SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2022
ORGANIZATION AND MANAGEMENT SERIES NO. 165

WHETHER ARTIFICIAL INTELLIGENCE IS INTELLIGENT. PHILOSOPHICAL DILEMMAS

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Purpose: The purpose of the publication is to present an important issue for modern civilization concerning two important concepts - intelligence and AI - shaping the conditions of modern societies and determining the development for the next decades. The article discusses the cognitive mechanisms of artificial intelligence - whether in the future AI will be able to perceive and analyze the environment to such an extent that it will be possible not only to receive information, but also to imitate those functions of the brain that are responsible for interpreting and processing it.
Methodology: The publication is theoretical in nature. The objectives of the publication were achieved using the method of analysis of the literature on the subject. This method made it possible to learn about the current state of research in the field under discussion and indicated the perspective of further issues and questions to which answers are sought, thereby suggesting directions for future research.
Findings: The publication discusses the important attributes of human intelligence from the perspective of human cognitive functions and the limits of its use for building AI systems.
Social consequences: Considerations of the development and operation of AI systems indicate the possible consequences of a different organization and structure of social relationships.
Originality: The publication addresses the question of whether AI can model itself on human intellectual abilities and simulate cognitive processes specific to humans.

Keywords: intelligence, AI, cognition, subjectivity, freedom.

Category of the paper: conceptual paper, viewpoint.

Introduction

Artificial intelligence is a concept that today organizes our development space of technical, social and human sciences to an intense degree. It is a contemporary creator of visions of the world of the future stimulating imagination to search for ideal solutions and provoking action towards streamlining systems to effectively organize and manage many aspects of reality. Artificial intelligence systems are therefore used to improve living standards and conditions,

enhance social and technical safety, and handle repetitive and monotonous tasks. It is in the purely material dimension, i.e. how to use effectively and responsibly the technical potential developed and available now. The answer to this question will determine the direction of AI development, and with it the challenges, opportunities and risks in many dimensions. Research is still being conducted on what constitutes the essence of intelligence as well as what AI is. So is intelligence simply thinking and analyzing, drawing conclusions, adapting to changes, that is, activities inherent only in humans, and AI is just technology, that is, a field of science that deals with the study of the mechanisms of human intelligence and the modeling and construction of systems that are able to support or replace intelligent human activities. The question arises about the limits of AI intelligence and whether that limit will be the self-awareness of the machine or the device. The subject of this paper, therefore, is whether AI can be truly intelligent, or whether AI is just a computer program written by an intelligent human.

Intelligence *tout court*

Intelligence is a term used by scientists from many disciplines in an attempt to clarify or specify what the essence of intelligence is, what its components are, and in an effort to create tools to study and measure intelligence.

Despite the long history of intelligence research, there is still no standard definition of the concept. This creates the notion that intelligence can be described but cannot be explicitly defined. The definitions indicated below, proposed by many researchers representing various disciplines, show the complexity of the matter, which translates into a very complex and ambiguous scope of meaning of the concept. However, the definitions reveal strong similarities between specific functions included in the concept of intelligence, which allows us to distinguish at least two groups defining intelligence. Narrowing the definition to human intelligence, as opposed to the intelligence of the animal world, is a deliberate move in the publication, aimed at distinguishing the elements that characterize human intelligence from the intelligence of the animate world in general.

Charles Darwin wrote "a high degree of intelligence is certainly compatible with complex instincts, and although actions, at first learned voluntarily, may soon by habit be performed with the rapidity and certainty of reflex action, yet it is not improbable that there is a certain amount of interference between the development of free intelligence and instinct, which implies some inherited modification of the brain (Darwin, 1889, p. 68). In the passage quoted above, the founder of the theory of evolution does not give a clear definition of intelligence. However, he emphasizes the fact that it is connected with the development of instincts, understood as the adaptive abilities of living organisms. The development of psychological science has also posed an important problem for researchers to define the concept of intelligence. Here are some

