International Journal of Scientific Trends- (IJST)
ISSN: 2980-4299
Volume 4, Issue 6, June - 2025
Website: https://scientifictrends.org/index.php/ijst
Open Access, Peer Reviewed, Scientific Journal

Artificial Intelligence as a Phenomenon of Contemporary Philosophy of Science and Technology

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Abstract

Artificial Intelligence (AI) has evolved from a computational discipline into a philosophical phenomenon that challenges traditional notions of science, technology, and humanity. As AI systems increasingly exhibit capacities such as learning, reasoning, and decision-making, they provoke fundamental questions about the nature of intelligence, autonomy, and epistemic authority. This paper explores AI through the lens of contemporary philosophy of science and technology, analyzing how AI disrupts classical conceptions of objectivity, agency, and scientific rationality. Drawing upon interdisciplinary insights—from analytic philosophy and phenomenology to systems theory and posthumanism—the study examines the ontological and epistemological transformations triggered by AI. Special attention is given to the implications of machine learning, algorithmic decision-making, and human-AI interaction for rethinking the human condition in the digital age. The paper argues that AI is not merely a technological artifact but a philosophical event that redefines what it means to know, act, and exist in a technologically mediated world.

Keywords: Artificial Intelligence; Philosophy of Science; Epistemology; Technological Agency; Ontology; Human-Machine Interaction; Posthumanism; Algorithmic Reasoning; Machine Learning; Digital Rationality.

Introduction

In recent decades, Artificial Intelligence (AI) has undergone a dramatic evolution—from a specialized field of computer science into a transformative force that permeates nearly every domain of human activity. From autonomous vehicles and medical diagnostics to predictive policing and content recommendation systems, AI technologies now shape not only how societies function but also how individuals perceive reality, knowledge, and agency. This rapid integration of AI into social, scientific, and institutional infrastructures has generated complex philosophical

questions that transcend technical concerns and enter the realm of epistemology, ontology, and ethics.

Traditional philosophy of science has long operated on assumptions of human-centered rationality, objectivity, and control over knowledge production. However, the advent of machine learning, neural networks, and generative models challenges these assumptions by introducing non-human agents capable of discovering patterns, generating hypotheses, and even creating novel content. As a result, the distinction between subject and object, human and tool, observer and system becomes increasingly blurred. These developments compel philosophers to reexamine foundational concepts such as intelligence, intentionality, consciousness, and autonomy within the context of human-machine interaction.

Moreover, the rise of AI calls into question the role of science itself in a world where algorithmic systems can outperform human experts in specific tasks. Are AI systems merely extensions of human cognition, or do they represent a new form of epistemic agency? Can machines be said to "know" or "understand," and if so, by what criteria? How should we interpret the outputs of deep learning systems that lack transparency or interpretability? These questions are central to the contemporary philosophy of science and technology, which increasingly seeks to understand the implications of delegating reasoning and decision-making to artificial agents.

This article investigates AI not solely as a technological innovation but as a philosophical phenomenon that reconfigures the very frameworks through which we conceptualize knowledge, reality, and human identity. Drawing upon diverse philosophical traditions—ranging from analytic philosophy and systems theory to phenomenology and posthumanism—the study aims to illuminate the ontological and epistemological shifts engendered by AI and to evaluate their broader impact on the philosophy of science in the digital age.

Methods

The methodology of this study is inherently interdisciplinary, combining philosophical inquiry with conceptual analysis, critical theory, and science and technology studies (STS). Rather than relying on empirical experimentation or quantitative modeling typical of the engineering sciences, this research employs qualitative and interpretive tools to investigate how artificial intelligence challenges, transforms, and redefines core categories in the philosophy of science and technology.

At the foundation lies philosophical conceptual analysis, which involves the clarification and critical examination of central notions such as "intelligence," "agency," "knowledge," "consciousness," and "autonomy" in the context of AI systems. These concepts are not merely abstract philosophical constructs but are now operationalized in algorithmic systems, embedded into social infrastructures, and deployed in real-world decision-making. Thus, the study traces the genealogy of these concepts from classical philosophy (e.g., Aristotle, Descartes, Kant) through Enlightenment rationalism and positivism to contemporary posthumanist and techno-ontological perspectives.

