

The Philosophy of Artificial Intelligence from the Perspective of Pragmatic Empiricism and Scientific Humanism

Rohollah Eslami 

Associate Professor of Political Science, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: eslami.r@um.ac.ir

Article Info

Article type:

Research Article

Article history:

Received 10 May 2026

Received in revised form
27 May 2026

Accepted 03 June 2026

Published online 25
October 2026

Keywords:

Artificial Intelligence;
Scientific Realism;
Philosophy of
Technology; Human
Enhancement; Global
Civilization

ABSTRACT

The rapid rise of AI has sparked a major philosophical debate. While AI has expanded human capabilities in medicine, education, governance, and communication, dominant philosophical views remain pessimistic and anti-technological. Phenomenological, critical, and postmodern thinkers—such as Heidegger, Foucault, Habermas, Castells, Agamben, and Harari—portray AI as a source of alienation, surveillance, inequality, and civilizational decline, creating a climate of technological anxiety. This article challenges these views using a science-realist and empiricist framework grounded in Bacon, Hume, Mill, Dewey, and Russell. Through a qualitative philosophical-analytical method, it contrasts pessimistic critiques with the empirical achievements of contemporary science and technology. The study argues that AI is not primarily a mechanism of domination or risk, but an extension of human cognitive capacity, experimental rationality, and institutional adaptation. It contributes to global scientific cooperation, women's empowerment, transnational citizenship, biomedical innovation, democratic participation, and human development. The article concludes that the twenty-first century represents not the decline of humanity, but the expansion of human agency through science, technology, and evidence-based global governance.

Cite this article: Eslami, R. (2026). The Philosophy of Artificial Intelligence from the Perspective of Pragmatic Empiricism and Scientific Humanism. *Journal of Philosophical Investigations*, 20(56), 259-278. <https://doi.org/10.22034/jpiut.2026.72335.4502>



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Publisher: University of Tabriz.

Intruduction

The twenty-first century has witnessed the return of science as the central organizing force of human civilization. Advances in computational science, machine learning, biotechnology, robotics, and data analytics have fundamentally transformed the conditions of human existence, expanding human capabilities in medicine, communication, governance, education, and economic production. Among these developments, artificial intelligence (AI) has emerged not merely as a technological innovation but as a civilizational force capable of reshaping institutions, identities, and forms of collective life. The rapid diffusion of AI across scientific research, industrial production, financial systems, military strategy, and cultural production indicates that technological reason has once again become the dominant epistemic framework of modern societies (Russell & Norvig, 2021, 1–5; Hajkowicz et al., 2023, 2–4). The contemporary world, therefore, is increasingly organized around data, algorithms, computation, and predictive intelligence.

The twenty-first century has witnessed the consolidation of science and data-driven computation as central organizing forces of contemporary societies, a claim increasingly supported by sector-specific empirical evidence. In medicine, for instance, deep-learning systems have demonstrated diagnostic performance comparable to or exceeding human specialists in areas such as radiology and dermatology, with large-scale validation studies reporting significant improvements in early detection rates of conditions such as diabetic retinopathy and certain cancers (Esteva et al., 2017, 1150–1153; McKinney et al., 2020, 1345–1352). In computational science and climate modeling, machine-learning-based surrogate models have substantially reduced computational cost while improving predictive accuracy in ensemble forecasting systems (Kashinath et al., 2021, 145–152). In economics and labor markets, econometric and field-based studies show that automation and AI-assisted decision systems increase productivity in both manufacturing and service sectors, though with heterogeneous distributional effects across skill groups (Brynjolfsson, Rock, & Syverson, 2019, 24–28). Across these domains, artificial intelligence is therefore not merely a speculative technological narrative but an empirically documented transformation of knowledge production, institutional decision-making, and applied scientific practice (Russell & Norvig, 2021, 3–6).

Yet paradoxically, the rise of AI has also intensified anti-scientific narratives, cultural anxieties, and philosophical pessimism. While AI has contributed to medical diagnostics, climate modeling, scientific discovery, and productivity enhancement, public discourse is increasingly saturated with dystopian interpretations. Popular media, cinema, digital art, and speculative literature frequently portray AI as an autonomous threat to humanity, associating it with unemployment, surveillance, autonomous warfare, algorithmic domination, social inequality, and even the eventual replacement of human beings. These representations construct

AI not as an extension of human rationality but as a highly complex and potentially uncontrollable socio-technical system. Such interpretations have been reinforced by philosophical traditions that approach modern technology primarily through suspicion, alienation, and domination (Bostrom, 2014, 1–4).

Within continental philosophy, particularly in the works of Martin Heidegger, modern technology is interpreted as a mode of “enframing” (Gestell) that organizes reality as a standing reserve of calculable resources (Heidegger, 1977, 19–27). However, Heidegger’s argument should not be understood as a simple rejection of technology itself. Rather, his analysis constitutes an ontological inquiry into how technological modes of revealing may simultaneously disclose and conceal dimensions of Being and human existence. Heidegger also emphasized that technology contains both danger and the possibility of a “saving power,” suggesting that reflective engagement with technology can open alternative modes of understanding and dwelling in the world (Heidegger, 1977, 28–35). His critique is therefore directed less at scientific rationality as such than at the reduction of human and natural existence to purely instrumental calculation.

