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ARTICLE

From Big Data to Dataism: Philosophical Reflections on Freedom, Labor, and Biological Inequality from a Historical Materialist Perspective

Nguyễn Vân Hạnh

Faculty of Scientific Socialism, Academy of Journalism and Communication, Hanoi 11300, Vietnam

ABSTRACT

Grounded in the methodology of historical materialism, the article interprets dataism as a new configuration of power and ownership emerging within the digital mode of production. While big data technologies significantly enhance economic efficiency and scientific knowledge, they also generate structural risks for future society. The study analyzes four interrelated concerns. First, the concentration of data ownership may facilitate forms of algorithmic governance that threaten democratic institutions and individual autonomy. Second, the rapid development of artificial intelligence could restructure labor markets, leading to large-scale displacement and deepening socio-economic inequality. Third, the convergence of biotechnology and data analytics raises the possibility of biological stratification through genetic intervention. Fourth, personalized data profiling may intensify individualized forms of discrimination. Taken together, these developments suggest that dataism challenges not only distributive arrangements but also the normative foundations of freedom, equality, and human agency. The article argues that these risks require philosophical reflection and institutional responses aimed at preserving democratic autonomy and a shared human condition. Such responses include democratic oversight of data ownership, investment in education and human development, and the establishment of global legal–ethical frameworks for emerging genetic technologies.

Keywords: Dataism; Algorithmic Power; Human Autonomy; Digital Labor; Biological Inequality

*CORRESPONDING AUTHOR:

Nguyễn Vân Hạnh, Faculty of Scientific Socialism, Academy of Journalism and Communication, Hanoi 11300, Vietnam;
Email: nvhanhajc@gmail.com

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1. Introduction

The emergence of dataism marks not merely a technological breakthrough, but a structural transformation in the mode of production and the organization of social power. While many accounts interpret dataism primarily as an outcome of technological evolution—emphasizing advances in computing capacity, data storage, and algorithmic efficiency—such an approach risks reducing dataism to a neutral or incremental innovation. From a historical materialist perspective, however, dataism signifies a deeper reconfiguration of economic relations and power structures within contemporary capitalism. Big data is no longer simply a tool for improving efficiency; it increasingly functions as a central productive asset, shaping economic value creation, political authority, and epistemic legitimacy. As data becomes embedded in processes of accumulation and governance, new forms of algorithmic control and digital ownership emerge. These developments are not external to social relations but actively restructure them, influencing how labor is organized, how decisions are made, and how social inequalities are reproduced. Across the globe, data-driven scientific and technological achievements are widely celebrated as symbols of progress. Yet beneath this surface of innovation lies a transformation in the architecture of ownership and authority. The growing concentration of data ownership may reshape democratic institutions, reconfigure labor markets, and intensify social stratification. In this sense, the expansion of dataism is not merely a technological trend, but a historical reorganization of human agency within digital capitalism. For this reason, it is necessary to critically examine dataism as a structural development of contemporary capitalism and to reflect on the institutional responses required to prevent the erosion of autonomy and the deepening of inequality in the digital age.

2. Method

This study adopts a qualitative and theoretically grounded approach rooted in historical materialism and critical social theory. Rather than treating dataism as a neutral technological evolution, the methodological framework interprets it as a structural transformation in the mode of production and in the configuration of power relations within digital capitalism. From a Marxist perspective, data is analyzed as an emerging means of production, while algorithmic infrastructures are examined as productive forces that reshape relations of ownership, labor, and accumulation. Building on Marx's analysis of capital and alienated labor, the study approaches data extraction as a contemporary form of value appropriation embedded in digital infrastructures. In this sense, the expansion of big data is understood not merely as technical progress, but as a reorganization of economic power. Marcuse's critique of technological rationality further informs the analysis by highlighting how advanced technological systems can absorb critical autonomy and normalize instrumental forms of domination[1]. This theoretical lens enables the study to examine how algorithmic efficiency may gradually displace democratic deliberation and human agency.

Empirically, the research is based on a systematic analysis of academic and institutional literature. The study engages with key works on automation and labor transformation, foundational discussions on big data, and critical analyses of technological change and human agency. It also incorporates Zuboff's theory of surveillance capitalism, which conceptualizes data extraction as a logic of accumulation based on behavioral surplus[2]. These sources are not treated as an exhaustive synthesis, but as a conceptual corpus through which specific mechanisms of power, ownership, and governance are identified and interpreted within a historical-materialist framework.

In order to reduce over-abstraction, the study employs a case-oriented analytical strategy that focuses on concrete manifestations of data power. These include selected practices of platform governance, documented controversies related to political information management, and developments in data-driven biotechnology such as mitochondrial replacement techniques. These cases are not presented as comprehensive empirical case studies, but as analytically bounded examples that make visible broader structural tendencies, including the commodification of behavioral data, the externalization of cognitive labor into algorithmic systems, and the bio-political implications of genomic databases.

