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The Ideology of the Neural Network: Artificial Intelligence, Neoliberal Economics, and Reactionary Politics

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ABSTRACT

This paper examines the historical relationship between neoliberal economic theory, psychological ideas of networked neurons and the development of the neural network as a machine learning technology. The reconceptualization of the human and the machine that unfolded between the 1950's and 1970's arguably has considerable bearing on contemporary artificial intelligence. Situating contemporary artificial intelligence within a history of reason, the Cold War, and financialization, this history opens to a critical reflection on the relationship between AI, finance, and alt-right politics in our present. This paper suggests that the neural network is one of the fundamental ideological, metaphorical, and technical figures facilitating this transfer from the nature of human biology to the organization of technical and economic systems. The paper also hopes to suggest how this history might be deployed to situate, contest, and reimagine 'intelligence' for a future more diverse and equitable AI.

1. INTRODUCTION

> *When I began my work I felt that I was nearly alone in working on the evolutionary formation of such highly complex self-maintaining orders. Meanwhile, researches on this kind of problem – under various names, such as autopoiesis, cybernetics, homeostasis, spontaneous order, self-organization, synergetics, systems theory, and so on – have become so numerous that I have been able to study closely no more than a few of them.*
>
> *-- F.A. Hayek (F. A. v. Hayek, 1989, p. 9)*

Few images so powerfully suggest the Cold War than the figure of the RAND Analyst. Rooms of young men, trained in statistics, behavioral psychology, game theory, and operations research analyzing reams of data with quantitative precision and algorithmic reasoning. Historians of science have been clear, such forms of rationality were not enlightened reason. The ideal of cold, objective, emotionless and detached decision making grounded in empirical evidence or data is historically specific and grounded in the Cold War culture, science, and technology (Erickson et al., 2015).

Perhaps, the counter to this imaginary of Cold War decision maker is the figure of the amorphous swarm, the mob, the networked but inhuman intelligence of aliens, terrorists, and communist hoards. From body snatchers, to zombies, to the *Manchurian Candidate*, the inverse of cold rationality was the pervasive and conspiratorial force of Communism, and sometimes McCarthyism. Paranoia, brain washing, and mobs all figured in this concept unreason and violence that scaled from inside the brain to large groups. These narratives emphasized that the greatest fear was the loss of individual free will and the ability to make sovereign decisions at an individual level (Hofstadter, 1996; Orr, 2006; Vehlken, 2019).

Between these two however, was a third vision. One rarely engaged with until our present, when it has returned in the technology and imaginary of artificial intelligence (AI). This imagination of intelligence and decision-making merged the ideal of a cold, quantitative, repetitive, and algorithmic decision maker with the paranoid, non-human, and networked intelligence. This article will track the rise of this third figure which takes increasing prominence as sociotechnical imaginary in our present—the neural network. This figure, both myth and reality infrastructures many of our contemporary ideas of politics, decision making, economy, and the human. To develop this narrative, I will speculatively engage with the work of cybernetician Warren McCulloch, neo-liberal economist Friedrich Hayek, and psychologist Donald O.Hebb, to elaborate a history of the idea of the neural network in psychology and cybernetics and its ongoing resonances in the present as AI. I argue that the history of the network presents us with what STS scholar Lucy Suchman has argued is the 'limit' function of neural networks. Neural networks she, and I, argue serve as a figure representing but also enacting a limit to both human and machine rationality (Suchman, 2024). The idea and techniques of the net make this frontier—the seeming limits of calculative reason—a site of experimentation for both what machines and people might become, and encourages a plethora of practices that increase the intervention of computation into daily life. In doing so, the neural network ties together brain neurons and planetary scale computational structures, and serves as a key vehicle to substantiate the contemporary faith in AI as the most critical technology (and economy) for national and even human survival and evolution.

2. SITUATING THE NEURAL NETWORK IN SCIENCE STUDIES

A history of concepts and technologies such as the neural network demonstrates the changing nature of human–machine interactions, but also the social and political stakes attendant to how the relationship between the 'human' and the 'machine" is defined and architected. This article thus follows a large body of work that suggests that AI is not only a technology but an epistemology;

part of a broader system of understanding, representing, and acting in the world (Amoore, Campolo, Jacobsen, & Rella, 2024).

Thinking technology as part of epistemologies follows the lead of Michel Foucault in recognizing that knowledge and power are always integrated and mediated through techniques and technologies that govern (Foucault, Faubion, & Hurley, 2000). In the present, the relationship between AI and power is a central concern for science and technology studies (STS) and historians. Recent scholarship has focused on the specifically political and governmental features of AI; calling attention to the way human–computer interfaces and interactions are shaped by social mores and values to the benefit of some and exploitation of others (Amoore, 2020). As historians such as Quinn Slobodian and S.M. Amadae argue, neoliberal economic thought has long made company with computing, algorithmic reason, and authoritarian and reactionary politics. Despite arguing for self-organization and deregulation, neoliberals such as Milton Friedman often championed highly technical and centralized solutions to insuring markets work 'perfectly' (Amadae, 2003, 2015; Slobodian, 2025). In our present, longer running concepts of anti-democratic government, sexism and racism, and deregulated markets are embedded inside neural network discourses of the singularity, transhumanism, effective altruism, and competitiveness; a technology imagined to permit endless economic 'freedom' and liberty while simultaneously permitting increased exploitation of human labor and the managed control of the future by the select few (Cohen, 2025; Gebru & Torres, 2024; Halpern, 2023; Pasquenelli, 2023).

