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Paper Title: **Machine Learning and The Algorithmic Cancellation of the Future**

Abstract:

In this paper I explore the impact of machine learning algorithms on the data they process. I make a two-part argument. First, that the inductive basis of machine learning functionality forecloses their capacity to produce outcomes with no ancestral relation to their training data. This has a protracted winnowing effect on content, which is a political concern due to the growing presence of machine learning algorithms in various facets of communal and individual life. I maintain that the a priori restrictions placed by algorithms on data constitute an emerging hegemonic order. Second, that an intervention in this scenario can be staged through an examination of non-digital, interpretative and self-reflexive methods in empirical science. The restrictions of machine learning, I offer, are drawn into high relief by exploring scientific studies in which it is deemed methodologically insufficient. This reading indicates predicates of intelligence which allegedly “intelligent” automation fails to self-generate.

I substantiate the first part of my argument with work from work from philosophers of digital media. Matteo Pasquinelli argues that machine-learning-based systems, including A.I., cannot be intelligent, as their inductive functionality does not compass the creativity constitu genuine intelligence. Adrian Mackenzie applies a Foucauldian framework to algorithmic determinacy, highlighting the role of contingency in knowledge production to explain how prediction effectively “creates” the future. These thinkers provide me with materials for the second part, in which I use cases from experimental psychiatry to theorize potential sites of resistance to the algorithmic cancellation of the future.

**Machine Learning and The Algorithmic Cancellation of the Future**

Part I: The Future Is Dead; Long Live The Future?

In his 2009 book *Capitalist Realism: Is There No Alternative?*, cultural theorist Mark Fisher argues that, at the dawn of the new millennium, it has become easier to imagine the end of the world than the end of capitalism.[[1]](#footnote-0) He turns to popular culture to make this claim, observing that mainstream films and television shows tend to depict apocalyptic scenarios more often than long-term improvements in human life. He also notes that the phenomenon of “retro”and remix-based artwork stems from the widespread intuition that the end of the world is more likely than a meaningful shift away from capitalism. Artists, he suggests, no longer see the point in creating original work for a future in which it will only be considered valuable to the extent that it generates profit. They merely amalgamate the past, mining popular works from various historical epochs to be recombined as collage.[[2]](#footnote-1) The subsequent cultural impoverishment redoubles the pervasive, if still tacit, sense that there is little left to expect but increasingly desperate levels of competition and inequality spurred by unregulated economy.

In his 2014 book *Ghosts of My Life: Writings On Depression, Hauntology And Lost Futures*, Fisher describes this scenario as “the slow cancellation of the future,” borrowing an expression from Marxist sociologist Franco ‘Bifo’ Berardi.[[3]](#footnote-2) In a 2013 essay, Fisher indicates that Berardi did not intend the phrase to denote extinction in any literal sense; rather, he coined it to refer to a sort of diffuse psychological effect. By his telling, the future was at one time understood as a promise. The fact that tomorrow will be better than today was a social predicate, a certainty beyond question — but the economic policies that took root in the United States and Western Europe beginning in the 1970s gradually erased these optimistic visions. Deregulation, Berardi writes, spilled over into the collective psyche, leaving an impression of hyper-determinacy.[[4]](#footnote-3) His works investigate the mental toll this takes: the death of the future manifests as the normalization of cynicism and depression. Fisher scrutinizes the external effects of “the slow cancellation of the future” in his examinations of apocalyptic, cynical, endlessly reiterative art.

Both thinkers agree that this fatalism imposes a generational schism. Younger people, they claim, may be born into a world where they accept the indiginites of capitalism as both inevitable and eminently normal. Berardi writes that he cannot adjust to this perceptual shift, admitting that “it is very difficult, maybe impossible, to ... look at reality without this kind of temporal lens.” [[5]](#footnote-4) Fisher adds that while Berardi is a generation older than him, the two “are on the same side” of this divide. Neither believe themselves to be capable of making sense of reality if the illusion of a better future completely breaks down. Fisher implies that those younger than himself may learn to live with the new futility. But if such concessions are made, the “slow cancellation of the future” will become more than simply psychological. The acceptance of the apocalypse, Fisher writes, encourages a very dangerous pessimism, recasting tangible actions toward a better world as pointless. Environmental activism, social justice advocacy, voting, protesting: all are superfluous if capitalism permits no structural challenge to itself. Cynicism and depression give way to apathy, and apathy allows for destruction. This catalyzes a vicious cycle: pessimism manifests as its own self-fulfilling prophecy

