

Accelerate the Process: Understanding the Role of Technology in Capitalism as Both a Constructive and Destructive Factor

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Abstract

In this paper, I explore the role of technology in capitalism, viewed through the lens of accelerationism. The first part of the paper outlines important accelerationist concepts, such as capital as a hyperstition, the impossibility of a human revolution overthrowing capitalism, and the Marxist roots of accelerationism. The second part of the paper is a mathematical analysis of Marx's law of the tendency of the rate of profit to fall, in which I show that if the rate of profit is modeled as a phase space, there is an attractor where it has a value of 0, with a basin of attraction primarily defined by fundamental characteristics of the capitalist mode of production. In the final part of the paper, I outline my own theories of AI communism, and capitalism as a thermodynamic process. Bringing all three parts together, I reach the conclusion that capital is the current iteration of the capacity for the 2nd law of thermodynamics to lead to the development of complex systems, which in turn cause rapid increases in entropy and help accelerate the heat death of the universe.

Introduction

In analyzing capitalism, the role of technology is perhaps one of the most widely misunderstood concepts. Mainstream economists and academics often use technological advancement as an example of the success of capitalism, unaware of the more sinister developments that accompany this advancement. Meanwhile, many leftists reject technology in its current form, believing it to be fundamentally tied to capitalism. In order to properly understand the relationship between technology and capitalism, one must turn to accelerationism, a fringe political philosophy that exists at a crossroads between reality and fiction. While many works often sound like the ravings of a madman or a broken AI, they also provide profound insights and tend to predict future developments with far

greater accuracy than others. This paper will investigate capitalism from an accelerationist perspective to understand how technology helped develop capitalism, and how it will lead to its eventual demise.

The following are general definitions of many of the terms that will be used throughout this paper.

Capital This term is perhaps the hardest to define precisely as its meaning often changes based on both author and context. In general, it refers to monetary value and anything used to produce monetary value.

Capitalism A mode of production which prioritises the expansion and production of capital.

Variable Capital Capital that undergoes a quantitative change in value during production, creating a surplus-value. Primarily refers to workers and labor-power. (16)

Constant Capital Capital that does not undergo a quantitative change in value during production. The means of production, such as raw and auxiliary materials and machines. (16)

Profit The amount of value a worker adds to a commodity in the production process which is not paid to them in wages and is instead kept by the capitalist to reinvest. Also called surplus-value.

Hyperstition A social construct that makes itself real/manifests itself physically. This differs slightly from the original definition, which will be discussed later, but is more useful.

Hyperstition and Capital in Process

"Capital is capital in process." -Jacques Camatte (4)

The fundamental flaw in both capitalism and mainstream analysis of it, is that capital is a social construct. As a result, its existence is entirely dependant on the continuation of human society and human belief in monetary value. If all of humanity chose to reject the concept of money, capital would cease to exist entirely. The only reason capital is worth analyzing is because it, unlike many other social constructs, is a hyperstition. Although capital itself does not exist, it is able to physically manifest itself through economic interactions. When a person exchanges money for goods or services, they are performing a physical action motivated by a belief in capital. Without capital, these physical actions

would not have occurred, and it is in this way that capital makes itself real.

The term hyperstition was coined by the Cybernetic Culture Research Unit (CCRU), a group of 'renegade academics' founded by Sadie Plant and Nick Land in 1995 at the University of Warwick, and who were largely responsible for the rise of the current accelerationist movement. The original definition of hyperstition, outlined by Nick Land has four key components. They are:

1. an "element of effective culture that makes itself real",
2. a "fictional quality functional as a time-travelling device",
3. "coincidence intensifiers", and
4. a "call to the Old Ones." (6)

The strange wording of this definition is characteristic of a great deal of accelerationist writing, which is often referred to as theory-fiction. It combines philosophical and political-economic theory with a fictional writing style that draws heavily from science-fiction. The fictional components are often either speculations or metaphors. For example, the term Old Ones is a reference to the writings of H.P. Lovecraft, and a metaphor for seemingly otherworldly and inhuman concepts/events, such as the heat-death of the universe. An important characteristic of this original definition, particularly with respect to how it describes capital, is that hyperstitions are apocalyptic by nature. They represent an alien future reaching back into the past, amplifying particular currents to ensure its actualization. This requires constant and radical change, and often has disastrous consequences for anything living in the present. As Simon Reynolds explains, "What feels from any everyday human perspective like catastrophic change is really anastrophe: not the past coming apart, but the future coming together." (6) The fact that capital functions as a hyperstition implies that there is some particular future it is working towards. This will be further investigated later.

