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On Humans, Artificial Intelligence, and Oracles

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Abstract

Our epoch is fascinated by human-like minds and by the fantasy of intelligent machines, which might surpass and substitute human intelligence. Computational machines were initially invented for unburdening humans from tedious and unrewarding tasks, often doing repetitive tasks better and quicker than bored human. Today, things are changing, and the mounting trend is to produce intelligent machines imitating human skills, such as intuition, emotions, sentiments, capacity for perceiving atmosphere and context, capacity for sense of humor, and so. The potentiality of next-generation artificial intelligence (AI) is thus in the limelight of the scholarly discussion and raises public concerns. In this chapter, I will develop a new argument, based on Floridi's *Diaphoric Definition of Data*, to demonstrate that computational machines might replicate human intuitive skills but they cannot exactly duplicate them. The chapter does not aim to grade natural vs. artificial intelligence, not yet to raise any ethical consideration on AI, rather it only aims to show the inherent limits of AI and its applications. Finally, I will conclude that the current debate about the hypothetical risk that AI might one day surpass human intelligence is largely misplaced.

Keywords: Intelligent machines, AI, GOFAI, next-generation AI, esprit de géométrie and esprit de finesse, explosive logic, paraconsistent logic, intuitive skills, unthinkability

4.1 Introduction

Almost no day goes by, one does not read articles in magazines and newspapers about terrific progress achieved by research and applications on artificial intelligence (AI). All industrial sectors, as well as finance and services, are investing into AI, "*ABI Research forecasts that the total installed base of devices with Artificial Intelligence will grow from 2.694 billion in 2019 to 4.471 billion in 2024 (...) There are billions of petabytes of data flowing through AI devices every day and the volume will only increase in the years to come*" [1]. Tangible and economic reasons are not, however, the sole justification for such a fashion. AI is in the Zeitgeist. As other historical periods were fascinated by robots and automata (think of the 18th and 19th centuries, and the flourishing of interest in artificial human-like creatures, from the Mechanical Turk chess player to the Golem), our epoch is fascinated by human-like minds. There would be even an evolutionary substrate to justify this interest. Since 2005, American technologist and futurist, Ray Kurzweil [2], has argued that AI is entering a "runaway reaction" of self-improvement cycles, increasingly producing more and more intelligent generations of devices, which will end up by surpassing all human intelligence. Finally—suggests Kurzweil—AI is the next step of evolution, destined to take over humanity. More recently, Swedish philosopher Nick Bostrom has suggested that, sooner or later, an artificial super intelligence could replace the human species [3].

This fantasy of substitution can be traced back in the mass culture no less than to 1968 Kubrick's "2001: A Space Odyssey" and A. Clarke's corresponding novel with HAL 9000, the fictional AI, playing the role of the villain. The plot is well known, HAL 9000 tries to take control of the spaceship to fulfill its mission to Mars, although this implies to kill human astronauts; the story unfolds against a background hinting at a vague, spiritual, epochal shift. Indeed, the fascination for AI is inseparably connected with fantasies about its evil, or at least dangerous, nature. Why do we fantasize so much of a machine intelligence going amok and taking power on humans? Could these fantasies ever become a reality? Could AI ever take over human minds and surpass human intelligence? In this chapter, I will try to provide an original answer to these questions.

4.2 The Sorrento Counterfeiters

Let's start with a real story about machine intelligence. This story begins—or rather, it ends—on May 16, 2017, when the Italian police took down a ring of money counterfeiters in Sorrento, near to Naples. This event does not seem to be that remarkable, if only because counterfeiting is not rare in the Neapolitan area. There are historical reasons for that. In the 19th century, Naples was an important hub for small, very sophisticated, publishing houses, skilled in offset printing, lithography, specialized in art books, and limited artist editions. As the business became increasingly controlled by major international publishers, Naples artisanal industry died. Many skilled printers found themselves unemployed and reinvented themselves in the counterfeit market. They gave birth to families of counterfeiters, handing down the knowledge for perfect counterfeiting from father to son. Still today, some of the best counterfeiters in the world live in Naples. For instance, in 2006 a Neapolitan forgery ring put on the market in Germany a considerable amount of counterfeit euro banknotes, perfectly imitated except they were 300 euros banknotes, a nonexistent denomination. However, these banknotes passed as real and circulated for some months.

