individual. The social imaginary engenders the social institution, which, in turn, shapes the psyche of the individual person. Society establishes a "magma" or world of significations, which the individual then internalizes. The atomized self-authoring individual is a myth. Castoriadis writes:

> Every society up to now has attempted to give an answer to a few fundamental questions: Who are we as a collective? What are we for one another? Where and in what are we? What do we want; what do we desire; what are we lacking? Society must define its "identity," its articulation, its world, its relations to the world and to the objects it contains, its needs and its desires. Without the "answer" to these "questions", without these "definitions," there can be no human world, no society, no culture – for everything would be an undifferentiated chaos. The role of imaginary significations is to provide an answer to these questions, an answer that, obviously, neither "reality," nor "rationality" can provide.[133]

But what is Castoriadis' position on postmodern society? Is the degree of "fictionalizing" increased in the post-Second World War consumer and media culture, or do all human societies have an equal degree of fictionalization? Castoriadis is known as the "philosopher of autonomy." He theorizes how societies can become more directly democratic, self-managed, egalitarian, and cognizant of their own "imaginary" institution, which can come under their conscious control and choices against rampant power relations. Autonomy refers to the condition of "self-institution" whereby an individual or a society creates its own laws in full self-awareness. Although every society apparently forges its own institutions, only autonomous societies view themselves as the innate source of justice. Most societies stagnate in the condition of self-alienation or heteronomy.

In contemporary capitalism, imaginary significations are more dominant than in any previous society. This is an economy that purports to be highly rational yet is perpetually engaged in manufacturing the artificial "needs" of consumers and the built-in obsolescence of consumer goods. Its claim to rationality resides in its insistence that well-being is materially measurable and subject to permanent upgrade through the progress of science and technology. It is an economy stuck on the treadmill of having to endlessly satisfy the new "needs" that it itself has generated. In his essay "The Retreat from Autonomy: Post-Modernism as Generalized Conformism," Castoriadis comments on the gen-

eral retreat from autonomy into cultural and political conformism in the postmodern era.[134] There is a disappearance of political imagination. Social institutions become "autonomous" in an unconscious, bureaucratic, and ossified way, as opposed to society becoming consciously autonomous in the democratic and pragmatic-utopian sense. Alienation and power relations prevail. Castoriadis writes:

> Alienation occurs when the imaginary moment in the institution becomes autonomous and predominates, which leads to the institution's becoming autonomous and predominating with respect to society… Society lives its relations with its institutions in the mode of the imaginary, in other words, it does not recognize in the imaginary of institutions something that is its own product.[135]

Donna J. Haraway on the Informatics of Domination

In "A Manifesto for Cyborgs," Donna Haraway writes about power and control in postmodernism.[136] In her two-column tabular listing of historical pairings called "The Informatics of Domination," Haraway enumerates many features of the transition from modern to post-modern "epistemologies," indicative of the paradigm shift brought about by the advances of science and technology, and the hegemony of information.[137] The modernist-postmodernist pairs include: the passage from representation to simulation in aesthetics; the passing from the realist novel to science fiction in literature; the movement from organism to bionics and techno-implants in the life sciences; the turn from reproduction to replication of "offspring"; the crossing from dual public-and-private spheres to cyber-cultural citizenship in the topology of social space; the change from work to automation/robotics in the accomplishing of economic tasks; and the progression from mind to Artificial Intelligence in the answer to the question "what is thinking?"

For Haraway, there is a paradigm shift from the "comfortable old hierarchical dominations" of modernity to the "scary new networks" of postmodernism where power is exercised via science fictions, technoscience narratives, simulations, communications and genetic engineering, cybernetic systems logics, cyborg citizenship, and "women in the integrated circuit." Anticipating hyper-modernism, Haraway implies already in the 1980s that domination was becoming primarily implemented via informatic and bio-technological codes. She writes of the "translation of the world into a problem of coding." "Microelectronics is the technical basis of simulacra – that is, of copies without originals."[138]

Michel Foucault's Analytics of Power

The philosopher Michel Foucault's political theory of freedom is not a liberal theory. Foucault is most well-known for his theory and studies of relations of power in modern society. But in "The Ethics of Care for the Self as the Practice of Freedom," Foucault writes:

> One must observe that there cannot be relations of power unless the subjects are free. If one or the other were completely at the disposition of the other and became his thing, an object on which he can exercise an infinite, and unlimited violence, there would not be relations of power. To exercise a relation of power, there must be on both sides at least a certain form of liberty.[139]

In contrast to the opposition between power and freedom in liberal political theory, where freedom is generally considered abstractly as being the absence of external constraints imposed by the state or other large institutions/organizations, power for Foucault operates in and through everyday life practices. The discovery of freedom is to be made in understanding how we have been manipulated in the most intimate areas of personal existence, and how we can concretely and creatively transform that. This is a process of experimentation. One cannot know at the outset of each freedom-forging experience what the outcome is going to be.