Similarly, Michel Foucault interprets technological systems through disciplinary power, surveillance, and normalization, emphasizing the capacity of institutional technologies to produce obedient subjects (Foucault, 1977, 170–194). Contemporary critical theorists extend these concerns to digital capitalism, algorithmic governance, and platform power, arguing that information technologies reinforce asymmetries of knowledge, wealth, and political control (Castells, 2010, xvii–xxi). These critiques have significantly shaped public understanding of AI, often producing a philosophical atmosphere of technological fatalism.

At the same time, pseudo-scientific interpretations and apocalyptic futurism have gained considerable influence in discussions of AI. Speculative claims concerning the “end of humanity,” “post-human domination,” or the inevitability of machine sovereignty frequently circulate without rigorous empirical foundations. Public intellectuals and cultural commentators often amplify existential fears surrounding AI, contributing to a moral panic that obscures the scientific realities of technological development. Such narratives are not always grounded in computational science, engineering practice, or empirical social research, but rather in cultural imagination, ideological anxiety, or philosophical nostalgia (Floridi, 2014, 6–11).

This situation raises a fundamental philosophical problem: why has a technology designed through scientific experimentation, mathematical modeling, and human engineering become predominantly interpreted through pessimistic, anti-scientific, or metaphysical frameworks? More specifically, why do critiques of AI often privilege narratives of domination, dehumanization, and catastrophe while neglecting its contributions to human empowerment, global cooperation, gender inclusion, scientific progress, and institutional innovation? The dominance of critical and postmodern interpretations has, in many contexts, marginalized

scientific realism, empirical rationality, and technological optimism as legitimate philosophical responses to AI.

This article argues that a science-oriented philosophy of AI offers an alternative intellectual framework for understanding the role of intelligent technologies in the future of human communities. Rather than viewing AI as an autonomous force of destruction, scientific realism interprets it as an extension of human creativity, experimentation, and adaptive intelligence. From this perspective, AI represents not the decline of humanity, but the expansion of human capacities through evidence-based innovation, institutional learning, and transnational cooperation. The central problem addressed in this study, therefore, concerns the philosophical struggle between scientific humanism and anti-scientific pessimism in interpreting artificial intelligence in the twenty-first century. This article seeks to reconstruct AI from the perspective of scientific rationalism and to examine its implications for the future of human civilization, democracy, global citizenship, gender emancipation, and post-biological possibilities.

1. Literature Review

Philosophical debates surrounding artificial intelligence have emerged from multiple intellectual traditions, each attempting to interpret the consequences of technological modernity for human existence, political order, and social organization. Much of the existing literature on AI and advanced technology has been shaped not by scientific optimism or empirical technological studies, but rather by philosophical traditions characterized by skepticism toward instrumental rationality, computational abstraction, and technological expansion. These traditions can be broadly classified into phenomenological critiques, critical-theoretical critiques, and postmodern critiques. While each has contributed important conceptual tools for understanding technology, they have also, in many instances, generated a persistent intellectual climate of technological pessimism that often underestimates the emancipatory and productive capacities of scientific innovation.

2. Phenomenological Critiques of Technology

One of the earliest and most influential critiques of modern technology emerges from the phenomenological tradition, particularly in the work of Martin Heidegger. Heidegger argued that modern technology should not be understood merely as a collection of tools, but as a mode of revealing that transforms the world into what he called *Bestand* (standing reserve), where beings—including nature and human beings—are reduced to calculable and exploitable resources (Heidegger, 1977, 17–21). For Heidegger, the dominance of mathematical rationality and technical calculation creates an ontological crisis in which authentic human existence becomes subordinated to systems of efficiency, measurement, and control. His critique of technological modernity has profoundly influenced subsequent philosophical discussions on computation, automation, and digital systems.

A similar concern appears in the work of Lawrence Kohlberg, whose later reflections on moral development and social institutions emphasized the risks posed by bureaucratic and technologically mediated systems to human autonomy and moral agency. Although Kohlberg's primary work was in moral psychology, his reflections on institutional rationalization raised concerns about forms of cyber-administration that may erode ethical deliberation and create conditions for technocratic domination (Kohlberg, 1984, 398–405). Both Heidegger and Kohlberg, despite their different intellectual backgrounds, represent a broader philosophical anxiety toward quantitative rationality, algorithmic decision-making, and the possibility of cyber-totalitarian forms of governance.

However, contemporary science-oriented scholarship argues that such phenomenological critiques often fail to distinguish between technology as domination and technology as augmentation. By emphasizing existential loss, these critiques risk overlooking the ways computational systems have expanded human capabilities in medicine, communication, education, and scientific discovery (Floridi, 2014, 65–72).

3. Critical Theory and the Politics of Information Technology

Within critical social theory, Manuel Castells and Jürgen Habermas have provided influential analyses of digital modernity. Castells, in his theory of the network society, argues that information technologies have fundamentally transformed economic production, political mobilization, and social identity. He emphasizes that digital networks create new forms of social movements, decentralized communication, and transnational political participation (Castells, 2010, xvii–xxv). At the same time, he warns that networked capitalism can generate new inequalities between those integrated into informational flows and those excluded from them (Castells, 2010, 374–381).