Finally, an interdisciplinary perspective integrating philosophy, political economy, critical theory, technology studies, and bioethics is used to synthesize the findings. This approach allows the study to connect structural analysis with normative evaluation, clarifying how transformations in data ownership and algorithmic governance generate risks for freedom, labor, democratic institutions, and biological equal-

ity in the age of dataism. Normative conclusions are derived only after the relevant mechanisms have been specified, thereby strengthening the coherence between theoretical claims and empirical illustrations.

3. Result

3.1. Dataism and the Transformation of Power and Ownership

3.1.1. Dataism

Contemporary science no longer approaches reality through simplification alone but increasingly seeks to grasp dynamic, complex, and constantly evolving processes. Such complexity cannot be adequately expressed through linear causality with a limited number of variables; rather, it requires comprehensive recording and the processing of massive datasets capable of mapping diversity, contingency, and structural interconnections. This epistemic transformation has given rise to the era of big data and, more broadly, to what may be termed dataism.

Recent studies argue that: "The world of things is composed of data, the nature of the world is data, everything can finally use data to represent it, so the world of things can be represented by data" (p. 215)[3]. However, this formulation should not be understood in a strict ontological sense. The fact that reality can be extensively represented, modeled, or analyzed through data does not imply that reality itself is constituted by data. Rather, data functions as a representational and epistemic medium through which complex phenomena are rendered legible, comparable, and governable. From this perspective, dataism is not merely a technological practice but an epistemological orientation in which knowledge increasingly relies on large-scale data aggregation and correlation. As Mayer-Schönberger and Cukier emphasize, the growing reliance on correlations "reduces the degree of difficulty in perceiving and grasping things" (p. 75)[3], even when causal mechanisms remain opaque. Dataism thus prioritizes predictive capacity and operational effectiveness over causal explanation, without collapsing the distinction between representation and the ontological constitution of the world.

However, dataism extends beyond epistemology. It represents a broader ideological paradigm in which data becomes the primary medium through which reality is interpreted, governed, and valued. In this sense, dataism converges with what Zuboff conceptualizes as surveillance capitalism: a novel economic logic in which human experience is translated into behavioral data, appropriated as "behavioral surplus," and converted into predictive products for commercial and political purposes[2]. Under this regime, data is not merely descriptive but extractive—it functions as a new source of accumulation and asymmetrical power.

This transformation also resonates with Marcuse's critique of advanced industrial society, in which technological rationality tends to absorb critical reason and reduce human autonomy to operational efficiency[1]. In the age of dataism, algorithmic rationality risks becoming a new form of "one-dimensional" logic, where quantitative optimization displaces qualitative judgment. Similarly, Arendt warned that modern societies risk subordinating political action and plurality to systems of administration and process[4]. The elevation of data processing to the status of ultimate authority may thus threaten the space of human deliberation and public freedom.

The big data era employs digital infrastructures—smart sensors, cloud computing, and platform architectures—to convert location, images, sounds, behaviors, and even bodily states into continuous streams of information. As noted, "Big data marks a great step forward for mankind on the path to search for quantification and awareness of world. A lot of things that were previously impossible to quantify, store, analyze, or share are now dataized. Having such vast and largely unfiltered data has opened new doors for interpreting our world" (p. 23)[3].

From this point onward, data ceases to be a neutral representation of reality and becomes an economic asset endowed with exchange value and strategic importance. Thus, dataism may be defined as a historical condition in which data functions simultaneously as epistemic infrastructure, economic resource, and mechanism of governance. It is not simply a stage of technological development, but a reconfiguration of knowledge, power, and ownership in digital capitalism.

3.1.2. Data Ownership and the Question of Social Control

In earlier historical epochs, ownership primarily concerned tangible assets such as land, machinery, oil, or financial capital. In the digital age, data emerges as a new object

of ownership. Communication platforms, financial institutions, and technology corporations accumulate vast datasets, forming large-scale digital conglomerates. Data increasingly functions as capital—what may be termed data capital.

Unlike traditional material assets, data is intangible, infinitely reproducible, and globally transferable at high speed. Its accumulation does not diminish its availability; rather, its value expands through aggregation and algorithmic processing. For this reason, data ownership is not merely an economic matter but a structural socio-political issue.

Zuboff demonstrates that surveillance capitalism operates through unilateral extraction: human behaviors are continuously monitored, transformed into data, and commodified without meaningful reciprocity [2]. Ownership of data thus entails ownership over predictive capacities—the ability to anticipate, influence, and potentially shape human conduct. The concentration of such capacities in a limited number of corporations creates asymmetries of knowledge and power that exceed those of earlier industrial formations.

