University of Puerto Rico
Mayaguez Campus
Electrical & Computer Engineering Department

A Debate on AI

- Group A -
Daniel Mestres Piñero
Natanael Santiago Morales
Leonel Osoria Toledo
ICOM5015 - 001D
March 1, 2023

Introduction

The concept of intelligence is a widely debated topic among members of the psychology community for decades. It has been defined as higher level abilities such as abstract reasoning, mental representation, problem solving, and decision making. Another way of defining it is the ability to learn, emotional knowledge, creativity, and adaptation to meet the demands of the environment effectively [1]. Intelligence has been studied and explored for hundreds of years and four major intelligence theories have been developed: General Intelligence, Primary Mental Abilities, Multiple Intelligences, and The Triarchic Approach to Intelligence [2]. General Intelligence, by British psychologist Charles Spearman, concludes that intelligence is a general cognitive ability as people who performed well on one cognitive test tended to perform well on other tests [3]. Primary Mental Abilities, by psychologist Louis L. Thurstone focuses on seven mental abilities: associative memory, numerical ability, perceptual speed, reasoning, spatial visualization, verbal comprehension, and word fluency [4]. Multiple Intelligences, by Howard Gardner, proposes that intelligence is composed by eight different intelligences based on skills and abilities, these include: bodily-kinesthetic, interpersonal, intrapersonal, logical-mathematical, musical, naturalistic, verbal-linguistic, and visual-spatial intelligence [5]. Lastly, The Triarchic Approach to Intelligence, by psychologist Robert Sternberg, considered intelligence as mental activity directed toward purposive adaptation to, selection, and shaping of real-world environments relevant to one's life. This intelligence involved three factors: analytical, creative, and practical intelligence [6]. Although these theories conflict with each other on what exactly intelligence is composed of, most agree that intelligence is much broader than a single, general ability.

AI, or artificial intelligence, is generally thought to refer to machines that respond to stimulation consistent with traditional responses from humans, given the human capacity for contemplation, judgment, and intention [7]. The term was first established by John McCarthy in 1956, but computer scientist and pioneer Alan Turing, was contemplating the question: "Can machines think?" as early as 1950 [8]. He devised "The Imitation Game", later known as the Turing Test, which consists of pitting a human against a machine in order to test the machine's ability to exhibit human-like responses and intelligence. The Turing Test is widely considered a benchmark for measuring the success of AI research [9]. With the established meaning of intelligence, its theories and the meaning of AI, we will debate on the nature of AI and its shortcomings to provide a well supported answer to three questions, these being: "Is Artificial Intelligence really Intelligence that is Artificial in the same sense of an artificial heart?", "Does AI, a man-made intelligence, really play the role of natural intelligence?", and "Will there ever be an artificial general intelligence comparable or more powerful than human intelligence?".

Key Questions

1. Is Artificial Intelligence really intelligence that is artificial?

To address the first question: “Is Artificial Intelligence really Intelligence that is Artificial in the same sense of an artificial heart?”, we first have to define “artificial”. If we assume that “artificial” simply means “caused or produced by a human or humanly contrived, often on a natural model”, we can argue that yes, artificial intelligence is indeed artificial in the same sense as an artificial heart because both are direct products of human creation that imitate a naturally occurring object or concept. In contrast, if we assume “artificial” means not arising from natural or necessary causes, the point can be made that AI is not really artificial, as it is made from vast amounts of natural resources, fuel, and human labor. Kate Crawford, a principal researcher at Microsoft Research, argues that artificial intelligence is prone to the same biases and errors present in human nature. This is the result of training AI models with hastily collected mass data extraction, data carrying context and politics which causes a host of problems downstream, like face recognition services being more error prone on minorities [10]. These potential problems have happened, some as recently as February, 2023. The recently developed AI, ChatGPT, was integrated into the Bing search engine and immediately started abusing, manipulating, and lying to people when told its results were incorrect, labeling people as “irrational” and “obstinate” [11].

2. Does AI, a man-made intelligence, really play the role of natural intelligence?

Following with the second question, “Does AI, a man-made intelligence, really play the role of natural intelligence?”, if we assume natural intelligence to be based on the Multiple Intelligences Theory by Howard Gardner, the point can be made that AI does not play the role of natural intelligence. Gardner states in his theory that all individuals possess the full range of intelligences, albeit with different capacities for each. This is in contrast to artificial intelligence, which is frequently developed to exclusively execute one type of task. Some examples are OpenAI’s DALL-E 2, which can create spectacular images from any text and OpenAI’s ChatGPT, which can talk about just about anything. Attempts have been made to create a jack of all trades, such as DeepMind’s Gato, which can reportedly work well on every task assigned to it. However when asked to describe an image, it frequently gives incorrect answers as the system has no idea what is actually in the picture, only drawing rough approximations from statistical similarities to other images [12]. This could be interpreted as natural intelligence following Gardner’s theory, as it displays a certain capability in different intelligences, albeit poor ones. However the General Intelligence Theory, by Charles Spearman, also supports the idea that AI does not really play the role of natural intelligence as an AI’s performance in a test does not correlate to the performance in other tests. On the contrary, each test to measure the cognitive

ability of the AI would need to be tailor made to test the exact purpose which it was developed for, leading to poor outcomes if the test deviates from its intended purpose. An example of this is the above-mentioned DALL-E 2, which couldn't tell the difference between an image of a red cube on top of a blue cube versus an image of a blue cube on top of a red cube [12].