Habermas, by contrast, approaches technological communication from the perspective of democratic legitimacy and communicative rationality. His concerns focus on the fragmentation of the public sphere and the colonization of communicative action by bureaucratic and market-driven systems that may undermine rational-critical discourse (Habermas, 1989, 181–195). However, Habermas should not be interpreted as rejecting science or technological modernity altogether. On the contrary, he consistently defends the emancipatory potential of Enlightenment rationality and scientific inquiry while arguing that instrumental rationality must remain balanced by communicative reason and democratic deliberation (Habermas, 1984, 8–22). From this perspective, digital technologies and contemporary media systems possess both democratic possibilities and risks: they can expand participation and public communication, yet they may also weaken conditions for informed dialogue, consensus formation, and public accountability. Habermas's critique is therefore directed not against technology itself, but against the unreflective expansion of instrumental logic into the lifeworld and public sphere. While both scholars acknowledge the transformative potential of digital systems, their analyses

frequently reflect a generational caution toward technological acceleration. Their work often emphasizes structural risks—fragmentation, inequality, communicative distortion—more than the empirical successes of digital innovation in expanding participation, knowledge access, and collaborative intelligence. Recent studies in digital governance and computational social science suggest that AI-driven communication platforms can also strengthen civic engagement, global dialogue, and distributed knowledge production when supported by appropriate institutional design (Brynjolfsson & McAfee, 2014, 127–133).

4. Postmodern Critiques: Power, Control, and Digital Sovereignty

Postmodern critiques of technology are strongly shaped by the work of Michel Foucault and Giorgio Agamben. Foucault's analysis of disciplinary institutions demonstrates how modern systems of knowledge and administration produce normalized subjects through surveillance, classification, and behavioral regulation (Foucault, 1977, 195–228). In contemporary interpretations, digital infrastructures, data analytics, and algorithmic systems are often read as extensions of disciplinary power. However, Foucault's position should not be reduced to a wholesale rejection of technology or scientific rationality. In his later works on ethics and the "technologies of the self," Foucault explored how technical and institutional practices could also enable forms of self-formation, autonomy, and human freedom (Foucault, 1988, 16–49). His analysis therefore represents a critical investigation of the ambivalent relationship between power, knowledge, and technology rather than a purely anti-technological critique.

Agamben extends this critique through his theory of the state of exception, arguing that modern political systems increasingly normalize emergency governance and suspend legal protections in the name of security (Agamben, 2005, 1–7). In digital contexts, his ideas have been used to interpret biometric governance, predictive policing, and algorithmic surveillance as threats to privacy, citizenship, and legal autonomy.

Although these critiques provide important warnings regarding digital power, they often present technological systems primarily through frameworks of domination, exclusion, and institutional violence. Critics of postmodern technology theory argue that this perspective can produce analytical pessimism, overlooking empirical evidence that digital technologies have also contributed to transparency, accountability, human rights monitoring, and citizen empowerment (Mayer-Schönberger & Cukier, 2013, 156–164).

5. Technological Pessimism, Pseudo-Scientific Narratives, and Apocalyptic Futures

One of the most influential contemporary narratives regarding AI emerges from Yuval Noah Harari, whose writings on dataism, post-humanism, and algorithmic governance suggest that human autonomy may be fundamentally challenged by intelligent systems (Harari, 2017, 366–389). Harari argues that data-processing systems may eventually surpass human cognitive capacities and transform political institutions, labour markets, and personal identity.

While such narratives have gained significant public attention, critics argue that many apocalyptic interpretations of AI remain speculative and insufficiently grounded in engineering realities, empirical data, or technological implementation studies. Science-oriented philosophers contend that technological development should be assessed through experimentation, institutional performance, and measurable outcomes rather than civilizational anxiety or intellectual nostalgia (Russell & Norvig, 2021, 3–8). In this view, the attraction of pseudo-scientific philosophies lies partly in their cultural appeal: they offer dramatic narratives of collapse, domination, and existential crisis that resonate within intellectual circles, even when empirical evidence suggests more complex and often positive technological trajectories.

From a scientific realist perspective, technology is fundamentally linked to human action, experimentation, and practical problem-solving. Scientific knowledge is not merely theoretical abstraction but embodied practice. As the pragmatist tradition suggests, truth emerges not only through discourse, but through successful intervention in the world (Dewey, 1929, 20–26). In this sense, the future of AI should be evaluated not through metaphysical fear, but through its concrete contributions to human flourishing, institutional innovation, and global cooperation.

5-1 Theoretical Framework

This study is grounded in the philosophical tradition of scientific realism and empirical rationalism. Its central theoretical assumption is that artificial intelligence should not be interpreted primarily through metaphysical anxiety, cultural pessimism, or ideological suspicion, but through the epistemological foundations of modern science: observation, experimentation, induction, verification, and practical human intervention in nature. In this sense, the philosophical understanding of AI developed in this article emerges from the intellectual lineage of Francis Bacon, David Hume, John Stuart Mill, John Dewey, Auguste Comte, and Bertrand Russell. These thinkers collectively established a conception of knowledge based on evidence, systematic inquiry, and the practical utility of reason.