At the same time, data ownership must also be examined in relation to data misuse and illegal data economies. Large-scale profits are increasingly generated through unauthorized data extraction, data theft, illicit data trading, and the exploitation of personal and commercial information beyond regulatory frameworks. These practices further intensify power asymmetries and expose individuals and institutions to forms of control and vulnerability that operate outside democratic accountability. Consequently, data protection becomes not only a technical or legal concern, but a fundamental political condition for safeguarding autonomy and social trust in digital society.

From a historical materialist perspective, if data functions as a contemporary means of production—generating value through algorithmic processing—then its ownership decisively shapes the distribution of power and wealth. The notion of "social ownership of data" should therefore not be reduced to state monopoly. Rather, it refers to institutional arrangements that ensure collectively generated data is governed in accordance with collective interests. Possible mechanisms include public data trusts, transparent regulatory oversight, democratic accountability structures, and enforceable limits on extractive and illicit data practices.

Within this framework, the struggle over data ownership becomes inseparable from questions of freedom, democracy, and equality. If data remains concentrated within private platforms operating under extractive and weakly regulated logics, algorithmic governance may intensify inequality and erode human autonomy. Conversely, rethinking data ownership and protection is essential for preventing the consolidation of predictive power in the hands of a narrow elite and for preserving the conditions of plural action and public agency [4].

3.2. Structural Risks of Dataism: Freedom, Labor, and Human Equality

3.2.1. The Reconfiguration of Freedom under Algorithmic Rationality

In pre-digital societies, structures of domination were often visible in institutional hierarchies, sovereign authority, or ideological apparatuses. In the contemporary data-driven order, however, power operates increasingly through informational asymmetry and predictive capacity. The scale of data aggregation determines the ability to model, anticipate, and modulate social behavior. Thus, what appears as technological efficiency simultaneously constitutes a transformation in the ontology of power: sovereignty shifts from command over territory to command over data flows. Data monopoly is therefore not merely an economic concentration but a structural precondition for what may be termed algorithmic governmentality.

Zuboff conceptualizes this configuration as surveillance capitalism, in which human experience is appropriated as "behavioral surplus" and transformed into predictive commodities [2]. The decisive issue is not simply commodification, but the emergence of a regime in which knowledge about behavior becomes asymmetrically concentrated. Ownership of data entails ownership of anticipatory architectures—systems capable not only of forecasting but of shaping conduct. In this respect, predictive power becomes a new modality of domination, one that operates preemptively rather than repressively.

This transformation resonates with Michel Foucault's concept of governmentality, where power functions through the management of populations rather than overt coercion [5]. Algorithmic systems intensify this logic: instead of disciplining bodies in enclosed institutions, they modulate behavior across open digital environments through continuous data extraction and feedback loops. The locus of control shifts

from visible authority to infrastructural design.

The political consequence is not the immediate collapse of democratic institutions, but a gradual displacement of deliberative processes by computational optimization. As algorithmic systems increasingly mediate public discourse through opaque and privately owned infrastructures, the conditions of political visibility, participation, and influence are progressively reshaped. In this context, democratic processes become less dependent on collective deliberation and more reliant on technical architectures that operate beyond direct public scrutiny. Within this framework, Harari suggests—at a speculative and popular level—that algorithmic systems may process political information more efficiently than human institutions (p. 444)[6]. Whether or not such projections are exaggerated, they serve to illustrate a broader structural asymmetry: when public discourse is mediated by proprietary algorithmic platforms, political plurality becomes contingent upon technical systems that are not democratically governed. Democracy, in this sense, risks transformation from participatory deliberation into data-driven behavioral management.

Shoshana Zuboff emphasizes that predictive systems aim not only to know behavior but to "tune and herd" it (p. 8)[2]. This anticipatory logic aligns with what Byung-Chul Han describes as psychopolitics—forms of control that operate through internalized optimization rather than external coercion[7]. Unlike classical authoritarianism, digital domination need not silence dissent through force; it can redirect attention, personalize information flows, and fragment collective experience.

Hannah Arendt's distinction between power and violence is instructive here. For Arendt, political freedom depends upon a public space where individuals appear before one another in speech and action[4]. When algorithmic infrastructures structure visibility itself—ranking, filtering, and amplifying according to proprietary criteria—the conditions of appearance are no longer collectively determined. Administrative rationality risks superseding political plurality. The danger is not censorship alone, but the silent reorganization of the horizon within which action becomes thinkable.

Herbert Marcuse anticipated a related phenomenon in advanced industrial society: technological rationality can become totalizing, reducing critical reason to functional adaptation[1]. In the era of dataism, algorithmic rationality extends this dynamic. Optimization, efficiency, and predictive accuracy gradually displace qualitative judgment. Freedom becomes redefined as frictionless participation within managed systems rather than autonomous deliberation about shared ends.