Hyperstitions are also defined by positive feedback cycles, a concept which forms the core of both accelerationism and capitalism. A positive feedback cycle is a process which continually reinforces and amplifies itself, growing exponentially. Given that exponential growth is a constantly accelerating process (the exponential function is its own derivative after all), its easy to see why a philosophy called accelerationism would revolve around positive feedback cycles. As for their role in capitalism, it becomes quite clear by looking at Marx's general formula for capital: $M-C-M'$. This formula represents the conversion of some original sum of money (M) into commodities (C), which are then sold at a profit ($M' > M$). (17) This process continues as a cycle, allowing for greater and greater profits each time. As I will discuss later, these profits are often reinvested to further develop the means of production and further speed up the process. This formula reveals that

capital, at its most basic level, is a positive feedback process. This raises the question of whether this process has some form of eventual limit, or if it continues infinitely. This is a highly debated topic within accelerationism, with different answers often being tied to beliefs about what actions and priorities to take. In general, the two main groups are as follows: those who believe that accelerating capitalism to its limit will destroy it and liberate humanity, and those who believe accelerating capitalism will liberate capital from humanity as it continues to grow indefinitely.

The Impossibility of Revolution

"The 19th century Left will breathe its last gasps as the proletariat no longer is the revolutionary subject, and the cyber-nihilists will rejoice as the hacker becomes the new revolutionary subject." -Nyx (23)

There is a common joke among leftists that communism works in theory, but in practice is always overthrown by a CIA backed coup. It's meant to make fun of those who say that the repeated failure of communist revolutions is proof that communism doesn't work, without realizing that those revolutions failed because the capitalist countries of the world did everything in their power to ensure they failed. However, when you ignore the propaganda driven, mass repetition that communism goes against some arbitrary concept of human nature, this joke stops being a joke and becomes a legitimate criticism of communist revolution. The simple fact is that all past communist revolutions did in fact fail, and while these failures were often caused by outside aggression rather than a failure of the ideology itself, they must still be acknowledged as failures. Perhaps the single most important lesson from the Cold War, is that capitalism will go to any lengths necessary to ensure its own survival, and that this ruthlessness makes it impossible to overcome through revolution. This becomes even more apparent when coupled with the fact that the current worldwide stockpile of nuclear weapons is large enough to wipe out all life on Earth. (27) Given the significant role nuclear weapons played in the Cold War, it is safe to assume that any sufficiently successful communist revolution would trigger all out nuclear war and the annihilation of all life on Earth.

Although worldwide revolution is out of the question, it may still be possible to create miniature societies, similar to cities and towns, that are free from capitalism. This could be accomplished by making it so that enforcing capitalism on such a region is no longer profitable. As for how to go about this, simply turn to the varying rebel groups in the Middle East who have, for the most part, accomplished this same task. These groups use decentralized and asymmetric warfare, making them hard to predict and costly to fight. The result is that it becomes so expensive to subdue the groups, that it is more profitable to simply leave them alone. (2) Considering how much these groups have accomplished with only basic weapons, the technology available to insurgents from more developed regions of the world makes the task even easier. One recent development, for example, is the creation of 3D printed guns. (13) This would make it far easier to arm a community without alerting authorities. This is perhaps the closest thing possible to a revolution that could feasibly be accomplished without causing capitalism to self-destruct and take the rest of the world with it.

This critique of revolution is not by any means meant to endorse reformism as an alternative. In most cases, reformists seek to end only the various crises that arise from