The Sorrento ring was a small ring, made up of a bunch of teenagers and a few senior skilled counterfeiters, who recreated 10 euros notes, with perfect, artistic, precision. In small groups, made up of one adult and some youngsters, they went in the most frequented stretches of Neapolitan coast. The group pretended to be a class trip; the adult simulated to be a teacher and the youngsters his students. They searched for currency exchange machines. The fake teacher gave some counterfeit banknotes to the fake students, who changed them. In such a way, they succeeded in changing between 1,000 and 2,000 euros per day. They were all arrested with charges of forgery of money, spending, and introduction of counterfeit money. This story would be quite trivial except for one thing: they could not be prosecuted. Each note bore a visible printed caption "specimen," and they were printed scrupulously respecting Italian legal rules concerning sample banknote reproduction. Legally speaking, those people were not counterfeiters[1]; it was not their fault if machines are stupid.

[1]At the end, the court convicted the senior counterfeiters of illegal possession of currency grade printing paper, which is a minor criminal offense, while the teenagers went free.

Currency exchange machines are “stupid,” they have almost nothing to do with AI; engineers can undoubtedly explain why they were not able to “see” the caption “specimen” and how this bug can be fixed, but this is irrelevant to my argument. Think of the tremendous artisanal talent with which the banknotes were counterfeited, the brilliant and straightforward stratagem conceived to escape the law, confronted with the limited amount of the fraud itself. Think of the lovely pantomime that counterfeiters and teenagers played. Why? Pretending being a school trip was redundant; they did not need such a trick to change banknotes, it could draw even too much attention on them. It was not a rational choice; it was pure love for staging, probably the same love for staging which drove the other forgery ring in 2006 to invent 300-euro banknotes. You need to look at the big picture to understand: the beauty of Sorrento and the history of counterfeiting in Naples are all part of this amusing story. Machines can detect fake banknotes, but over and above technical bugs, will they be ever able to see the big picture? Can machines understand the poetic nuances of a Neapolitan crib of the 17th century? Or can they grasp the art of the *Bamboccianti* (puppet makers), 17th century genre painters of everyday life in Rome and Naples? In their landscapes, any single detail is carefully depicted with a cloying perfection, but what truly matters is the whole, the details are misleading. What counts in the story of the Sorrento ring—as well as in the Neapolitan crib and the *Bamboccianti's* paintings—is the totality; only by understanding the totality, one can catch the meaning of what is facing. Could a machine ever understand this? Mechanical devices lack the capacity for perceiving the atmosphere, feeling the context, appreciating the situation in a single glance, which is instead so essential to human beings[2].

4.3 The Good, the Bad, and the Ugly

Let's consider another example: this time, it is an invented story. The story is based on a classic 1966 Spaghetti Western film directed by Sergio Leone, “*The Good, the Bad and the Ugly.*” The Blondie (The Good) (Clint Eastwood)

[2] A further example of machines' inability to perceive totality is provided by computational humor, a branch of AI, which aims to produce a computer model of sense of humor. Based on a natural language generator programs, AI can invent jokes and puns (not that funny, admittedly) and recognize when a human being jokes, but it cannot “feel” the comical, because AI lacks two essential qualities to appreciate it, the perception of the whole and the sense of timing (comic time) [4].

is a professional gunslinger; Angel Eyes (The Bad) (Lee Van Cleef) is a hitman; and Tuco (The Ugly) (Eli Wallach) is a wanted outlaw. They all know that there is a stash of gold buried in a cemetery. Tuco only finds out the name of the cemetery, while Blondie finds out the name on the grave. Angel Eyes knows they know the location of the gold. Finally, the Good, the Bad, and the Ugly find themselves in the courtyard of the cemetery where the gold is hidden; the Blondie writes the name of the grave where the gold is hidden on a stone that he puts in the center of the courtyard; then, he challenges Tuco and Angel Eyes to a duel (a "*truel*") among the three of them, the one who will survive will take the gold. There is now a triangle, made up of the Good, the Bad, and the Ugly; each one of them must shoot the others, but each one can fire only one shot at a time; targeting one opponent, unavoidably he gives time to the second opponent to kill him. This triangle is the typical example of the so-called *Mexican standoff*, say a confrontation in which no strategy exists that allows any party to achieve victory. The reader who did not see the movie, or who did not remember it, could fruitfully search the sequence on the Internet[3], where the three men stare at each other during 10 minutes of silence, glances, and close-ups. It is one of the most epic showdowns in film history; a real masterpiece punctuated by Ennio Morricone's great music. Indeed, assuming that (1) each gunman—A, B, and C—has the same probability of hitting his target; (2) each gunman may shoot a limited number of bullets; and (3) the three gunmen might shoot simultaneously or sequentially, and who shoots first will kill his target; the first who shoots has 100% odds to die. In fact, if A shoots B or C, the survivor has time enough to kill him; and so on. The sole strategy to half the risk is to wait deliberately that someone else shoots, and then to kill him (provided that the target was the other opponent). If all the three players know the trick, they enter a loop. No one fires first, and the "truel" will never start, they will remain paralyzed looking at each other forever.

