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HUMAN INTELLIGENCE AND ARTIFICIAL INTELLIGENCE: A COMPARATIVE AND CONTRASTIVE REVIEW

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ABSTRACT

Humans originated approximately 6-7 million years ago. The human brain, through emotion, learning, and the manipulation of ideas, has made many impossible things possible. Human intelligence (HI) and artificial intelligence (AI) represent two fundamentally different approaches to intelligent way of behaving. Human intelligence is a biological and psychological phenomenon arising from the interaction of cognition, perception, emotion, experience, consciousness, human to human learning and biological processes. Artificial intelligence, in contrast, refers to computational systems designed to perform tasks that traditionally require human cognitive abilities, including learning, reasoning, perception, language processing, prediction, and decision-making. The rapid development of machine learning, deep learning and generative AI has intensified debates concerning (question arises here) "whether artificial systems can replicate, augment or eventually exceed human intelligence?" This review comparatively examines human and artificial intelligence across major dimensions, including learning, reasoning, memory, competition, creativity, emotional intelligence, adaptive capability, consciousness, speed, accuracy, generalization, decision-making, ethics, and human to human interaction. The review argues that AI has achieved higher levels of task-specific performance and, increasingly, sophisticated reasoning and multimodal capabilities; however, performance on benchmarks should not automatically be equated with the broader psychological construct of intelligence. At the same time, evidence suggests that human-AI collaboration can produce substantial benefits when the complementary strengths of humans

and machines are appropriately integrated. The article concludes that the most productive research direction is not simply to determine whether AI is superior to humans, but to probe how human and artificial intelligence can be combined while preserving human agency, accountability, contextual judgment, creativity, and ethical responsibility. The brain is almost made of same types of neurons and genes too in all normal human beings. But its cultivations and training in all aspects make it successful intelligent one as compared to others. The stored data and its integration while retrieving the information from brain are different every time as per requirements. Humans are capable of creating AI, but AI cannot create human beings, which are living organisms.

KEYWORDS: Artificial intelligence (AI), human cognition, Human intelligence, machine learning, generative AI, creativity, reasoning, human-AI interactions, and cognitive abilities.

1. INTRODUCTION

Intelligence has traditionally been studied as a characteristic of living organisms, particularly humans, involving the capability to learn from experience, reason, solve problems, adapt to changing circumstances, and pursue goals. Psychology has approached intelligence as a multidimensional construct associated with cognitive abilities such as reasoning, memory, comprehension, problem-solving, and adaptation. Artificial intelligence, by contrast, emerged from computer science and seeks to develop computational systems capable of performing tasks associated with intelligent way of behaving.

The distinction between these two forms of intelligence has become increasingly important because of the rapid progress of machine learning and generative AI. Contemporary AI systems can generate text and images, translate languages, analyze large datasets, write computer programs, assist scientific research, and perform increasingly sophisticated reasoning tasks. The 2026 Stanford AI Index reports that frontier AI capabilities are advancing faster, with some benchmarks reaching or surpassing human-level performance; nevertheless, the report also emphasizes that performance remains uneven across different tasks and evaluation settings.

The comparison between HI and AI, therefore, cannot be reduced to a simple question of which is "more intelligent." Intelligence itself is difficult to define consistently across psychology, neuroscience, philosophy, and computer science. A recent study in *Intelligent* argues that researchers should distinguish intelligence from artificial achievement and

expertise and proposes a multidimensional approach to evaluating both human and artificial systems.

The present review examines the similarities and differences between human and artificial intelligence and evaluates their respective strengths, limitations, and potential for collaboration.