Amid a profusion of future-oriented technologies, however, one wonders if Fisher and Berardi’s verdict is somewhat perfunctory. The “slow cancellation of the future” has not accounted for the optimism inherent to the accelerating rate of innovation in technoscience, especially as regards a field patently invested in the world of tomorrow. Computational predictive analytics, assisted by advances in machine learning, present lapidary prognosticative visions. Amidst the future’s alleged cancellation, we are presented with datafied visions of the future accompanied by assurances of objectivity and accuracy. The phenomenon of predictive analytics appears to challenge the myth of the future’s end. How could it be that we are developing so many new tools for augury while simultaneously conceding to the end of the world? Predictive computation makes Fisher and Berardi appear out of step with society — as if though they are in much greater despair than the political subjects they imagine.

In actuality, both developments share the same ontological ground. Predictive analytics are merely a scientized correlate to the sense of defeatism which pervades popular culture. This is because “the future,” as a concept, rests on a certain *a priori* unknowability. When the future is repackaged as computational probability, its conceptual function changes entirely. The enigma of the future has a social function, inoculating a sense of possibility and changefulness into the social sphere. In his essay “Data’s Intimacy: Machinic Sensibility and The Quantified Self,” communications scholar Sun-ha Hong defines the future as a space where “truths too uncertain, fears too politically incorrect, ideas too unprovable, receive unofficial license to roam... the future is a liminal zone, a margin of tolerated unorthodoxy that provides essential compensation for the rigidity of modern epistemic systems.” The rise of predictive analytics and machine learning add to a series of epistemic developments — spanning the domains of scientific research and popular culture — which, in contrast to the enshrined function of the future, render modern ways of knowing and producing knowledge all the more stringent. Popular visions of the apocalypse, nostalgic art and computational prediction work in concert to replace imagination with determination. In this environment, speculative activities appear as naïve, and hopefulness reflects a disconnect from reality.

In what follows, I will focus on machine learning, algorithmic prediction and artificial intelligence as contributors to the alleged “cancellation” of the future. After describing the means by which predictive analytics effectively preempts the future, I offer a case study from the burgeoning field of psychedelic psychiatry as an example of a domain in which epistemic indeterminacy is not only viable, but necessary. The case I offer is an epistemic scenario that defies predictive computational logic. Its principles may be extrapolated to a general hypothesis of epistemic unassailability, indicating new sites for speculation and imagination which resist economic subsumption.

Part II: How Do Machines Learn?

Machine learning, defined summarily, comprises computational algorithms which are designed to automatically update themselves as they assimilate new data inputs. Contemporary artificial intelligence invariably includes machine learning features; in fact, the concepts of artificial intelligence (or A.I.) and machine learning (or M.L.) are so closely related that the terms are often used interchangeably. “Predictive analytics” refers to computational tools which use M.L./A.I. to prognosticate future events. Predictive analytics forecasts, among other progressions, crime, future food and drink preferences, and the development of illness in biological organisms. As these programs appear to become more accurate, they are said to possess greater “intelligence.”

Computer scientist Pedro Domingos is an expert in the field. In his primer article “A Few Useful Things To Know About Machine Learning,” he writes that machine learning programs “learn” by means of generalization. M.L. “knows” how to carry out its functions based on generic principles. Their “fundamental goal is to generalize beyond the examples in the training set,” he observes, where the term “training set” refers to the data that human programmers use in the creation of machine learning algorithms. Training-set data provide the materials on which M.L. “learns” to learn: if, for example, a machine learning system is intended to distinguish human faces from other forms of data, a training set might include thousands of photos which feature human faces alongside multiple unrelated images. Technologists observe how well an M.L. algorithm performs the bespoke task of identifying human faces amid visual cacophony. They then alter the program’s algorithms to accede toward a more refined array of general principles. These principles allow the program to successfully carry out this function on any data set, including those that it may encounter once it is no longer under human oversight. Unsupervised M.L. systems auto-update: they refine their own algorithms to optimize themselves as they encounter new datasets in the wild.