Jacques Lacan, the French psychoanalyst, discussed a situation very similar in his 1945 essay "*Logical Time and the Assertion of Anticipated Certainty: A New Sophism*" [5]. There are three prisoners—tells Lacan—a prison warden announces them that he will free the one who win a challenge. The prison warden has five disks differing only in color, three white and two black disks. He will fasten one of them between the shoulders of each prisoner without letting know which he selected. Prisoners cannot look the

[3]https://www.youtube.com/watch?v=aJCSNIl2Pls

disk on their shoulders; they can only see the disk between the shoulders of their fellows. By considering their companions and their disks, each prisoner must infer whether he is black or white. The first who will deduce his color must move toward the door, and he will be free. The situation is the reverse of the *Mexican standoff* because in this game all the three players unavoidably win (at least in principle). In fact, each prisoner could see either (1) two white disks; (2) one white and one black disk; or (3) two black disks. Knowing that there are three white and two black disks, if the first prisoner sees that his companions have two black disks fastened, he will immediately and unerringly deduce that he has a white disk and he goes to the door. If he sees that his companions have one black and one white disk, he could be either black or white. Nevertheless, if he were black, one of his companions would see two black disks; consequently, one of them would immediately go toward the door because he would know to be himself white. Therefore, if the first prisoner sees one of the two companions running toward the door, he can immediately do the same, because it means that he is black. Similarly, if both companions hesitate, it means that they both see two white disks, then he is white; he can thus go to the door. In conclusion, given that each prisoner can carry out the same reasoning, all three players might go simultaneously to the door. This game reveals the trick, which allows solving also the *Mexican standoff*. Both dilemmas can be solved only by using anticipation or retroaction of time; in other words, each player must guess the move of the other two opponents before deciding his move. This operation is precisely what machines cannot do. To be sure, machines can reckon the odds of other players according to the course of action they opt for, as well as they can calculate what decision would optimize the probabilities to win; finally, machines, provided with advanced sensors, can also detect early signs of any decision taken by others, by processing subliminal signals, which would go unnoticed to human eyes; consequently they might react before any human could do. Brief, there is no doubt that in real life, an intelligent machine could shoot, or run toward the door, before its fellow gunmen or prisoners, but it would need a material input which might show (even subliminally) the decision taken by other players. If human opponents do not reveal their intentions, not even through subliminal signals, or if the machine is opposed to other intelligent machines, programmed to win and with the same calculation power, the situation is a stalemate. Machines cannot create imaginary situations in which they think *as they were someone else* [6]. Intelligent machines can play quite well Bridge tournaments, but they are bad in bidding and the initial phases of this card game [7]. Indeed, during the bidding stage, each player knows only his/her cards and must play to guess at the hidden hands. This guess is psychologically possible by anticipating and retroacting the conclusions reached by other players. In other words, each player decides his bid by conjecturing past (how were the cards dealt among players?) and future (what will the play of other players be?) situations and projecting them on the critical instant of his decision. This instant can be conceptualized as a point on which all temporal lines, past and future, converge and intersect each other: it is the right moment to decide. Also, the gunman who decides whether to shoot or the prisoner who decides whether to get out needs to catch the right moment. We enter thus a different dimension of time, stretched between waiting and haste, hesitation and urgency. This time is no longer chronological time; it is a clot of tension, which can explode at any moment. The lesson that Lacan draws from the sophism of the three prisoners is thus that there is a temporality without reference to the clock; a mental temporality, which is not simply subjective, e.g., psychological time, but it is objective, as long as it is shared by all humans and it is articulated in a logical, nonspatial, structure. Within such a temporality, Lacan distinguishes three distinct moments: (1) the instant of the gaze, (2) the instant of the comprehension, and (3) the instant of the decision. Each one of these three moments is the expression of a logical, not chronological, punctuation. In other words, they are not a form of duration but are pure, immediate intuitions. The three gunmen, as well as the three prisoners, may reach simultaneously the same conclusions because these three moments are not chronological units, rather they are "*the intersubjective time that structures human action*" [8]. They are examples of the time opportune, say, the kairos.