Understanding Human Intelligence

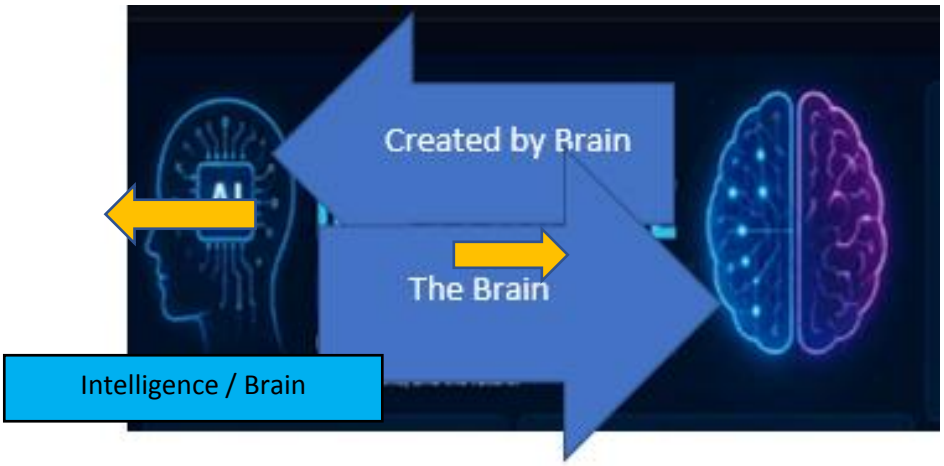
Human intelligence may broadly be understood as the capacity of individuals to acquire knowledge, learn from experience, reason about unfamiliar situations, solve problems, adapt way of behaving, and pursue meaningful goals. The brain contains roughly 100 billion neurons that communicate through trillions of connections, making it the most complex structure in the body.[]1 The brain runs on about 20 to 25 watts of electrical power, which is enough to keep a small light bulb lit. The brain divides into the cerebrum (for senses and thinking), the cerebellum (for balance and coordination), and the brainstem (for automatic life support like breathing).[2]

Human intelligence is not a single isolated capacity. It encompasses multiple interacting dimensions, including:

- perceptual processing;
- creativity and imagination;
- human to human cognition;
- analytical and logical reasoning;
- verbal and linguistic capability;
- working and long-term memory;
- emotional intelligence;
- metacognition and self-reflection;
- practical and contextual judgment; and
- learning.

A major characteristic of HI is its capacity to operate across diverse environments. Humans can transfer knowledge from one domain to another, learn from relatively small amounts of experience, incorporate human to human and cultural information, and modify way of behaving when circumstances change.

Human intelligence is also embedded in biological, emotional, human to human, and cultural contexts. Consequently, human decision-making is influenced not only by formal reasoning but also by values, emotions, motivations, interpersonal relationships, previous experiences, and ethical considerations.[3]



Creativity of Artificial Intelligence

Artificial intelligence refers to computational systems capable of performing functions associated with intelligent way of behaving. AI uses algorithms and large amounts of data to spot patterns and make decisions instead of following strict, manual rules. You can learn more about the fundamentals from it. Modern AI is largely based on machine learning, neural networks, deep learning, reinforcement learning, natural language processing, computer vision, and related computational approaches.

Unlike human intelligence, AI does not arise from biological development. It is engineered through algorithms, computational architectures, training data, optimization procedures, and hardware infrastructure.

Contemporary AI systems demonstrate several impressive capabilities. Machine learning is a core part of AI where computers improve through experience. Deep learning uses artificial neural networks inspired by the human brain to handle complex jobs like image and speech recognition.

Capabilities

The machines were the best AI model found first on this earth since ancient time. The wheel, the engine, fuel burning system, etc. were early pioneers of technology. AI systems use

subfields like **Computer Vision** to see images and **Natural Language Processing (NLP)** to understand human speech.[4] These tools power everyday apps like virtual assistants, translation software, and maps. The processor makes all software to work in co-ordination and balanced way to the command given in computer. Chatbots predict the next likely word in a sentence using probability rather than checking facts. This can cause "hallucinations," where the system outputs confident, smooth answers that are completely false.

They can process enormous datasets, identify statistical patterns, generate language and images, recognize objects, translate between languages, make predictions, and assist in complex scientific and technical activities.

However, the existence of impressive task performance does not necessarily establish that AI possesses intelligence in precisely the same sense as humans. Research published in *Intelligence* argues that many existing AI evaluations may measure artificial achievement or expertise rather than the broader construct of intelligence.