definitions taken from this stream. Like Darwin, Swiss psychologist Jean Piaget presents a definition of intelligence, treating it as an adaptation to the environment. However, it is too general and does not allow us to extract the features relevant to our point of view. Piaget points out that: intelligence is adaptation: "life is the constant creation of increasingly complex forms and the gradual balancing of these forms with the environment" (Piaget, 1952, pp. 3-4). A similar definition can be found in William Stern, the creator of the intelligence quotient concept. However, the German researcher distinguishes intelligence from other mental abilities such as talents. According to this definition, talent is related to a specific domain, while intelligence is a major and general adaptive factor. Stern points to intelligence as "the general capacity of the individual to direct his thinking consciously to new demands: it is the general spiritual capacity to adapt to new tasks and conditions of life" (Stern, 1914, p. 3). This definition clearly distinguishes intelligence from other mental abilities. Howard Gardner, the creator of the theory of multiple intelligences also treats intelligence as the ability to adapt to an environment broadly understood within a cultural context: "intelligence is the ability to solve problems or create products that are valued within one or more cultural contexts" (Gardner, 1983, p. 28). American psychologist Robert J. Sternberg distinguishes three types of intelligence in human cognition. Analytical intelligence is the ability to analyze and evaluate ideas, solve problems, and make decisions. Analytical intelligence builds on known issues requiring only in-depth analysis and critical evaluation to identify the problem and formulate an appropriate strategy. Creative intelligence involves going beyond what is given to generate new and interesting ideas. Creative intelligence, generates completely new, logically consistent and rational ideas. Practical intelligence is a skill that people use to find the best fit between themselves and the demands of the environment. This type of intelligence is restorative in nature, but it too seeks optimal adaptations to the environment (Sternberg, 2018). Another definition from American psychologist Philip Zimbardo classifies intelligence as a general mental capacity that includes the ability to think abstractly and understand complex thoughts: "intelligence is a very general mental capacity that includes, among other things, the ability to reason, plan, solve problems, think abstractly, understand complex thoughts, learn quickly, and learn from experience" (Zimbardo, Gerrig, 2008, p. 285). American psychologist Raymond Cattell, a pioneer of research on personality, divided intelligence into crystallized, that is the ability to use knowledge acquired by an individual and the ability to access this knowledge, and fluid, that is the ability to perceive complex relations and use them to creatively solve problems (Zimbardo, Gerrig, 2008, p. 290). The researchers of the psychometric trend define intelligence as the ability to think abstractly, to approach problems creatively, to understand in general, to learn and to comprehend, that is as a spectrum of adaptability to the environment: "the ability to adapt to circumstances by perceiving abstract relations, drawing on prior experience and effectively controlling one's own cognitive processes" (Nęcka, 2007, p. 726) and "the ability to adapt knowledge and understand and use this knowledge in previously unknown situations" (Carter, Russell, 2006, p. 76). The above definitions are dominated by adaptive traits, the ability

to perceive and analyze information, and creative problem solving, that is, indicating that intelligence is the sum of complex cognitive processes. This does not change the fact that research is still ongoing on the precise definition of intelligence as to what it actually is in addition to being an intellectual capacity that enables complex cognitive processes. This is revealed by the American psychologist Robert Yerkes, who wrote early in the twentieth century, "the term intelligence denotes a complexly interrelated set of functions, none of which is completely or precisely known to man" (Yerkes, R.M., Yerkes, A.W, 1929, p. 524).

