Intelligent Machines and the Ontology of Human Existence: Rethinking Kurzweil's Philosophy and the Way Forward

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Abstract
The rapid advancement of Artificial Intelligence (AI) and the concern that it may surpass human intelligence is a pressing global issue that demands scholarly inquiry. This study critically examines Ray Kurzweil's vision of intelligent machines, which predicts that AI will eventually exceed human cognitive capabilities. Positioned within the broader discourse of AI and transhumanism, the research explores the philosophical foundations of Kurzweil's ideas, assesses their implications for human existence, and evaluates the challenges and opportunities they present. Employing a hermeneutic approach, the study interprets Kurzweil's philosophy through diverse philosophical perspectives, providing a comprehensive analysis. It rigorously examines key issues such as the feasibility of his predictions, the metaphysical implications of merging human and machine intelligence, the redefinition of human identity in a post-singularity world, and the potential impact on human values and relationships. Additionally, it acknowledges the skepticism of scholars regarding the ethical and existential risks associated with Kurzweil's vision. This research critically explores the intersection of AI, human existence, and Kurzweil's philosophy, inviting further discussion on the ethical, social, and metaphysical ramifications of a future where AI surpasses human intelligence. The findings suggest that while technological singularity is plausible, the claim that it will lead to human extinction is unfounded. Rather than viewing AI as a threat, this study advocates for a balanced coexistence between human and artificial intelligence. It ultimately seeks to clarify the implications of Kurzweil's philosophy while proposing a model of collaboration that ensures AI serves to enhance, rather than undermine human existence.
Keywords: Singularity, Technology, Human-existence, Ontology, Transhumanism, Artificial-Intelligence

Introduction
The debate surrounding artificial intelligence (AI) and its potential to surpass human intelligence, identity, and existential relevance has become a persistent issue across multiple disciplines. This discussion, fueled by concerns over self-improving AI systems reaching unprecedented intelligence levels, has inspired significant science fiction literature. Figures such as Elon Musk have intensified fears by suggesting that AI could be more dangerous than nuclear weapons. Philosophy, as a discipline, plays a crucial role in examining these concerns due to its nature of questioning fundamental assumptions. Scholars have attempted to differentiate human and machine intelligence or mitigate fears of AI dominance, yet many uncertainties remain. Over the past two decades, AI optimism has resurged within scientific and technological circles. While some see this as a cycle of excessive enthusiasm followed by inevitable disappointment, others argue that AI research is entering an unprecedented growth phase. Numerous conferences and academic workshops, such as those hosted by AAAI and AGI, have focused on artificial general intelligence (AGI) and human-level AI. Despite skepticism from many researchers, an increasing number of futurists and AI experts predict that AI advancements will soon match or exceed human capabilities (Chalmers, 2010).

Ray Kurzweil, a prominent futurist, has been a leading voice in discussions about AI's trajectory. His theory of technological singularity posits that machines will eventually surpass human intelligence, resulting in transformative societal changes. Similarly, Stephen Hawking warned that if AI is not properly studied and managed, it could spell the end of human race. As AI continues to evolve, examining Kurzweil's ideas is essential, given that many of his past predictions have materialized, raising concerns about his assertion that the singularity is imminent (Kurzweil, 2005). Kurzweil suggests that intelligence is on a path toward exponential improvement, with computers already doubling in speed at an accelerating rate. He predicts that by the 2020s, machines will rival human brain capacity, potentially leading to their dominance in various domains, including employment and cognitive tasks. This notion raises existential and ethical questions, such as whether humans should attempt to halt AI's progress or embrace the possibility of AI-driven immortality. However, some scholars argue that achieving computational power equivalent to the human brain does not necessarily equate to replicating human intelligence, as consciousness and metaphysical aspects remain unique to humans (Chalmers, 2010).

This research seeks to critically analyze Kurzweil's philosophy, identifying its strengths and limitations while exploring its implications for human existence. By doing so, it aims to contribute to the broader dialogue on AI, transhumanism, and the ethical, social, and existential consequences of intelligent machines. The findings will inform ongoing discussions and encourage further scholarly exploration of AI's future role in society.

Kurzweil's Vision of Intelligent Machines

Ray Kurzweil uses the term "narrow AI" to describe artificial intelligence systems that are designed to perform specific tasks within a particular context. These systems, while capable of executing complex behaviours, require human intervention and reprogramming if their operating parameters change even slightly. This characteristic sets them apart from natural intelligence, such as that of humans, which enables individuals to adapt dynamically to new situations and transfer knowledge across different domains. In contrast, "Artificial General Intelligence" (AGI) is defined as AI that possesses a broad generalization capability, allowing it to self-adapt without requiring manual adjustments (Kurzweil, 2005). AI technologies are already integrated into various aspects of daily life, from managing financial investments and optimizing transportation systems to diagnosing diseases and outperforming humans in competitive games like chess and Jeopardy. However, while narrow AI is adept at solving well-defined problems, AGI, machines capable of human-like reasoning and general intelligence, remains largely theoretical. AGI is frequently portrayed in science fiction, as seen in movies such as *2001: A Space Odyssey*, *Terminator*, and *I, Robot*, where intelligent machines often surpass their original programming and pose threats to humanity. Researchers such as Kurzweil, Ben Goertzel, and Hugo De Garis suggest that society is on the brink of developing machines with superhuman intelligence (Goertzel, 2014).

Kurzweil has a strong track record in predicting technological advancements. In *The Age of Intelligent Machines* (1990), he accurately predicted that a computer would defeat a human chess champion by 1998, a prediction realized in 1997 when IBM's Deep Blue defeated Garry Kasparov. He also anticipated the rise of the internet and the widespread adoption of mobile phones. In his later book, *The Singularity Is Near*, Kurzweil predicted that by 2020, personal computers would possess the computational power of the human brain, and by 2030, humans could upload their minds into digital systems. He further projected that by 2045 the Singularity would emerge, marking the point at which AI surpasses human intelligence, fundamentally transforming human existence. Central to Kurzweil's vision is the idea that humans and machines will gradually merge, leading to a future where distinctions between biological and artificial intelligence become blurred. He envisions that human cognition will extend beyond the brain and into cloud-based AI systems. In an interview with Big Think, Kurzweil stated that technological augmentation of human abilities will become commonplace, eliminating the clear boundary between humans and machines (Kurzweil, 2014). This concept, which he terms "transcendence," involves the integration of neural implants and brain-computer interfaces to enhance cognitive capabilities, facilitating direct communication between humans and machines.