Foucault famously studied psychiatric institutions in *The History of Madness in the Classical Age* (1962), hospitals in *The Birth of the Clinic* (1963), the Panopticon prison architecture of power in *Discipline and Punish* (1975), and the discursive construction of sexuality in the four-volume *History of Sexuality* (1976, 1984, 1984, 2018).[140] The Panopticon is primarily an arrangement of virtual deterrence power or self-surveillance whereby the observed prisoner is not literally seen by a human guard, but who modifies his own behavior because he fears himself to be under surveillance.

The conjuncture of power and knowledge is present throughout Foucault's work. In his later work, this mutates into the concept of governmentality. There are analytics of "disciplinary power" and "biopower." Power operates through knowledge, discourses, everyday life, culture, social customs, individuals, networks, and relationships. Power functions not only on the level of institutions but it "reaches into the very grain of individuals, touches their bodies, and inserts itself into their actions and attitudes, their discourses, learning processes, and everyday lives."[141] Power is everywhere and in all interactions. In postmodernism, power is increasingly virtual. Foucault writes in "The Subject and Power": "Power relations are exercised, to an exceedingly important extent, through the production and exchange of signs."[142]

As Foucault explains in the first volume of *The History of Sexuality*, power is a set of "force relations" which happen at the "molecular" or "micro-physical" level. Power is not possessed but rather exercised. Power comes from below. Power is embedded in networks and systems more than in the agencies of power holders. Power relations are processes. They are in a constant state of flow and transformation. Power relations underlie and precede institutions. Power relations are not in "politics." They are rooted in the entire networked fabric of "the social." There is always resistance to power. Those at the subordinate end of a power relationship can consent or rebel. Humans have freedom to not submit to the exertion of power.

Jean Baudrillard, *Forget Foucault*

Baudrillard somewhat self-destructively damaged his reputation in 1977, especially in France, with the publication of his small volume *Forget Foucault*.[143] In that text, he takes aim specifically at the theory of power elaborated in *Discipline and Punish*. Is there something of value in Baudrillard's apparent critique of Foucault (which is not a critique since Baudrillard claims to have abandoned the mode of writing of critique in favor of a "radical" or "fatal" theory)? Parallel to Baudrillard's farewell to Marx in *The Mirror of Production* (Marx unwittingly mirrors the logic of capitalist industrial production which Marx intends to criticize), Foucault, according to Baudrillard, has written a "mirror of power," an unwitting reflection of the system of power and domination which Foucault purports to criticize.

By writing so brilliantly, and in such detail, about power, Foucault perpetuates and extends the system of power, which in postmodernism exercises itself primarily through discourses. Paradoxically, Foucault is wrong because he is too right. Since power instantiates itself more and more via rhetoric, an elaborate discourse about power is itself power. The perfection of Foucault's vast chronicle of power is possible because the historical era of literal power is over. *Forget Foucault* is not a critique of Foucault, but rather the opposite: Foucault has painstakingly set up his discourse on power as a discourse without limits, hence perfectly impervious to critique and appropriate for the era of the eclipse of critique. Baudrillard writes:

> If it is possible at last to talk with such definitive understanding about power, sexuality, the body, and discipline, even down to their most delicate metamorphoses, it is because at some point all this is here and now over with.[144]

Power and sexuality as frontal objects of knowledge inquiry depend upon a strong reality-principle and a strong truth-principle. It is precisely these strong referents which disappear with simulation and simulacra. As Roland Barthes wrote (contrasting American culture to that of the Japanese "empire of signs"), "sexuality is everywhere except in sex."[145] Postmodern culture is everywhere pornographic in its universal visibility and availability of "shocking" or voyeuristic images of every possible "erotic" and "trans-erotic" minutiae which no longer shock. Power and sexuality are experiencing an implosive crisis, not a productive explosion to ubiquity, as Foucault suggests. Power is nowhere because it is everywhere. The supersession of the real by the hyperreal is also the end of literal power and literal sexual desire. Baudrillard writes:

> Foucault unmasks all the final or causal illusions concerning power, but he does not tell us anything concerning the simulacrum of power itself… Behind power, or at the very heart of power and of production, there is a void which gives them today a last glimmer of reality.[146]

Power is a challenge, a play of theatre and appearances. Power is symbolically reversible. It is only a "perspectival space of simulation," like the *trompe-l'oeil* artistic technique

which creates the optical illusion of a three-dimensional space. Power is invented on the shoulders of signs.