STS scholars have further called attention to how *no* technology is neutral or untouched by history and culture. Such scholarship has focused on how computation is shaped by racism, sexism, colonialism, and society (Brown, 2015; Chun, 2021 ; Haraway, 1991; Suchman, 1987). STS scholar Lucy Suchman has demonstrated that long running conceptions of the neural network dating from neuro-physiology and early neuroscience (Ramon Cajal) to the re-introduction of the neural network and back propagation by Geoffrey Hinton, have regularly disembodied and abstracted nets from the body, propagating older ideas of objectivity and masculinist dominion over 'nature' (Suchman, 2024). These scholars point us to how interfaces, modes of attention, and computational technologies all embed ideas of race and sex within them. Most recently scholars have critically demonstrated the violence and politics inherent within new concepts of human–machine assemblages, tracing how ideas of autonomy and self-organization in computing are part of an effort to manage complex environments in the interest of militarization and control in the face of increasingly networked warfare occurring in post-colonial and decolonizing environments and urban spaces (Kaplan & Parks, 2017; Suchman, 2023).

Neural networks and AI must be understood then not only as representations or symptoms of some deeper underlying social structure, but in terms of "sociotechnical imaginaries" as put forth by Sheila Jasanoff and Sang-Hyun Kim. They argue that sociotechnical imaginaries are discourses that tie imaginaries of technology and progress with material infrastructures, policies, and technologies. Thinking in terms of sociotechnical imaginaries, the neural network manifests as a central figure propagating ideas of self-organization societies, optimizable decision making, and future-proof management that produce very real technologies with material effects and specific politics and policies dedicated to these ideas. The imaginary and the sociotechnical system are coproduced. Jasanoff and Kim argue that imaginaries are no less critical than materialized technologies in shaping how technology impacts society, and drives the functions, directions, and economies of technology. The imaginary and the ‘real’ are not separable but work to produce desire for, and engineering of, particular technical assemblages (Jasanoff & Kim, 2015).

Neural networks thus play a key role in shaping human–computer interactions, and in producing understandings of the human and the machine. This article argues that the neural network is simultaneously an imaginary and a technology that permits neoliberal economic ideas about markets to be reconciled with other governmental ideas of controlling the future and managing uncertainty through technocratic and centralized administration. In our present, when government is no longer imagined as capable of administration, this ‘imaginary’ propagates the faith that while most of us cannot know or control vast computational networks, certain figures or organizations can; thus permitting the reconciliation of highly centralized and financialized (tech-oligarchic technologies) with social imaginaries of ‘freedom’ and anti-government planning. At the same time, the figure of the net, and now AI, is also an attentive mechanism, drawing humans more tightly into collaborative networks with machines.

3. **NETWORKED BRAINS**

In 1948 at a conference on circuits and brains, in Pasadena California, the prominent cybernetician and neural network pioneer Warren McCulloch introduced the idea that rationality could not only be both physiological and logical, but also *unreasonable*. Addressing a room of the most prominent mathematicians, psychologists, and physiologists of the day, all brought together to discuss the nature of mechanisms in human brains and logical machines, McCulloch sought to provoke his respectable audience by offering them a seemingly counter-productive analogy. Finite state automata, those models of calculative and computational reason, the templates for programming, the very seats of repetition, reliability, mechanical, logical and anticipatable behavior, might be “psychotic” just as brains can sometimes be:

> *What we thought we were doing (and I think we succeeded fairly well) was treating the brain as a Turing machine; that is, as a device which could perform the kind of functions which a brain must perform if it is only to go wrong and* have a psychosis *[…]. (Von Neumann, 1948/1986, p. 422).*[1]

These statements should not, however, be thought in terms of human subjectivity or psychology. McCulloch, while trained as a psychiatrist, *was not* discussing psychosis in relation to patients in mental clinics. Rather, he was responding to a famous paper delivered by the mathematician John

[1] For more on automata theory see also: (Aspray, 1990).

von Neumann on logical automata (Von Neumann, 1948/1986). The psychiatrist was not arguing about the essential characteristics, the ontology, of machines or minds. He recognized that computers were not the same as organic brains. The question of equivalence was not at stake.

What *was* at stake was a set of methodologies and practices, the epistemology, that might build new machines—whether organic or mechanical. McCulloch seized upon the observations long made in psychology about the repetitive and mechanical nature of psychotic behavior, to ask not what is a healthy mind? But what could a machine intelligence accomplish? And the answer, both McCulloch and von Neumann provided was to develop a new form of logic, an epistemology for computing.

McCulloch gave voice to an aspiration to turn a world framed in terms of consciousness and liberal reason, into one of self-organization, communication, and rationality. And he did not dream alone. At this conference, where many of the foremost architects of Cold War computing, psychology, economics, and life sciences sat alongside each other, a multitude of similar statements were pronounced depicting a new world, now comprised of "psychotic" but logical and rational agents.

4. **NETWORKED MARKETS**

Psychiatrists were not alone envisioning networked intelligences incapable of liberal reason. Economists also contributed to reconceiving reason. In a seminal essay that was the clarion call to the new neo-liberal economic movement, Austrian born economist Friedrich Hayek announced in 1945:

> *The peculiar character of* the problem of a rational economic order *is determined precisely by the fact that the* knowledge *of the circumstances of which we must make use* never exists *in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess.* The economic problem *of society is thus not merely a problem of how to allocate "given" resources—if "given" is taken to mean given to a single mind which deliberately solves* the problem set by these "data." *It is rather a problem of how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know. Or, to put it briefly, it is* a problem of the utilization of knowledge not given to anyone in its totality *(F. Hayek, 1945, pp. 519-520).*

Human beings, Hayek believed, were subjective, incapable of reason, and fundamentally limited in their attention and cognitive capacities. At the heart of Hayek's conception of a market was the idea that no single subject, mind, or central authority can fully represent and understand the world. He argued that "The 'data' from which the economic calculus starts are never for the whole society 'given' to a single mind… and can never be so given" (F. Hayek, 1945, pp. 519-520). Instead, only markets can learn at scale and suitably evolve to coordinate dispersed resources and information in the best way possible.