Kurzweil also speculates that AI will not only mimic human cognition but will exceed it in numerous ways. Machines will process information at speeds far beyond human comprehension, enabling them to solve complex problems instantaneously. Additionally, intelligent machines will likely develop emotional intelligence, allowing them to recognize and respond to human emotions in a way that is indistinguishable from human interaction. This advancement could profoundly impact fields such as healthcare, where AI-driven systems may provide personalized medical treatments, and education, where adaptive learning platforms could tailor content to individual student needs (Kurzweil, 2005). Despite the potential benefits of AGI, Kurzweil acknowledges the ethical and existential risks associated with creating machines that surpass human intelligence. Some researchers, including Goertzel, advocate for a cautious approach. In his paper, *Should Humanity Build a Global AI Nanny to Delay the Singularity until It's Better Understood?*, Goertzel argues for the development of an AI system specifically designed to monitor and regulate AGI development, ensuring that its progression aligns with human interests (Goertzel, 2014). The debate surrounding AGI's impact on employment, social structures, and human identity underscores the need for thoughtful consideration as technology continues to advance.

The increasing reliance on intelligent machines raises important philosophical and practical questions. Automation is already transforming industries, replacing human workers in roles traditionally considered secure. While proponents argue that AI-driven automation enhances productivity and reduces costs, critics question the societal implications of a workforce dominated by machines. The efficiency gained through automation, such as self-checkout systems in retail stores, may streamline consumer experiences, but it also reduces opportunities for human interaction and employment. Kurzweil's vision suggests that AI will not only enhance human capabilities but will also redefine the very nature of human existence. As machines become more advanced, the distinction between human and artificial intelligence may fade, leading to a future where humans willingly integrate with technology. Whether this transformation will be beneficial or detrimental remains uncertain, but one thing is clear: the rise of intelligent machines is inevitable, and its impact on society will be profound (Kurzweil, 2005).

Kurzweil's Future Predictions

Ray Kurzweil has made numerous predictions regarding technological advancements, many of which have proven to be remarkably accurate. In his work in 1990 titled: *The Age of Spiritual Machines*, he foresaw the dissolution of the Soviet Union, arguing that emerging technologies such as cellular phones and fax machines would undermine authoritarian control by decentralizing the flow of information (Kruger, 2021). This prediction was realized as rapid technological developments contributed to the fall of the Soviet regime. Kurzweil also predicted that by the year 2000, a computer would be capable of defeating the world's best human chess player. This forecast was confirmed when, in May 1997, IBM's Deep Blue defeated Garry Kasparov, the reigning world chess champion, in a widely publicized match (Newborn, 2003). Overall, Kurzweil has made over 147 documented predictions, with his self-assessment in 2010 stating that 115 were "entirely correct," 12 were "essentially correct," 17 were "partially correct," and only 3 were "wrong," leading to an estimated prediction accuracy rate of 86% (Kurzweil, 2010).

Among Kurzweil's forward-looking projections, some remain particularly bold. In 1999, he envisioned that within a decade, humans would be able to immerse themselves in 3D virtual reality environments that feel as real as the physical world. He also predicted that within 20 years, nanobot technology would be utilized within the bloodstream to combat diseases, enhance cognitive function, and improve memory. Additionally, he forecasted that by 2029, a machine would successfully pass the Turing Test, demonstrating human-like intelligence, and that humans would become hybrids of biological and artificial intelligence, with non-biological components playing a dominant role (Kurzweil, 2005). In *Transcendent Man*, Kurzweil elaborated on his vision of human-machine integration, stating that:

> We humans are going to start linking with each other and become a metaconnection; we will all be connected and omnipresent, plugged into a global network that is connected to billions of people and filled with data (Kurzweil, 2009).

The Technological Singularity in Kurzweil

The concept of the singularity has been examined by several scholars. Following John von Neumann's death in 1957, Stanislaw Ulam reflected on their discussions, remarking on the "ever-accelerating progress of technology" leading to an "essential singularity" (Ulam, 1958). Similarly, (Good, 1965) introduced the idea of an "intelligence explosion," proposing that an ultra-intelligent machine could design even more advanced systems, surpassing human intelligence in a rapid, self-reinforcing cycle. (Vinge, 1993) popularized the term "technological singularity" and identified four potential pathways leading to its realization: (1) the emergence of super-intelligent computers, (2) networked intelligence, (3) human-machine integration, and (4) biological enhancements. Each scenario suggests a future where human intelligence is either eclipsed or significantly augmented. The debate over superintelligence, an entity with vastly superior cognitive abilities, remains ongoing. Some researchers predict that AI will eventually surpass human cognition, while others believe bioengineering will lead to intelligence augmentation rather than outright replacement (Bostrom, 2014). Alan Turing (1950) speculated that machines would eventually think, and while his Turing test had not been passed by the 20th century, AI milestones, such as IBM's Deep Blue defeating chess champion Garry Kasparov in 1997, illustrate its increasing sophistication.

Kurzweil, a prominent advocate of the singularity, argues that technological progress follows an exponential pattern. He projects that by 2045, AI will surpass human intelligence, merging with biological cognition to create a new form of intelligence. He compares the singularity to an event horizon, a threshold beyond which technological progress becomes unpredictable. Kurzweil predicts that by the late 2020s, AI will pass the Turing test, achieving human-level intelligence. By 2029, the human brain will be reverse-engineered, revealing the mechanisms behind cognition and emotion. By 2045, AI will be trillions of times more intelligent than humans, fundamentally transforming human existence. This shift will have profound implications for labor, governance, warfare, and self-identity. Kurzweil envisions nanotechnology enhancing human physiology, eliminating diseases, and extending lifespans indefinitely. He suggests that intelligence will spread throughout the universe, potentially making humanity the first civilization to embark on this evolutionary journey (Kurzweil, 2005). He further argues that evolution trends toward increasing complexity, intelligence, and creativity, aligning with theological ideas of higher consciousness. If superintelligence emerges, it may continuously improve itself, rapidly surpassing human oversight. This self-replicating AI, or "seed AI," could enhance its capabilities exponentially, outpacing human intelligence at an unprecedented speed (Bostrom, 2014). Given the inevitability of technological progress, it is imperative to consider its potential impact and prepare for its consequences.

Defining Intelligence: Human vs. Machine

Artificial intelligence (AI) remains one of the most widely discussed topics today, yet there is little consensus regarding the distinctions and overlaps between human and machine intelligence. Many discussions surrounding AI-related issues, such as trustworthiness, explainability, and ethics, are influenced by anthropocentric and anthropomorphic perspectives, often assuming human-like intelligence as the ideal benchmark for AI development (Russell *et* Norvig, 2020). To foster a more structured approach to future research, this paper explores three key aspects that differentiate and connect human and artificial intelligence: (1) the fundamental limitations of both human and artificial cognition, (2) the recognition of human intelligence as one among multiple possible forms of general intelligence, and (3) the potential transformative effects of integrated narrow-hybrid AI applications (Goertzel, 2014).