Gilles Deleuze, "Postscript on the Societies of Control"

In his 1990 essay "Postscript on the Societies of Control," Gilles Deleuze acknowledges Foucault's magisterial historiographical contribution in naming the essential characteristics of the "disciplinary societies" of the phases of modernity and early capitalism that ascended in the eighteenth and nineteenth centuries and reached their height in the early twentieth century.[147] The citizen of the capitalist disciplinary society lived in the spaces of physical enclosure of family, school, hospital, prison, military, factory, and office. The disciplinary society, for Deleuze, is superseded by a new system of domination which is the "society of control." Deleuze cites theorist Paul Virilio as "continually analyzing the ultrarapid forms of free-floating control that replaced the old disciplines operating in the time frame of a closed system."[148] Media technologies have dissipated the borders among the enclosed spaces.

The corporation, with its flexible games of psychological motivation and competition among colleagues, has replaced the factory. Lifelong perpetual training has replaced school. In the society of control, one is never finished with anything, but rather in a state of eternal recurrence or endless cycling between corporation and educational system. The society of control is based in a numerical language that manages access to information. The human becomes a piece of data, a record in a database, a statistical sample. Computers are the archetypal machines of the society of control. Computers are subject to jamming, piracy, and viruses. The body is subject to network controls. We are in orbit in a continuous network. It is a mobile and free form of neo-enclosure. The system tracks us through our transactions and our momentary movements. The computer follows our virtual position – physical barriers and definite locations become irrelevant. The financial system replaces the gold standard with the floating rate of exchange and the global electronic flows of capital.

Early capitalism emphasized concentration, production, and property. The property-owning class of capitalists built enclosed spaces like the factory and – derived from the factory as model – the school and the family home. The late capitalism of the society of control is no longer engaged primarily in the production system of acquiring raw materials from Third World countries which it then converts to finished products. Now capitalism buys shares of stocks and sells services. Marketing replaces production. One controls the market via gimmicks and tricks, by grabbing control, no longer through good old-fashioned raising quality and lowering costs. The citizen is in lifelong financial debt to the system. Control is continuous and without limits.

Fiction, Power, and Codes in Hyper-Modernism

The most significant facet for my perspective is that, in hyper-modernism, the power and control exercised via narratives and fictions in the media-technological society now

get implemented on much more detailed micro-levels via algorithmic-informatic codes and digital, virtual, and cybernetic technologies. We have become an informatic society. We are subjected to algorithms, data collection, Big Data analytics, surveillance, the deterrence of self-surveillance, and mutual surveillance in every area from participation in simulation-social media to targeted advertising to bureaucratic interactions with governmental agencies. We are immersed in systems of informational and informatic power. We are coded as subjects of human data processing. New data analysis techniques for categorizing us while providing us with the illusion of personalization are continuously developed and experimented on us. We are interminable feed and fodder for the algorithms. We have become our data.

Data does not only record who we have been and who we are, but it is an active force in reshaping our "becoming." In this sense, the role of data can already be illuminated with some basic media theory insights à la Marshall McLuhan. Data is widely seen as being a useful tool for communication and administration, but it is much more than that. Data is exercising power and a performative molding of who we are. The self undergoes datafication. "Info-power," as defined by Foucault-inspired philosopher Colin Koopman in his book *How We Became Our Data*, is a distinctive paradigm of power and control that unceasingly reformats the body, mind, and conduct of the individual.[149] Koopman derives the term "info-power" from Foucault's chain of terms of disciplinary power and biopower. Racial bias and discrimination are also deeply built into the data and algorithms.

Algorithms construct and tell us narratives about ourselves. The info-power of algorithms comes to the fore via the narratives that they engender about us, and the individual "enjoyment" they propose to us. In the informatic society, our lives are increasingly given their meaning and their guidelines for action by algorithmic processes. The algorithm notes your viewing history, figures out your "affects" and desires, and then weaves its designed, packaged, individualized narratives just for you. The algorithm brings to realization the feedback loop originally conceived and promised by Norbert Wiener's first-order cybernetics.