Recent scholarship in critical data studies underscores this shift. Lazar argues that algorithmic intermediaries govern the digital public sphere … shaping public communication and distributing attention with unprecedented speed and subtlety[8]. Similarly, Shoshana Zuboff notes that behavioral modification is embedded in platform design rather than declared as policy. These dynamics signal a transition from juridical power to infrastructural power[2].

The central danger, therefore, lies not in the computational superiority of algorithms, but in the ontological relocation of agency. When decision-making authority migrates from reflexive human judgment to automated predictive systems, autonomy is subtly redefined. Control no longer appears as command but as correlation. Digital authoritarianism, in this sense, need not manifest as overt repression; it may emerge as a regime in which predictive architectures pre-structure choices before conscious deliberation occurs. If predictive capacity remains concentrated in a narrow set of actors—corporate or state—algorithmic infrastructures risk evolving into a pervasive yet normalized form of governance. The philosophical question thus concerns the status of the subject within computational modernity: whether human freedom can persist as self-determination, or whether it becomes increasingly subordinated to the anticipatory logic of data-driven rationality.

3.2.2. The Displacement of Labor in the Age of Artificial Intelligence

This section examines the transformation of labor under dataism by focusing on how algorithmic automation externalizes cognitive functions and reorganizes labor relations within platform-based production systems. Rather than treating labor displacement as a purely technological effect, the analysis situates it within concrete institutional practices that reshape control, coordination, and value extraction in digital capitalism.

Artificial intelligence should not be understood merely as a new technological tool but as a transformation in the structure of productive rationality. Whereas earlier industrial mechanization primarily automated muscular labor, contem-

porary AI increasingly targets cognitive operations such as pattern recognition, probabilistic inference, and strategic optimization. This shift reconfigures how work is organized and how decision-making processes are externalized into technical systems. From this perspective, landmark events such as Deep Blue's victory over Kasparov and AlphaGo's defeat of Lee Sedol are better interpreted not as the domination of machines over human individuals, but as emblematic of the increasing abstraction and formalization of strategic reasoning within algorithmic systems, a process that reshapes how humans and AI co-produce strategic innovation[9]. As Harari suggests in a speculative and illustrative manner, these moments exemplify a broader tendency toward the formalization of human cognitive capacities within computational infrastructures, even if such interpretations should not be read as strict technical assessments[6].

From a Marxian perspective, this development may be interpreted through the concept of the "general intellect" articulated in the Grundrisse[10]. Marx foresaw a stage in which knowledge, science, and collective intellectual capacities become direct forces of production. In digital capitalism, algorithmic systems crystallize this general intellect into proprietary infrastructures. Cognitive capacities once embodied in skilled workers are increasingly objectified in code, owned and operated by corporate platforms. The decisive shift is therefore not technological substitution alone but the privatization of socially produced intelligence.

Empirical projections of automation risks, building on and refining earlier occupation-based estimates, increasingly rely on task-level analyses enabled by machine learning, as shown by Xu, Yang, Rizoiu, and Xu, who model automatability through fine-grained task decomposition rather than broad occupational categories, estimate that a substantial proportion of occupations are technically susceptible to computerization[11]. However, beyond statistical prediction lies a deeper structural issue: the historical compromise of industrial modernity—whereby automation of manual labor was offset by expansion in cognitive and administrative employment—no longer holds. AI encroaches simultaneously upon routine physical tasks and routine intellectual labor. The boundary between manual and mental work, central to earlier divisions of labor, becomes increasingly porous.

This transformation recalls Marx's analysis of alienation, wherein the worker's capacities confront them as an external power[12]. In algorithmic production, cognitive skills—diagnostic reasoning, linguistic analysis, logistical planning—are encoded into machine-learning systems. The result is not merely job displacement but the estrangement of intellectual agency itself. When diagnostic systems in clinical contexts demonstrate performance comparable to or exceeding that of board-certified clinicians, as evidenced by recent benchmarking of autonomous AI doctors versus human practitioners[13], the issue extends beyond efficiency to encompass profound questions about the reshaping of professional authority and the recognition of expertise.

Herbert Marcuse warned that technological rationality in advanced industrial society tends to subsume individuals within systems oriented toward efficiency and control[1]. In the digital economy, optimization becomes the dominant norm: value is measured in predictive accuracy, speed, and scalability. Human labor is increasingly evaluated against algorithmic benchmarks. This comparison risks redefining human worth in functional terms, thereby narrowing the space for forms of activity not easily quantifiable.