To operate, e.g., to take a train, convene a meeting, cook a pizza, and so, we must think of the time in spatial terms, as it were made up by a chain of equal moments, from the past, through the present, into the future; otherwise, we will always miss trains and meetings, and burn pizzas. Nevertheless, human mental time is not made up of *equal moments*, rather of *meaningful instants*: "Now" which are unique, singular, "atoms of sense." Argentinian writer, essayist, and poet, J. L. Borges, superbly expressed this concept in his poem *Doomsday*:

"No hay un instante que no pueda ser el cráter del Infierno/ No hay un instante que no pueda ser el agua del Paraíso/ No hay un instante que no esté cargado como un arma/ En cada instante puedes ser Caín o Siddharta, la máscara o el rostro / En cada instante puede revelarte su amor Helena de Troya / En cada instante el gallo puede haber cantado tres veces / En cada

*instante la clepsidra deja caer la última gota." (*J. L. Borges*, Doomsday,* in *Los conjurados,* Buenos Aires, 1985)".[4]

The notion of "now" is extraneous to modern science; fundamental laws of physics ignore it, and there is no experimental way to establish it. According to an anecdote told by Rudolf Carnap, once Einstein said that "*the problem of the Now worried him seriously. He explained that the experience of the Now means something special for man, something essentially different from the past and the future, but that this important difference does not and cannot occur in physics. That this experience cannot be grasped by science seemed to him a matter of painful but inevitable resignation. I remarked that all that occurs objectively can be described in science; on the one hand, the temporal sequence of events is described in physics; and, on the other hand, the peculiarities of man's experiences with respect to time, including his different attitude towards past, present, and future, can be described and (in principle) explained in psychology. But Einstein thought that these scientific descriptions cannot possibly satisfy our human needs; that there is something essential about the Now which is outside the realm of science*" [9].

A further formulation of the three-prisoner and the *Mexican standoff* dilemmas is known in logic as the Buridan's ass paradox, named after the 14th century French philosopher Jean Buridan. The paradox reads: "*An ass placed equidistant between two bales of hay must starve to death because it has no reason to choose one bale over the other [...] The general principle underlying the starvation of Buridan's ass can be stated as follows:* a *discrete decision based upon an input having a continuous range of values cannot be made within a bounded length of time. Buridan's ass starves because it cannot make the discrete decision of which pile of hay to eat, a decision based upon an initial position having a continuous range of values, within the bounded length of time before it starves. A continuous mechanism must either forgo discreteness, permitting a continuous range of decisions, or must allow an unbounded length of time to make the decision*" [10]. Ironically enough, intelligent machines tend to behave such as the stupid ass of the tale. In electronics, the metastability problem, or arbiter problem

[4] Any instant can be the hell crater/Any instant can be the heaven water/Any instant is loaded as a gun/At every instant, you can be Cain or Siddhartha, mask or face/At every instant, Helen of Troy may reveal her love for you/At every instant, the rooster may have crowed three times/At every instant, the hourglass is about to drop the last drop.

(from the device, *arbiter*, used to face it[5]), is indeed a real-life application of the Buridan's paradox. Metastability is a condition in which the circuit pauses, becoming incapable of making any option. Metastability can arise when reading asynchronous inputs, generated by a computer interacting with an external device, an interaction requiring analogue to digital conversion, multiple clock domains on the same chip. In a metastable condition, a signal is sampled close to a transition, leading to indecision as to its correct value, "*for example, if a 0 is represented by a zero voltage and a 1 is represented by +5 volts, then some wire might have a level of 2.5 volts. This leads to errors because a 2.5-volt level could be interpreted as a 0 by some circuits and a 1 by others*" [10]. A well-designed arbiter can ensure that all delays are very brief, but it cannot eliminate the problem. In other words, although metastability can be practically dealt with, no technical fix can prevent it, because it is structurally connected with how digital machines are built to cope with time and decisions.

4.4 What Computers Can't Do

AI incapacity to perform some functions and activities that are standard for natural intelligence is the basis for the rejection of the very notion of intelligent machines. Radical critics of AI programs argue that the concept of AI is misleading. To be sure, computational machines exist, they are helpful, and they can improve human performances. However, when we state that a computer "*calculates*," we are unknowingly using a metaphor, as when we state that a telescope and a microscope "*see*." Humans calculate *through* computers and see *through* telescopes and microscopes[6]. All technology devices do not autonomously act even when they are highly automated, but they improve more and more hugely human ability to do something; they are not agents, they are tools. This argument was first raised in the 1970s by Berkeley philosophy professor, Hubert Dreyfus. His book, "What computers can't do" [11], is paramount for all those who are interested in machine intelligence. Dreyfus argues that "*facts are not relevant or irrelevant in a fixed way, but only in term of human purposes, (. . .) Since a computer is not in a situation, however, it must treat all facts as possibly relevant at all times.*

[5] An arbiter has two stable states corresponding to the two choices, each request pushes the circuit toward one stable state or the other.

[6] This comparison does not consider, however, the difference between digital and analogue devices; this difference has important consequences that I will illustrate in the next chapters.