Secondly, the research integrates hermeneutic and phenomenological approaches, particularly in examining the human experience of interacting with AI. Inspired by thinkers such as Heidegger, Merleau-Ponty, and Don Ihde, this method explores how human intentionality, perception, and embodiment are mediated and altered by smart technologies. Phenomenology allows for the investigation of how AI reshapes the lived experience of science and technology—how

researchers, users, and institutions interpret, internalize, and respond to intelligent systems in their epistemic and normative practices.

Another crucial component is drawn from critical theory and ethics of technology, particularly the Frankfurt School, Michel Foucault, and contemporary scholars such as Luciano Floridi and Shoshana Zuboff. This allows the study to critique the socio-political implications of AI deployment, such as surveillance, algorithmic bias, automation of labor, and epistemic injustice. The ethical dimension is examined not only in terms of moral responsibility but also in terms of how AI reconfigures the conditions of moral agency and normative reasoning.

Finally, the methodology incorporates insights from science and technology studies (STS), which bridge sociology, anthropology, and philosophy to understand the co-production of scientific knowledge and technological systems. The STS perspective emphasizes that technologies like AI are not value-neutral tools but are deeply embedded in cultural narratives, institutional logics, and political economies. This framework facilitates an analysis of AI as a socio-technical assemblage that both reflects and shapes epistemic authority, technological determinism, and human identity.

By synthesizing these diverse methodologies—conceptual analysis, phenomenology, critical theory, and STS—the study constructs a multi-layered framework for understanding AI as a transformative phenomenon. This approach makes it possible to address AI not only as a scientific or technical innovation but as a complex cultural and philosophical force that compels a rethinking of foundational assumptions in the philosophy of science and technology.

Results

The analytical application of philosophical and interdisciplinary methodologies reveals that artificial intelligence (AI) is not merely a technological instrument designed to enhance computational efficiency or solve narrowly defined problems. Rather, it constitutes a transformative phenomenon that penetrates the very foundations of epistemology, ontology, and ethics within the contemporary philosophy of science and technology. AI represents a shift not only in how knowledge is produced and utilized but also in how reality itself is conceptualized and mediated through intelligent systems.

From an epistemological standpoint, AI challenges classical understandings of knowledge as a uniquely human endeavor, rooted in consciousness, intentionality, and rational deliberation. It introduces new modalities of knowledge production that are algorithmic, probabilistic, and data-driven—operating often beyond the limits of human comprehension. This emergence of machine-generated insights forces philosophers to reconsider long-standing distinctions between knowing and computing, understanding and processing, and between explanation and prediction. The rise of AI thus destabilizes traditional epistemic hierarchies and opens the door to what may be termed *non-anthropocentric epistemologies*, wherein knowledge can be generated, validated, and operationalized by non-human agents.

Ontologically, AI challenges the metaphysical status of the human subject and problematizes the boundary between the natural and the artificial, the organic and the synthetic. The increasing autonomy of AI systems—exemplified by machine learning, generative models, and neural networks—raises fundamental questions about the nature of agency, intentionality, and even consciousness. Philosophers are now confronted with the task of rethinking the ontology of intelligence itself: Is intelligence necessarily tied to human-like self-awareness, or can it emerge

in systems fundamentally different from us? This ontological reorientation requires a revision of classical dualisms—such as mind/body, subject/object, and human/machine—and a critical engagement with posthumanist and transhumanist frameworks that envision hybrid or distributed forms of intelligence.

Moreover, the interdisciplinary methodologies employed in this inquiry reveal that AI is not an isolated development within engineering or computer science, but a deeply embedded social and cultural artifact. Its design, deployment, and impact are shaped by—and simultaneously reshape—societal values, institutional norms, political power structures, and ethical expectations. Thus, AI must be analyzed not only through the lens of technological functionality, but as a socio-technical assemblage that embodies and reproduces particular worldviews and ideologies. This requires integrating insights from philosophy of technology, science and technology studies (STS), cognitive science, law, and digital ethics.