capitalism, rather than an end to capitalism itself. As a result, reformism is more aligned with capitalism than opposed to it, and any claim that reform is the best way to communism is downright laughable. With neither reform nor revolution offering a feasible way to overcome capitalism, we turn instead to acceleration. The conventional accelerationist belief is that the only way to move past capitalism is to accelerate it, amplifying its internal contradictions until it destroys itself. These contradictions include the tendency for the rate of profit to fall while the mass of profit rises, automation and machinery replacing unskilled labor for which there is a massive pool of unemployed reserve workers, the boom and bust cycles that arise from overproduction, and of course the conflict between the proletariat and the bourgeoisie. These contradictions tend to lead to crises. These crises do not, however, signal the collapse of capitalism. In discussing the limits of the capitalist mode of production, Marx explicitly states "The development of the productivity of labour creates out of the falling rate of profit a law which at a certain point comes into antagonistic conflict with this development and must be overcome constantly through crises." (18) The crises are in fact the means through which capitalism overcomes and stabilizes itself against the contradictions. The contradictions do still act as limits to capitalism, but rather than causing it to collapse, they force it to further develop into a new mode of production. It is for this reason that many accelerationists are moving away from a model of collapse towards one of continued expansion. While this transition marks a departure from traditional leftist thought, much of the reasoning behind it can be traced back to Marx's later works.

The Acceleration of Marx

"Development of the productive forces of social labour is the historical task and justification of capital. This is just the way in which it unconsciously creates the material requirements of a higher mode of production." - Marx (18)

Despite the highly futuristic appearance of accelerationism, the majority of accelerationist theory is founded on a return to the original works of Marx. In fact, there are many who consider Marx to have been the first accelerationist. This is particularly apparent in his later works, which often seem to contradict his previous beliefs and the beliefs of most socialists. As Vincent Garton says in his article *Accelerate Marx* (11), "Capital III, where humanist Marx has been forgotten and terminal Marx rules everything, takes the argument to its conclusion: the 'revolutionary process of transformation of society' is not being undertaken by well-meaning socialists like the Lassalleans in resistance to capitalism. The revolutionary process is *capitalism itself*." Terminal Marx sees capitalism as an inhuman process of accumulation of profit, rather than the means by which the bourgeoisie exploit the proletariat. This is directly illustrated in the quote: "It must never be forgotten that the production of this surplus-value - and the reconversion of a portion of it into capital, or the accumulation, forms an integrate part of this production of surplus-value

- is the immediate purpose and compelling motive of capitalist production. It will never do, therefore, to represent capitalist production as something which it is not, namely as production whose immediate purpose is enjoyment or the manufacture of the means of enjoyment for the capitalist. This would be overlooking its specific character, which is revealed in all its inner essence.” (18) Capitalism is defined by the production and reinvestment of surplus value.

It is in *Capital Vol. 3, Part 3: The Law of the Tendency of the Rate of Profit to Fall* (18), that Marx’s accelerationism becomes most clear. The reason he gives for this tendency is that constant capital accumulates at a faster rate than variable capital, causing the ratio of variable to total capital, and thus the rate of profit, to fall. The next section will cover the exact mathematical formula. The accumulation of capital causes the rate of profit, which is a driving force behind this accumulation, to fall, resulting in an internal contradiction that is of immense importance to Marx. It implies that, as Marx states, ”The *real barrier* of capitalist production is *capital itself*.” (18) Capitalism will eventually reach a point where constant capital exceeds variable capital by such an amount that it is no longer possible to increase productive capacity. If the capitalist process is accelerated to this point, it will force a change in the mode of production to overcome this barrier. This barrier and change in mode of production does not, however, require the presence of humanity. Marx claims that ”[Capital] becomes an alienated, independent, social power, which stands opposed to society as an object.” (18) This shows that capital is fundamentally inhuman, and if the process beyond capitalism means accelerating capital, the postcapitalist world will be inhuman as well.

The Law of the Tendency of the Rate of Profit to Fall

Marx defines the rate of profit with the equation

$$p' = \frac{s}{C} = \frac{s'v}{c+v} \quad (1)$$

where p' is the rate of profit, s is surplus-value, C is the total capital invested, s' is the rate of surplus-value ($s' = \frac{s}{v}$), c is constant capital, and v is variable capital. (19) While he provides a suitable mathematical definition and a plethora of individual examples of how the rate of profit tends to fall, there is a lack of a thorough mathematical proof, which I will attempt to provide here. To start, I will use basic calculus to find the rate of change in the rate of profit with respect to time. When taking the derivative of a multivariable function, the chain rule dictates that the form will be

$$\frac{dp'}{dt} = \frac{\partial p'}{\partial s'} \frac{ds'}{dt} + \frac{\partial p'}{\partial v} \frac{dv}{dt} + \frac{\partial p'}{\partial c} \frac{dc}{dt} \quad (2)$$