This leaves AI workers with a dilemma: they are faced either with storing and accessing an infinity of facts or with having to exclude some possibly relevant facts from the computer's range of calculations" (**??**). His argument is that machines are programmed as though the world were made by atomic, out-of-context, facts, governed by formal rules[7], which is a model good enough to perform some tasks, but incapable of explaining the complexity of the human world. Dreyfus' point is the old philosophical issue[8] about how the world could be simultaneously seen as made up of both continuous and discrete quantities, the same problem which generates the Buridan's ass paradox. Dreyfus argues that machines can operate only on discrete, context-free facts; consequently, they are obliged to turn continuous quantities, which have an infinite number of steps, into finite and countable data.

On the contrary, human intelligence operates through continuous elements. Although we can isolate atomic facts—such as figures in the foreground—we always perceive the background and unconsciously we interpret the foreground through, and thanks to, the background. In other words, human beings always perceive the world as a gestalt, structured by their intentions and purposes: "*The human world, then, is prestructured in terms of human purposes and concerns (...) This cannot be matched by a computer, which can deal only with universally defined, i.e., context-free, objects. In trying to simulate this field of concern, the programmer can only assign to the already determined facts further determinate facts called values, which only complicates the retrieval problem for the machine*" [11, p.261]. To Dreyfus, this gap is not a *transitory* limitation, destined to be overcome by technology progress, but it is a structural limit inherent to any machinery, no matter how sophisticated it is. This limit makes misleading the notion of AI, because—he argues—machines will never be able to operate with concepts such as situation and purposes, and they will never develop the holistic vision necessary to perform activities such as learning a natural language or successfully competing with a human chess master. So, although Dreyfus' arguments were convincing, his conclusions were wrong.

Dreyfus grasped something important—as even some computer scientists later admitted [12, 13]—but he was misled by AI of first generation, the

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[7] Dreyfus calls this assumption "psychological assumption," to distinguish it from biological, epistemological, and ontological assumptions, which concern respectively how the brain is organized, the structure of human knowledge, and the configuration of real world.

[8] The problem was first debated by the pre-Socratic Greek philosopher, Zeno of Elea (c. 495 – c. 430 BC), and the Eleatic School.

so-called "*Good Old-Fashioned AI*" (GOFAI). "GOFAI" was constructed on high level symbol manipulation, assuming that "*although human performance might not be* explainable *by supposing that people are actually following heuristic rules (…), intelligent behavior may still be* formalizable *in terms of such rules and thus reproduced by machine*" [11, p. 189]. GOFAI devices were just sophisticated computational machines. Despite their sophistication, they were only tools for automating calculations and operating with formal logical symbols. In 1992, when Dreyfus wrote the introduction to the MIT edition of his book [14], it was already apparent that the new generation of AI devices was instead game changing. The rapid increase in processing capacities and speed, coupled with exponential growth in data volumes and storage, algorithmic improvements (e.g., evolutionary algorithms, genetic algorithms, swarm intelligence algorithms, and so on), advances in machine learning and perception, new "statistical learning" techniques such as hidden Markov models and neural networks, created a new scenario. Next-generation AI was beginning to learn by seeing, reading, viewing, watching, and searching. Not only Dreyfus' criticisms were disproved by technology progress, but the very theoretical foundation of his criticism was shifting. Dreyfus, then, posed the ultimate objection to AI: "*all work in AI, then, seems to face a deep dilemma. If one tries to build a GOFAI system, one finds that one has to represent in a belief system all that a human being understands simply by being a skilled human being (…) Happily, recent research in machine learning does not require that one represent everything (…) But then, as we have just seen, one encounters the other horn of the dilemma. One needs a learning device that shares enough human concerns and human structure to learn to generalize the way human beings do. And as improbable as it was that one could build a device that could capture our humanity in a physical symbol system, it seems at least as unlikely that one could build a device sufficiently like us to act and learn in our world*" (Dreyfus 1992, xvi). Dreyfus' point is thus a phenomenological and existentialist objection to machine intelligence: machines cannot have actual experiences, because they do not have intentions, motivations, volitions; they cannot love or hate, they cannot feel happy or unhappy.

The main weakness of the phenomenological objection is that it takes as granted what it should instead demonstrate. There is no doubt that, for now, current technology devices do not have "experiences" in the human sense of the term, but could we exclude that they will be ever able to develop such an ability? Already today, machines can do most activities that, in 1972, Dreyfus thought to be impossible to them. Natural language processing approaches are developing the capacity of encoding semantic commonsense knowledge and machines promise to acquire narrative skills soon. A variety of next-generation sensors are dramatically improving machines' capacity for sensing the environment, including increasing capabilities for speech, facial, and object recognition. *Nouvelle artificial intelligence* creates robots provided with embodied minds, which learn through the inputs they receive from the external world. New generation algorithms, based on fuzzy and paraconsistent logics, allow creating subsymbolic and nongoal systems, which can "learn from the experience" and fix their goals autonomously, only according to the training data. Intelligent machines can increasingly recognize, interpret, process, and simulate human affects. Brief, the history of AI shows that one must be very cautious fixing theoretical limits to technological advances. As a Heideggerian philosopher, like Dreyfus, should have known, technology is only ruled by the will for a boundless increase of power.