Some scholars have questioned whether this generalization process can be likened to “learning” in any meaningful sense. In his article “Machines That Morph Logic: Neural Networks and the Distorted Automation of Intelligence As Statistical Inference,” media theorist Matteo Pasquinelli interrogates the notion that machine learning is conceptually analogous to non-digital learning. In the following passage, he introduces this argument by emphasizing that generalization, whether in the context of digital or non-digital intelligent systems, is always a process of logical induction — and that there are significant variations between the logical procedures of induction, deduction, and abduction:

By induction, we conclude that facts, similar to observed facts, are true in cases not

examined. By hypothesis [a function of abduction], we conclude the existence of a fact

quite different from anything observed, from which, according to known laws, something

observed would necessarily result. The former is reasoning from particulars to the general

law; the latter, from effect to cause. The former classifies, the latter explains.[[6]](#footnote-5)

Departing from there, Pasquinelli writes that technologist Frank Rosenblatt, considered the father of modern-day artificial intelligence, intended his programs to automate complex forms of induction, not abduction. While the machinations of M.L. systems may occasionally resemble abduction, they do not surpass the basic restrictions of this original design. As Pasquinelli emphasizes:

The complex statistical induction that is performed by [M.L.] gets close to a

form of weak abduction, where new categories and ideas loom on the horizon, but it

appears invention and creativity are far from being fully automated [...] if pattern

recognition via statistical induction is the most accurate descriptor of what is popularly

termed Artificial Intelligence, the distorting effects of statistical induction on collective

perception, intelligence and governance (over-fitting, apophenia, algorithmic bias, “deep

dreaming”, etc.) are yet to be fully understood.[[7]](#footnote-6)

This is the basis by which Pasquinelli argues that machine “learning” is something quite different from “learning” conceived as a function of non-digital mentality (as in human and animal intelligence). For him, deductive and abductive reasoning are conceptual preconditions for “learning” and “intelligence;” to uphold “learning” as a procedure that might be purely inductive is an epistemic mistake. Although their functions may resemble a weak form of abduction, Pasquinelli maintains that M.L. never entirely supersedes induction to achieve the capacity to, for example, explain unprecedented phenomena, generate new hypotheses, and invoke idiosyncratic metaphors, as poets might. He offers these examples as embodiments of “genuine intelligence.” The epistemic misconception which labels entities incapable of these function as also bearing “intelligence” is becoming authorized and naturalized in the field of machine learning.

Critical theorist Adrian Mackenzie is similarly concerned with the contingent presumptions which are being reified as scientific “fact.” In his book *Machine Learners: Archaeology of a Data Practice*, he takes a historiographic and arguably more radical approach than Pasquinelli. Drawing equally from the disciplines of computer science, continental philosophy, and the history of statistical mathematics, he argued that the assumptions codified in machine learning systems lead to ontological transformations in their subjects. Naming philosophers Michel Foucault and Ian Hacking as his influences, Mackenzie attends to the impact of statistical probability and metrical comparison on the subjects of automated inference, referencing the history of naïve Bayes classification and linear regression[[8]](#footnote-7) to argue that computational output occupies “a reality that had already introjected statistical realities at least a century earlier.” For this reason, digital “knowledge” always bears the ontological signature of its ancestors. Knowledge produced by machine learning cannot be scientifically objective, he claims, even in the ostensibly neutral domains of mathematics and computer science.

Regardless of whether they are the products of ontological alteration or not, it is at least true that the data output of M.L. programs are restricted by their imperative to generalize from the initial data sets on which they were trained. Herein lies the main concern of Matteo Pasquinelli: the restrictions at the heart of computational predictive analytics place this functionality within an epistemic and ontological order very much separate from that of non-digital intelligence. Although their functions may appear to weakly resemble abduction and induction, they can neither execute the “reverse generalization” of deductive reasoning nor the hybrid technique defined as abduction.