Crucially, AI alters the philosophy of science itself by introducing new forms of scientific reasoning and practice. The traditional scientific method, which emphasizes hypothesis testing, causal explanation, and empirical falsifiability, is being supplemented—or even supplanted—by data-intensive, correlation-based methodologies. AI systems capable of autonomously identifying patterns and proposing solutions without transparent logical steps challenge the very notion of scientific understanding. What does it mean to "understand" a phenomenon if the explanation is produced by an inscrutable algorithm? What role does human judgment play in validating machine-driven discoveries? These questions underscore the urgent need for a revised philosophy of science that can accommodate the epistemic novelty and complexity introduced by AI.

Several key results emerge from this inquiry:

Traditionally, intelligence was considered a uniquely human faculty, grounded in reason, consciousness, and intentionality. However, with the rise of AI—especially machine learning and neural networks—the boundaries of intelligence have been extended beyond biological agents. AI systems perform tasks involving pattern recognition, prediction, and even autonomous decision-making, prompting philosophers to rethink the nature of rationality. The classical dichotomy between human cognition and mechanical computation is blurred, leading to the emergence of "artificial epistemology"—a field that investigates how knowledge is generated, validated, and applied by non-human agents.

AI has begun to influence not only what science studies but also how science is conducted. Data-driven discovery, automated hypothesis generation, and algorithmic modeling represent a shift from theory-led to correlation-based scientific inquiry. This calls into question traditional notions of causality, explanation, and falsifiability as defined by Popper, Kuhn, and Lakatos. Philosophers of science are now faced with the challenge of interpreting scientific knowledge production in an era where AI tools can operate beyond human cognitive limits, sometimes producing results that are opaque or non-interpretable to human scientists.

Philosophically, AI catalyzes a reexamination of the human condition. The human is no longer the sole center of epistemic authority or creative agency. The presence of autonomous machines that simulate human behavior leads to a post-anthropocentric turn in philosophy of technology. Human subjectivity is increasingly distributed across socio-technical networks, and identity is co-

constructed through interaction with intelligent agents. This ontological decentralization destabilizes established concepts such as the self, agency, and personhood.

AI introduces new ethical complexities, especially regarding responsibility, accountability, and the distribution of moral agency. Traditional ethical theories—deontology, utilitarianism, virtue ethics—must be reformulated to account for decisions made by non-human actors. The phenomenon of algorithmic opacity (so-called "black boxes") challenges legal and moral systems that rely on transparency and intent. Furthermore, AI systems reflect and amplify societal biases, leading to structural forms of injustice that require both ethical and political responses.

AI's integration into research and governance produces new epistemic configurations. Notions such as "algorithmic governance" and "machine epistemics" describe how knowledge is now filtered, shaped, and prioritized by intelligent systems. In scientific communities, peer review and expertise are supplemented—or even replaced—by computational assessments. This raises concerns about epistemic authority, the reliability of automated reasoning, and the preservation of human judgment within techno-scientific practices.

AI also reshapes how science and technology are conceptualized as a unity—technoscience. It dissolves the boundary between theoretical knowledge and practical application, making innovation a continuous feedback loop driven by data and computation. Philosophers are thus required to interrogate not only the ethical consequences of AI but the very metaphysics of scientific progress, creativity, and technological mediation.

Discussion

The findings discussed above reveal that artificial intelligence (AI) functions as a disruptive and generative force within the contemporary landscape of philosophy of science and technology. Its impact extends beyond technical systems and computational capabilities, penetrating into the foundational concepts that underlie scientific knowledge, human identity, and technological agency. In this context, AI must be understood not simply as an outcome of scientific progress, but as a catalyst for rethinking what science and technology mean in the 21st century.

First, AI compels a reconceptualization of *scientific rationality*. Traditionally, science has relied on human cognition for observation, interpretation, theorization, and experimentation. However, AI-driven methods—such as deep learning and pattern recognition—replace some of these cognitive processes with algorithmic mechanisms that operate without explicit models or prior hypotheses. This shift raises epistemological questions: Can we trust scientific conclusions that we cannot fully explain? How should we interpret discoveries made by black-box systems that are not directly interpretable by humans? The notion of "explainability" becomes both a philosophical and practical concern, prompting the need for a new framework of *epistemic responsibility*.