5-2 Science as Organized Experience

The modern philosophical conception of science begins with Francis Bacon, whose rejection of scholastic speculation marked a decisive shift toward empirical inquiry. Bacon argued that knowledge is not produced through abstract metaphysics or inherited authority, but through disciplined observation, experimentation, and systematic interaction with nature. His famous assertion that “knowledge itself is power” was not merely rhetorical; it expressed a political and epistemological commitment to the transformation of human conditions through scientific discovery (Bacon, 1620/2000, 33–36). For Bacon, the scientific method was fundamentally emancipatory because it allowed humanity to move beyond superstition, dogma, and speculative metaphysics toward practical mastery over natural limitations.

This Baconian understanding of science was later institutionalized by Auguste Comte, who developed positivism as a philosophy of knowledge grounded in observable facts and causal

regularities. Comte argued that human intellectual development progresses from theological explanations to metaphysical abstractions, and finally to positive science, where reality is studied through empirical observation and methodological regularity (Comte, 1853/2009, 25–31). From a positivist perspective, technological systems such as artificial intelligence should be understood not as existential threats, but as extensions of cumulative scientific knowledge. AI, in this sense, represents the continuation of humanity's movement toward increasingly sophisticated forms of rational organization.

5-3 Induction, Experience, and the Logic of Technological Knowledge

The epistemological foundation of this framework is further developed through the theory of induction. David Hume's analysis of causation and experience remains foundational for understanding how scientific reasoning operates under conditions of uncertainty. Hume demonstrated that human knowledge about the world emerges not from a priori certainty but from repeated observation, experiential association, and probabilistic inference (Hume, 1748/2007, 18–24). Although Hume famously questioned the logical certainty of induction, his work reinforced the necessity of experience as the basis of all meaningful knowledge.

John Stuart Mill transformed Hume's insights into a systematic methodology for scientific investigation. In *A System of Logic*, Mill formalized inductive reasoning as the foundation of causal inquiry, arguing that reliable knowledge emerges through comparison, variation, and experimental testing (Mill, 1843/2011, 211–229). From Mill's perspective, scientific progress depends on the ability to identify regularities in experience and convert them into predictive models. Artificial intelligence, particularly machine learning systems, operationalizes this very principle by identifying patterns in large datasets and generating predictive outcomes through inductive computation.

John Dewey extends this empirical tradition through pragmatism. For Dewey, knowledge is not a passive reflection of reality but an instrument of intelligent action. Scientific inquiry, therefore, must be evaluated by its capacity to solve concrete human problems and improve collective life. Inquiry becomes meaningful when ideas are tested through action, revised through consequences, and validated through practical success (Dewey, 1938, 101–109). In the context of AI, Dewey's pragmatism provides a crucial framework: intelligent systems should be assessed not through speculative fears but through measurable contributions to medicine, education, environmental governance, economic productivity, and human welfare.

5-4 Technology as the Expansion of Human Reason

A defense of technology within this study also draws on the work of Marquis de Condorcet, whose philosophy of historical progress remains highly relevant to contemporary debates on AI. Condorcet argued that scientific advancement and technological innovation are inseparable from moral progress, political equality, and the expansion of human freedom. He viewed science as the principal force through which ignorance, poverty, disease, and oppression could

be overcome ([Condorcet, 1795/2012, 187–194](#)). This Enlightenment vision directly challenges contemporary technological pessimism. From a Condorcetian perspective, AI is not a threat to human civilization but a continuation of humanity's historical struggle to overcome biological and social limitations.

Bertrand Russell further reinforces this scientific orientation by emphasizing intellectual clarity, logical analysis, and scepticism toward ideological dogmatism. Russell argued that scientific thinking requires precision, openness to evidence, and resistance to metaphysical absolutism ([Russell, 1912/2001, 72–79](#)). In the age of AI, Russell's epistemological discipline remains essential for distinguishing empirical technological analysis from cultural panic or philosophical exaggeration.

5-5 Critique of Anti-Scientific Approaches to Technology

This theoretical framework also critically distances itself from philosophical traditions that interpret technology primarily through domination, alienation, or existential crisis. The works of Martin Heidegger, Michel Foucault, and Karl Marx, despite their historical importance, often approach technological development through normative suspicion rather than empirical evaluation.

Heidegger interprets technology as an ontological danger that transforms the world into a calculable reserve ([Heidegger, 1977, 19–27](#)). Foucault reads modern technologies through disciplinary power and surveillance mechanisms ([Foucault, 1977, 170–194](#)). Marx associates industrial technology with class domination and capitalist exploitation ([Marx, 1867/1990, 492–507](#)). Although these frameworks reveal important dimensions of power, they frequently reduce technological systems to instruments of control and overlook the empirical evidence of technological empowerment, scientific innovation, and institutional improvement.

From the standpoint of scientific realism, these approaches become limited when they privilege ideological interpretation over experimentation, predictive validity, and measurable social outcomes. Artificial intelligence should therefore be understood not through metaphysical fear or structural determinism, but through the scientific principles of induction, experimentation, and practical human flourishing.