Human versus Artificial Intelligence

Despite their different origins, HI and AI share several functional characteristics.

Both humans and AI systems can improve their performance through exposure to information or experience. Humans learn through observation, instruction, experimentation, feedback, and human to human interaction.[5] Machine-learning systems learn statistical relationships from training data and feedback.

The mechanisms, however, are fundamentally different. Human learning is embodied, contextual, motivational, and human to humanly influenced, whereas AI learning is computational and dependent on its architecture, training data, and optimization processes.

Problem arises with its solution and creates another problem most of the time. In urgency we find solution readily available then later on we visualize better than previous solution i.e. updated mobile instruments other AI powered gadgets. Both humans and AI can analyze problems and generate solutions. AI systems can solve mathematical, linguistic, coding, and classification problems at considerable speed. Humans, however, can often redefine the problem itself, identify implicit objectives, and incorporate contextual and human to human considerations.

Pattern recognition is central to both forms of intelligence. Humans identify patterns in language, visual scenes, human to human interactions, and environmental events. AI systems can detect statistical patterns across datasets that may be difficult or impossible for humans to process manually. Both humans and AI make decisions based on available information. Human decisions incorporate reasoning, experience, emotions, values, and human to human context. AI decisions are generated from algorithms, learned representations, statistical relationships, programmed constraints, and in some systems external tools or feedback. Both forms of intelligence can respond to changing circumstances. Humans generally possess highly flexible adaptation capabilities, while AI adaptation depends on system design. Some AI agents can now adjust strategies and use tools dynamically, but their generalization remains uneven.

Biological versus Computational Foundations

The most fundamental difference concerns their underlying substrate. HI emerges from the human brain and nervous system, whereas AI emerges from computational hardware and software.

Human cognition is embodied in a biological organism with physiological needs, sensory systems, emotions, and human to human relationships.[6] AI systems do not possess the same biological embodiment.

Learning Mechanisms

Humans can often learn concepts from very limited examples and can use prior knowledge to interpret novel situations. AI models typically require large-scale datasets and computational training, although newer approaches have substantially reduced data requirements for some tasks.

Human learning is also continuous and deeply contextual. AI learning is usually dependent on the particular training and inference mechanisms implemented by developers.

Speed and Computational Capacity

AI has a major advantage in computational speed and information processing. A machine can process enormous quantities of information fasterly and perform repetitive calculations without fatigue.

Humans operate under biological limitations involving attention, working memory, processing speed, and fatigue. Consequently, AI can outperform humans in many large-scale computational tasks.

Memory

Computational systems can store and retrieve enormous amounts of information, depending on their architecture and available resources. Human memory is comparatively limited and reconstructive.

However, human memory is connected to meaning, emotion, personal experience, and contextual understanding. Thus, larger computational storage should not automatically be interpreted as superior memory in the psychological sense.

Creativity

Human creativity involves imagination, divergent thinking, cultural experience, personal motivation, emotional associations, and the capability to generate and evaluate novel ideas.

Generative AI can produce highly novel combinations of existing patterns and can support human creative work. Nevertheless, the nature of AI creativity remains contested because the system does not necessarily possess human-like intentions, lived experience, or intrinsic motivation.

Emotional Intelligence

Humans experience emotions and can interpret the emotional states of others through embodied and human to human interaction. Emotional intelligence influences communication, leadership, empathy, conflict resolution, and interpersonal relationships.

AI can recognize emotional cues from language, facial expressions, or other signals and can generate emotionally appropriate responses. However, recognizing or simulating emotion should not be equated with actually experiencing emotion.

Consciousness and Self-awareness

Human beings possess subjective experiences and forms of self-awareness. Whether present AI systems possess consciousness remains an unresolved philosophical and scientific question. Current AI systems should therefore not automatically be treated as conscious entities simply because they can communicate fluently.