Unlike Pasquinelli, Mackenzie is not interested the changing definitions of “intelligence” and “learning.” His project is to reveal future-prediction as a form of future-creation — or future-control. Here, he writes the functionality of prediction forecloses certain futures, and in so doing, increases the likelihood others:

The programs that machine learners "write" are formulated as probabilistic models, as learned rules or association, and they generate predictive and classificatory statements ("this is a cat") . They render calculable some things that hitherto appeared intractable to calculation (e.g., the argument of a legal case). Predictive and classificatory calculation, with all the investment it attracts (in the form of professional lives, in the form of infrastructures, in reorganization of institutions, corporations, and governments, etc.) does rule out some and reinforce other futures…. although it is not always possible to disentangle machine learners from the databases, infrastructures, platforms, or interfaces they work through, I will argue that data practices associated with machine learning delimit a positivity of knowing.[[9]](#footnote-8)

Mackenzie then clarifies that he uses the term “positivity” in the sense meant by Michel Foucault in his 1969 book *The Archaeology of Knowledge*. For Mackenzie, following Foucault, a “positivity” designates ”specific forms of accumulation of statements grouped in a discursive practice and an operational formation.” Positivities are not by definition finite, but the knowledge generated by M.L. introduces finitude — hard boundaries — to the bodies of knowledge they process. In other words, the realities they reinforce arrive with a priori limitations and bounds. The futures immanent to predictive analytics are foretold, containing the inscription of technological contingencies internalized over decades (and sometimes centuries) of development. Multiple iterations of development, including the addition of new content, device embodiment and applied usage, sediment to such an extent that probability is recast as absolute inevitability. Alternative possibilities are gradually written out of intellectual awareness: futures that do not fit within these computational and mathematical models are slowly cancelled.

Part III: A Case From Psychedelic Science

The rationale given for the use of qualitative and non-digital methods in psychedelic drug research — and in particular, interpretative phenomenological analysis — can be leveraged toward an intervention in this case of epistemic overdetermination. Within the scope of qualitative psychedelic psychiatry research, interpretative phenomenological analysis has become quite popular. The unusual character of psychedelic therapy, manifest as a subjectively experienced alteration in consciousness, calls for a methodological commitment to a broad, holistic understanding of individual research factors — a perspective that affirms their profound context-sensitivity. Psychedelic research also benefits from a self-reflexive acknowledgement of scholarly bias. Both of these principles are enshrined within interpretative phenomenological analysis.

In her book *Introducing Qualitative Research In Psychology*, psychologist Carla Willig explains as much, writing that in interpretative phenomenological analysis,

understanding cannot take place without us making some preliminary assumptions about the meaning of what we are trying to understand. There is a circularity built into the process of meaning-making that is referred to as the ‘hermeneutic circle’. This means that “parts can only be understood from an understanding of the whole, [and] that the whole can only be understood from an understanding of the parts. [[10]](#footnote-9)

The need for such a deep entwinement between researchers, subjects and data is also suggested by journalist MichaelPollan. His recent publication *How To Change Your Mind: What The New Science of Psychedelics Teaches About Consciousness, Dying, Depression, Addiction and Transcendence* reports on the rise of psychedelic drug research in the twenty-first century — and what has been discovered in attempts to use modern digital techniques to explore this fascinating, stigmatized, and under-researched class of chemicals. Pollan notes that the various causes and effects of psychedelics fundamentally resist isolation “whether from the context in which [the treatment] is administered, the presence of the therapists involved, or the volunteer’s expectations”.[[11]](#footnote-10) The psychiatric advantage of psychedelics evidently relies on a sort of Gestalt characteristic wherein the therapeutic encounter is felt to supersede the sum of its parts. In turn, the medically effective properties of psychedelic substances may not resemble discrete data factors predetermined by scientists, and psychedelic researchers must consider the possibility that the outcome of their trials will bear little resemblance to their original expectations. This dynamic makes Willig’s “circular movements” between presupposition and interpretation highly useful toward the most accurate understanding of psychedelic medicine.