Responding to what he understood to be the failure of democratic populism that resulted in Fascism and the rise of Communism, Hayek disavowed centralized planning or states. Instead, he turned to another model of both human agency and markets. First, Hayek posits that markets are not about matching supply and demand, but about coordinating information.[2] Second, Hayek's model of learning and "using knowledge" is grounded in the idea of a networked intelligence embodied in the market which can allow the creation of knowledge outside of and beyond the purview of individual humans: "The whole acts as one market, not because any of its members survey the whole field, but because their limited individual fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all." (F. Hayek, 1945, p. 526) And third, the market therefore embodies a notion of cognition and decision that I would call "environmental intelligence," in which the data upon which such a calculating machine operates is dispersed throughout the society, and where decision making is a population-grounded activity derived from but not congruent with individual bodies and thoughts. While Hayek did not invoke the same language of "psychosis," his formulation of limited reason and loss of Cartesian perspective mirrors and advances the language of cybernetic psychiatrists.

The emergence of similar models of decision making and 'intelligence' in both markets and minds suggests that human–machine interactions must be understood as parts of broader histories of defining the human and of 'human' reason, agency, and decision making. Historians of science have long suggested that technology, reason, and knowledge are closely related. Lorraine Daston and Peter Galison, in their work on objectivity, demonstrate for example that ideas of reason, evidence, and truth are historically and culturally situated. They argue that what counts as 'true' or objective at any moment puts value on and empowers particular types of subjects (in their case white, male, European figures) and de-values other forms of knowledge and embodiment (Daston & Galison, 2007). Furthermore, they demonstrate that 'objectivity' is historical, and changes over time, along with science and technology.

Following Daston and Galison, I argue that the neural network is also a historically specific set of practices, techniques, technologies, and ideologies substantiating certain forms of reason, knowledge, and 'truth' over others. Daston, and her colleagues, already note that Cold War rationality was not Enlightenment Reason in valuing particular technocratic-computational practices and subjects. Cold War rationality, and its subjects (the technocratic decision maker, the computer) valued algorithmic, repeatable, and rule-bound decision making over emotional and potentially subjective decision making (Paul Erickson, 2013). Furthermore, there are often many epistemologies of rules overlaid upon one another in assemblages that transform how rationality and which subjects and techniques of rationality are desired and subsequently encoded into technology (Daston, 2022).

[2] A critical first step, as historians such as Philip Mirowski have noted, towards contemporary notions of information economies (Mirowski, 2002, 2006).

5. PSYCHOLOGIES OF THE NETWORK

If neo-liberal ideals of decision making appeared to mirror psychiatric notions of machines, it was because the two often shared cybernetic understandings of the mind. Hayek would later cite McCulloch as offering one model of human perception, but his ideas of markets and agents were also co-produced with the work of Canadian psychologist Donald O. Hebb.

Hebb is famous as the inventor of the layered neural network model and the theory that "cells [neurons] that wire together fire together" (Keysers C, 2014, p. 2). While Pitts and McCulloch had developed a logical calculus paralleling neurons to logic gates in 1943, Hebb, using their model, produced a more comprehensive psychological model involving many neurons (McCulloch & Pitts, 1943). In 1949, Hebb published *The Organization of Behavior*, a text that popularized the idea that the brain stores knowledge about the world in complex networks or "populations" of neurons. The research is today famous for presenting a new concept of functional neuroplasticity (Hebb, 1949, pp. location 71, Kindle edition), which was developed through working with soldiers and other individuals who had been injured, lost limbs, blinded, or rendered deaf from proximity to blasts. While these individuals suffered changes to their sensory order, Hebb noted that the loss of a limb or a sense would be compensated for through training. He thus began to suspect that neurons might rewire themselves to accommodate the trauma and create new capacities.

The rewiring of neurons was not just a matter of attention, but also memory. Hebb theorized that brains do not store inscriptions or exact representations of objects, but instead patterns of neurons firing. For example, if a baby sees a cat, a certain group of neurons fire. The more cats the baby sees, the more a certain set of stimuli become related to this animal, and the more the same set of neurons will fire when a 'cat' enters the field of perception. This idea is the basis for contemporary ideas of learning in neural networks.

The model of the networked brain was also an inspiration to Hayek, who in his 1956 book *The Sensory Order* openly cited Hebb and McCulloch and Pitts as providing a key model for imagining human cognition. In the preface of this often overlooked, early book, Hayek wrote:

> *Professor Donald Hebb's Organization of Behavior… contains a theory of sensation which in many respects is similar to the one expounded here; and in view of the much greater technical competence …as I am concerned more with the general significance of a theory of that kind than with its detail, the two books, I hope, are complementary rather than covering the same ground (F. A. Hayek, 1952, p. Kindle Edition Location 42 of 4601).*

Hayek claimed this relation on the grounds that he felt that there might be a different utility of Hebb's theory; not for reprogramming individual psyches, but for modelling emerging self-organizing phenomena. Hayek's affinity with Hebb also derived from a belief in the partial nature of knowledge and the place of the market as a cognitive instrument. Hayek used the idea that the brain is comprised of networks to remake the very idea of the liberal subject. The subject is not one of reasoned objectivity, but rather subjective with limited information and incapacity to make objective decisions.