Contemporary critical political economy deepens this analysis. Contemporary analyses of digital economic systems highlight how platform economies monetize user interactions by transforming behavioral and interactional data into market value, emphasizing the centralization of data infrastructures as a driver of economic power and accumulation in digital capitalism[14]. Labor, in this configuration, is not only displaced but reconfigured: gig work, data labeling, and affective engagement become subordinate to algorithmic management systems. Automation and precarization thus operate simultaneously—eliminating certain forms of employment while intensifying control over remaining workers.

The philosophical problem, therefore, exceeds the quantitative issue of unemployment rates. It concerns the status of labor as a medium of social integration and self-realization. In classical modernity, labor functioned not merely as income generation but as a site of recognition and participation in collective life. If algorithmic systems increasingly perform large-scale cognitive functions, the normative foundation linking labor, dignity, and citizenship becomes unstable.

Moreover, when ownership of AI infrastructures is concentrated, the gains of productivity accrue disproportionately to those who control data and computational architectures. Zuboff demonstrates that surveillance capitalism channels

economic value toward platform owners who possess predictive systems. Automation, under such ownership structures, risks amplifying inequality by separating the production of wealth from broad-based participation in its benefits [2].

Thus, the risk of large-scale unemployment should be reframed as a structural displacement of human agency within the mode of production. The central question is not whether machines will replace humans in specific tasks, but whether the organization of digital capitalism will render substantial segments of the population economically and socially redundant. The challenge is ontological as much as economic: whether labor remains a constitutive dimension of human self-realization, or becomes increasingly peripheral within a regime governed by algorithmic rationality.

This analysis highlights a concrete mechanism through which dataism reshapes labor relations in digital capitalism. Algorithmic automation does not merely replace isolated tasks; it externalizes cognitive functions—such as evaluation, coordination, and decision-making—into platform-based systems that manage labor through data-driven metrics and automated control. Within these production systems, work is increasingly fragmented, monitored, and governed by opaque algorithms, while workers' knowledge and skills are progressively absorbed into computational infrastructures. As a result, labor relations are reorganized around asymmetrical control over data and platforms, intensifying precarity and weakening collective agency. This mechanism illustrates how the displacement of labor operates through identifiable institutional practices rather than as an abstract technological trend.

3.2.3. The Risk of Biological Stratification in Data-Driven Society

This section examines the risk of biological stratification by focusing on how data-driven biotechnologies translate genetic information into predictive and classificatory practices. Rather than treating biological inequality as a speculative future scenario, the analysis considers how genomic data is already embedded in concrete healthcare, insurance, and reproductive decision-making processes.

In earlier stages of capitalism, inequality operated primarily at the level of property, income, and social power. Despite profound economic asymmetries, the biological structure of the human species remained largely shared. Contemporary biotechnology, however, introduces the possibility that inequality may penetrate the somatic level itself. The convergence of genomic data, machine learning, and gene-editing technologies reconfigures life as an object of informational manipulation. Biology increasingly becomes readable, computable, and potentially redesignable.

The rapid decline in sequencing costs and the consequent accumulation of human genetic data have not only accelerated genomic research but also driven the development of large-scale data infrastructures—such as scalable genetic data lakes that integrate Genome-Wide Association Study (GWAS), molecular quantitative trait loci, and epigenetic datasets—transforming genetic information into a high-throughput computational resource for discovery and drug development [15]. When integrated with predictive analytics, genomic datasets enable risk modeling, personalized diagnostics, and targeted intervention. CRISPR-Cas9 gene-editing technology further extends this capacity by making direct modification of DNA increasingly precise and accessible [16]. The controversy over germline editing continues to highlight deeply rooted ethical and social concerns about heritable genome interventions, as recent systematic reviews of the biomedical and bioethics literature show persistent disagreement about risk, oversight, equity, and justice in human embryo editing and its regulation [17].

At stake is not merely therapeutic innovation but the potential transition from treatment to enhancement. Jürgen Habermas [18] warned that liberal eugenics could undermine the symmetry of moral relations if some individuals are designed according to the preferences of others. The moral equality presupposed in democratic societies depends upon the contingency of birth; when genetic traits become subject to deliberate optimization, the intersubjective conditions of autonomy may be altered. The issue is therefore not technological capability alone, but the transformation of the anthropological premise upon which political equality rests.

Hannah Arendt emphasized that the "human condition" refers to shared existential structures—natality, plurality, and mortality—that ground political life [4]. If biotechnology, mediated by data-driven selection, enables systematic enhancement accessible primarily to affluent groups, inequality could shift from socio-economic disparity to bio-structural differentiation. Unlike traditional class divisions, which remain historically contingent and reversible, biological stratification risks becoming embodied and inheritable.