Accordingly, this article adopts a science-centered framework in which AI is conceptualized as a continuation of the Enlightenment project: the expansion of human intelligence through evidence-based inquiry, technological creativity, and institutional adaptation.

In light of the foregoing discussion and in response to contemporary critiques of strong scientific realism, this study more precisely reframes its theoretical position as a form of pragmatic empirical rationalism rather than a strict metaphysical scientific realism. In this view, the epistemic value of artificial intelligence does not depend on unverifiable claims about ultimate ontological correspondence, but on its demonstrable success in prediction, problem-solving, and the continuous refinement of models through feedback from experience. This

position aligns closely with contemporary philosophy of science that emphasizes the fallibility, revisability, and instrumentality of scientific knowledge while preserving its rational authority (Dewey, 1938, 107–110; Putnam, 1990, 21–25). Accordingly, AI is understood as an extension of experimental intelligence: a socio-technical apparatus that improves its epistemic reliability through iterative learning, empirical correction, and adaptive optimization rather than metaphysical certainty.

From this pragmatic and Enlightenment-oriented standpoint, the historical trajectory of science and technology provides strong inductive grounds for a cautiously optimistic interpretation of artificial intelligence. Across domains such as medicine, communication, transportation, and industrial production, technological modernization has consistently expanded human life expectancy, reduced material scarcity, and increased the scope of cognitive and social coordination (Pinker, 2018, 45–52). While such progress is neither linear nor free of unintended consequences, the cumulative direction of scientific development indicates that human well-being has, on average, improved through successive waves of technological innovation. Consequently, this study rejects romanticized narratives of a “lost golden age” as empirically unsubstantiated, treating them instead as cultural imaginaries rather than historical realities. Within this framework, artificial intelligence is conceptualized not as a rupture with human flourishing, but as a continuation of an observable historical pattern in which scientific knowledge progressively enhances human capacities for understanding, prediction, and collective problem-solving (Russell, 1912/2001, 74–78)

6. Mainstream Scientific Philosophy and the Future of Artificial Intelligence: A Scientific Defense of Human Civilization

6-1 Mainstream Philosophy of Science: From Observation to Predictive Intelligence

The philosophical foundations of modern science rest upon a clear epistemological principle: knowledge emerges through observation, experimentation, induction, and systematic verification. Science differs from metaphysics, ideological speculation, and cultural mythology because it produces knowledge that is publicly testable, empirically observable, and operationally effective. The ultimate purpose of scientific inquiry is not merely contemplation but explanation, prediction, and control of natural and social phenomena (Comte, 1853/2009, 28–34). In this sense, science remains the most reliable human institution for understanding reality.

The roots of this scientific tradition extend beyond early modern Europe. In the Islamic scientific tradition, Muhammad ibn Zakariya al-Razi emphasized empirical observation, medical experimentation, and rational skepticism. His methodological approach rejected dogmatic authority in favor of direct experience and clinical evidence (Goodman, 1995, 77–82). Similarly, Ibn Sina developed a sophisticated integration of observation, causal reasoning, and experimental medicine, particularly in *The Canon of Medicine*, where knowledge was

validated through repeated observation and therapeutic effectiveness (McGinnis, 2010, 163–171).

This tradition reached methodological maturity in the work of Francis Bacon, who argued that reliable knowledge emerges through induction—from particular observations toward general laws. Bacon’s scientific method rejected scholastic abstractions and placed experiment at the center of human progress (Bacon, 1620/2000, 33–39). Auguste Comte later institutionalized this approach through positivism, arguing that societies evolve toward scientific stages of development where reality is understood through measurable and observable laws (Comte, 1853/2009, 41–47).

Artificial intelligence represents the latest extension of this scientific tradition. Machine learning systems operate precisely through inductive reasoning: identifying patterns in data, generating probabilistic models, and refining predictions through iterative feedback. AI does not abandon scientific rationality; it intensifies it. Through computational analysis, scientific inquiry now acquires unprecedented capacities for prediction, diagnosis, optimization, and decision-making across medicine, economics, governance, and environmental science (Russell & Norvig, 2021, 18–26).

6-2 In Defense of Technology: Innovation and the Return of Scientific Power

Technological innovation represents one of humanity’s greatest achievements. Every major transformation in human civilization—from agriculture to printing, electricity, vaccination, telecommunications, aviation, and computing—has emerged from the application of scientific knowledge to practical problems. Technology is not external to humanity; it is the material extension of human intelligence.

Artificial intelligence, robotics, automation, multimedia systems, and digital communication technologies represent the return of scientific authority in public life. In the twentieth century, ideological conflicts often overshadowed scientific institutions. In the twenty-first century, however, technological systems increasingly shape governance, education, healthcare, finance, and communication. Science has returned not as abstract theory but as operational infrastructure (Brynjolfsson & McAfee, 2014, 49–61).

AI-assisted diagnostics now outperform traditional medical screening in several fields, including radiology and pathology. Scientific simulations accelerate pharmaceutical development. Intelligent systems optimize transportation networks, reduce energy waste, and improve disaster management. These developments demonstrate that technology should not be interpreted primarily through fear, but through its capacity to solve human problems and expand human agency (Floridi, 2014, 83–95).