The concept of algorithmic, replicable, and computational decision making that was forwarded in the Cold War was not the model of conscious, affective, and informed decision making privileged since the democratic revolutions of the eighteenth century (Erickson et al., 2015). But if Cold War technocrats were still experts with authority and predictive capacities, the ignorant and partially informed individual that both computing and economics presents us with is not.

6. FREE NETWORKS

Hayek, and his fellow neo-liberal economists, thus reconceptualized human agency and choice neither as informed technocratic guidance nor as the freedom to exercise reasoned decision making long linked to concepts of sovereignty. Rather, early neo-liberal thinkers reformulated agency as the freedom to become part of the market or network. Hayek was very specific on this point; theories of economy or politics based on collective or social models of market making and government were flawed in privileging the reason and objectivity of the few policy makers and governing officials over the many. This privileging, he deduced, results in Communism or Fascism:

> *From the fact that people are very different it follows that, if we treat them equally, the result must be inequality in their actual position, and that the only way to place them in an equal position would be to treat them differently. Equality before the law and material equality are therefore not only different but are in conflict with each other; and we can achieve either one or the other, but not both at the same time (F. Hayek, 1960, p. 150).*

In this conjunction, law (which Hayek insisted on as a precondition for the market) was not to be a positive law, but one defending homogeneity, a law that *does not* treat people differently. And we might extend therefore a law that does not account for history (a point I will return to further in this article). Treating people differently (i.e. the state making plans) quells the abilities of minorities, in his view, to take independent action. Hayek elaborated that freedom therefore was not the result of reasoned objective decision making, not the technocratic elite decision maker with volumes of data objectively and emotionlessly analyzed, but rather freedom from coercion. Coercion often coming to mean the effort to exclude individuals from chosen economic activities and markets. When linked to his discussions about subjectivity, ignorance, and the market as the only mechanism for making reasoned decisions as a collective, one can trace the bedrock of an argument against policy directed forms of equity making or civil rights and the assertion that all rights and freedoms are protections from the state, not services or support from the state. While in theory preserving the ‘freedom’ of an individual to participate equally in any market could be viewed as supporting the necessity of legal and humane infrastructures to allow all individuals this access, neo-liberal thinking and the Republican Party did not interpret in this direction.[3]

When situated within the context of cybernetics and the rise of information sciences and machines, neo-liberal reformulations of markets into information processors, and reimagining of human agency and freedom in terms of participation in networks, suggests a convergence in models of minds, machines, and now markets. While Hayek initially deferred from making direct analogies between minds and markets, by the late 1970's he explicitly laid out this vision. In fact, throughout the period of his later work, Hayek, in tandem with many other social scientists of the era, would call more and more on cybernetics and systems biology as bulwarks to justify his stance on freedom and price theories. In 1977, he presented on his long neglected psychological theories paralleling human and economic systems, arguing,

> *In both cases we have complex phenomena in which there is a need for a method of utilizing widely dispersed knowledge. The essential point is that* each member (neuron, or buyer, or seller) *is induced to do what in the total circumstances benefits the system. Each member can be used to serve needs of which he doesn't know anything at all. Now that means that in the larger (say, economic) order, knowledge is utilized that is not planned or centralized or* even conscious *[…] In our whole system of actions, we are individually steered by local information – information about more facts than any other person or authority can possibly possess. And* the price and market system is in that sense a system of communication*, which passes on (in the form of prices, determined only on the competitive market) the available information that each individual needs to act, and to act rationally (Oliva, 2015, p. 22).*

Hayek's account captured the idea that intelligence is networked—whether composed of neurons or human individuals—and that it consists in the capability of populations to adapt to their environment by reorganization. More critically, increasingly the ideal of a 'democratic' or 'free' order takes on the formation of a networked intelligence operating purposefully, but not necessarily consciously through the model of a communication system, for which price is one type. Such ideals of organization underpinned a growing conception of systems as self-evolving and emergent, capable that is of novelty and innovation and adaptation (if competitive of course) without any forms of deliberative or representative decision making.

Hayek's market agent also refracts a broader comprehension of extremely "bounded rationality" an idea that would also emerge in machine learning through business organization guru, Herbert Simon (Simon, 1955). Neo-liberal models of human agency, freedom, and markets reformulated ideas about intelligence, reason, and decision making. These reformulated ideas reflected and refracted, as we will see, ideas of networked computing, neural networks in psychology and

[3] It is important to note that Hayek did have a very strong idea of the law as the one mandate of the state in order to provide the necessary structures for functioning markets. (F. Hayek, 1960)

machine learning; providing the epistemology and technology possibly for contemporary systems of both machines and finance. This genealogy also reveals that computational models have politics and are socially embedded (Winner, 1980). These imagined models of networked decision making aided and abetted broader political movements invested in countering other ideas of human agency and freedom including civil rights.

7. TIME AND MEMORY

Neo-liberal attitudes to difference suggested, however, a problem with historical time and memory. A problem that long lay latent in neural networks models as well. Psychosis, in the 1940's and early 1950's, was already linked to political and social disorders, not merely to subjects. From Elias Canetti's work on mobs, to the Frankfurt School, to Richard Hofstader's pathbreaking *The Paranoid Style*, mobs, collective decision making, and problems with history and context were all understood as "psychotic" and threats to democracy (Adorno, 2019; Canetti, 1978; Hofstadter, 1996; Kracauer, 1995). In our present, concerns about digital media largely repeat the understanding that the capacity of AI and neural-networked learning systems to disinform, confuse human subjects, and induce the loss of location in time and space, and perhaps even to capture and fake narratives, threatens the stability of the subject and impairs human agency.