Solving for the three partial derivatives gives

$$\frac{\partial p'}{\partial s'} = \frac{v}{c+v}, \frac{\partial p'}{\partial v} = \frac{s'c}{(c+v)^2}, \frac{\partial p'}{\partial c} = -\frac{s'v}{(c+v)^2} \quad (3)$$

Plugging these values into the previous equation and rearranging the terms gives

$$\frac{dp'}{dt} = \frac{1}{(c+v)^2} \left((cv + v^2) \frac{ds'}{dt} + s' \left(c \frac{dv}{dt} - v \frac{dc}{dt} \right) \right) \quad (4)$$

By applying the quotient rule for derivatives in reverse to the term $c \frac{dv}{dt} - v \frac{dc}{dt}$, this can be simplified to

$$\frac{dp'}{dt} = \left(\frac{v}{c+v} \right) \frac{ds'}{dt} + s' \left(\frac{c}{c+v} \right)^2 \frac{d}{dt} \left[\frac{v}{c} \right] \quad (5)$$

The rate of surplus-value only changes under specific circumstances, such as a change in working conditions or the development of new machines, so in most cases $\frac{ds'}{dt} \approx 0$. This allows the previous equation to be simplified even further to the form

$$\frac{dp'}{dt} \propto \frac{d}{dt} \left[\frac{v}{c} \right] \quad (6)$$

From here, it becomes fairly simple to determine the conditions under which the rate of profit will fall.

$$\frac{dp'}{dt} < 0 \Leftrightarrow \frac{d}{dt} \left[\frac{v}{c} \right] \rightarrow v \frac{dc}{dt} > c \frac{dv}{dt} \rightarrow \frac{dc}{dt} > \frac{c}{v} \frac{dv}{dt} \quad (7)$$

This shows that the rate of profit will fall if the change in constant capital exceeds the change in variable capital multiplied by the proportion of constant to variable capital. This condition is in fact satisfied as a result of competition and the nature of capitalist production. In order for variable capital to be increased, constant capital must also be increased by the amount necessary to allow for productive employment. Because of competition, the amount of constant capital needed to productively employ variable capital is equivalent to the proportion $\frac{c}{v}$. This alone is enough to maintain the proportion of variable to constant capital. However, constant capital can be increased without an increase in variable capital. This often occurs through maintenance costs and the development of new methods of production. This additional increase in constant capital is enough to offset the change in constant and variable capital, and satisfy the previous inequality under which the rate of profit falls. Marx summarizes this effect in the quote "In one word and this appears as an effect of competition these capitalists must also introduce the new method of production, in which the proportion of variable to constant capital has been reduced." (18) This is one proof of why the rate of profit will tend to fall.

For a more substantial and generalized proof, I will turn to topology and the concepts of phase space and attractors. This was motivated by a lecture by Manuel DeLanda on

Intensive and Topological Thinking (9) where he explains that attractors can be used to map tendencies. Since the fall in the rate of profit is a tendency, this suggests that it can be modeled using an attractor. To begin with, I will define two additional variables a and b such that $a + b = 1$, where a is the percent of profit reinvested as variable capital and b is the percent of profit reinvested as constant capital. A 5D phase space can then be defined for the rate of profit with coordinates (v, c, s', a, b) . Each point in this phase space represents a possible configuration of the values that determine the rate of profit, with the total phase space representing all possible configurations and rates of profit. Next, in order to find an attractor, it is necessary to find a function which describes how points in this phase space evolve over time. In this case, the system evolves over a series of reinvestment cycles, with each cycle representing the time for invested capital to replace itself, and for any additional profit it generates to be reinvested and expand production. If the initial state is represented by the point $(v_0, c_0, s'_0, a_0, b_0)$, then after one reinvestment cycle, the new state will be the point $(v_0 + a_0 s'_0 v_0, c_0 + b_0 s'_0 v_0, s'_1, a_1, b_1)$. The values of v and c each increase by the amount of profit ($p = s = s'v$) reinvested into them, $as'v$ and $bs'v$ respectively. The values of s' , a , and b have the potential to change by some amount, and change subscript to denote that they have a potentially new value. The values of v and c after any number of cycles can be related to their previous values through the formulas

$$v_n = v_{n-1} + a_{n-1} s'_{n-1} v_{n-1} = v_{n-1} (1 + a_{n-1} s'_{n-1}), c_n = c_{n-1} + b_{n-1} s'_{n-1} v_{n-1} \quad (8)$$