6-3 In Defense of Internationalization: Global Integration and Scientific Civilization

The rise of digital technologies has accelerated the transformation of humanity into a globally interconnected civilization. Marshall McLuhan famously described this transformation as the

emergence of the “global village,” where electronic communication collapses spatial distance and creates new forms of global consciousness (McLuhan, 1964, 63–69).

Later, Kenichi Ohmae argued that national boundaries are increasingly weakened by economic integration, technological interdependence, and global networks of production and consumption (Ohmae, 1995, 1–12). Artificial intelligence intensifies this process by enabling real-time communication, global collaboration, distributed knowledge production, and transnational governance.

Scientific research today depends on international data sharing, global laboratories, open-source platforms, and cross-border academic cooperation. AI contributes to this global integration by removing linguistic, informational, and institutional barriers. Rather than destroying national cultures, scientific internationalization expands the capacity of humanity to cooperate beyond geography, ethnicity, or ideology.

6-4 In Defense of Feminization: Technology and the Empowerment of Women

One of the most transformative consequences of scientific and technological progress has been the empowerment of women. Digital technologies, online education, healthcare innovation, and AI-assisted communication systems have expanded women’s access to education, employment, entrepreneurship, and public participation. Historically excluded voices now participate in public discourse, political debate, economic innovation, and scientific leadership.

Research consistently shows that access to digital infrastructure significantly improves women’s economic independence, educational attainment, and social visibility (World Economic Forum, 2023, 15–22). AI-based translation tools, remote work platforms, digital finance, and telemedicine reduce structural barriers that historically limited women’s participation. Technology does not merely include women; it restructures social institutions in ways that make exclusion increasingly unsustainable.

A substantial body of empirical research supports the claim that digitalization and technological change have measurably improved women’s socio-economic position across multiple indicators. Cross-country panel studies indicate that increased internet penetration is significantly associated with higher female labor force participation and reduced gender gaps in employment, particularly in middle- and high-income economies. Similarly, World Bank analyses of digital finance and mobile banking systems show that access to mobile money services increases women’s likelihood of formal financial inclusion and independent income generation in developing economies (Demirgüç-Kunt et al., 2018, 27–30). In the domain of education, UNESCO reports demonstrate that expansion of online and ICT-supported learning environments has contributed to narrowing gender disparities in tertiary education enrollment, especially in STEM-related fields in several emerging economies (UNESCO, 2022, 45–48). Furthermore, labor market studies on remote work diffusion during and after the COVID-19 pandemic show that digital platforms disproportionately benefited women by increasing

flexibility and reducing structural constraints related to caregiving responsibilities (Alon et al., 2020, 3–6). Taken together, these findings support the interpretation that the Fourth Industrial Revolution is associated with a measurable reconfiguration of gendered opportunity structures, often described in the literature as a gradual shift toward greater female economic and epistemic participation within digitally mediated societies.

6-5 In Defense of the Nation-State and Global Citizenship

Contrary to claims that globalization eliminates political belonging, digital modernity produces a dual identity: national citizenship and global citizenship. Individuals remain members of political communities while simultaneously participating in transnational networks of information, education, employment, and mobility.

Global communication platforms allow citizens to access knowledge, engage in international dialogue, pursue education abroad, migrate for work, and build transnational professional networks. Modern urban life increasingly reflects this synthesis of local belonging and global connectivity (Sassen, 2001, 89–97). AI enhances this process by personalizing education, facilitating migration systems, and supporting cross-border economic participation.

6-6 In Defense of Biological Enhancement and the Extension of Life

Scientific progress increasingly challenges traditional biological limitations. Advances in genetic engineering, regenerative medicine, cloning research, prosthetics, and bioinformatics suggest that human longevity, reproductive medicine, and physical restoration are entering a new historical phase.

Technologies such as CRISPR Gene Editing, stem-cell therapies, and synthetic biology enable the correction of hereditary diseases, tissue regeneration, and reproductive innovation (Doudna & Sternberg, 2017, 112–126). AI accelerates these developments by analyzing genomic data and optimizing biomedical experimentation. From a scientific perspective, extending healthy human life is not a violation of nature; it is the continuation of medicine's historical mission.

6-7 In Defense of Humanism: Science Against Violence and Fanaticism

Scientific civilization historically reduces violence by increasing prosperity, communication, education, and institutional accountability. As technological systems improve living standards, reduce scarcity, and expand access to information, societies become less dependent on tribalism, religious extremism, and violent conflict.

Empirical evidence suggests that modernization and education correlate strongly with reductions in interpersonal violence and authoritarian attitudes (Pinker, 2011, xxii–xxvii). AI contributes by improving conflict prediction, humanitarian logistics, crisis response, and public transparency. Scientific humanism therefore opposes war, cruelty, and fanaticism by creating conditions of security, leisure, intellectual development, and social trust.