In the political arena of simulation-social media, the filter bubble and the echo chamber show you exactly what you want to see. The same computing paradigm is deployed in "politics" and in online shopping. As a Deep Learning neural network, the algorithm is permanently "training" itself at your expense, with you as its test "experience," you are the data provider. The algorithm perfects its seduction of you, deploying the feedback mechanism to refine its narratives to endearingly stroke your narcissism. Your personalized sales or newsfeed stream at Amazon, Facebook, or TikTok. Technology or code itself is the author of these narratives. From the narratives of postmodernism to the code/algorithms/Big Data of hyper-modernism, one major persistent continuity is the profit-seeking of techno-capitalism: institutions and large organizations which seek power and control now want to use code to automate their power.

Thinkers in Science and Technology Studies (STS) like Ludwig Fleck and Bruno Latour put forward the idea that, as knowledge gets deployed for the exercise of power, the human being becomes a *scientific fact.*[150] In the hyper-modern era, the human being becomes an *informatic fact*. The human body was earlier an object of science, the target of medical and other discourses of rationalizing control. There were many mono-sciences rich in content. The "reality" which science took as its noble mission to understand was al-

ways already a simulation model. With informatics, the individual sciences get overtaken by the generalized practice of digital models and algorithmic Deep Learners. Knowledge-content is overtaken by the statistical representation of knowledge. "Reality" becomes hyperreality of the rule of data.

In the media genre of the computer game, narrative and code come together. Navigational permutations and emergent behaviors are coded into the game in both deterministic and indeterminate coding paradigms. Game designers link intimately their story construction plans with the intricacies of software toolkits. One can analyze science fiction films about computer games in a transmedia study. Films like *Tron* and *Tron Legacy* (both starring Jeff Bridges), *Free Guy* starring Ryan Reynolds, David Cronenberg's *eXistenZ*, Steven Spielberg's *Ready Player One*, Chris Marker's *Level Five*, *Black Mirror*: "Bandersnatch," and the Polish/Japanese co-production *Avalon* are exemplary in this respect. One can also contemplate films which are adaptations of a computer game, like *Lara Croft: Tomb Raider*. What is the significance of the POV perspective in the genre of games – the special relationship between player and avatar – for narrative? To write the software code for new games, is it possible to develop a narrative-centered Creative Coding development environment, parallel to how Processing is a visual-centered Creative Coding integrated development environment?

It would be difficult to extend the conceptual framework of Castoriadis to the hyper-modern situation of the hybrid narrative-and-code-based power and control assemblage of algorithms. The "imaginary" is seen by him as existing on the level of society and on the level of the individual. A kind of Freudian psychoanalytical connection is made between the two. For Castoriadis, there is a constant tug-of-war going on in history between the poles of the conscious autonomy of self-managed, self-instituting societies and the alienation of institutionally frozen and degenerated societies. This dialectic seems to not foresee a configuration like the "pretzel"-like paradoxical logic of algorithms which bestows on the socially constructed "individual" a pseudo-autonomy that is an extension of postmodern narcissistic consumer culture. Castoriadis would only be able to fathom hyper-modernism as a furthering of the "retreat from autonomy" which is already operative for him in postmodernism.

In her writings about "The Informatics of Domination," Haraway was prescient about the important role that code would play in narrative-driven power and domination relations in hyper-modernism. Haraway foresaw the hegemony of information. She already underlined the ubiquity and potency of informatic and bio-technological codes. She wrote of the "translation of the world into a problem of coding."[151] Foucault's analytics of the "micro-physics" of power lend themselves very well to adaptation to the conditions of hyper-modernism. He underscores the relationship between power and knowledge, and between power and discourse. The architecture of power of the social media platforms of "surveillance capitalism," or of the Internet as a whole, can be trenchantly analyzed as a revised next generation configuration of the Panopticon. Power in hyper-modernism adds to semiotic signs the supplement of electronic signals. William Bogard, in *The Simulation of Surveillance*, succeeds in synthesizing Baudrillard's concept of simulation and Foucault's concept of surveillance.[152]

Deleuze's concept of the "societies of control" lends itself well to an upgrade for hyper-modernism and digitalization. He wrote already about how informatic technologies

would be deployed to support power relationships. Digital systems of control monitor our movements in a virtual networked sense. Our physical location in designated spaces of confinement recedes to secondary importance. We are visible to the digital behemoth via our real-time transactions. Foucault's "disciplinary society" of surveillance is superseded by Deleuze's "society of control," which is about the management of flows. The interest in turbulence unleashes the potentiality of indefinite production and signification for the era of free-floating bio-cybernetic capitalism, with its global financial transactions and money circulation via electronic impulses. Entropy becomes useful for work in the form of turbulence, chaos, and "female" flows.