Generalization and Contextual Understanding

Humans can often apply knowledge flexibly across unfamiliar circumstances. AI performance may be extremely strong within particular domains while becoming unreliable under distribution shifts, unfamiliar situations, or poorly specified objectives.

Recent AI evaluations illustrate this unevenness. Stanford's AI Index reports faster improvements on challenging benchmarks while also noting continuing difficulties with complex reasoning, planning, and tasks requiring reliable generalization.

Ethics and Moral Responsibility

Humans can be held morally and legally responsible for decisions. Good use and bad use are two sides of a coin; both sides are being used simultaneously by different people in the world. AI systems themselves do not independently possess moral responsibility in the conventional human sense. Responsibility therefore remains associated with developers, organizations, users, institutions, and policymakers.

This distinction becomes especially important when AI is used in healthcare, education, criminal justice, employment, finance, and other high-stakes environments.

Few points - Comparative Framework.

Dimension	Human Intelligence	Artificial Intelligence
Origin	Biological	Computational
Learning	Experiential, human to human, contextual	Data-driven, algorithmic
Processing speed	Relatively slow	Extremely fast
Data capacity	Limited	Very large
Memory	Associative and reconstructive	Digital and computational
Creativity	Imaginative, experiential, intentional	Generative and pattern-based
Emotion	Experienced internally	Simulated or inferred
Consciousness	Associated with subjective experience	Not established in current systems
Human to human understanding	Deeply contextual	Increasingly sophisticated but limited
Generalization	Usually highly flexible	Uneven and task-dependent
Fatigue	Yes	No biological fatigue
Consistency	Variable	Often highly consistent under fixed

Dimension	Human Intelligence	Artificial Intelligence
		conditions
Moral responsibility	Human agents can be responsible	Responsibility remains with humans/institutions
Learning from few examples	Often strong	Traditionally more data-intensive
Large-scale computation	Limited	Exceptional
Adapt capability	Broad and embodied	Dependent on architecture and environment
Errors	Cognitive biases and mistakes	Hallucinations, bias, distribution failures
Purpose	Intrinsic human goals and motivations	Assigned or optimized objectives
Cultural knowledge	Lived and human to humanly embedded	Learned from data and system interaction
Collaboration	Naturally human to human	Increasingly capable of human–AI collaboration

CONCLUSIONS

A major conclusion emerging from recent research is that the relationship between HI and AI should not necessarily be conceptualized as a competition.

A 2024 systematic review and meta-analysis in *Nature Human Behavior* reexamined human AI combinations across multiple tasks. The researchers found that combining humans and AI can produce substantial benefits because humans contribute general reasoning, contextual understanding, creativity, and judgment, whereas AI contributes computational power and performance on specific tasks. However, human–AI combinations do not automatically outperform the best human or AI acting alone; communication, trust, coordination, and other factors can reduce collaborative performance.[7]

Human intelligence and artificial intelligence are similar in that both can support learning, problem-solving, pattern recognition, prediction, and decision-making. However, their underlying mechanisms and characteristics are fundamentally different. Human intelligence is biological, embodied, emotional, human to human, experiential, and associated with subjective consciousness. Artificial intelligence is computational, engineered, data-dependent, scalable, and capable of extraordinary performance in specific cognitive tasks.

This finding suggests a **complementarity model** rather than a replacement model.

Humans may be particularly valuable for:

- defining goals;
- understanding human to human and cultural context;
- ethical reasoning;
- interpreting ambiguous situations;
- exercising accountability;
- establishing priorities;
- evaluating consequences; and
- generating meaning and purpose.

AI may be particularly valuable for:[8]

- large-scale data analysis;
- faster information retrieval;
- pattern recognition;
- repetitive operations;
- prediction;
- computational optimization;
- generating alternative solutions; and
- supporting complex technical workflows.

The most effective systems may therefore involve a division of cognitive labour between humans and machines.

One world level project has to be carried out as per my suggestion for real testing of AI vs. Human expert's brain. For the same gather all number one 2 experts of different subjects at one place and all high-level AI tools with operators of number one of different subjects. Pose the different questions (suppose -101 questions) of unknown topics and see that who gives – accurate, fastest, correct solutions/answers. The results of such an experiment will help determine which is best.