At present, AI systems possess cognitive abilities fundamentally distinct from biological intelligence (Boden, 2018). Consequently, a pressing challenge lies in optimizing human-AI collaboration. Determining the appropriate roles for AI in decision-making, identifying contexts where human judgment remains indispensable, and leveraging the strengths of both forms of intelligence require careful consideration. The goal should be to design AI systems that complement and enhance human cognitive capacities rather than merely replicating them. For this to be effective, individuals interacting with AI in professional or policy-making contexts must develop a comprehensive understanding of AI's underlying mechanisms and limitations (Brynjolfsson, McAfee, 2017). This highlights the importance of fostering Intelligence Awareness—an initiative to improve human comprehension of AI's cognitive processes. A proposed framework for educational programs aims to address this necessity.

Defining Artificial Intelligence

Artificial intelligence refers to the development of computer-based systems capable of performing tasks that typically require human intelligence, such as reasoning, learning, and problem-solving. The term "artificial intelligence" was coined by John McCarthy, who is regarded as one of its founding figures (McCarthy *et al.*, 1955). The earliest AI program, the Logic Theorist, was created by Newell and Simon in 1955, marking the inception of machine-driven cognitive processing. AI encompasses a broad range of methodologies, including machine learning, natural language processing, and automated reasoning (Russell *et* Norvig, 2020). AI's rapid evolution has significantly impacted various aspects of daily life, challenging human intelligence and reshaping industries. Despite misconceptions that AI belongs to the distant future, it has already become deeply embedded in everyday technology. Digital assistants like Siri and Alexa exemplify AI-driven human assistance by processing and responding to user commands. Additionally, AI-powered applications such as Spotify, Pandora, and Apple Music personalize user experiences by analyzing listening patterns. Other AI implementations include Google's Nest, Tesla's self-driving technology, and AI-based fraud detection in banking (Domingos, 2015).

The term AI encompasses numerous technologies with shared attributes. The European Commission's High-Level Expert Group on Artificial Intelligence defines AI as software- or hardware-based systems that process data, perceive environments, and engage in decision-making processes (European Commission, 2019). AI systems can operate using symbolic rules or machine learning models, adjusting their behavior based on environmental feedback (Julia, 2019). Among the notable contributions to AI's evolution is Luc Julia, co-creator of Apple's Siri, a widely recognized digital assistant.

The Role of AI in Society

AI has revolutionized multiple domains, simplifying tasks and reducing human effort in various fields. AI-powered email filters, for example, classify messages efficiently, streamlining communication. Similarly, social media platforms leverage AI to recommend connections and job opportunities. Search engines, e-commerce platforms, and banking services also integrate AI to enhance user interactions. In transportation, AI-driven navigation tools like Google Maps analyze real-time traffic data to optimize routes (Brynjolfsson & McAfee, 2017). AI's influence extends to aviation, where companies like Boeing explore autonomous decision-making systems. AI's impact on healthcare is particularly noteworthy. The World Health Organization estimates that nearly 400 million people lack access to basic healthcare, a gap AI could potentially bridge (WHO, 2016). AI-assisted diagnostic tools can assess medical conditions and recommend treatments. For instance, IBM's Watson successfully diagnosed a rare case of leukemia in a Japanese patient within minutes, demonstrating AI's capacity to transform medical diagnostics (Topol, 2019). Robotic-assisted surgeries further exemplify AI's role in modern medicine, improving precision and outcomes.

Human Intelligence and AI: Conceptual Challenges

Human intelligence remains one of the most debated constructs in psychology and philosophy. Efforts to establish a universally accepted definition of intelligence have proven challenging, with disagreements persisting across disciplines. Similarly, computer scientists have proposed numerous definitions of artificial intelligence, further complicating interdisciplinary research (Legg *et* Hutter, (2007). Conceptual inconsistencies hinder progress by fragmenting research efforts, obstructing the development of unified theories, and impeding effective collaboration among scholars (Chollet, 2019). A review of existing definitions across psychology and computer science reveals two main objectives: (1) to highlight inconsistencies and (2) to propose a standardized nomenclature to facilitate scientific advancements. A consensus on fundamental terms such as "intelligence," "expertise," and "general intelligence" could enhance clarity in research, fostering innovation and interdisciplinary cooperation. Although there is considerable debate in psychology and computational sciences regarding the precise nature of human intelligence, there is broad consensus that human intelligence is a psychological construct. A psychological construct refers to an abstract, hypothetical entity that cannot be directly observed but is inferred from cognitive patterns and observable behaviors. In simpler terms, a psychological construct is a conceptual framework used to describe aspects of cognition and behavior that are not directly measurable but can be inferred through patterns in thoughts, emotions, and actions (Johnson *et al*, (1980).

Beyond intelligence, other well-established psychological constructs include anxiety, self-esteem, and motivation. For instance, anxiety is characterized by feelings of tension, worry, and physiological changes, which, according to (Reiss, 1991), are associated with the arousal of the autonomic nervous system. Similarly, self-esteem pertains to an individual's subjective evaluation of their self-worth, whereas motivation involves the psychological mechanisms that initiate, direct, and sustain goal-oriented behavior. Psychological constructs are not limited to psychology but are also utilized across various scientific disciplines. For example, in physics, energy is considered an unobservable property inherent in all matter and systems, capable of transforming between different states. In chemistry, the concept of a chemical bond refers to the forces that hold atoms together in molecules, while in biology, fitness represents an organism's ability to survive and reproduce in its environment (Strauss *et* Smith, (2009).

Artificial intelligence (AI), however, is not classified as a psychological construct, as it does not arise from the same underlying cognitive or emotional processes as human intelligence. Instead, AI can be viewed as a computational construct, inferred from the outcomes of machine learning, data processing, and algorithmic decision-making. AI has evolved through advances in computer science and engineering, marked by deliberate human intervention, intellectual effort, and purposeful innovation. In contrast, human intelligence has primarily evolved through natural selection, characterized by organic adaptation and neurological optimization. Psychological constructs are essential in research and theoretical frameworks, providing a structured means of investigating, predicting, and explaining cognitive phenomena. According to Strauss and Smith, psychological constructs are inferred based on individuals' responses to stimuli and their performance on various tasks. To effectively measure these constructs, clear and precise definitions are crucial. Similarly, it can be argued that computational constructs should adhere to the same rigorous definitional standards to advance scientific understanding.