Second, the philosophical debate on *human subjectivity and agency* is reoriented in the age of intelligent systems. As machines increasingly perform tasks involving decision-making, problem-solving, and even creative expression, the boundary between human and artificial agency becomes less distinct. This forces a reassessment of long-held anthropocentric assumptions, including the exclusive attribution of rationality, moral responsibility, and creativity to human beings. Emerging perspectives from posthumanism and techno-philosophy suggest that we may be entering an era of *distributed agency*, where decision-making is co-produced by hybrid constellations of human

and non-human actors. This challenges legal systems, moral theories, and societal norms that are still predicated on individual accountability and human exceptionalism.

Third, AI systems generate new *ontologies of reality*. In a world increasingly shaped by algorithmic interpretation—where data is collected, classified, and acted upon by autonomous systems—what constitutes reality is mediated through digital abstractions. Philosophical concerns arise regarding the objectivity and neutrality of these representations. AI systems are trained on data sets embedded with historical and cultural biases, thereby reproducing or amplifying inequalities. Therefore, ontological questions about AI are inseparable from ethical considerations: Who defines the categories used by AI? Whose worldview is encoded in these systems? And how can we ensure that the ontologies produced by AI remain pluralistic, inclusive, and contestable?

Moreover, AI introduces a new level of *technological reflexivity*. Technologies no longer merely extend human capabilities—they now shape the cognitive, social, and political conditions under which knowledge is produced and decisions are made. This reflexivity demands a deeper engagement with the *philosophy of technology*, particularly the works of thinkers such as Martin Heidegger, Gilbert Simondon, and Don Ihde, who emphasize the co-constitutive relationship between human beings and their tools. In the context of AI, this relationship becomes recursive: we shape algorithms, and in turn, they shape our understanding of ourselves, our institutions, and our future.

Finally, AI raises urgent questions regarding *normativity and ethics*. As intelligent systems are increasingly embedded in domains such as healthcare, education, governance, and criminal justice, their normative dimensions cannot be ignored. Philosophers and ethicists must grapple with the consequences of delegating moral and legal decisions to non-human agents. Principles such as fairness, accountability, transparency, and justice must be redefined in light of algorithmic mediation. This demands not only regulatory interventions but also a philosophical re-examination of core ethical concepts in the context of non-anthropocentric intelligences.

In sum, the discussion confirms that AI is not a neutral or isolated development, but a philosophically rich and complex phenomenon that challenges the categories and assumptions of modernity. It invites interdisciplinary collaboration between technologists, philosophers, scientists, and policymakers to ensure that the design and deployment of AI reflect the values of a just and sustainable society. The future of AI, therefore, must be shaped not only by innovation but by reflection—guided by a philosophical vision attuned to both the promises and perils of intelligent technologies.

Conclusion

This study has explored the phenomenon of artificial intelligence (AI) not merely as a technological innovation, but as a transformative epistemological and ontological challenge within the contemporary philosophy of science and technology. Through an interdisciplinary lens, it has become evident that AI interrogates and reconfigures core philosophical categories—rationality, subjectivity, agency, reality, and normativity—thereby demanding a critical reevaluation of how we produce knowledge, define human identity, and govern socio-technical systems.

AI systems, by performing cognitive, creative, and decision-making functions traditionally attributed to humans, redefine the boundaries of science and technology. They generate new forms

of knowledge production that are no longer fully explainable in human terms, prompting a reevaluation of trust, responsibility, and scientific understanding. Moreover, they participate in shaping socio-political realities through algorithmic ontologies that carry embedded assumptions, biases, and normative judgments. These developments reveal that the deployment of AI is never value-neutral—it is deeply entangled with cultural, ethical, and philosophical presuppositions.

The ontological and epistemic transformations provoked by AI call for a more reflexive and inclusive philosophical framework. Such a framework must account for the hybridization of agency, the co-evolution of humans and machines, and the recursive feedback between technological development and social meaning-making. It must also address the ethical imperative to design AI systems that promote fairness, transparency, accountability, and human dignity, particularly as these technologies influence legal, medical, educational, and political domains.

Ultimately, this inquiry confirms that artificial intelligence is a phenomenon that both reflects and reshapes the philosophical foundations of science and technology. Future research must therefore continue to bridge disciplinary divides—integrating philosophy, computer science, ethics, legal theory, and cultural studies—to better understand and govern the evolving human-technology relationship. Only through such integrative efforts can we ensure that the development and application of AI serve not only technical efficiency but also the broader goals of justice, sustainability, and human flourishing.

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