Human intelligence

However, abstracting from the above thesis, it is possible to distinguish from the definitions quoted above distinct groups of cognitive functions that characterize intelligence, especially human intelligence. Definitions of intelligence emphasize its general ability to adapt to the broader environment. Adaptive skills can be divided into at least two groups containing distinct abilities. The ability to perceive, store and process information can be assigned to the first group, while abstract thinking and creative problem solving can be assigned to the second group. The separation of intelligence functions into separate groups is a deliberate procedure carried out for the purpose of this publication. This is because these functions have evolved at different stages of evolution and are used to varying degrees by the animate world. Within the first group, three distinct capacities of human intelligence can be considered, each of which contains more or less autonomous features. What then characterizes the first group, which includes the perception, storage and processing of information. Definitions of intelligence do not give a range of these abilities. It can be assumed that perception refers to conscious sensory impressions. Information storage is related to memory, or the ability to encode, store, and reproduce sensory information, and information processing is related to a specific response to a perceived stimulus. The ability to perceive sight was already possessed by primitive organisms, beginning with cnidarians, which developed the ropalium, a simple light-sensitive organ, and transparent cells, which functioned as a lens. The evolution of the eye has developed organs that carry out different adaptation processes, depending on the function they have to perform. For example, bird's eyes allow you to see within 300 degrees. In addition, they have four types of cones, which allows them to see in the ultraviolet, since many bird species have plumage in these colors. Some species perceive the direction of polarization of light, which is important for navigating space. They also have two or three yellow spots on their retina, which allows them to see several sharp images simultaneously. Waterbirds have an extra eyelid that acts as a lens, sharpening the image underwater. The design of the eye of birds of prey can be compared to a camera with a telephoto lens: the lenses of the eye project small fragments of the surface onto the retina, but with very high resolution. The organs of hearing and balance also

arose in a long evolutionary process. The vestibulocochlear organ, responsible for the perception of sound and body balance in space, has only been developed by vertebrates. Invertebrate animals have mostly static organs. The only exceptions are insects, in which the senses of hearing and balance occur together. Also the other senses which allow us to acquire sensory information from the environment were developed at different, often very distant stages of evolution from the present.

Another ability of this group relates to memory. The broad ability to remember sensory information is common in the animate world. Many times it determines the survival of the organism. Typically, offspring learn certain behaviors from their parents through imitation. Sometimes it is a genetic memory mechanism, that is, the generational transmission in the genetic code of basic behaviors common to a species. This phenomenon should not be confused with the so-called lamarkism, or the transmission of acquired traits to descendants, which is generally incompatible with the current paradigm, although epigenetic experiments on mice conducted by scientists led by Professor Wolf Reik of the Babraham Institute in Cambridge shed new light on this issue. Elephants and dolphins have excellent long-term memory. Dogs have an episodic memory, a system of long-term memory also known as event memory, which has its location in space and time.

The last ability is related to information processing, i.e. analysis and reaction to perceived sensory information (one should also remember about internal senses - somatosensory, such as interoceptive, responsible for sensations coming from internal organs, i. e. the sense of hunger, thirst, body temperature, heart rate, vestibular sense, responsible for movement and balance, proprioceptive, receiving information about orientation of the position of one's own body parts from receptors located in muscles and joints). Information processing can mean both a simple, intuitive reflex response to a perceived threat, as well as an elaborate analysis of perceived objects and an appropriate response. The first reaction activates the flee or fight mechanism and is an unconditioned reflex in all animals. The second, an extended analysis, triggers a thought process that allows for an in-depth threat assessment and an appropriate response.

The second group of cognitive functions includes abstract thinking and creative problem solving. The processes included in this group require preparation, specific preprocessing in the form of perception, selection and orderly storage of sensory information (long-term declarative memory, including episodic memory and semantic memory). This therefore applies to the functions contained in the first group of definitions, but raised, as it were, to a higher level. Analysis of information is not instinctive, reflexive. A creative thought process is set in motion. It is possible that the creators of the definition of intelligence, when speaking of perceiving, storing, and processing information, had in mind an extended range of these functions, but it is not indicated that they are phenomena that are the *sine qua non* of complex cognitive processes, and not separate entities. Perhaps this is why it is difficult to speak of a well-defined problem in these definitions that would give us a clear answer. The definition of the creative thought process can be based on the classic definition given by Edward Nęcka. This process consists of