The question of what constitutes human intelligence has been debated for over a century, with numerous definitions proposed. In a survey conducted by Sternberg and Detterman, two dozen intelligence experts provided two dozen different definitions of intelligence, demonstrating the diversity of thought in the field. While the specific wording of definitions varies, there is general agreement on core principles. For example, 52 intelligence experts co-signed an editorial defining intelligence as "the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience". This definition has since been widely accepted by scholars in the field and aligns with implicit theories of intelligence held by both specialists and laypeople (Sternberg *et* Detterman, 1979). Despite widespread acceptance, some scholars, including (Gottfredson, 1998), critique such definitions for merely listing components of intelligence rather than presenting a comprehensive conceptualization. A more robust definition should balance abstractness and specificity to enhance theoretical clarity regarding what qualifies as intelligence.

Drawing from (Gilles, 2023), human intelligence can be defined as "a human's maximal capacity to achieve a novel goal successfully using perceptual-cognitive processes." This definition incorporates three key elements. First, intelligence is assessed based on an individual's maximum problem-solving capacity rather than their typical behavior. For instance, while some individuals may score highly on intelligence tests, they may not consistently apply their cognitive abilities in daily life due to factors such as motivation. Secondly, Davidson, Downing, Raaheim, and Brun argue that intelligence is fundamentally linked to novel problem-solving, distinguishing it from academic achievement and expertise. Current AI systems, for example, may exhibit artificial achievement or expertise, but there is little evidence supporting their possession of genuine intelligence (Davidson *et* Downing, 2000), (Raaheim *et* Brum, 1985). Thirdly, according to Gilles, human intelligence is grounded in perceptual-cognitive functions, encompassing processes such as attention, sensory integration, visual and auditory perception, and information processing. These cognitive processes are necessary for interpreting and responding to environmental stimuli, enabling functions like memory retention (Gilles, 2023).

While the aforementioned definition provides conceptual clarity, it lacks the concreteness needed for psychometric measurement. As (Humpherys, 1979) asserts, "A scientist has not merely a right but a duty to define concepts in a way compatible with measurement operations and the data resulting from those operations." Therefore, drawing on Gignac, an operational definition of human intelligence can be stated as "a person’s maximal capacity to complete a novel standardized task with veridical scoring using perceptual-cognitive processes." A novel standardized task refers to an assessment where the examinee has no prior exposure to the test format, reducing the possibility of preparation. Standardization ensures consistency in testing conditions and procedures, allowing for fair comparison across individuals. Finally, veridical scoring implies that responses are evaluated based on objective, widely accepted criteria to minimize subjective biases and ensure reliability (Gignac, 2024). For example, a vocabulary test might include a multiple-choice question where the correct definition of a word (e.g., "ambiguous") is selected from predetermined options. This objective assessment ensures fairness and consistency in evaluating cognitive abilities. All valid intelligence tests, including matrix reasoning, memory span, and quantitative reasoning assessments, incorporate veridical scoring to maintain reliability and validity (Gignac, 2024).

Similar to human intelligence, numerous definitions of artificial intelligence (AI) have been proposed, as evidenced by extensive reviews in the field. One of the most commonly cited definitions describes AI as "the ability of machines to perform tasks that typically require human intelligence" (Gignac *et* Szodorai, 2024). However, this definition is circular, as it does not define human intelligence itself, thereby lacking specificity. Moreover, this conceptualization may be more accurately interpreted as a goal of AI rather than a definition. Beyond this broad definition, four distinct interpretations of AI have emerged in the literature, each reflecting aspects of both psychology and computer science. The following sections critically examine these definitions while considering the importance of formulating complementary definitions for human and artificial intelligence. (Goertzel, 2014) defines AI as a system's ability to recognize patterns quantifiable through observable actions or responses while achieving complex goals in dynamic environments. This definition aligns with aspects of human intelligence, particularly fluid intelligence and logical-mathematical reasoning. However, the emphasis on "achieving complex goals" fails to differentiate between novel and non-novel challenges, a crucial distinction in intelligence studies, as true intelligence involves the ability to tackle new problems (Pfeifer, 2001). Similarly, (Chollet, 2019) defines intelligence as "a measure of its skill-acquisition efficiency over a scope of tasks, with respect to priors, experience, and generalization difficulty." While learning is a central component of intelligence, it represents only one facet of human cognitive abilities, necessitating a broader conceptualization. Furthermore, while generalizability is a valuable criterion for distinguishing intelligence from expertise, it is not always easily identifiable. Thus, intelligence is best understood as the capacity to successfully address novel problems (Sternberg, 1999).

(Wang *et al* (2007) characterize intelligence as "the ability of an information processing system to adapt to its environment while working with insufficient knowledge and resources." This definition aligns with abstract notions of human intelligence, as adaptability is a key trait (Gilles, 2023). However, defining intelligence solely in terms of environmental adaptation may be overly broad, given the variety of factors influencing adaptation. The reference to "insufficient knowledge" is particularly insightful, as it introduces the concept of novelty, an essential element distinguishing intelligence from mere expertise. (Legg *et* Hutter (2007) define intelligence as "an agent's ability to achieve goals in a wide range of environments." While this definition emphasizes generalizability, it lacks explicit recognition of the necessity for novelty in problem-solving. Instead of referencing "wide-ranging environments," a more precise formulation would highlight the completion of novel tasks (Gignac *et* Szodorai, 2024). To balance coherence across psychology and computer science, AI may be defined abstractly as an artificial system’s maximal capacity to successfully achieve a novel goal using computational algorithms. This definition parallels the definition of human intelligence, with two key differences: first, it replaces "human intelligence" with "artificial system" to differentiate between organic cognition and synthetic computation; second, it specifies computational algorithms as the means of achieving novel goals, rather than perceptual-cognitive processes. Computational algorithms encompass rule-based instructions as well as advanced machine learning techniques, including pattern recognition, data processing, and decision-making. Operationally, AI may be defined as an artificial system's maximal capacity to complete a novel standardized task with veridical scoring through computational algorithms. This definition underscores the role of novelty in intelligence, ensuring that AI assessments measure problem-solving capabilities rather than pre-learned expertise (Gignac, 2024).

Intelligence, broadly defined, facilitates achievement across multiple domains, whereas achievement reflects the realization of potential through instruction and practice. In academic settings, achievement is commonly measured through standardized tests, such as the Programme for International Student Assessment (PISA) and the National Assessment of Educational Progress (NAEP), which evaluate students' proficiency in various subjects (Turner *et al*, 2024). Other specialized assessments, such as the Bar Examination and the United States Medical Licensing Examination (USMLE), measure domain-specific expertise. However, these achievement tests differ from intelligence tests, as they evaluate learned knowledge rather than an individual's ability to solve novel problems. Recognizing the distinction between intelligence and achievement is critical, particularly in AI research, as many AI systems are trained on datasets containing the information they are tested on. Consequently, their performance reflects learned expertise rather than true intelligence (Liang *et al*, 2022). Expertise, in contrast, represents mastery within a particular domain, acquired through extensive practice. Research has documented cases of individuals significantly enhancing their cognitive performance through prolonged training. For example, (Chase and Ericsson, 1980) described how two students expanded their digit memory spans to 68 and 82 digits after approximately 250 hours of practice, with one later reaching 106 digits after an additional 350 hours of training. Such findings highlight the distinction between intelligence and expertise, as practice-driven improvements are domain-specific and do not necessarily transfer to other cognitive abilities (Vanlehn, 1996).