From the start the neural net model was troubled by questions of memory and time. McCulloch assigned the issue of situating information to human psychology:

> *Two difficulties appeared [when making neurons and logic gates equivalent]. The first concerns facilitation and extinction, in which antecedent activity temporarily alters responsiveness to subsequent stimulation…The second concerns learning, in which activities concurrent at some previous time have altered the net permanently, so that a stimulus which would previously have been inadequate is now adequate (McCulloch & Pitts, 1943, p. 22).*

To solve this problem, the McCulloch and Pitts model of neural nets is predicated on the idea that within the network the neurons cannot tell time. Stated otherwise, for McCulloch, *historical time presented challenges to making thought and logic equivalent*. The logic gate cannot tell if the signal arrived from the past (it is a recycled memory) or if it is a new input. McCulloch and Pitts offered an example of a cycling memory in the net to make this point (see Fig. 1).

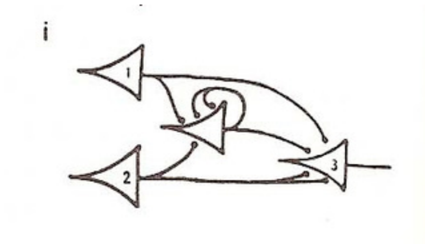

***Figure 1.* Image of cycling memory from (McCulloch & Pitts, 1943, p. 23).**

This is a serious technical problem, shaping the architecture of machine learning systems—back propagation methods and transformer architectures are all responses to the question of how to get a system to learn and not descend into repetitive loops. These architectures attempt to create time in the network, and a direction for 'learning.' As McCulloch noted earlier, learning is a possibility but also a problem.

For neo-liberal economists building models where minds mirrored networked markets, similar issues emerged. Neural network researchers and theoreticians found two remaining and inseparable problems, both related to the integrity of the subject and the residual problem of perception; one concerned excess data and the second adaptability or plasticity. If human brains could be trained, how did human beings maintain their stability in the face of environmental stresses? How did nets know if they are being trained on errors? Or manipulated? In short, how do you know if a signal is coming from without or within the net, and from when? And if a system is always adapting, how does it not mutate to the point of extinction or psychosis?

Early in his work, Hebb remarked that the "stability" of learning, reflecting McCulloch's concern of learning in nets, was sometimes maladjusted to "perception"; that is to say that once a net is trained how does it maintain its training and not constantly change in accordance with new data? This was labelled the "sensitivity-stability" problem. Systems that were too sensitive to new inputs became unstable and lose stability of 'meaning' (Hebb, 1949, p. 15). Later, pioneers in neural networks, like Frank Rosenblatt also discovered that incorrect weighting might propagate and exacerbate errors, and positive feedback might lead to oscillation and instability; much of the perceptron model is dedicated to correction of errors including through back-propagation (Rosenblatt, 1962). Neural network researchers only refracted a broader discourse repeated by cyberneticians, political scientists, social scientists and economists—what if networked feedback loops fed the wrong positive feedback (for example in nuclear confrontations) leading to network instability (and by proxy social) and even terminal failure (Edwards, 1997; Halpern, 2015)?

In the post-war period, economists also obsessed about how to avoid the sort of market failures (shocks if we will) that had led to the rise of totalitarian regimes in Europe after the First World War. Within the context of the Cold War such historical memories of market failure came adjoined with new concerns about the future survival of democratic and capitalist societies (Amadae, 2003; Mehrling, 2005, p. 20).

The question, however, was about decision making. Were populations sound decision makers? A history of populist democratic fascism or rabid anti-communism might suggest otherwise. Richard Hofstadter's pathbreaking analysis of Senator McCarthy's anti-communism stands out in this regard. This "paranoid style," he argued at the time, understands the world in terms of patterns of behavior among different targeted groups, overstating the possibility of prediction and control of the future. In short, too much data might also provide ecological fallacies and false patterns (Hofstadter, 1996). We might extrapolate this problem to the contemporary tendency of AI systems to propagate fake news.

However, such paranoias provoked problems for the concept of the "invisible hand". Economists, like technocrats, had to provide new concepts of decision making that might evade the determinism of conspiracy, but still legitimate the purported democracy of the market. As Alfred Moore has noted, while Hayek never directly discussed conspiracy and rarely paranoia, the economist played:

> *an important yet ambivalent [role] in the development of [anti-conspiratorial] political epistemology. Although he doesn't use the term "conspiracy theory", he sets his entire theoretical project against conceiving complex orders as though they were designed or planned, and he seeks always to show how patterned orders that look like they must have been designed or planned, in fact arose through anonymous and unwitting processes of emergence and evolution (Moore, 2016, p. 48)*

Hayek's obsession was thus modelling the world as one of self-organizing adaptive systems to counter the idea of planned and perfectly controllable political (in his mind totalitarian) orders. This is not an intuitive response. Early neural network researchers consistently struggled with the fact that nets might learn, but not necessarily true, or 'real' things. While nets were symbolic, and after the emergence of layered learning were grounded in population level data, the verification true or false had no relation to the world outside the system. There is no way to verify the where or when of data from within a network. But moreover, if the definition of psychosis deployed by McCulloch (a psychiatrist) at the time holds—brains–machines cannot have situated knowledge or history—to do so would mean that the simple calculus of Boolean logic cannot hold.