4.5 Esprit de Géométrie and Esprit de Finesse

It seems thus that we have reached a dead end; as much as objections to the notion of AI are reasonable, they are—and seem to be destined to be—disproved by technology progress. Ultimately, we are still far from being able to answer the question of whether AI will be ever able to simulate, maybe surpass, human intelligence.

Computational machines, as we know them today, were invented in the 17th century in France by Blaise Pascal, the French scientist and philosopher. In 1642, the young Blaise was 19. He was obliged to spend his days, sometimes even nights, helping his father, a tax collector for Upper Normandy, in interminable, grueling, calculations of taxes. He was probably bored to tears, so he devoted himself to a way to get free from this tedious task. Being a genius, instead of telling off his dad, Pascal invented the first digital calculator of human history. Pascal's calculator—also known as the arithmetic machine or Pascaline—is still today the paradigm of all computational devices.

This story shows well what automation is for. Be Pascal's calculator, robots in assembly lines, currency exchange machines, or HAL 9000; it is always the same. The more a task is boring and unrewarding, e.g., calculating taxes, assembling pieces of an item, exchanging currencies, and calculating a spaceship route, the more we try to dump its burden on machines. Computational devices are for automating boring and repetitive activities and increasing the speed of their execution, including those mental activities which are less gratifying such as, e.g., solving a diophantine equation in 26 variables or identifying people by confronting their actual faces with photos on their passports[9]. These repetitive activities increased exponentially with the industrial revolution and, consequently, also computational devices spread and became ubiquitous. When we speak of AI, we must thus consider that we automated only a fraction of natural intelligence, the one involved in wearisome and uninspiring activities, setting aside other functions and abilities. Natural intelligence includes a variety of skills, which have not been taken into consideration—at least up until now—by automation.

It was precisely Pascal to propose the distinction between *esprit de géométrie* and *esprit de finesse*. The *esprit de géométrie* is the analytic mind, which always distinguishes and dissects reality into elementary components. The *esprit de finesse* is instead intellectual finesse, the perception of those things that can't be dichotomized and analyzed, such as music, arts, religion, human affects and emotions, and the horrible and the sublime; it is the feeling of the whole and the unspeakable. *Esprit de géométrie* and *esprit de finesse* must not be thought as two different realms, rather they are the two sides of the same coin, which is human intelligence: "*We must see the matter at once, at one glance, and not by a process of reasoning, at least to a certain degree. And thus it is rare that mathematicians are intuitive, and that men of intuition are mathematicians, because mathematicians wish to treat matters of intuition mathematically, and make themselves ridiculous, wishing to begin with definitions and then with axioms, which is not the way to proceed in this kind of reasoning*" [15, p. 2].

Starting with Pascal, humans began to create machines (GOFAI included) to automate and expedite tedious operations relevant to the *esprit de géométrie*. By contrast, they did not invent devices to automate activities pertaining to the *esprit de finesse*. In fact, these activities can hardly be defined "boring"; rather, they constitute the most pleasant and attractive part of human life. Moreover, they are much less relevant to industrial production, and consequently less economically significant, than repetitive actions based on calculations, logical operations, procedures, and algorithms. Something radically new happened in the 1990s with the birth of the World Wide Web. The web has been increasingly offering to each one the possibility

[9]Of course, one cannot exclude that there are human beings who are pleased to calculate diophantine equations or to check passports, but most persons are probably happier if an intelligent machine does these activities for them.

of being always connected; using and producing contents; remotely making money and sex; gaming, trading, and flirting online; enjoying music and videos; overcoming spatial and temporal barriers; mixing languages and linguistic codes; sharing memories and knowledge; and so. These activities are emotionally and economically rewarding, but they require machines more and more able to recognize, emulate, and interact with human imaginative insight and conjectural skills. The online digital world aims to become—so to speak—a Turing's nightmare: a place where humans and machines are indistinguishable. The electronic world is highly immersive; the late Marshall McLuhan noticed that electronic communication is much more reactive and emotionally intense than any previous form of communication [16]. Walter Ong spoke of "second orality" or "electronic orality" [17] to describe the digital society. The digital, interconnected society needs machines, which can hybridize with human beings, precisely because humans and machines must become fully interchangeable online, to increase effectiveness, operational capacity, and economic profitability. The expressions "*digital unconscious*" has been recently used by various scholars to describe how a collective human–machine mindset is emerging, beyond the awareness of single users[10]. In 2010, Lydia H. Liu, W. T. Tam Professor in the Humanities at the *Institute for Comparative Literature and Society*, Columbia University and director of the *Center for Translingual and Transcultural Studies* at Tsinghua University, Beijing, devoted a scholarly book [21] to a new understanding of human–machine interactions at the unconscious level, based on the idea of an increasing symbiosis of the computing machine (and the digital world) and the human unconscious. Canadian sociologist, and former Marshall McLuhan assistant, Derrick de Kerckhove, conceptualized the "digital unconscious" as a collective human–machine intelligence emerging from the whole information shared online, which would arise "*from hybridization between real and virtual, marked by reduced interiority, connected to the self, and an extended externality linked to the networked world"* [22]. In 2015, Mireille Hildebrandt provided an extensive description of "digital unconscious": ~~590787365~~"*We are in fact, surrounded by adaptive systems that display a new kind of mindless agency. Brain-inspired, neurosynaptic chips have been prototyped, that are typical for the way long-existing technologies such as artificial neural networks and miniaturization of ever more integrated circuits on silicon chips combine to simulate one of the most*