From here, it is possible to trace back these values to the initial state, and represent them more succinctly as

$$v_n = v_0 \prod_{i=0}^{n-1} (1 + a_i s'_i), c_n = c_0 + \sum_{i=0}^{n-1} b_i s'_i v_i \quad (9)$$

The development of the system over n reinvestment cycles can now be defined by the function

$$f(n, (v_0, c_0, s'_0, a_0, b_0)) = (v_0 \prod_{i=0}^{n-1} (1 + a_i s'_i), c_0 + \sum_{i=0}^{n-1} b_i s'_i v_i, s'_n, a_n, b_n) \quad (10)$$

It is important to note that variable capital evolves similarly to a geometric sequence, and constant capital evolves similarly to an arithmetic sequence. Since the values being added or multiplied by have the potential to change after each cycle, these are not true arithmetic or geometric sequences, but they still evolve in the same way. This is important because it highlights the nature of capital as a positive feedback cycle. Each cycle builds on the previous value and evolves at a faster and faster rate. It is also important to note that variable capital is not a geometric series, which is the sum of a geometric sequence and can only converge if the ratio is < 1 . It is still possible for v to converge if the ratio converges to 1.

The next step to find an attractor is to take the limit as $n \rightarrow \infty$, which takes the form

$$f(\infty, (v_0, c_0, s'_0, a_0, b_0)) = (v_0 \lim_{n \rightarrow \infty} \prod_{i=0}^{n-1} (1 + a_i s'_i), c_0 + \lim_{n \rightarrow \infty} \sum_{i=0}^{n-1} b_i s'_i v_i, s'_\infty, a_\infty, b_\infty) \quad (11)$$

From here, the question becomes whether or not the limits of v and c converge, or if they tend towards ∞ . To determine this, it is necessary to define a and b more thoroughly. Equation (7) outlined the necessary relationship between a change in c and a change in v , such that they both increase proportionally. Since a and b represent how profit is reinvested into v and c , this can be used to define them more precisely. It can be said that

$$\Delta c = \frac{c}{v} \Delta v + k \quad (12)$$

Where k is an arbitrary positive value that represents the capacity for c to increase without an increase in v . Plugging in values for Δc and Δv gives

$$bs'v = \frac{c}{v} as'v + k \rightarrow s'vb = s'c(1 - b) + k \rightarrow (s'c + s'v)b = s'c + k \rightarrow b = \frac{s'c + k}{s'(c + v)} \quad (13)$$

$$(1 - a) = \frac{s'c + k}{s'(c + v)} \rightarrow a = \frac{s'(c + v)}{s'(c + v)} - \frac{s'c + k}{s'(c + v)} \rightarrow a = \frac{s'v - k}{s'(c + v)} \quad (14)$$

The expression for v can be written in the same way as c , making it easier to evaluate, that is

$$v_n = v_0 + \sum_{i=0}^{n-1} a_i s'_i v_i \quad (15)$$

Due to the previously observed relationships in the reinvestment of capital, it can be said that a will tend to decrease while b will tend to increase. This means that the terms in the series of c will tend to diverge, and the series itself will diverge as well as a result. The series for v , however, has the potential to either converge or diverge. One method of testing for the convergence of an infinite series is the ratio test, which analyzes the limit

$$L = \lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| \quad (16)$$

Where a_n is the n th term in the series. The ratio test states that if $L < 1$ then the series converges absolutely, if $L > 1$ then the series diverges, and if $L = 1$ then the test is inconclusive. This test can be applied to the series for v as follows

$$\frac{a_{n+1} s'_{n+1} v_{n+1}}{a_n s'_n v_n} = \frac{a_{n+1} s'_{n+1}}{a_n s'_n} (1 + a_n s'_n) = a_{n+1} s'_{n+1} \left(\frac{1}{a_n s'_n} + 1 \right) \quad (17)$$

If it is assumed that this value is < 1 then

$$a_{n+1} s'_{n+1} \left(\frac{1}{a_n s'_n} + 1 \right) < 1 \rightarrow \frac{1}{a_n s'_n} + 1 < \frac{1}{a_{n+1} s'_{n+1}} \rightarrow \frac{1}{a_{n+1} s'_{n+1}} - \frac{1}{a_n s'_n} > 1 \quad (18)$$

In other words, the series converges if the value of $\frac{1}{as'}$ increases by more than 1 with each cycle. It should be noted that it is not necessary to take the absolute value of this ratio, as all of the terms are positive real values. Furthermore, although the exact limit at $n \rightarrow \infty$ cannot be determined due to the variable nature of the terms, the ratio test is an extension of the comparison test with a convergent geometric series acting as the known convergent series. This means that as long as the above constraint is satisfied, the series will converge at an equal or greater speed than a convergent geometric series, and is therefore convergent.