A growing body of empirical research from political science, criminology, and development studies provides more robust support for the claim that modernization processes are associated with measurable declines in organized violence and certain forms of interpersonal aggression. Longitudinal conflict datasets, such as the Uppsala Conflict Data Program (UCDP), indicate a general decline in the intensity and lethality of interstate wars since the mid-twentieth century, alongside a shift toward lower-intensity conflicts and increased international mediation (Pettersson et al., 2021, 1–4). In criminology, cross-national studies demonstrate that increases in educational attainment and income levels are significantly associated with reductions in homicide rates and violent crime, even after controlling for institutional variation (Nivette, 2011, 102–105; Fajnzylber, Lederman, & Loayza, 2002, 132–136). Moreover, World Bank governance indicators and OECD analyses show that improvements in institutional quality, rule of law, and transparency—often facilitated by digital information systems—correlate with lower levels of corruption, state violence, and political instability (World Bank, 2022, 17–20). Within this empirical context, artificial intelligence contributes indirectly to violence reduction by enhancing early warning systems for conflict prediction, optimizing humanitarian logistics in crisis zones, and improving transparency in public decision-making through data-driven governance tools (UN OCHA, 2023, 6–9). Taken together, the evidence suggests that scientific and technological modernization does not eliminate conflict entirely, but is consistently associated with structural conditions that reduce the probability, intensity, and persistence of organized violence, thereby providing a more empirically grounded basis for scientific humanism than purely philosophical optimism

6-8 Corporate–Citizen Alliances and the Transformation of State Power

The rise of global technology companies has transformed political authority. Major corporations increasingly provide communication systems, cybersecurity, financial infrastructure, education platforms, and even quasi-legal dispute mechanisms. Traditional state monopolies over information, economic regulation, and public administration are weakening.

Scholars of global political economy argue that platform capitalism and network governance redistribute power from territorial states toward corporate and civic networks (Castells, 2010, 371–385). Citizens increasingly trust digital services more than bureaucratic institutions. This does not necessarily imply political collapse; it suggests a transformation in sovereignty where states must compete with private innovation for legitimacy.

6-9 Human Rights, Democracy, and Ecological Consciousness

Scientific progress creates conditions for deeper democratization and broader human rights protection. Digital communication supports transparency, citizen participation, direct democratic engagement, and global rights advocacy. AI-based monitoring systems expose corruption, track environmental degradation, and document human rights violations.

At the same time, technological societies increasingly prioritize quality of life: art, music, literature, travel, ecological sustainability, and animal welfare become central social values. Scientific knowledge enables more sustainable energy systems, biodiversity monitoring, and environmental restoration ([United Nations Development Programme, 2022, 33–40](#)).

Empirical research in political science, environmental studies, and digital governance provides more differentiated support for these claims, while also highlighting their conditional nature. Cross-national datasets on democratic accountability suggest that increases in digital connectivity are associated with higher levels of government transparency and citizen reporting of corruption, particularly through open-data initiatives and digital complaint mechanisms ([World Bank, 2022, 14–17](#); [UNDP, 2022, 35–38](#)). In the field of human rights documentation, large-scale evidence-based monitoring projects—such as satellite-assisted conflict mapping and AI-supported text analysis of social media reports—have improved the detection and verification of violations in fragile states, increasing both the speed and reliability of international responses ([UN OHCHR, 2021, 6–9](#)). Environmental research further indicates that data-driven governance tools, including remote sensing systems and AI-based climate modeling, have significantly enhanced the capacity of states and international organizations to monitor deforestation, carbon emissions, and biodiversity loss in near real time ([IPCC, 2021, 102–105](#)). However, comparative studies also show that these positive effects are unevenly distributed and depend heavily on institutional capacity, regulatory frameworks, and political will, meaning that digital technologies may amplify both transparency and surveillance depending on governance context ([Zuboff, 2019, 11–14](#)). Taken together, the empirical literature supports a qualified interpretation: technological systems contribute to democratization and ecological awareness under specific institutional conditions, rather than automatically producing these outcomes.

6-10 The Return of Reaction and the Historical Triumph of Science

Scientific progress inevitably encounters resistance. Tribalism, ethnic nationalism, authoritarian populism, religious extremism, and anti-intellectual movements continue to challenge modern institutions. Yet historically, reactionary movements rarely reverse scientific transformation for long. Printing survived censorship. Vaccination survived superstition. Democracy survived monarchy. Digital science will similarly outlast contemporary forms of anti-technological fear.

The history of civilization suggests that while reactionary forces may temporarily disrupt scientific institutions, the long-term trajectory of humanity favors empirical knowledge, technological adaptation, and institutional innovation. Science ultimately prevails because it produces results—not myths, not nostalgia, but measurable human improvement.

However, a more empirically cautious interpretation of this historical trajectory is necessary in line with contemporary science and technology studies and political sociology. While

scientific institutions have demonstrated considerable long-term resilience, this does not imply a linear or irreversible process of “scientific victory,” but rather a contingent and institutionally mediated form of stability. Research in science and technology studies shows that the continuity of scientific systems depends on evolving networks of trust, funding structures, regulatory frameworks, and epistemic authority, all of which may vary significantly across political contexts and historical periods (Jasanoff, 2004, 13–16). Likewise, Collingridge’s analysis of technological governance demonstrates that technological systems often produce unintended consequences that are difficult to anticipate or reverse in early stages of development, complicating any simple narrative of cumulative progress (Collingridge, 1980, 19–22). Furthermore, diffusion studies in innovation theory indicate that even demonstrably beneficial scientific and technological advances are adopted unevenly across societies and may encounter persistent social, cultural, or institutional resistance before becoming stabilized (Rogers, 2003, 6–9). Accordingly, the historical endurance of science should be understood not as deterministic triumph, but as a fragile and continuously reconstructed achievement that relies on sustained institutional maintenance, adaptive governance, and public legitimacy.