[10]At the beginning, the expression was chiefly used to mean only the huge amount of personal information unwarily shared on the web [18, 19, 20].

critical capacities of living organisms: unconscious, intuitive and on-the-spot pattern recognition. The environment is thus becoming ever more animated. At the same time, we are learning slowly but steadily to foresee that we are being foreseen, accepting that things know our moods, our purchasing habits, our mobility patterns, our political and sexual preferences and our sweet spots. We are on the verge of shifting from using technologies *to* interacting with them, *negotiating their defaults, pre-empting their intent, while they do the same to us. While the environment gets animated, we are reinventing animism, ready to learn how to anticipate those that anticipate us – animals, fellow humans and now also smart, mindless machines"* [23, ix].~~590787365RPRRajendra Prasad Ravindran5907873651200104238TS: Please set as a block quote.~~ This situation has created—for the first time in history—the will to automate the *esprit de finesse*. In other words, as the industrial civilization needed to automate the *esprit de géométrie,* the digital culture is obliged to embark on the adventure of attempting to automate the *esprit de finesse.*

So, at this juncture, we can provide a first, provisional, answer to the initial questions, whether AI could ever take over natural intelligence and why this question is in the limelight. AI is in the limelight because it is driven by the epochal transformation from the industrial to the digital society. Intelligent machines, provided with something which emulates (or at least simulates) the *esprit de finesse,* are the critical technological shift needed to achieve such a transition. When powerful historical and economic forces push technology in a direction, there is no way to change this evolution. The fashion for machine intelligence and the flourishing of cultural narratives and imagery about AI—scary tales on the rebellion of machines included—express the pervasiveness and the hegemonic power of the material forces driving technology innovation. Single AI programs can fail, as it happened in the past, but AI is here to stay, notwithstanding any philosophical and scientific criticism. However, although there is no doubt that machine intelligence can outperform human intelligence as far as the *esprit de géométrie* is concerned, it remains highly controversial whether AI programs, aiming to duplicate the *esprit de finesse*, could be ever accomplished. The question of whether intelligent machines are destined to become intelligent agents, or whether they will remain forever what Chalmers called "philosophical zombies" [24] is still unsolved. Nevertheless, now this question can be reformulated in different terms, asking whether AI will be ever able to automate the *esprit de finesse*.

4.6 The Symmetrical Logic

At the beginning of this chapter, I have illustrated some situations in which intelligent machines are unable to emulate humans, e.g., understanding the bizarre behavior of a ring of money counterfeiters, get rid of the Mexican standoff, recognizing the kairos in the three-prisoner dilemma, and solving the Buridan's ass paradox. Human beings could cope with these situations by some forms of intuition and conjectural capacity, say, employing the *esprit de finesse.* In principle, machines provided with an automated *esprit de finesse* should be able to face them quite easily. What are thus the capacities that machines must develop to achieve such a result? All these situations are dealt with humans by resorting to their capacity for perceiving the whole and the now.

Whole and now apparently belong to two different realms. The whole seems to concern space, while the now seems to concern time. However, on a closer look, one can realize that whole may refer to time as well, "*To view the world sub specie* aeterni *is to view it as a whole - a limited whole. Feeling the world as a limited whole - it is this that is mystical*" [25, 6.45]. Similarly, the notion of now hides a spatial dimension. Scholastic philosophers distinguished between "the now that passes" (*Nunc fluens*), which is the ephemeral human time; and "the now that remains" (*Nunc stans*), which is the eternal time of God.[11] However, this distinction might create an unbridgeable gap between humanity and God, because the two now can hardly meet. In such a way, human beings and God would be destined to live in two separate, parallel, noncommunicating temporal dimensions, which are unbearable for religion, such as Christian religion, centered on the incarnation and the sacred history. So, Nicholas of Cusa, the great Renaissance humanist and philosopher, introduced a third distinction, the *Nunc instantis*, the "instantaneous now." The "instantaneous now"—argued Cusa—is the moment of eternity, which cuts the continuum of the chronological time. Each instant is potentially eternal because it can be indefinitely expanded in the subjective experience, yet it is not the eternity, because it has no duration at all, i.e., you cannot catch the instant. It is a point with zero dimensions but with a location determinable by an ordered set of spatiotemporal coordinates. Brief, the *Nunc instantis* is the eternity as human creatures can experience it, and it is the place where they can get in