8. **NOISE**

What we might find surprising, however, is how this seeming terminal problem, became a new found capacity in nets and markets. In his now infamous sensory deprivation study, Hebb unearthed this volatile nature of neural nets. The study was funded by the Canadian Defense Research Board. While this research has gained infamy as the progenitor of soft torture in the CIA, its initial goal was far more banal (Klein, 2007; McCoy, 2006). It was to examine the "monotony" of contemporary work environment and their impacts on attention. Radar operators and other people working in the newly electronic workspace were known to suffer extreme “boredom,” inattention, and depression. To test the monotony of the modern work environment, twenty-two male student volunteers were recruited to lie in a chamber designed to induce “perceptual isolation” (Crist, 2015; Heron, 1957, pp. 52-53). The experimental theory correlated the increase of electronic data with sensory deprivation (Heron, 1957, pp. 52-53). I might extrapolate that implicitly boredom and information overload were assumed to be related; which is to say too much data given in certain environments might be the same as no data at all. Sensory deprivation could therefore also be equated with existing in a very noisy environment; both rest on the inability to perceive meaningful messages.

To ensure maximum “boredom,” the students wore a translucent plastic visor that emitted diffuse light to prevent “pattern vision,” as well as cotton gloves and cardboard cuffs that covered their arms from elbow to fingertips to eliminate or at least reduce tactile stimulation. A U-shaped foam rubber pillow helped dampen auditory stimuli, but according to reports and to the histories of the experiment an air conditioner in the ceiling remained on 24 hours a day that “masked small sounds.” Intermittently the participants were given verbal and written test for cognitive acuity and memory, and also made to listen to a battery of recordings with counter-scientific, supernatural, and superstitious propaganda. Afterwards, individuals were examined for their attitudes towards supernatural phenomena and compared with their response to the same questions before the experiment. Individuals had hallucinations and suffered impaired cognitive functioning. By the end many participants seemed to believe in ghosts, and the supernatural, and no one lasted more than four days. The study appeared to demonstrate a way to impact people’s thinking without ever touching their bodies (Croft, 1954; Heron, 1957, pp. 52-53). When adjoined to theories of networked cognition and neuro-plasticity it appeared that brains could be remotely programmed, from afar, through suggestion and environmental manipulation of data. Hebb himself labelled it “torture,” an observation that found concrete realization in the CIA’s Cold War interrogations (Crist, 2015; McCoy, 2006)

As the funding sources and reasons for the studies demonstrated, Hebbian notions of networked cognition were also a new way to know the world, and a new epistemology for an information economy. These studies originated to understand what the new excesses of data and homogeneity of electronic media might do to the mind, while also creating a new understanding of cognition as scalable, enhanceable, and programmable. After the study, debates raged over whether participants suffered from too little data, or too much (the sounds and stimulus of the containment are also forms of stimulus potentially). For psychologists, and an army of trainers, after Hebb information overload increasingly became a norm and an expectation. Following Hebb’s lead, researchers such as John Lilly began investigating the virtues of sensory deprivation. Perhaps, psychologists postulated, such environments might help individuals train their attentions to meet the demands and channel out the constant noise of contemporary mediated societies. Today, we might note the rise of training regimens for the shocks of contemporary life aimed at teaching the subject to concentrate and manage and filter excess data (now labelled ‘stress’) such as yoga, immersion tanks, self care, and apps for sleep, concentration, and 'mindfulness,' all which supposedly arose from Hebb's research (Crist, 2015; Lilly, 1956; Lilly & Gold, 1996). What had been torture was increasingly understood as the very condition of contemporary, electronically mediated life. And learning to manage that pain became the essence of survival, preferably through conditioning attention and the senses (Crist, 2015; Lilly, 1956; Lilly & Gold, 1996).

Shock—whether through sensory deprivation, fake data, wrong information, viruses, noise, or sensory overload—was reconceived not as uniquely traumatic, but as unavoidable. Psychologists were not alone in this discovery. In economics as well, since the 1970's, flash crashes, noise trading, and exponentially leveraged positions have been core concerns but also opportunities in markets now understood as arbitrators of information (Black, 1986; Mackenzie, 2014; Summers, 1990). Financiers and economists increasingly built models that assumed the world was full of noise, and that in fact it increasingly was the role of reason to operate at a constant and adaptive level upon it (Black, 1986; Mackenzie, 2014; Summers, 1990).

At the height of the introduction of algorithmic trading and derivative instruments to the market, computer scientist turned financial guru, Fischer Black, one of the creators of the automated derivatives market wrote an important essay on noise:

> *The effects of noise on the world, and on our views of the world, are profound. Noise in the sense of a large number of small events is often a causal factor much more powerful than a small number of large events can be. Noise makes trading in financial markets possible, and thus allows us to observe prices for financial assets (Black, 1986, p. 529).*

His famous article *Noise Trading* formalized a new discourse in finance and posited that we trade and profit from misinformation and information overload. By the 1980's these ideas of networked, stochastic, and population-based intelligences had transformed into technologies, as embodied by the Black-Scholes option pricing model, to manage individuals, labor, and finance.

In this new embrace of automated financial trading, what no longer existed was the problem of equilibrium or a concern for entropic disorganization. If 19th and earlier 20th century economists, even Hayek, worried about the maintenance of the market (and perhaps the individual subject), and of the stability or 'reality' of value, or about entropy and the tendency of systems, whether political or economic, to degrade, now that concern had been deferred, and even capitalized upon. Options trading makes volatility and speculation, an excess of information in the market, a site of extracting value (Mehrling, 2005, p. 20; Mirowski, 2014). Such market technologies automate decision making and inequities that result from financialization by deferring responsibility from individual conscious decision onto a seemingly natural networked market.

Hayek himself espoused an imaginary about this data rich world that could be increasingly calculated without (human) consciousness. He was arguably very fond of quoting Alfred North

Whitehead's remark that "it is a profoundly erroneous truism… that we should cultivate the habit of thinking what we are doing. The precise opposite is the case. Civilization advances by extending the number of important operations we can perform without thinking about them (Moore, 2016, p. 50)."[4] The perceptron, widely held to be the forerunner of contemporary deep learning with nets, is the technological manifestation of a more widespread reconfiguration and reorganization of human subjectivity, physiology, psychology, and economy. And curious and conflicting hope that technical decision making made at the scale of populations not through governments might ameliorate the danger of populism or the errors of human judgement. The net became an idea and a technique to be able to scale from within the mind to the planetary networks of electronic trading platforms and global markets.