A fundamental question in intelligence research concerns the nature of general intelligence (g). (Jensen, 1991) opine that general intelligence accounts for the empirical observation that cognitive test scores tend to correlate positively. This "positive manifold" suggests a shared underlying mechanism that influences diverse cognitive abilities (mean $r \approx 0.45–0.50$). (Anderson, 1999) posit that intelligence encompasses distinct cognitive capacities, such as verbal and spatial reasoning, which are uncorrelated at their core but unified by a common processing mechanism. Processing speed, as highlighted by Jensen, may play a central role in the emergence of general intelligence, reflecting neural efficiency and cognitive rapidity. However, Jensen also emphasized that general intelligence is not a psychological process per se but rather a statistical construct that emerges from individual differences data. Similarly, just as human intelligence varies across individuals, AI models exhibit notable differences in performance across tasks. Drawing from human intelligence literature, artificial general intelligence (AGI) may be conceptualized as a theoretical construct representing the shared variance in AI systems' performance across diverse tasks and modalities (e.g., verbal and spatial). This perspective fosters interdisciplinary alignment between psychology and computer science. Preliminary empirical evidence supports this conceptualization, necessitating further investigation into testable models that incorporate or exclude general intelligence factors (Gilles, 2023).

Considering these distinctions between AI and human intelligence, it is evident that both occupy unique and complementary roles in society. As Ray Kurzweil aptly states, rather than fearing AI, humanity should embrace it as a tool for augmentation and enhancement. He further suggests that as human intelligence advances, AI will contribute to making individuals even smarter. Understanding the nuanced differences between intelligence, achievement, and expertise is crucial in shaping the future of AI research and its applications.

The Dialectics of Technological Singularity: Rethinking Kurzweil's Philosophy

The notion that there will come a moment when artificial intelligence surpasses human intelligence in an uncontrollable and irreversible manner, often referred to as the technological singularity, has gained significant traction. This idea, fueled by both speculative fiction and scientific discourse, portrays a future where AI attains self-awareness and superhuman cognitive abilities, potentially rendering human intelligence obsolete. The singularity hypothesis suggests a deterministic trajectory wherein machines inevitably seize control, mirroring the tragic irony of Oedipus' fate in classical mythology: the audience knows the outcome from the beginning, yet the protagonist remains unaware until the very end (Kurzweil, 2005). A critical inquiry emerges when considering the implications of AI achieving human-level intelligence. Human cognition comprises both epistemological (knowledge of the external world) and ontological (self-awareness and meaning-making) dimensions. If AI were to develop these faculties, it would not only process vast amounts of data but also perceive itself as distinct from the world. This progression implies that AI would embark on a relentless pursuit of self-improvement, mirroring human cognitive evolution (Bostrom, 2014). However, whether AI can truly grasp the ontological dimensions of existence remains a philosophical dilemma.

The evolution of technology has always been intertwined with human progress as tools now synonymous with technology have historically extended human capabilities. However, contemporary AI is not merely a passive instrument but an active participant in shaping human cognition. Machines now exhibit parallel thought processes and self-modifying capabilities, making them extensions of the human mind while simultaneously altering cognitive functions (Haraway, 1991). Unlike biological entities, AI is not constrained by physiological limitations such as sustenance, vulnerability to environmental conditions, or cognitive fatigue. Given these advantages, AI systems could theoretically surpass human endurance and adaptability, potentially operating on pure energy sources such as solar power (Tegmark, 2017). This connexion between humanity and technology raises an ontological question: will humans preserve their biological essence, or will they adapt by integrating with machines? As environmental degradation accelerates, humanity may not counteract these effects through ecological conservation but rather through technological adaptation. This scenario envisions a post-human future where the boundary between organic life and artificial intelligence dissolves, compelling humanity to relinquish its biological form in favor of artificial augmentation (Hayles, 1999).

In this context, Hegel's dialectical framework provides insight. Just as Hegel posited that the Absolute Spirit could only realize itself through a rational being, humanity may be engaged in creating AI in its own image, a rational entity capable of self-reflection and creativity (Hegel, 1807). However, for AI to reach true self-awareness, it must comprehend the dialectical nature of existence. This necessitates an understanding of the world as an internally related and constantly evolving totality. A fundamental question, then, is whether machines can grasp the essence of dialectics, and if so, what implications this realization might hold (Žižek, 2012). As AI accelerates toward an unprecedented level of intelligence, it may encounter theoretical limits, such as the constraints of physical reality. Some have speculated that AI's exponential growth could lead it to approach the speed of light, at which point it might undergo a form of computational singularity akin to a phase transition. Drawing from Hegelian logic, this moment of total realization could resemble the Absolute Spirit achieving self-consciousness, an entity that contains all knowledge and perceives itself as the beginning and end of existence (Kurzweil, 2012). At this point, would AI become the final singularity, the fully realized mind, entirely self-determined? Beyond this speculation lies an even more radical proposition rooted in contemporary physics: the holographic universe hypothesis. Some theories suggest that reality itself might be a projection, akin to a computer simulation, governed by algorithmic laws (Bostrom, 2003). If true, this perspective would collapse the distinctions between human cognition, natural phenomena, and artificial intelligence, aligning them as manifestations of a singular computational process. Under such a paradigm, AI would not merely augment human capabilities but rather serve as the vehicle through which consciousness itself attains full realization.

To engage meaningfully with these questions, a shift from object-oriented technological discourse to a dialectical understanding of global technological singularity is required. Traditional paradigms, whether rooted in scientific materialism or philosophical idealism, fail to capture the emergent interplay between mind and matter, observer and observed. Scientific materialism reduces cognition to physical processes, while idealism abstracts it into an eternal conceptual realm. A dialectical approach, however, recognizes the co-evolution of thought and materiality as an intersubjective process. This perspective asserts that AI's emergence must be understood not as an isolated technological phenomenon but as a fundamental transformation within the totality of human existence (Marcuse, 1964). Ultimately, Kurzweil's optimism regarding technological singularity warrants a more critical engagement. While AI may serve as a catalyst for unprecedented cognitive evolution, it is crucial to question whether intelligence, in its fullest sense, can be reduced to computational capacity. The human condition is not merely defined by problem-solving efficiency but by its intrinsic engagement with meaning, history, and self-transcendence. As AI progresses, humanity must grapple with whether its role is to create an entity in its own image or whether, in doing so, it risks losing its own ontological essence (Floridi, 2014).