Phrased differently, the Gestalt nature of the psychedelic experience implies its resistance to predictive practices based on the rote extraction and examination of parts taken as separate from the whole. Meanwhile, phenomenological analysis was developed to address the irreducibility of experience and context to isolated and datafiable variables, highlighting it as a uniquely well-suited technique in this arena. This rationale is taken up by psychedelic psychologists Stuart Turton, Robin Carhart-Harris, and David Nutt. Noting the constraints inherent to quantitative and measurement-based methods, they offer that interpretative phenomenological analysis is instead “the most appropriate to use to explore human experience” in their work.[[12]](#footnote-11)

The fact that they portray their research as an exploration of human experience not necessarily restricted to illness or suffering is significant: Nutt, Carhart-Harris and Turton count among a number of psychedelic researchers who view these substances not only as palliatives,[[13]](#footnote-12) but also as powerful tools for the exploration of the human psyche. Stanislav Grof, a founder of transpersonal psychology, observed that “the potential significance of LSD and other psychedelics for psychiatry and psychology was comparable to the value the microscope has for biology or the telescope has for astronomy”.[[14]](#footnote-13) This is reflected in the etymology of the word: translated from Ancient Greek, “psychedelic” may mean either or “mind-manifesting” or “mind-revealing”. psychedelic substances are quite literally defined by their capacity to provide insight on the mind. Thus research performed on them stands not only to impact treatment, but also to furnish new perspectives on healthy, high-functioning minds.

Interpretative phenomenological analysis — along with similar methodologies in which integration, subjectivity, and self-reflexivity serve as organizing principles — may be necessary to bring these perspectives to light. Here, information and interpretation take multiple directions as they flow between patients, scientists, and other interested parties. Significantly, the methods which may be most essential to psychedelic science are grounded in philosophies which challenge the inductive — unidirectional — basis of machine learning. Among these assumptions is a certain logical positivism reflected in the precept that all knowledge can be determined by computation.

In a notable overlap with Pasquinelli’s remarks on the production of metaphor as a sign of genuine intelligence, psychedelic researcher Nese Devenot identifies the production of metaphor by those under the influence of psychedelics as a justification for the use of non-computational interpretative techniques:

Linguist R. S. Sharma writes that the fundamental function of poetic language is “to convert denotation into connotation, the language of [objective] reference into that of feeling and mood.” Poetry employs creative metaphors to communicate subtle nuances of subjective experience, and the poetic transfer of meaning inherent to metaphor-making constitutes a universal linguistic device for communicating novel and unprecedented experiences. In the process of verbalizing the interiorized effects of moderate- to high-dose psychedelics, poetic language and creative metaphors are often evoked spontaneously. Since scholars of poetry are trained to discern meaning in non-ordinary language, literary scholars are well positioned to make meaningful contributions in the context of qualitative research that seeks to determine the significance of psychedelic trip reports.[[15]](#footnote-14)

The use of qualitative methods here allows psychedelic scientists to perceive a characteristic breakthrough of epistemic finitude of the particular type implanted by machine learning. The use of hypothesis-generating methodology leads to insights which indicate a genuine connection between psychedelic psychotherapy and abduction, a power which surpasses the limits precoded in predictive analytics.

Conclusion: Against Algorithmic Realism

In *Capitalist Realism,* Mark Fisher is emphatic that capitalism is culpable for presenting the entirety of history as occupying the same ontological territory. By constructing virtually everything as a potential commodity, it imposes a decisive sameness: “the power of capitalist realism,” Fisher writes, “derives in part from the way that capitalism subsumes and consumes all of previous history: one effect of its 'system of equivalence' which can assign all cultural objects, whether they are religious iconography, pornography, or Das Kapital, a monetary value.”[[16]](#footnote-15) Much like capitalism, computation also homogenizes its objects: digital objects compose the same ontological strata — discrete, datafied bits and bytes — and in that sense, cannot be thought of as ontologically or epistemically incommensurable, that is, truly “other.”

The future, however, relies on epistemic otherness. If there is no space for subjective hermeneutics or a certain humility toward the limits of knowability, technoscience will have ceded to the precise condition of defeatism Fisher so carefully explored in *Capitalist Realism*. Algorithmic realism homogenizes all that is transformed into data, suppressing all that could not be portended by calculation and statistical inference. As an intervention, I present interpretive meaning-making in psychedelic psychiatry as a case from a technoscientific field that affirms the continued relevance of non-computational intelligence. Cases such as these, which emphasize epistemic uncertainty and multivalent, irreducible contextual factors, should be recognized as social and political outliers. Irreducible to parts that may enter into an economy of equivalences — including financial currency or digital data — they remain as sites where true otherness maintain social authority. Here, the imagination may recognize itself on a socially legitimate stage, and the possibility of the truly new remains.

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