four stages. The first stage is preparation, which is the initial activity of collecting data and preparing the problem to be solved. The second stage is incubation, which involves the spontaneous, unconscious "hatching" of an idea during a pause in intentional work on the problem. The third stage is illumination, which is the dazzle accompanying the sudden solution to the problem through insight, and the fourth stage is verification, which is checking the usefulness of the produced solution (Nęcka, 2007, p. 789). The concept of preparation falls within our preprocessing process. Incubation and illumination eludes the possibility of algorithmizing the problem. A variety of techniques such as brainstorming, used to varying degrees since the dawn of humanity by bodies such as tribal councils and councils of elders, are employed here to achieve a satisfactory result. Another technique is "morphological analysis", which involves analyzing all possible solutions, or finally "synectics" by William Gordon (Gordon, 1961), which combines the two previous methods. An interesting proposal to achieve the goal is the multi-phase "ideal solution method" by Gerald Nadler, which consists of generating an ideal system in the first phase of the process and then gradually introducing constraints until the real system is obtained (Nadler, 1967). This method is the opposite of the classical method of improving functioning systems. Finally, verification is a well-defined problem that allows us to identify functional differences between requirements and our subsequent models.

AI

When comparing man-made intelligence, or artificial intelligence, to intelligence that evolved with human beings, it is important to define the terms AI. The creator of the term was John McCarthy, an American computer scientist at Stanford University, and it was first used at the Dartmouth conference in 1956. In his article "What is Artificial Intelligence?" published in 2007, John McCarthy poses a number of questions and provides answers about artificial intelligence. When asked what artificial intelligence is, he answers, "it is the science and engineering of creating intelligent machines, especially intelligent computer programs. In his article "What is Artificial Intelligence?" published in 2007, John McCarthy poses a number of questions and provides answers about artificial intelligence. When asked what artificial intelligence is, he answers, "it is the science and engineering of creating intelligent machines, especially intelligent computer programs. There are different types and degrees of intelligence in humans, and many animals and some machines also have it. Is there no general definition of intelligence that does not require references to human intelligence? Not yet. The problem is that we cannot yet generally characterize what kinds of computational procedures we want to call intelligent. We understand some mechanisms of intelligence and not others. Isn't artificial intelligence about simulating human intelligence? Sometimes, but not

always. On the one hand, we can learn something about how to make machines solve problems by observing other people or simply by observing our own methods. On the other hand, most work in artificial intelligence involves studying the problems the world presents to intelligence instead of studying human or animal behavior. Artificial intelligence researchers are free to use methods that are not observed in humans, or that require much more computing power", (McCarty, 2007). Hector J. Levesque, a Canadian scientist and researcher on artificial intelligence, situates it outside the biological and social sciences. He writes about artificial intelligence as follows, "Note that the science of artificial intelligence studies intelligent behavior, not who or what causes it. For example, it studies natural language comprehension, not natural language comprehenders. This is what makes artificial intelligence very different from human research (in neuroscience, psychology, cognitive science, evolutionary biology)", (Lavesque, 2014, p. 1). Andreas Kaplan and Michael Haenlein give a definition of artificial intelligence defined as "the ability of a system to correctly interpret data from external sources, the ability to learn from that data, and to use that knowledge to perform specific tasks and achieve goals through flexible adaptation" (Kaplan, Haenlein, 2019). Thus, artificial intelligence is intuitively understood as an imperfect imitation of human intelligence. Nothing could be further from the truth. If a person behaves intelligently, we assume they are intelligent. We judge this based on external considerations. To act intelligently is to be intelligent. So an artificial intelligence that behaves intelligently is a real intelligence, only that it is artificially created. The idea of determining intelligence by external viewing became the basis for Alan Turing's formulation of an intelligence test, known as the Turing test, in 1950, (Turing, 1950). It consists of a game in which a participant (the interrogator) can ask the other party (the witness, who can be a machine), any question via a text-based interface (at the time it was a teletype). If the interrogator is unable to determine whether the witness is a human or a machine, it follows that the witness must have intelligence. Turing assumed that a witness who is not truly intelligent could not feign intelligence with respect to a wide variety of subjects. A competition organized by the University of Reading in England on June 7, 2014 featured a computer program called Eugene Goostman, a chatbot developed by two programmers, Russian Vladimir Veselov and Ukrainian Eugene Demchenko in 2001. It was credited with being the first artificial intelligence to pass the Turing test. Eugene was able to convince 33 percent of the judges (out of the 30 percent required by Turing under the assumptions in his 1950 Computing Machinery and Intelligence article that they were talking to a thirteen-year-old Ukrainian boy. Controversy arose over the behavior of the chatbot, which explained the errors in the answers by a lack of general knowledge due to age and a poor command of English. Besides, he often joked, which was supposed to lend credence to his human personality. This controversy revealed a number of shortcomings of the Turing test. Levesque, one of the critics of the test thus constructed, has pointed out several important problems arising from its use. First of all, the machine does seem intelligent, but the essential point remains that it is created on the basis of a false consciousness, which is no longer part of intelligence. So this is