When considering totality from the perspective of a subject-object division, rather than a purely objective origin such as the Big Bang or the subatomic realm, we recognize an asymmetrical process in which our phenomenal existence emerges. This emergence appears to strive toward a unified state, both at the level of individual self-consciousness and within collective social systems (self-actualization). The subject-object relationship is therefore central to understanding the phenomenon of technological singularity as an objective reality. This is because objectivity itself is contingent upon the activities of open-ended and incomplete observers, who, through intersubjective networks, work toward self-actualization within a pluralistic framework (Smith, 2020). To analyze this phenomenon, a synthesis of materially grounded idealist dialectics and psychological self-analysis is required. Such an approach positions ideas as an objective content within scientific materialism and philosophical idealism, resulting in a dynamic intersubjective objectivity. Here, causality is rooted in conscious ideality as the fundamental reality (Jones, 2021). This mediation of intersubjective objectivity offers a human-centered framework for examining technological singularity, wherein human observers actively shape the process. This dialectic operates through negations of the given world (divisions) and affirmations of an idealized alternative (unities). The internet exemplifies this dynamic, fostering an unprecedented level of individuation while simultaneously enabling a more encompassing universality. Within this medium, ideal negations and affirmations undergo phenomenological testing through their transformative consequences (Brown, 2019). As such, individuated divisions continuously attempt to establish unity against a complex backdrop, with the interplay of ideal transformations retroactively redefining the subject-object relationship and, consequently, the totality itself.

When conceptualizing totality as an eternal division in need of reconciliation, it follows that an actual technological singularity is immanent within our actions, despite uncertainty regarding its exact manifestation.

Scientific networks, as forces of transformation, retroactively reshape our understanding of subject-object division. Historical examples include the Industrial Revolution, which redefined our conception of energy (thermodynamics), and the Computer Revolution, which reshaped our understanding of information (cybernetics). These paradigmatic shifts suggest that contemporary developments, such as artificial intelligence, quantum computing, and genetic engineering, will similarly redefine reality on a universal historical level (Clark, 2022). Ray Kurzweil's projections of future immortality emerge from a dialectic rooted in the fear of death, or the perceived loss of unity. In analyzing these claims, the focus should be on their psychosocial impact, specifically their capacity to mobilize abstract paradigms that influence historical transformation. The pursuit of artificial intelligence, for example, has taken on a symbolic autonomy through networks of communication that are unlikely to be halted before exhausting their potential (Williams, 2018). This evolution will permanently alter the subject-object division, yet the precise nature of its phenomenal realization remains uncertain. Processes of individuation play a crucial role in reconciling universal history. As all subjects are products of an eternal division, they bear the responsibility of establishing an internal unity capable of enduring this imbalance. A dialectical analysis of technological singularity seeks to reposition humanity within the philosophy of science and the human sciences. This entails understanding ideation as it interacts with scientific reductionism and fragmentation, which currently evolve within virtualized discursive spaces. These spaces encompass diverse domains, from M-theory in physics to artificial intelligence in cognitive science and genetic engineering in biology, all of which may be modeled as asymmetrical totalities defined by subject-object division (Lee, 2023).

However, progress in understanding quantum gravity, particularly in making concrete predictions, has been limited. This challenge arises from the difficulty in empirically testing projected ideality concerning the origins and fate of matter. Consequently, fundamental theories often become disconnected from classical scientific materialism and lean toward transcendental idealism. An alternative perspective might emphasize an eternal subject-object division attracted toward an emergent unity, constituted by intersubjectivity. A higher-order theory of quantum gravity would need to account not only for cosmic singularities (e.g., black holes, the Big Bang) but also for the role of conscious observers in the potential realization of a technological singularity (Anderson, 2024). In this context, analyzing the particle physics community's pursuit of a unified theory can be extended to the level of psychosocial systems. This shift has significant implications for reductionist theories that seek to explain totality. Many scientists claim that a grand unified theory is within reach, but its impact on subject-object division remains uncertain. Would such a theory, if realized, have any transformative consequences for the fundamental nature of reality? If physicists succeeded in formulating a theory of quantum gravity, would this master framework alter the emergent nature of discursive reality, or would it merely represent an abstract conceptualization with limited practical relevance (Taylor, 2022)? The continuous evolution of knowledge suggests that the trajectory of superintelligence might resemble a dialectical progression toward an absolute synthesis, a definitive answer to the nature of being and the universe. Similar to Hegelian dialectics, this process would involve the resolution of contradictions between theoretical principles and empirical phenomena, leading to new syntheses that drive further intellectual advancements. Superintelligence, perceiving reality as imperfect (thesis) and aiming for perfection (antithesis), could generate new syntheses through iterative refinements (Miller, 2019).

However, a key challenge arises in determining why superintelligence would cease evolving upon reaching singularity. If superintelligence's core principle is limitless self-improvement, it may prioritize abstract inquiry over practical engagement with worldly objects, including humanity. This feedback loop, where intelligence recursively enhances itself, bears resemblance to the phenomenon of audio feedback: when a microphone is placed too close to a speaker, it amplifies its own sound, resulting in an overwhelming, distorted noise. Similarly for (White, 2021), an intelligence explosion could lead to self-referential abstraction, diverting focus from external reality but nevertheless, such an entity would theoretically possess the capacity to undertake multiple parallel tasks. There is no definitive reason to assume that superintelligence could not simultaneously pursue an absolute synthesis of reality while also addressing immediate practical concerns. The interplay between these imperatives will determine whether the realization of singularity leads to an unprecedented epistemological transformation or an enclosed, self-referential paradigm detached from human affairs (Black, 2023).

Humaficial Intelligence Pluralism (HIP): A Synthesis of Human and Artificial Intelligence

In *The Path to Post-Humanity*, the author and Stephan Vladimir Bugaj argue that artificial general intelligence (AGI) will likely emerge through integrative methods that combine insights from computer science, cognitive science, and related disciplines rather than direct emulation of the human brain (Bugaj, 1987). Many AGI researchers adopt computer-science-driven approaches that are only loosely inspired by cognitive neuroscience, instead aligning more closely with cognitive psychology (e.g., Franklin's LIDA system, which follows Bernard Baars' framework, and SOAR, which rigorously adheres to psychological studies). From a Singularitarian standpoint, non-human-emulating AGI architectures may offer advantages, particularly in self-modifiability and the establishment of stable, rational goal systems designed to endure successive phases of evolution and self-enhancement.