Critical bioethics scholarship reinforces this concern. Sheila Jasanoff[19] argues that biotechnological regimes co-produce scientific knowledge and social order; the governance of life sciences shapes collective imaginaries of what counts as a "better" human. Similarly, Rose describes the emergence of "biological citizenship," in which individuals are increasingly defined by molecular identities and genetic risk profiles[20]. When such identities are integrated into insurance systems, employment screening, or reproductive decision-making, data infrastructures can amplify disparities in access to health and longevity.

The economic dimension intensifies this risk. Advanced gene therapies and precision medicine treatments remain costly and unevenly distributed[21]. If enhancement technologies evolve within market-driven frameworks, access may correlate with wealth. Under such conditions, the logic of capital extends beyond labor and consumption into the modulation of life itself. The fusion of biotechnology and data capitalism thus introduces a novel possibility: the commodification of biological potential.

This prospect requires conceptual clarification. Biological inequality is not inevitable; therapeutic gene editing aimed at alleviating suffering can expand human flourishing. However, when predictive genomics and enhancement technologies are embedded within competitive market logics, differential access may produce cumulative advantages—health, cognitive capacity, longevity—reinforcing intergenerational stratification. The danger lies not in science per se, but in the institutional configuration through which it is deployed.

From a philosophical standpoint, the question concerns the stability of human equality as a normative axiom. If the shared vulnerability and contingency of birth underpin democratic reciprocity, systematic genetic optimization accessible to a minority could destabilize that foundation. Biological stratification would represent not merely a new inequality of resources, but a redefinition of what it means to belong to a common human condition.

The scenario remains contingent and politically negotiable. International frameworks—such as those proposed by National Academies of Sciences, Engineering, and Medicine and ongoing UNESCO bioethics deliberations—aim to establish collective governance over germline interventions[21]. Yet regulatory divergence across nations underscores the fragility of global consensus. In the age of dataism, where genomic information becomes a strategic asset, the governance of biotechnology is inseparable from the governance of data itself.

Thus, the risk of biological inequality should be understood not as speculative alarmism, but as a structural possibility emerging from the informationalization of life. The convergence of predictive analytics and gene editing relocates power from economic ownership alone to the modulation of biological potential. The philosophical challenge is whether technological modernity can preserve the principle of human equality while expanding its capacity to intervene in the very substrate of life.

This mechanism illustrates how biological stratification does not arise directly from biotechnology itself, but from the institutional contexts in which genomic data is collected, interpreted, and applied. When genetic information is integrated into market-oriented and competitive frameworks, data-driven differentiation may gradually solidify into durable forms of inequality. Biological stratification thus emerges as a socio-institutional outcome shaped by data governance, rather than as an inevitable consequence of scientific advancement.

3.2.4. The Reconfiguration of Discrimination in Algorithmic Society

This section examines discrimination under dataism by focusing on how algorithmic profiling translates large-scale data collection into routine decision-making practices. Rather than treating discrimination as a purely normative or abstract issue, the analysis considers how probabilistic classification operates in concrete contexts such as employment screening, credit evaluation, and access to social services.

In classical modernity, discrimination was typically organized around visible or legally codified categories—race, gender, class, religion—embedded within institutional structures. In the age of dataism, however, discrimination undergoes a qualitative transformation. It is no longer necessarily anchored in explicit group identity; rather, it emerges from probabilistic classification within algorithmic systems. The subject is no longer excluded because of who they are in a juridical sense, but because of what predictive models infer they might become.

The integration of biometric, behavioral, and genomic data into large-scale digital infrastructures intensifies this

shift. As health data, consumption patterns, mobility traces, and online interactions are aggregated, individuals are rendered as dynamic profiles within predictive architectures. Critical data scholarship has shown that such systems do not merely reflect social reality but actively structure opportunity[22]. Risk assessment tools used in employment screening, insurance underwriting, and credit scoring operate through statistical correlations that may reproduce or amplify existing inequalities while remaining formally neutral.

Frank Pasquale describes this phenomenon as the emergence of the "black box society," in which algorithmic decisions are opaque, shielded by proprietary secrecy and technical complexity[23]. The crucial issue is not simply bias in datasets, but epistemic asymmetry: individuals are subjected to decisions generated by systems whose logic they cannot access or contest. In this context, discrimination becomes infrastructural rather than declarative. It is embedded within the design of ranking, filtering, and recommendation systems.

Shoshana Zuboff emphasizes that predictive architectures are designed not only to anticipate behavior but to "modify" it (p. 8)[2]. When personalization systems continuously adjust information flows, prices, or opportunities based on behavioral data, differential treatment becomes individualized and dynamic. Unlike traditional discrimination, which targets collective identities and thus generates shared grounds for resistance, algorithmic sorting operates at the micro-level. Each subject is positioned within a unique probabilistic niche.