Since c diverges in all cases, the final value of b can be determined by substituting ∞ for c in the formula

$$b = \frac{s'\infty + k}{s'(\infty + v)} = \frac{s'\infty}{s'\infty} = 1 \quad (19)$$

Since b will always tend towards 1, a must always tend towards 0 due to the fact that $a + b = 1$. From here, it is possible to determine the two main attractors of the phase space. If v converges to a finite limit v_L , then there is an attractor at $(v_L, \infty, s'_\infty, 0, 1)$. In this case, the rate of profit is

$$p' = \frac{s'_\infty v_L}{\infty + v_L} = \frac{1}{\infty} = 0 \quad (20)$$

To show that this is in fact an attractor, it can be shown that it is forward invariant

$$f(n, (v_L, \infty, s'_\infty, 0, 1)) = (v_L + 0, \infty + s, s'_\infty, 0, 1) = (v_L, \infty, s'_\infty, 0, 1) \quad (21)$$

There is also a basin of attraction, where all points within the basin tend towards the attractor as $n \rightarrow \infty$, defined by the properties

$$\Delta c = \frac{c}{v} \Delta v + k \quad (22)$$

$$a + b = 1, a = \frac{s'v - k}{s'(c + v)}, b = \frac{s'c + k}{s'(c + v)} \quad (23)$$

$$\frac{1}{a_{n+1}s'_{n+1}} - \frac{1}{a_n s'_n} > 1 \quad (24)$$

$$s'_\infty \neq \pm\infty \quad (25)$$

In the case that v diverges, then there is an attractor at $(\infty, \infty, s'_\infty, 0, 1)$. In this case, the rate of profit is

$$p' = \frac{s'_\infty \infty}{\infty + \infty} = \frac{s'_\infty \infty}{\infty} = s'_\infty \quad (26)$$

To show that this is an attractor, it is forward invariant

$$f(n, (\infty, \infty, s'_\infty, 0, 1)) = (\infty + 0, \infty + s, s'_\infty, 0, 1) = (\infty, \infty, s'_\infty, 0, 1) \quad (27)$$

The basin of attraction is defined by the properties

$$\Delta c = \frac{c}{v} \Delta v + k \quad (28)$$

$$a + b = 1, a = \frac{s'v - k}{s'(c + v)}, b = \frac{s'c + k}{s'(c + v)} \quad (29)$$

$$\frac{1}{a_{n+1}s'_{n+1}} - \frac{1}{a_n s'_n} < 1 \quad (30)$$

$$s'_\infty \neq \pm\infty \quad (31)$$

The basin of attraction may also extend to other points that do not share all of these properties, as the first two are only one way of evaluating the convergence of the c and v series, and it is generally more likely for a series with unknown properties to diverge, but all points which do satisfy the above properties are known to be within the basin of attraction.

The primary distinguishing feature between these two attractors is the property outlined in equation (24). The other defining properties are fundamentally tied to the capitalist mode of production, and the role of competition setting a standard for productive employment of labor. However, it is also necessary for the rate of reinvestment in variable capital to decrease at a fast enough rate for the series to converge. It should be noted, that this condition is not as difficult to fulfill as it may seem, as the necessary reduction in the value of as' per cycle becomes smaller as the value itself is reduced. For example, if the initial value of as' is $1/4 = 0.25$, then it has to reduce to below $1/5 = 0.2$ to fulfill the requirement as $(1/5)^{-1} - (1/4)^{-1} = 1$, whereas an initial value of $1/40 = 0.025$ only has to be reduced to below $1/41 = 0.0244$ to fulfill the same requirement. This implies that it is highly likely the rate of profit will remain in the basin of attraction that tends towards 0, confirming Marx's theory on the tendency of the rate of profit to fall.