John Armitage on Hyper-Modernism

In the 1999 publication *Machinic Modulations: New Cultural Theory and Technopolitics*, John Armitage poses the question if "modern and postmodern cultural theory are yielding to new 'hypermodern' and 'recombinant' cultural theories of technology?"[153] Armitage sees hyper-modernism not only in prevailing developments in technology, culture, and society, but he also writes of a "hyper-modernization" of cultural theory. Hyper-modernism, for Armitage, is a refusal neither of the epistemological optimism/teleological narratives of modernity nor of the diagnosis by post-modern philosophers of the decline of those narratives and epistemology. He theorizes hyper-modernism as the recognition of "double moments" of cultural affirmation and negation understood as the persistence of modernity or its "continuation by other means."[154] Hypermodern cultural theory refutes the hostile debate or binary opposition between thinkers associated with modernity versus post-modernism. It seeks a Hegelian *Aufhebung* or deconstructionist synthesis of the two. The de-re-construction of hypermodern theory and techno-politics proceeds from "scavenging among the remnants" of the two previous paradigms. Armitage argues for the importance of theorizing digital media technologies for new cultural and political practices.

Albert Borgmann on Hyper-Modernism

In his book *Crossing the Postmodern Divide* (1992), referring to Francis Bacon, René Descartes, and John Locke, the philosopher of technology Albert Borgmann defines modernity in the context of the Enlightenment as a fusion of the domination of nature, the primacy of method over content in intellectual work, and the sovereignty of possessive individualism.[155] In his genealogy of successive cultural history paradigms, post-modernism is a "divide" or transitional phase between two eras – modernity and what is to come later. Post-modernism, for Borgmann, is characterized, among other things, by the prevalence of media technologies, information processing, and the power of multinational corporations. Now we are at a crossroads. The future cultural paradigm will be either hyper-modernism (if we continue the current course) or the more utopian vision of what he calls "postmodern realism."

Hyper-modernism is defined by Borgmann as the giving to technology of a "hyper-fine and hyper-complex design."[156] Yet hyper-modernism cries out for a genuine alternative. "Postmodern realism" is the outgrowing of pure technological fetishism or determinism towards the agenda of designing technology for what might be called a "new real." This would be technology as support for the design of salutary life rather than technology for its own sake. Borgmann also discusses hyperreality as an aspect of hyper-modernism. He references Baudrillard and Umberto Eco. Television and video games are precursors of a full-fledged hyperreality that would engage all the senses, as in Virtual Reality flight simulators. Borgmann offers examples of hyperreality in consumer culture. Cool Whip is hyperreal whipped cream. It is cheaper, longer lasting, and has less calories than the "real thing."

Gilles Lipovetsky on Hyper-Modernism

In 2005, the French sociologist and philosopher Gilles Lipovetsky published landmark theses about hyper-modernism in his book *Hypermodern Times*.[157] For Lipovetsky, the concept of post-modernism to designate the cultural paradigm of the times in which we are living is obsolete and needs to be superseded. "The owl of Minerva [reference to Hegel] was announcing the birth of the postmodern just as the hyper-modernization of the world was already coming into being."[158] Like Borgmann, Lipovetsky sees post-modernism as a short-lived and transitional phase. Hypermodernity is the consummation of all the earlier tendencies of modernity, such as bureaucratic rationalization and the compression of space and time. With information and communications technologies, speeded up financial transactions, neo-liberal economics, and global markets and culture, we are thoroughly immersed in hyper-modern intensity. There is limitless consumerism, commercialization, and a cult of excess in almost every area of life.

Above all, there is a dramatic change in the experience of time. We live in a perpetual hyper-present. Time has become over-stressed and highly individualized. Most people are overworked. The individual seeks pleasure as a priority but is burdened with tension and anxiety. Hyper-modern life places excessive demands on the person: extreme mobility, flexibility, always the fastest, the newest, and the most. There is a ubiquitous desire for recognition, or the seeking of hyper-attention from others. We invent our emotions in the immediate moment. The hyper-modern crisis of time also provides an explanation for the rise of neo-fascist-populist movements. Given the disappearance of historical meaning, there is widespread nostalgia for its reappearance, albeit in the guise of a simulacrum of itself.