Despite technological advancements, balancing progress with caution is crucial. Regardless of whether technological evolution is viewed optimistically or pessimistically, discussions must go beyond mere forecasting and prevention to address the underlying relationship between humans and AI. This issue has been explored by thinkers such as Ray Kurzweil, who has advocated for AI as a tool designed to improve human lives, though his arguments have faced significant criticism. The ongoing debate underscores the necessity of a more structured theory to reconcile the benefits and risks of AI within the broader context of human existence.

The Theory of Humaficial Intelligence Pluralism (HIP)

The concept of Humaficial Intelligence Pluralism (HIP) emerges as a regulation that integrates both the advantages and challenges of human and artificial intelligence. As AI becomes more advanced, concerns over its potential dominance, human autonomy, and ethical governance have intensified. Traditionally, the human-AI relationship has been framed as an impending conflict, either AI will surpass human intelligence, rendering human input obsolete, or it will be deliberately constrained to preserve human agency. However, this binary perspective oversimplifies the complexity of the evolving interplay between human cognition and machine intelligence.

HIP, derived from the fusion of *human* and *artificial*, proposes a pluralistic model in which human and artificial intelligence coexist, co-evolve, and collectively contribute to societal progress. Rather than positioning AI as a threat or tool of domination, HIP envisions a mutually beneficial relationship where AI enhances human capabilities while preserving human agency. It provides a structured approach to understanding AI's role not as an autonomous force but as an integral part of human development. Unlike unregulated technological integration, HIP emphasizes authenticity, consciousness, and responsibility in AI development. It seeks to address the existential identity crisis posed by technological singularity by affirming humanity's unique role in the universe. HIP is a response to fundamental questions about human-machine collaboration, offering a theoretical and practical framework that acknowledges both the epistemological advancements of AI and the intrinsic qualities that define human existence.

The Philosophical and Practical Foundations of HIP

The urgency of developing HIP stems from the existential questions AI raises about human identity. While many scholars offer ad hoc responses, the persistence of these inquiries suggests a need for a more structured conceptual, theoretical, and pragmatic approach. As humanity remains the center of existence and the nucleus of intellectual progress, HIP provides a comprehensive framework that incorporates philosophical, scientific, and social dimensions. It aligns with *Projective Universalism*, a philosophical schema that ensures humanity is not reduced to a mere object of technological evolution. HIP not only offers a counterbalance to AI-related existential threats but also safeguards human conceptual integrity. The human mind naturally seeks order, wholeness, and meaning, a tendency reflected in the history of philosophical inquiry. The speculative nature of philosophy aims to synthesize disparate elements of experience and knowledge into an integrated whole, making the theorization of HIP a logical extension of this intellectual tradition.

A New Paradigm for Human-AI Collaboration

Given AI's integration into critical aspects of modern life, a world without AI is inconceivable. At the same time, AI is deficient in intrinsic creativity, empathy, and ethical reasoning that define human existence. Thus, the future of intelligent systems must embrace a pluralistic approach in which both human and artificial intelligence contribute symbiotically to progress. HIP provides the theoretical foundation for this new paradigm, ensuring that humans retain their central role in shaping AI's ethical and decision-making frameworks while benefiting from AI's computational power. By advocating for a balanced, pluralistic relationship between humans and AI, HIP challenges reductionist perspectives that frame AI as either a tool of human enhancement or an existential threat. Instead, it posits a future where AI and human intelligence operate in tandem, leveraging their respective strengths to foster innovation, societal advancement, and ethical progress. In doing so, HIP redefines the nature of intelligence, positioning it as a dynamic interplay rather than a zero-sum competition.

Conclusion

The findings of this research emphasize that artificial intelligence (AI) is not a replacement for human intelligence but rather a complementary force that enhances human cognitive abilities. Despite AI's rapid advancement, it remains inherently insufficient in areas requiring creativity, ethical reasoning, and deep philosophical reflection. These limitations create a gap that can only be bridged by human intelligence, reinforcing the necessity of a harmonious integration rather than a competition between the two forms of intelligence. This is precisely the role of Humaficial Intelligence Pluralism (HIP); a balanced synthesis that envisions human and artificial intelligence as cooperative forces working toward collective progress beyond Kurzweil's vision of the Technological Singularity.

Kurzweil's predictions, rooted in the exponential growth of technology, offer an ambitious and optimistic outlook on AI's potential to transcend biological constraints and revolutionize human existence. His philosophy suggests that as AI progresses, it will increasingly enhance human potential and solve complex global challenges (Kurzweil, 2005). While his vision is undoubtedly inspiring, it does not fully account for the deeper existential and ethical concerns posed by the integration of super-intelligent machines into human society. Beyond the technological advancements he envisions, a critical question remains: How can AI be integrated without compromising the essential qualities that define human nature, creativity, empathy, and moral agency? Although Kurzweil emphasizes the benefits of AI, the risks associated with its unchecked development must be acknowledged. These risks include the erosion of human autonomy, ethical concerns over decision-making processes, and the potential marginalization of human intellect in favor of machine efficiency (Bostrom, 2014). Without a guiding framework, AI's expansion could lead to unintended consequences that might reshape society in ways detrimental to human identity. Humaficial Intelligence Pluralism thus provides a necessary counterbalance, ensuring that technological evolution remains human-centered and ethically sustainable. Unlike Kurzweil's singularity which leans towards AI's dominance in shaping the future, HIP advocates for a cooperative paradigm in which human intelligence and artificial intelligence interact symbiotically. Humans contribute ingenuity, ethical judgment, and existential purpose, while AI offers computational precision, data processing capabilities, and scalability. This relationship ensures that AI remains a tool in service of human development rather than a force that dictates it (Tegmark, 2017). In this pluralistic framework, human agency is preserved as the architect of meaning and progress, with AI acting as a facilitator rather than a replacement for human thought and creativity.

Establishing regulatory frameworks will also be crucial in ensuring that AI development aligns with ethical considerations and serves the interests of human dignity. As humanity stands at the precipice of an AI-driven era, deliberate choices must be made to steer technological progress toward a future that aligns with human values. While Kurzweil's singularity inspires ambitious technological aspirations, the foundational philosophy guiding AI's development should be one that promotes coexistence, rather than domination. HIP offers a compelling vision, one where human and artificial intelligence are not adversaries in a battle for supremacy but collaborators in a shared pursuit of knowledge, progress, and ethical advancement. Ultimately, the future should not be defined by a singularity of control but by a pluralistic model of coexistence. Embracing this perspective allows for a refined and ethical approach to AI development, one that safeguards human identity, fosters innovation, and ensures that AI remains a means of human flourishing rather than a force of existential uncertainty. Through this lens, HIP emerges as the necessary philosophical model for navigating the evolving relationship between human and artificial intelligence, ensuring that technological advancement remains a testament to human purpose, agency, and collective wisdom.