fraud. In addition, during a conversation, many interactions can be classified as exhaustive of conversation, so elements of conversation such as jokes, intelligent remarks, and interjections may or may not suggest intelligence, since a machine can be intelligent without having human reasoning ability. These intelligent comments are simply pre-programmed. And finally, as for assessing intelligence, humans who are tested can make mistakes, so it is hard to require that such mistakes not be made by machines. In addition, judges can also make mistakes as to what intelligence is being tested. And if so, it can't be evidence of a machine's ability to think. These caveats make the Turing test difficult to consider as an unambiguous verification of artificial intelligence. Levesque proposed a test based on ambiguous multiple choice questions requiring general knowledge. They have a specific structure, the so-called Winograd diagrams, named after computer science professor Terry Winograd of Stanford University. Here is an example of questions formulated according to Winograd's scheme:

- Marysia has much less money than Basia because she just won the lottery. Who won the lottery? Mary or Basia.
- Marysia has much more money than Basia because she just won the lottery. Who won the lottery? Mary or Basia.

Another example comes from an article on testing smart behavior according to the Winograda scheme, (Morgenstern, Davis, Ortiz, 2012):

- A customer entered the bank and stabbed one of the tellers with a knife. He was immediately taken to the police station. Who was taken to the police station? Customer or teller.
- A customer entered the bank and stabbed one of the tellers with a knife. He was immediately taken to the hospital. Who was taken to the hospital? Customer or cashier.

John Searle, an American philosopher and creator of a thought experiment called the "Chinese Room" also questioned the Turing test as the ultimate test to verify intelligence. The experiment showed that even a computer's successful simulation of intelligence is not the same as having intelligence. The performance of certain tasks by artificial intelligence (for example, translation from language to language) does not require understanding, but only knowledge of vocabulary and grammar rules, i. e. there is a mismatch between semantics and syntactics**.** You can generate an "infinite" number of grammatically correct sentences, only some of which will make sense. John Searle's experiment has become central to the debate over the possibility of creating strong (general) AI (Strong/General AI) as opposed to weak (narrow) AI (Week/Narrow AI). The term weak (narrow) AI, Weak AI refers to a limited range of AI problems. It typically applies to a single task that it performs better (faster) than a human. Examples of applications include voice assistants like Cortana or Siri, language translation programs like Google Translator. Autonomous cars (e.g. Tesla) should also be included here. Weak AI benefits greatly from solutions used by fields such as automation and cybernetics. The term strong (general) artificial intelligence, Strong AI would refer to systems that have

comprehensive general knowledge and cognitive abilities. They should be characterized by the ability to think creatively (abstractly) to a similar extent as an intelligent person. A machine with a strong artificial intelligence would be capable of understanding the world and itself, it would have the ability to develop as a person to a degree far more perfect than a human. John Searle was always very skeptical of the success of the Strong AI concept, as expressed in his thoughts on the design of the artificial mind. He posited that "equipping some artifact we have built with a computer program is not sufficient for it to have mental states comparable to humans Such an artifact should, of course, have a causal capacity comparable to that of the human brain. Brain activity limited only to the execution of a computer program does not exhibit brain functioning that leads to a mind" (Searle, 1995, p. 36).