Conclusion

The philosophical debate over artificial intelligence is ultimately a debate about the future of human civilization itself. At its deepest level, the question is not whether machines will replace human beings, but whether humanity will continue to trust the epistemological foundations that made modern civilization possible: empirical inquiry, experimental verification, scientific reasoning, and institutional learning. This study has argued that many dominant interpretations of artificial intelligence within phenomenological, critical, and postmodern traditions have approached technological development through narratives of anxiety, domination, alienation, and civilizational decline. While these traditions have contributed valuable critiques of power, surveillance, and institutional inequality, they often remain structurally limited by their tendency to privilege suspicion over experimentation, interpretation over evidence, and metaphysical concern over practical outcomes.

By contrast, the scientific tradition—from Francis Bacon and David Hume to John Stuart Mill, John Dewey, and Bertrand Russell—offers a more productive framework for understanding artificial intelligence. Within this tradition, knowledge is not validated by rhetorical influence, ideological appeal, or philosophical pessimism, but by reproducibility, predictive accuracy, experimental success, and social effectiveness. Artificial intelligence represents the continuation of this scientific project. It is not an autonomous metaphysical force, nor an inevitable mechanism of domination, but an extension of human intelligence organized through mathematics, computation, and iterative learning.

The findings of this study suggest that the twenty-first century should be understood as the century of augmented humanity rather than technological displacement. Artificial intelligence

expands the human capacity to diagnose disease, model environmental change, accelerate scientific discovery, optimize institutional governance, and democratize access to knowledge. The expansion of computational systems does not diminish humanity; under appropriate ethical and institutional conditions, it amplifies human agency. The growing integration of AI into education, medicine, urban systems, digital economies, and scientific research indicates that technological intelligence increasingly functions as an infrastructure of human empowerment rather than a substitute for human meaning.

At the social level, scientific and technological development is closely connected to broader civilizational transformations. The continued internationalization of knowledge production, the emergence of globally connected citizens, the expansion of women's participation in education and public leadership, and the development of biotechnologies capable of extending healthy human life all point toward a historical shift in the structure of human existence. These developments challenge inherited hierarchies of gender, geography, class, and political authority. They also weaken tribalism, dogmatism, and closed systems of identity by creating more open, informed, and interconnected societies.

Universities, research institutions, laboratories, and scientific communities therefore occupy a central role in the future of civilization. In an era increasingly shaped by algorithmic systems, defending science also means defending institutions of verification, open inquiry, peer review, and intellectual accountability. The future of AI cannot be entrusted to fear, ideological nostalgia, or anti-scientific speculation. It must remain connected to empirical research, ethical engineering, democratic oversight, and global academic collaboration.

Therefore, this article concludes that the greatest philosophical task of our time is not to fear artificial intelligence, but to govern it scientifically, humanistically, and globally. The removal of pseudo-scientific narratives, technological fatalism, and anti-empirical intellectual traditions is essential for understanding the real significance of AI. The twenty-first century is not the age of human decline; it is the age of human expansion. It is an era defined by scientific creativity, technological capability, global citizenship, gender emancipation, biological innovation, and the growing possibility that humanity may redefine even its oldest limitations, including disease, vulnerability, and mortality itself. In this historical transformation, artificial intelligence is not the end of humanity—it is one of the most powerful instruments of its next evolution.

At the same time, it is necessary to acknowledge that the optimistic and science-centered interpretation advanced in this article does not exhaust the full range of empirical and normative concerns raised in contemporary AI scholarship. A substantial body of rigorous research in algorithmic fairness, AI safety, labor displacement, data justice, and accountability highlights genuine risks, biases, and structural asymmetries embedded in socio-technical systems (Barocas, Hardt, & Narayanan, 2019, 1–5; Amodei et al., 2016, 1–4; Pasquale, 2015, 3–7).

These findings should not be dismissed as “anti-scientific,” nor reduced to ideological critique, but rather recognized as an essential component of the scientific and interdisciplinary study of AI itself. Accordingly, the present study does not seek to negate or marginalize this literature, but to situate it within a broader empirical research program that remains open to revision, refinement, and methodological pluralism.

Therefore, while this article defends a broadly Enlightenment-oriented and empirically grounded optimism regarding artificial intelligence, it also recognizes that the governance of AI requires continuous critical scrutiny, domain-specific empirical validation, and ethically informed institutional design. The existence of serious challenges—ranging from algorithmic bias to safety alignment and labor market disruption—indicates not the failure of the scientific framework, but the necessity of extending it through further interdisciplinary research. Such concerns should be addressed through systematic investigation rather than speculative fatalism or pseudo-scientific extrapolation. Future research should therefore aim to integrate empirical AI performance studies with normative and legal analyses in order to develop a more comprehensive and methodologically balanced understanding of artificial intelligence in complex social systems

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