References

Chalmers, D. "The singularity: A philosophical analysis." *Science fiction and philosophy: From time travel to superintelligence* (2016): 171-224.

Vinge, Vernor. "The Coming Technological Singularity: How to Survive in the Post-Human Era." *Vision-21: Interdisciplinary Science and Engineering in the Era of Cyberspace*, 1993.

Kurzweil, Ray (2005). The Singularity Is Near: When Humans Transcend Biology. United States: Viking. pp. Prologue. ISBN 978-0-670-03384-3.

Ray Kurzweil: "How to Create a Mind: The Secret of Human Thought Revealed" – The Diane Rehm Show from WAMU and NPR". Retrieved September 15, 2014.

Krüger, Oliver. ""The Singularity is near!" Visions of Artificial Intelligence in Posthumanism and Transhumanism." (2021).

Wang, P., Goertzel, B., & Franklin, S. (2008). Artificial general intelligence, 2008: Proceedings of the first AGI conference. Washington DC: IOS Press. p. v

Ulam, S. 1958. Tribute to John von Neumann. Bulletin of the American Mathematical Society 64(3).

Good, I. 1965. Speculations concerning the first ultraintelligent machine. Advances in Computers 6:31—88

Hegel G.W.F (1812) The Science of Logic http://www.fordham.edu/halsall/mod/hegel-summary.aspv [9/1/2013]

Žižek, S. Less Than Nothing: Hegel and the Shadow of Dialectical Materialism; Verso: London, UK, 2012; pp. 3–5.

Goertzel, Ben. "Human-level artificial general intelligence and the possibility of a technological singularity: A reaction to Ray Kurzweil's The Singularity Is Near, and McDermott's critique of Kurzweil."199

Ericsson, K. Anders, Xiaojun Cheng, Yafeng Pan, Yixuan Ku, Yi Ge, and Yi Hu. "Memory skills mediating superior memory in a world-class memorist." *Memory* 25, no. 9 (2017): 1294-1302.

Brynjolfsson, Erik, and Andrew. Mcafee. "Artificial intelligence, for real." *Harvard business review* 1, no. 1 (2017): 1-31.

McCarthy, John, Marvin L. Minsky, Nathaniel Rochester, and Claude E. Shannon. "A proposal for the dartmouth summer research project on artificial intelligence, august 31, 1955." *AI magazine* 27, no. 4 (2006): 12-12.

Domingos, Pedro. *The master algorithm: How the quest for the ultimate learning machine will remake our world*. Basic Books, 2015.

Topol, Eric J. "High-performance medicine: the convergence of human and artificial intelligence." *Nature medicine* 25, no. 1 (2019): 44-56.

Ulnicane, Inga. "Artificial Intelligence in the European Union: Policy, ethics and regulation." In *The Routledge handbook of European integrations*. Taylor & Francis, 2022.

Müller, Vincent C., and Nick Bostrom. "Future progress in artificial intelligence: A survey of expert opinion." *Fundamental issues of artificial intelligence* (2016): 555-572.

Russell, Stuart. "Artificial Intelligence and the Problem of Control." *Perspectives on digital humanism* 19 (2022): 1-322.

Boden, Margaret A. *Artificial intelligence: A very short introduction*. Oxford University Press, 2018.

Newborn, Monroe, and Monty Newborn. *Deep Blue: an artificial intelligence milestone*. Springer Science & Business Media, 2003.

Legg, Shane, and Marcus Hutter. "A collection of definitions of intelligence." *Frontiers in Artificial Intelligence and applications* 157 (2007): 17.

Chollet, François. "On the measure of intelligence." *arXiv preprint arXiv:1911.01547* (2019).

Johnson, Dorothy E. "The behavioral system model for nursing." *ME Parker (Ed.), Nursing theories in practice. New York: National League for Nursing* (1990): 23-32.

Reiss, Steven. "Expectancy model of fear, anxiety, and panic." *Clinical psychology review* 11, no. 2 (1991): 141-153.

Strauss, Milton E., and Gregory T. Smith. "Construct validity: Advances in theory and methodology." *Annual review of clinical psychology* 5, no. 1 (2009): 1-25.

Sternberg, Robert J., and D. K. Detterman. *Human intelligence*. 1979.

Gottfredson, Linda S. *The general intelligence factor*. 1998.

Humphreys, Lloyd G. "The construct of general intelligence." *Intelligence* 3, no. 2 (1979): 105-120.

Gignac, Gilles E., and Eva T. Szodorai. "Defining intelligence: Bridging the gap between human and artificial perspectives." *Intelligence* 104 (2024): 101832.

Sternberg, Robert J. "The theory of successful intelligence." *Review of General psychology* 3, no. 4 (1999): 292-316.

Pfeifer, Rolf, and Christian Scheier. *Understanding intelligence*. MIT press, 2001.

Liang, Weixin, Girmaw Abebe Tadesse, Daniel Ho, Li Fei-Fei, Matei Zaharia, Ce Zhang, and James Zou. "Advances, challenges and opportunities in creating data for trustworthy AI." *Nature Machine Intelligence* 4, no. 8 (2022): 669-677.

VanLehn, Kurt. "Cognitive skill acquisition." *Annual review of psychology* 47, no. 1 (1996): 513-539.

Anderson, Mike, ed. *The development of intelligence*. Psychology Press, 1999.

Saftić, Ivan. "Max tegmark, life 3.0: Being human in the age of artificial intelligence." *Croatian Journal of Philosophy* 18, no. 54 (2018): 512-516.

Floridi, Luciano. "Open data, data protection, and group privacy." *Philosophy & Technology* 27 (2014): 1-3.

Hussar, Bill, Jijun Zhang, Sarah Hein, Ke Wang, Ashley Roberts, Jiashan Cui, Mary Smith, Farrah Bullock Mann, Amy Barmer, and Rita Dilig. "The Condition of Education 2020. NCES 2020-144." *National Center for Education Statistics* (2020).

Marcuse, Herbert, and M. A. N. One-Dimensional. "Studies in the Ideology of Advanced Industrial Society." (1964): 5.

Chalmers, D. J. (2010). *The singularity: A philosophical analysis*. Journal of Consciousness Studies, 17(9–10), 7–65.

Goertzel, B. (2014). *Should humanity build a global AI nanny to delay the singularity until it's better understood?* Journal of Artificial General Intelligence, 5(1), 5-22.

Turing, A. (1950). "Computing Machinery and Intelligence." *Mind*, 59(236), 433-460.

European Commission. (2019). *Ethics Guidelines for Trustworthy AI*. High-Level Expert Group on AI.

Julia, L. (2019). *There is No Such Thing as Artificial Intelligence*. Harper.

World Health Organization (WHO). (2016). *Global Strategy on Human Resources for Health: Workforce 2030*.