This shift aligns with what Gilles Deleuze termed the transition from disciplinary societies to societies of control[24]. In disciplinary regimes, power operates through fixed institutional enclosures; in control societies, modulation is continuous and flexible. Algorithmic discrimination exemplifies this modulation: access to credit, employment, or visibility is recalibrated in real time according to evolving data profiles. Exclusion no longer requires explicit prohibition; it is enacted through subtle adjustments in ranking and recommendation.

From a normative perspective, this transformation destabilizes traditional frameworks of justice. Liberal theories of equality presuppose identifiable categories of disadvantage against which claims can be articulated. Yet when disadvantage is personalized through predictive analytics, injustice becomes fragmented. Individuals may be denied opportunities not because they belong to a legally protected group, but because statistical inference associates them with elevated risk. As recent work emphasizes, fairness research in machine learning cannot be confined to abstract technical metrics but must be integrated with broader societal considerations and context-specific realities, given how discrimination and bias emerge through socio-technical interactions[25].

Moreover, algorithmic personalization can produce feedback loops that entrench inequality. Differential pricing, targeted advertising, and selective content exposure shape life trajectories in ways that are difficult to perceive collectively. Recent empirical analyses of search engine autocomplete predictions reveal that algorithmic outputs systematically reflect and reinforce societal biases related to race, gender, and sexual orientation, indicating that search technologies are not neutral but can reproduce existing inequalities in algorithmic form[26]. The invisibility of such processes complicates democratic accountability: when discrimination is dispersed across millions of individualized decisions, collective political mobilization becomes more difficult.

The philosophical stakes are therefore profound. Personalized discrimination relocates inequality from overt policy to predictive architecture. It transforms social classification into continuous modulation. The subject becomes a statistical composite, evaluated according to correlations rather than intentions or actions. In such a regime, the classical notion of equal citizenship—grounded in shared legal standing—risks erosion by invisible systems of differential valuation.

The danger lies not only in biased algorithms but in the normalization of predictive governance itself. When life chances are increasingly shaped by opaque computational models, autonomy is reframed as adaptation to algorithmic sorting. Discrimination ceases to appear as a public injustice and becomes a private misfortune. The central philosophical question is thus whether democratic societies can preserve transparency, contestability, and collective agency in the face of individualized algorithmic stratification.

This mechanism shows that discrimination in algorithmic society does not primarily take the form of explicit exclusion, but emerges through continuous data-driven classification and personalization. When access to opportunities

is shaped by opaque predictive systems, unequal treatment becomes individualized and difficult to contest. Algorithmic discrimination thus operates as a structural outcome of data-driven governance rather than as an isolated ethical failure.

4. Discussion

The preceding analyses indicate that dataism should not be interpreted merely as a technological development but as a transformation in the structure of rationality, power, and subjectivity. What is at stake is not the efficiency of algorithms, but the reconfiguration of the conditions under which human freedom, labor, and equality are constituted. The discussion must therefore move beyond policy adjustment and toward philosophical clarification of the mode of being inaugurated by data-driven infrastructures.

4.1. Data Ownership and the Question of Sovereignty

Historically, ownership of productive forces has determined the configuration of social power. In industrial capitalism, control over machinery structured class relations; in digital capitalism, control over data infrastructures and predictive architectures plays an analogous role. As recent critical work shows, digital platforms equipped with extensive datafication and algorithmic infrastructures centralize data extraction, computation, and value capture, transforming these resources into strategic assets that drive economic and socio-technical power in contemporary capitalism[27]. Data thus functions not only as commodity but as epistemic infrastructure: it shapes what can be known, predicted, and governed.

From a Marxian perspective, when socially generated information becomes privately appropriated, collective intelligence is objectified and alienated[12]. Predictive systems crystallize what Marx termed the "general intellect," yet this general intellect is increasingly enclosed within proprietary architectures. The philosophical problem is therefore one of sovereignty: who governs the informational conditions that structure social reality?

Foucault's notion of governmentality illuminates this transformation. Governance no longer relies primarily on juridical prohibition but on the modulation of populations through data analytics[5]. Algorithmic infrastructures operate as subtle regulatory environments within which behavior is anticipated and shaped. The displacement of sovereignty from visible political institutions to technical systems complicates democratic accountability.

The issue, then, is not simply regulatory oversight but the ontological status of data ownership. If predictive infrastructures become the primary locus of power, the preservation of democratic plurality depends upon their transparency and contestability. Without mechanisms that prevent the concentration of anticipatory authority, data capitalism risks transforming informational asymmetry into structural domination[2].