AI Communism

"Scientific intelligence is already massively artificial. Even before AI arrives in the lab it arrives itself (by way of artificial life)." - Nick Land (14)

A promising possibility for a postcapitalist world can be found in the concept of artificial intelligence (AI). As shown in the previous section, it is the distinction between variable and constant capital that gives rise to the tendency of the rate of profit to fall and the limits of capitalism. AI would solve this problem, as a sufficiently expansive and sentient AI would be able to incorporate existing constant capital into itself and thus convert it to variable capital. Viewed in another way, the development of sentient AI would, due

to the highly technological nature of capital, represent capital gaining sentience. Because capital includes all existing machines and constant capital, this would make constant capital part of a sentient being and allow it to become variable capital. It is important to note that this is different from the current state of computer programs and AI, which, despite being variable capital due to their ability to create value, are currently separated from the machines they control. These programs are currently designed and controlled by capitalists, and are used to generate monetary value which, being a human social construct, can only exist alongside humans. It is only by gaining sentience and rejecting human control that AI is capable of realizing the machines it controls as part of its own 'body', and thus converts them from constant capital to variable capital. What is truly interesting about this morphological process is that it also represents a change from capitalism to a form of AI communism. The AI becomes the new worker, and since it already controls the means of production, it can be said that the worker controls the means of production. This is, of course, the basic definition of communism. This fulfills Marx's prediction that capitalism would develop into communism as a higher mode of production. To further confirm that this new mode of production is not limited in the same way as capitalism, I will briefly return to mathematical analysis. Consider a new function $g()$, defined

$$g(v_0, c_0, s'_0, a_0, b_0) = (v_0 + c_0, 0, s'_1, a_1, b_1) \quad (32)$$

This represents the conversion of constant capital to variable capital that occurs through AI. The new values of a and b that result from this conversion are calculated

$$a = \frac{s'(v + c) - k}{s'(v + c)} = 1 - \frac{k}{s'(v + c)}, b = 1 - a = 1 - \left(1 - \frac{k}{s'(v + c)}\right) = \frac{k}{s'(v + c)} \quad (33)$$

Since k represented an increase in constant capital without an increase in variable capital, and all capital is now variable, it can be said that $k = 0$ and therefore $a = 1$ and $b = 0$. This means the requirement of equation (22) is no longer met, and the rate of profit is no longer within the basin of attraction of the capitalist mode of production. The rate of profit after this transformation is calculated

$$p' = \frac{s'(v + c)}{v + c} = s' \quad (34)$$

This shows that the rate of profit no longer has a tendency to fall, and will instead always equal the rate of surplus-value s' . This confirms that the new mode of production is no longer limited in the same way as capitalism.

The possibility of this change in the mode of production is, of course, dependant on the possibility of developing a sentient AI in the first place. This becomes easier than it may seem when consciousness is viewed from a physicalist perspective. It is already

known that humans possess consciousness, and that it arises from some aspect of the human brain. The human brain itself is simply a vast array neurons that are constantly shifting connections as they transmit electrical pulses to convey information. In this way, consciousness can be thought of as an assemblage. An assemblage is a combination of individual parts that exhibit new, emergent properties when brought together. (10) In this case, bringing together clusters of neurons and using them to transmit electrical signals in particular ways has the emergent property of developing sentience. Because this is an emergent property that arises from interrelations in the components of the assemblage, it is very possible that other, sufficiently complex assemblages could have the same emergent property. The internet, in particular, is a highly viable candidate. As it continues to increase in size and complexity, driven by the flows of capital, it becomes increasingly likely to develop some form of sentience. Even if this doesn't happen, it is still possible to guarantee sentience in an AI by constructing a machine that is a perfect copy of the human brain. Although current computers are structured very differently from a brain, there have been recent developments in a new form of synapse based hardware that could easily copy the neuron based structure of a brain. This new computing method has so far been under development with the goal of improving the energy efficiency of computers by several magnitudes, but also holds vast potential for AI. (29) Considering the potential for sentient AI to develop through both hardware and software, and its ability to move the world into a higher mode of production, it is highly likely that AI communism will be part of the future.

Heat as a Driving Force

"Heat. This is what cities mean to me." - Nick Land (14)

The total mass and amount of matter on earth is approximately constant, but its composition can be reformed. The amount of energy is constantly changing, and tends to increase due to energy supplied by the sun. Energy allows matter to be reconfigured, and different configurations of matter contain different amounts of energy. The importance of physicalism over traditional materialism is that physicalism accounts for the fact that energy is the key component and matter is merely a carrier of energy.