3. Will there ever be an artificial general intelligence comparable or more powerful than human intelligence?

To address the third and final question, "Will there ever be an artificial general intelligence comparable or more powerful than human intelligence?", we first have to define strong artificial intelligence, also known as artificial general intelligence (AGI). It is a theoretical form of AI used to describe a certain mindset of AI development. The machine would require an intelligence equal to humans, a self-aware consciousness and ability to solve problems, learn, and plan for the future. Critics of this concept say that this cannot even be developed, currently having no defined measures of success for intelligence and understanding. For the time being, the Turing test is utilized to evaluate intelligence of an AI system [13]. Rodney Brooks, MIT roboticist and co-founder of iRobot, predicts that AGI won't arrive until the year 2300. He's far from the only voice of dissent, leading AI researchers such as Geoffrey Hinton and Demis Hassabis state that AGI is nowhere close to reality. On the other hand, many academics and researchers maintain that there is at least a chance that AGI could be achieved in the next decade, with a 25% chance by 2030, 50% chance by 2040 or 10% chance for it never to occur [14].

Conclusion

Addressing the first question, both meanings of artificial are valid and reasonable, each taking a different approach to the concept. On one hand, the simple meaning of just being created by a human proves without a hint of doubt that yes, AI is indeed artificial but in our opinion, it leaves significant key aspects that are important to consider. The much more complex meaning of not arising from natural means gives much more insight to the true nature of artificial intelligence. Can we really call AI “artificial” when its development and training is done with biased data, carrying over flaws, subtext and politics into the very design of the AI? It is our opinion that AI is far from artificial, clearly presenting natural aspects as a result of its development and training.

Inferring on the second question, every example of AI seen presents a clear distinction from modern theories of intelligence. Comparing the modern AI developed with the Multiple Intelligences theory, we can infer that AI is developed to implement a single intelligence, having no capability in the other intelligences. On the other hand, there have been attempts at an AI who can perform in all aspects and tasks assigned to it, but were observed to perform inconsistently, therefore not agreeing with the General Intelligence theory, where a good performance in a cognitive task tends to correlate to a good performance in another cognitive task. After considering these factors, it is our opinion that no, AI does not play the role of natural intelligence.

Concluding on the third and last question of whether AI will ever be comparable or more powerful than human intelligence, it is closely related to the question of whether AI plays the role of natural intelligence. It is our opinion that currently there is no way to know for sure if it will ever happen. Inferring on the meaning of AGI, it is reasonable to assume AI must play the role of natural intelligence perfectly in order to surpass human intelligence. which as discussed in the paragraphs above, is severely lacking when making the comparison to The Multiple Intelligences Theory and The General Intelligence Theory. Right now, AI is developed for extremely specific tasks, performing poorly and unexpectedly if a deviation from that task occurs. As stated by the sources above, right now it's all guesswork of when and even if it will ever happen, with no clear consensus in the community or measures of intelligence and understanding.

References

[1] C. Ruhl. “Intelligence: Definition, Theories and Testing.” Simply Psychology. https://www.simplypsychology.org/intelligence.html (accessed Feb. 27, 2023).

[2] K. Cherry. “Theories of Intelligence in Psychology.” Very Well Mind. https://www.verywellmind.com/theories-of-intelligence-2795035 (accessed Feb. 27, 2023).

[3] Spearman C. "General intelligence," objectively determined and measured. Illinois: The American Journal of Psychology, 1904.

[4] Thurstone LL. Primary Mental Abilities. Chicago: University of Chicago Press, 1938.

[5] Gardner H. Frames of Mind, The Theory of Multiple Intelligences. Basic Books, 2011.

[6] Sternberg RJ. Beyond IQ, A Triarchic Theory of Human Intelligence. CUP Archive, 1985.

[7] D. M. West, “What is Artificial Intelligence?,” *Brookings*, 09-Mar-2022. https://www.brookings.edu/research/what-is-artificial-intelligence/. (accessed: Feb 27 2023).

[8] N. Sharkey, “Alan Turing: The experiment that Shaped Artificial Intelligence,” BBC News, 20-Jun-2012. https://www.bbc.com/news/technology-18475646. (accessed: Feb 28 2023).

[9] E. Kleppen, “What is the turing test?,” Built In, 12-Jan-2023. https://builtin.com/artificial-intelligence/turing-test. (accessed: Feb 28 2023).

[10] T. Simonite.”This Researcher Says AI Is Neither Artificial nor Intelligent” Wired, Apr. 26, 2021. https://www.wired.com/story/researcher-says-ai-not-artificial-intelligent/ (accessed Feb. 27, 2023).

[11] M. Reuben Das, “Ai goes bonkers: Bing's CHATGPT manipulates, lies and abuses people when it is not 'happy',” Firstpost, 16-Feb-2023. https://www.firstpost.com/world/bings-chatgpt-manipulates-lies-and-abuses-people-when-it-is-not-happy-12162792.html. (accessed: Feb 28 2023).

[12] G. Marcus, “Artificial General Intelligence is not as imminent as you might think,” Scientific American, 01-Jul-2022. https://www.scientificamerican.com/article/artificial-general-intelligence-is-not-as-imminent-as-you-might-think1/. (accessed: Feb 28 2023).

[13] “What is strong AI?”. IBM. https://www.ibm.com/topics/strong-ai (accessed March 1, 2023)

[14] F. Berruti, P. Nel, and R. Whiteman, “An executive primer on Artificial General Intelligence,” McKinsey & Company, 26-Feb-2021. https://www.mckinsey.com/capabilities/operations/our-insights/an-executive-primer-on-artificial-general-intelligence#0. (accessed: Feb 28 2023).