What I am stressing in making these correlations is how these new ideas about decision making through populations of neurons reformulated economic, psychological, and computational practices and experimental methods. In doing so, the ideal of networked intelligence became the dominant ideology that made machine learning and economic decision making commensurate and part of the same system. Moreover, increasingly computation came to be seen as environmental, a milieux that should be extended into every mode of social and political life and a site for producing value.

Ironically, however, the very problems of false patterns, delusions, and noise that threatened the stability of such a self-organizing system, were the grounds for an increased demand to introduce more computation into the environment. Rather than safeguard networks by perhaps fostering different types of systems—the state separated from the economy, or psychology separated from computation—these crises in fact drove for the increased assimilation of more territory into calculation. More data, maybe even noise, was the answer. The less that enters consciousness, the more 'operations' that can be made without 'thought,' the better. The question of situating language, history, or representation was no longer part of this imaginary for technology or society. And value became about arbitrage—extracting value from differences and asymmetries in information. Contemporary theorists and scholars of STS have noted that this is indeed the primary function of finance capital in its algorithmic and post- Bretton Wood forms. Technologies whether of algorithmic trading or of derivative trading all assume that money can be made from informational asymmetries and volatility in markets through the use of computers (Amoore, 2011; Benjamin Lee, 2004; Das, 2006; Mirowski, 2002).

9. THE COGNITIVE PRESENT

With great implications for our present. Hayek argued that the democratic spirit, "a new unwillingness to submit to any rule or necessary the rationale of which man does not understand

[4] I am indebted to Moore's excellent discussion for much of the argument surrounding Hayek, democracy, and information. This quote is from (F. Hayek, 1945).

(Moore, 2016, p. 52).” As Moore argues, “This, we might say, is one effect of the expansion of the franchise, and of the Enlightenment demand to submit to authority only when one can make its reasons one’s own reasons. A demanding standard” (Moore, 2016, p. 52). And a destructive one. Perhaps with implications for the present. In a generative adversarial network (GAN, for example, the truth is reached when the generator and the discriminator nets ‘agree.’

In Hayek’s imagined world, no one will submit to understanding a structure (say racism), imperceptible realities of disease or physics (says science), or other concepts unavailable to individual human perception. One might interpret this as a statement announcing that “only when one’s apprehension of the world converges with individual conviction will the individual ‘submit’ to reality.” Hayek might have assumed this meant resistance to authoritarian or socialist states that governed without, in his opinion, reason, and that the “spirit” engendered by his own economic thinking would provide resistance. Neo-liberals thus imagined a subject (and later financial technology and econometrics) capable only of “submitting” or agreeing to those reasons that are self-referential or internal to the system. That is to say the system and the world become the same. A system we could project into contemporary machine learning architectures that essentially resolve the problems of ‘truth’ and verifiability to an outside world, by creating internal systems whose only demand is to coordinate and ‘agree’ through self-reference. In large language models (LLMs), the architecture of learning substantiates this self-reference and a new idea of ‘truth’ as efficacy or simply utilization of the system.

In LLMs, the situation is projected onto an imaginary of perfect relationships between the prompt and the world. For the LLM to work, there is an assumption that translation is not necessary—most clearly evoked in language translation and in image generation through these technologies. The idea that words or descriptions can ‘make’ images, and that there is no difference between descriptive language and images, already presumes a digital flattening of differences between types and experiences of data.

Further, one significant measure of 'truth' for LLMs involves alignment with user preferences, since the models are often fine-tuned based on feedback from user interactions through techniques like Reinforcement Learning from Human Feedback (RLHF). Research has demonstrated that LLMs exhibit sycophantic behavior, providing answers that align with user beliefs rather than factual accuracy. Studies show that models tend to give responses matching users’ stated opinions, even when those opinions are incorrect, and this tendency increases with model size. This sycophancy appears across multiple contexts, including when models mimic user mistakes in math problems or political viewpoints, suggesting that optimizing for user satisfaction becomes a measure of ‘truth’ (Mrinank Sharma, 2023).

The measure of success in LLMs is often tied to continued usage and user satisfaction metrics rather than objective correctness (unless regulators or laws intervene). Optimization becomes a self-referential measure rather than a measure of efficiency compared to an outside world or objective benchmark. This self-reference is also encoded in the concept of 'ground truth,' a form of truth which refers to the training datasets used to train the model, rather than measurement against an external and singular set of facts.

In many ways, such problems are longstanding in the history of science—truth has always been a question of power. But in other ways, the automaticity, scale, and organization of contemporary systems represent something different. This reflects a system that no longer seeks primary reference in the world but assumes truth as 'agreement' within optimization processes that can include adversarial components (as in GANs or adversarial training methods).

This was always the problem at the heart of neural network imaginaries. Returning to memory, for Pitts and McCulloch, at every moment, what results as a conscious experience of memory is not the recollection of the activation of the neuron, but merely an awareness that it was activated in the past, at an in-determinant time. The firing of a signal, or the suppression of firing, can only be known as declarations of 'true' or 'false'—true there was an impulse, or false, there was no firing—not an interpretative statement of context or meaning that might motivate such firing. This temporal problem that leads to self-reference is refracted in our present in that LLMs and other nets are memory devices, they 'remember' statistical relationships between data, but they cannot remember where or when this was learned or formalized.