Human–AI Collaboration and Its Challenges

Human–AI collaboration is increasingly important in education, healthcare, scientific research, business, engineering, and public administration. AI can extend human cognitive capacity by reducing information-processing burdens and providing faster analytical support.

Therefore, the central challenge for future research should not simply be to create machines that imitate humans. It should be to understand the distinct characteristics of biological and artificial cognition and design systems in which their complementary capabilities can be used responsibly.[9] The future of intelligence may consequently be characterized less by replacement of human intelligence by artificial intelligence and more by the development of effective, ethical, and scientifically grounded **human AI intelligence systems**.

Nevertheless, collaboration introduces new risks. Humans may over-trust AI recommendations, misunderstand how AI systems operate, or accept incorrect outputs because of automation bias. Conversely, humans may reject useful AI recommendations because of inadequate trust or poor understanding of system capabilities.

Research demonstrated that repeated interaction with biased AI can influence human judgments and potentially increase human bias.

Consequently, successful human–AI collaboration requires
appropriate division of responsibilities; transparency regarding AI limitations; human oversight in high-risk decisions; effective AI literacy; mechanisms for detecting errors and bias; accountability frameworks; and continuous evaluation of human–AI system performance.

AI, Human Intelligence, and the Question of Superiority

The question "Is AI more intelligent than humans?" is difficult to answer because intelligence is multidimensional and hence multiple functions can be done for infinite time till power/fuel is supplied. Human physiology has limitations with respect to size, shape, structure, appearance, sensitivity, emotions, attachments, liabilities, expectation, ambitions etc.

AI already surpasses humans in certain narrowly defined activities. Machines can calculate faster, search enormous databases, process large datasets, and perform some highly specialized tasks at extraordinary levels.[10]

At the same time, humans continue to demonstrate advantages in areas involving embodied experience, flexible adaptation, human to human understanding, contextual interpretation, and long-horizon judgment.

The 2026 AI Index illustrates this uneven profile. AI performance has advanced dramatically and some systems now surpass human performance on selected evaluations, but benchmark saturation and remaining weaknesses in complex reasoning demonstrate that intelligence cannot be adequately represented by a single test score.

Research Gaps and Future Directions

Several research gaps remain.

There is no universally accepted operational definition of either human general intelligence or artificial general intelligence. Future research should develop multidimensional measures that evaluate reasoning, learning, adaptation, transfer, human to human cognition, and goal-directed behavior.

High performance on language and reasoning tasks does not necessarily demonstrate human-like understanding. Researchers need experimental methods that distinguish statistical competence from deeper forms of conceptual understanding.

Most evaluations measure performance over relatively short periods. Longitudinal studies are required to determine how sustained AI interaction affects human learning, creativity, memory, decision-making, and independence.

The educational consequences of AI deserve particular attention.[11] AI may provide individualized learning and cognitive assistance, but excessive dependence could potentially reduce opportunities for independent reasoning and problem-solving.

Future research must establish who is responsible when AI-assisted decisions cause harm. This question becomes increasingly important as AI moves into high-stakes domains.

An important emerging research direction is the possibility of using AI to augment rather than replace human intelligence. This includes AI-assisted scientific discovery, medical diagnosis, education, decision-making, and creative production.

The evidence does not support a simple conclusion that one form of intelligence is universally superior to the other. Instead, HI and AI possess different strengths and weaknesses. AI offers exceptional computational speed, scalability, consistency, and pattern-processing capabilities, whereas humans retain distinctive strengths in contextual reasoning,

human to human understanding, flexible adaptation, ethical judgment, embodied experience, and the generation of goals and meaning.

Recent research increasingly supports a complementary perspective. Human–AI combinations can be highly effective, although collaboration is not automatically superior and depends on appropriate coordination, trust, task allocation, and oversight.

Disclosure: This article is only for updating information to all interested people and not for any dispute or grievance.

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