Conclusion

If we could contrast human intelligence with artificial intelligence, Weak AI would be in the first group of our classification, Strong AI would be equivalent to the second group of human intelligence. Thus, it can be hypothesized that only Strong AI will have cognitive functions such as abstract thinking and creative problem solving. Thus, it will be equivalent to human intelligence, and with access to a huge range of data and with computing power that is difficult to predict (account should be taken of the rapid development of computer science, for example quantum computers), it can be assumed that in the foreseeable future it will surpass human intelligence. Artificial intelligence researcher Marvin Lee Minsky of the Massachusetts Institute of Technology formulates this thesis with little optimism, writing that future generations of computers will be so intelligent that "we'll be happy if machines want to keep us in our homes as pets" (Searle, 1995, p. 27).

Discussions on Strong AI attract a whole range of specialists from different fields, both humanities and sciences. From an interdisciplinary perspective, there are technical, legal and ethical arguments. A new phenomenon is emerging, one that is difficult to define and thus eludes unambiguous evaluation, especially since there are many questions and concerns related to the axiological point of view. So with the freedom and autonomy of man, protection of his subjectivity especially in a situation where artificial intelligence systems will be based on the use of neural networks and deep learning processes, that is, artificial intelligent entities.

Artificial intelligence is a technological and mental revolution. The very definition of AI is a linguistic revolution, for there is no general consensus among scientists as to its precise definition, especially since it is being courted by the sciences as well as the humanities. From the linguistic differences come substantive differences. For Scientists, AI is a challenge and contains the hope for progress and development, for further and further subordination of the world of matter to the authority of reason. For humanists, it represents a threat to

technocracy, all the more dangerous the more it becomes an illusory promise of guaranteeing human freedom in many aspects of life, in fact rendering people insensitive and vulnerable to technical domination and scientific development in the world. However, on the other hand: "someone who considers technical progress as the real source of mental and moral barbarization is condemned to barren catastrophic historiosophies that leave nothing to do but impotently wait for the fatally inevitable triumphs of barbarism in all areas of life" (Kołakowski, 2000, p. 258). Thus, on the one hand, the fascination with development, technology, material and physical reality, on the other hand, the humanistic perspective, the interest in spiritual reality and the implementation of values, and therefore sustainable development, are the strength of human reality and the antidote to the barbarization of humanity. This is exemplified by the view that the development of technology requires a humanistic rooting. It is from thinking that the technical arises, it is from thinking that the practically useful arises.... This assumption can have far-reaching consequences, for it can safeguard human existence from the existential emptiness that a utilitarian attitude to science funds. However, the publication also points out that AI can be an end in itself, can be autotelic in nature, that its status need not be limited to the assumption that it is merely a tool for designing a more predictable world of human needs. Since intelligence, by definition, is the ability to find oneself and behave effectively in completely new conditions, machines are already capable of mimicking the processes that determine human intelligence. The ability to repeat a certain behavior is not reduced to decision-making, but is linked more broadly to the ability to acquire data and gain knowledge in general, which in turn requires interaction with the environment. Thus, for intelligence and for an intelligent system, the essence is to act in an uncertain and unpredictable environment and solve tasks. In turn, this distinguishes intelligence from knowledge. As of today, it seems that the definitions of intelligence and artificial intelligence, even if they are not identical, are not contradictory. These are open questions to which there is no answer, the answer is contained in each subsequent question. Perhaps AI is as intelligent as humans are intelligent.... Now this answer seems sufficient, but in the future will this answer be so certain and unequivocal…

So the questions of whether AI can really be intelligent, or whether AI is a computer program written by an intelligent human, and where the limits of AI's intelligence run, and whether that limit will be the self-awareness of the machine or the device, may not matter much in terms of consequences, for: "it can be said that in the entire universe, man cannot find a well so deep that when he bends over it, he does not discover his own face at the bottom" (Kołakowski, 2000, p. 78).

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