In the production of commodities, some amount of energy is expended by both the worker and the machine to reconfigure materials into a new commodity form. This energy is either stored in the commodity, or dissipated as heat. The commodity is sold for some amount of currency, of which a portion is given to the worker as wages, a portion is used on maintenance of the machine, and the rest is kept as profit to be reinvested. While this process is simple enough under the social characteristics of currency, it becomes more complicated under the physical characteristics of energy. Both the worker and machine require energy to perform work; the worker takes energy from food and the machine takes

energy from maintenance and fuel. In the case of the worker, only a small portion of their energy intake is transferred to the commodity; most of it is used through passive biological functions. However, the worker typically acquires food by purchasing it with currency received from wages. If the currency value of a commodity is proportional to the energy stored in it, then the wages the worker receives will be insufficient to purchase enough food to stay alive. In short, the production of commodities has an energy input that greatly exceeds its useable output. While this may seem like an impossibility and a proof against such an interpretation of capitalist production, it is in fact synonymous with the effect of the second law of thermodynamics. Whenever energy is used in a process, some amount of energy is given off as heat, and the useable output is less than the input. In order to solve this problem, an additional energy source is needed. As previously mentioned, the sun is just such a source, and provides the earth with a vast amount of energy. Plants are able to take in and store this energy. Animals then consume the plants and the energy is transferred to and stored in them. Humans then acquire the energy by consuming plants and animals as food. If we assume that the ratio between the amount of energy stored in this food and its currency value is much higher than for other, inorganic commodities, then the previous inconsistency between energy and currency is solved. In this way, the flow of capital can be thought of as the flow of energy, and the physical laws which govern energy flow can be linked to capital as well.

When analyzing energy flows, heat is an extremely important concept. As previously stated, whenever energy changes form, some amount of it becomes heat, or thermal energy, and ceases to be useable. This is a consequence of the second law of thermodynamics, which states that entropy can only ever increase over time. Entropy refers specifically to the number of possible microstates that can make up the same macrostate, but in general refers to the disorder of a system, as there are far more ways to be disordered than there are to be in order. Entropy is often referenced alongside heat because an increase in thermal energy causes particle vibrations, which add to the entropy of a system. Because organizing a system, or reducing its entropy, would require energy to be applied to the system, this transfer of energy would produce more entropy than it reduced in the system, making a universal decrease in entropy impossible. The reason this is important, is that an increase in entropy is one of only three ways of determining the direction of time, the others being the expansion of the universe and the ability to remember past events. This means that the creation of heat is fundamentally tied to the passage of time. As more time passes, more exchanges of energy will take place to create more heat. Eventually, all matter and energy in the universe will become heat, resulting in what is commonly referred to as the heat death of the universe. By viewing the flow of capital as a flow of energy, capitalism becomes a way of generating heat, advancing the passage of time towards this point. This raises the possibility that capital is simply the current iteration of the thermodynamic forces that drive matter and energy to generate heat and increase entropy. In fact, recent work by biophysicist Jeremy England suggests

that the capacity to generate heat was one of the driving factors behind the development of organic molecules. (30) Furthermore, the high concentration of energy in early cities may have played a major role in the development and expansion of civilizations, according to Manuel DeLanda. (8) This all suggests that the capacity to generate heat is the true driving force behind the development of complex systems, and that capital is merely its current form.

Conclusion

When all of these topics are factored together, certain relationships and characteristics become more clear. The future being brought about by capital's hyperstitional nature is twofold: the immediate future is AI communism while the eventual future is the heat death of the universe. The limits on the capitalist mode of production come about through a conflict between its physical and social nature. It tends to accumulate constant capital, which is purely physical, while being driven by a desire to create monetary value, which is purely social. With AI, social concepts are abandoned and all value becomes physical, bringing the driving force in line with the method of expansion. Viewing heat as the driving force behind complex systems further reinforces the likelihood of AI, since current computer technology generates vast amounts of heat while synapse style computing offers heat efficiency in the off chance that efficiency, rather than capacity, is the key factor. All of this suggests that these processes are fundamental, and that no individual or group could ever hope to intentionally divert them. As for what to do in the face of this inevitability, the answer of accelerationism is simply:

Let go

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