4.2. Human Development and the Crisis of Instrumental Rationality

The automation of cognitive labor reveals a deeper tension within modern rationality. Marcuse diagnosed advanced industrial society as dominated by technological rationality—an orientation that reduces qualitative ends to quantitative efficiency[1]. In the age of artificial intelligence, this dynamic intensifies: value becomes equated with optimization, and human capacities are measured against algorithmic performance.

The philosophical danger is not unemployment alone, but the narrowing of human self-understanding. Arendt distinguished labor, work, and action, emphasizing that political freedom arises in the sphere of action—where individuals appear before one another as plural agents[4]. If algorithmic systems progressively colonize spheres of decision-making, the space for meaningful action may contract.

Education and human development, therefore, cannot be conceived merely as adaptation to technological change. Rather, they must cultivate capacities irreducible to computational logic—critical judgment, ethical deliberation, and imaginative plurality. Habermas underscores that communicative rationality, grounded in intersubjective dialogue, cannot be substituted by instrumental calculation[28]. The preservation of democratic life requires sustaining communicative spaces not subordinated to predictive optimization.

Thus, the philosophical response to automation lies less in resisting technological innovation than in safeguarding domains of meaning that exceed algorithmic rationality. The question is whether societies can maintain a conception of human flourishing that is not exhausted by data-driven

efficiency.

4.3. Biotechnology and the Fragility of Human Equality

The convergence of data analytics and biotechnology extends these concerns to the biological substrate of life. When genomic information becomes integrated into predictive infrastructures, the modulation of behavior merges with the modulation of biology. Habermas [18] warned that genetic enhancement could undermine the moral symmetry presupposed in democratic societies. If individuals are shaped by deliberate design rather than contingent natality, relations of reciprocity risk transformation.

Arendt's concept of natality—each human birth as a new beginning—grounds political equality in shared contingency [4]. Systematic biological enhancement accessible to a minority would destabilize this shared condition. Inequality would no longer be limited to social distribution but embodied in differential capacities.

Contemporary bioethical frameworks emphasize global governance of gene editing [16]. Yet regulation alone cannot resolve the philosophical issue. The deeper question concerns whether the informationalization of life redefines the human as an optimizable project rather than a plural condition.

4.4. Toward a Philosophical Reorientation

The analysis suggests that dataism represents a historical mutation in the mode of power: from ownership of material resources to control of predictive architectures; from disciplinary exclusion to continuous modulation; from economic inequality to potential bio-structural stratification. The common thread is the displacement of agency into opaque infrastructures governed by algorithmic rationality.

The task of critical philosophy is therefore not to prescribe immediate policy solutions but to clarify the normative stakes. Freedom must be reconsidered not only as absence of coercion but as the capacity to participate in shaping the informational environments that structure collective life. Equality must be defended not merely as distributive justice but as the preservation of a shared human condition in the face of technological redesign.

Dataism does not determine destiny; it reveals a field of contingency structured by institutional choice. Whether predictive infrastructures deepen domination or expand human capacities depends upon how societies negotiate the relation between technological rationality and democratic self-determination. The future of digital modernity thus hinges on a philosophical question: can computational power be integrated into social life without subordinating plurality, autonomy, and equality to its logic?

5. Conclusions

The transition from big data to dataism represents more than a technological shift; it marks a transformation in the structures through which knowledge, power, and human agency are organized. While digital infrastructures offer unprecedented opportunities for scientific advancement, economic efficiency, and medical innovation, they also reconfigure the foundations of democracy, labor, and biological equality. The central issue is not technology itself, but the institutional logic governing its development. When data becomes the primary resource of accumulation and algorithmic systems mediate social coordination, political power increasingly aligns with predictive capacity. As Zuboff suggests, the concentration of behavioral data may generate asymmetries that undermine democratic reciprocity [2]. As Marcuse warned in another technological era, rationality can become instrumentalized in ways that subtly diminish critical autonomy [1]. And as Arendt emphasized, freedom depends on preserving a public space in which human plurality and deliberation can flourish [4].

Dataism therefore poses a philosophical challenge: how can societies preserve human autonomy, dignity, and equality in a world increasingly governed by computational logic? The risks of labor displacement, biological stratification, and algorithmic governance are not predetermined outcomes but contingent possibilities shaped by political decisions. Addressing these challenges requires more than technical regulation. It demands rethinking data ownership as a matter of public concern, strengthening democratic oversight of digital infrastructures, investing in comprehensive human development and lifelong education, and establishing global ethical frameworks for genetic technologies. The future shaped by dataism will ultimately depend not on the speed of algorithms, but on the capacity of societies to align technological innovation with human freedom and collective

responsibility.

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During the preparation of this work, the author used ChatGPT (OpenAI) to assist in identifying and locating relevant literature. The author subsequently reviewed and verified all sources and takes full responsibility for the accuracy and integrity of the final manuscript.

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