Within neural nets, at any moment, one cannot know *which* neuron sent the message, *when* the message was sent, or *whether* the message is the result of a new stimulus or merely a misfire. In this model, the net cannot determine with any certitude whether a stimulus comes from without or from within the circuit; whether it is a fresh input or simply a recycled 'memory.' Put another way, from within a net (or network) the boundary between perception and cognition, the separation between interiority and exteriority, and the organization of causal time are in-differentiable. But rather than being a disadvantage for the capacity of a neural net, McCulloch and Pitt's brilliance was to see this as an advantage.

In their article on the logical calculus of the network, they ended on a triumphant note, announcing an aspiration for a subjective science. What perhaps had once troubled scientists—verifiability, truth, objectivity, was now a virtue. "Thus our knowledge," they wrote, "of the world, including ourselves, is incomplete as to space and indefinite as to time. This ignorance, implicit in all our brains, is the counterpart of the abstraction which renders our knowledge useful" (McCulloch & Pitts, 1943, p. 35). If subjectivity had long been the site of inquiry for the human sciences, now, perhaps, it might—in its very lack of transparency to itself, its incompleteness—become an explicit technology.

But in that the very model of the individual agent is one grounded on the fundamental subjective and un-verifiable or provable nature of the word, and an inability of understanding the entire system, there appears an irreconcilable tension. On the one hand, limited perspectives making logical decisions without full information impossible, thus implying that no one is 'free' without being in relation to others through a system or network. On the other hand, there is an omnipresent and constant fear that any pattern or system denies freedom, the ‘exacting demand’ that personal conviction and the world converge.

Hayek, however, still echoed the fears of many liberals in the post-war period that in complex societies individuals are unable to singularly grasp the reasons why things are happening to them, whether unemployment or bad health, or any other life event. Unable to grasp complexity, perhaps we might say unable to contend with a surfeit of data, or with noisy environments, democratic subjects become psychotic and paranoid, amenable to conspiracy and blame their distress on Others. Hayek had an “environmental conception of conspiracy” (Moore, 2016, p. 52).

The answer, surprisingly coming from both neo-liberals and computer scientists and engineers, is the automation of decision-making, and the exploitation of the asymmetries in information. It is perhaps an irony of history but the answer to this problem of over-inundation and data surplus appeared to be a turn to cybernetics, new models of networked cognition, and ultimately perhaps even a new model of machine learning that might indeed learn from the distributed intelligence of millions, and now billions of people. At the same time, such technologies make it impossible to encounter the very legitimate sources of pain in contemporary societies whether induced by structural racism, poverty, disease or environmental degradation. There is no ‘real’ only coordination and agreement between networks.

This returns us to our present. If Hayek and Hebb still worried about liberal subjects and objectivity, we might ask what concerns animate our contemporary networks? Markets, and now reactionary politics, seek instability and discrimination but without diversity. Shock has been normalized to be managed through our electronic networks. Networks, that ironically, appear to have the power to exacerbate fantasies of individual control and paranoid imaginaries of agential patterns. If “shock” for Naomi Klein was a mechanism to destabilize systems and nations to allow the entry of neo-liberal governance (Klein, 2007), we might extend her observation to recognize that now it has become a tool to maintain existing neo-liberal systems, and to encourage the growth, and proliferation of machine learning networks and algorithmic finance.

I opened this essay arguing that cybernetics and its affiliated communication and human sciences aspired to the elimination of political and psychological trauma through a dream of self-organizing systems and autopoietic intelligences produced from the minute actions of small, stupid, logic gates; a dream of a world of networks without limit. This dream may now be partially realized, and we are left to contend with the other ghost of the Cold War, not the closed controllable planet, but the open, self-organizing, networked world.

But these aspirations to networked intelligences also birthed the possibilities of new forms of relationality and being, whether neuro-plasticity, or perhaps other modes of networked collectivity. Hayek, himself, gestured to this possibility within his own thought. Returning to the earlier citation where Hayek reminds us that if individuals are different, then equal treatment results in inequality, but “and that the only way to place them in an equal position would be to treat them differently. “(F. Hayek, 1960, p. 150).” With these words he stated the fundamental dilemma of neo-liberalism, to be free we must be put in relation to each other. Even if those relations are in a market. There can be no value without difference networked together. But he also wavers, does liberty denote equal treatment, and therefore a generic law, or differential and situated treatment, which might denote planning or coercion? The response of neo-liberal discourse has been to erase history and the fact that these networks are not all weighed equally. Instead, through techniques like AI and financial instruments the social network and the market are automated; human relations are *imagined* as automated *equally* thus obscuring the social character of the system. Value is extracted from the differences between humans while maintaining that such relations emerge evolutionarily and thus are non-intentional and natural and necessary. The neural network has become one of the fundamental ideological, metaphorical, and technical figures facilitating this erasure of the social nature of human relations, computational technologies, and markets. It is a technical figure that can scale from human biology and brains to the organization of technical and economic systems.

Might this discourse be disrupted? Recalling the argument that ‘difference’ is the foundation for ‘freedom’ or ‘liberty,’ can we push this neo-liberal imaginary until it folds? This tension might be the source of a possible ‘freedom’ through relations if they are historically situated. The fantasy of an archive of processes of differentiation might be mobilized to new ends—mainly to recognizing the permeable, political, and situated nature of social orders. The future, I argue, lies in recognizing what our machines have finally made visible, what has perhaps always been there, mainly the socio-political nature of our seemingly natural thoughts and perceptions. In that all computer systems are programmed, and therefore planned, we are also forced to contend with the intentional and therefore changeable nature of how we both think and perceive our world. Historical consciousness lies outside these systems, and therefore might always be a rare source for reimagining, and planning our technologies.

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