[11] This distinction was first introduced by Boethius in The Consolation of Philosophy.

contact with God[12]. Similarly, the last century German philosopher, Walter Benjamin, argued that human time is not homogenous, but it is "*fulfilled by the here-and-now (Jetztzeit)*" [26]. Instantaneous now, here-and-now, are—according to Italian philosopher Massimo Cacciari—the door which unites two sides by separating them: the present that urges and the indifferent eternity [27, p. 52]. The whole and now are thus almost the two sides of the same coin. They are how humans speak of two unthinkable concepts: infinity and eternity.

Thinking the unthinkable is a unique feature of the human mind; this is the fundamental discovery of influential Chilean psychiatrist and psychoanalyst, Ignacio Matte Blanco [28]: "*Deep down, both the infinite and the unconscious are human attempts, independent of one another, at understanding something which is indivisible and, as such, unthinkable*" (Matte Blanco 1975, p.377). Matte Blanco was one of the most eminent psychoanalytic scholars of the second half of the 20th century. With his ground-breaking research, he attempted to formalize the theory of the unconscious using the formal logic of Russell and Whitehead. "*The most important general conclusion that emerges from my studies*—Matte Blanco writes—*is that psychical life can be viewed as a perceptual dynamic interaction—in terms of tension, cooperation, or even union—between two fundamental types of being which exist within the unity of every man"* [30, p. 13]. Matte Blanco argues that the human mind has two fundamental operational modes[13], with their respective logics: (1) the classical logic, in which each element is defined by spatiotemporal coordinates that he calls asymmetrical and (2) the logic of totality, atemporal and spaceless that he calls symmetrical.

[12]Nicholas of Cusa is thus arguing that we can get in contact with the transcendent through the instant. This idea is nicely expressed also in Sufi stories and Zen koans, such as the Zen parable of the man, the tiger, and the strawberry: "A man traveling across a field encountered a tiger. He fled, the tiger after him. Coming to a precipice, he caught hold of the root of a wild vine and swung himself down over the edge. The tiger sniffed at him from above. Trembling, the man looked down to where, far below, mother tiger was waiting to eat him. Only the vine sustained him. Two mice one white and one black, little by little started to gnaw away the vine. The man saw a luscious strawberry near him. Grasping the vine with one hand, he plucked the strawberry with the other. How sweet it tasted!" [29, p. 38].

[13]Similarly, Nobel laureate Daniel Kahneman suggests that there are two modes of thought; "System 1," fast, instinctive, and emotional; "System 2" slower, deliberative, and logical [31].

Asymmetrical logic is the logic followed by conscious thought, which allows the conception and perception of concrete and well-delimited things, such as a person, an object, a thought referring to a concrete fact, a single abstract concept, and so on. Asymmetrical logic is governed by the principle of noncontradiction, e.g., A cannot be the same as non-A, $A \neq non\text{-}A$. In Pascal's terms, asymmetrical logic corresponds to the *esprit de géométrie.*

Symmetrical logic is instead the sense for what cannot be broken down, the feeling for the whole [32]. Symmetry is a state of no limits, where the unit person feels as one with the world outside and inside, it is the deepest part of our mind, its primordial unconscious structure, which "*does not know individuals but only classes or propositional functions which define the class*" [30]. Symmetrical logic is characterized by (1) absence of contradiction so that any assertion is equal to its negation; (2) absence of distinction between mental and external reality; and (3) absence of boundaries in time and space (eternity and infinity). Symmetrical logic is made up of sets of infinite sets and is governed by the principle of totality, e.g., A is the same as non-A, although at a further dimensional level, $A(x) \Leftrightarrow non\text{-}A(x)$. Ultimately, with the term "symmetrical logic," Matte Blanco provides his description of the *esprit de finesse.*

The coexistence of symmetrical and asymmetrical logics, which is called bi-logic by Matte Blanco, is the standard condition of all human beings: "*we live the world as though it were a unique indivisible unit, with no distinction between persons and / or things. On the other hand, we usually think of it in terms of bi-logic and, some few times, in terms of classical logic*" [30, p. 46].

Now it is possible to reformulate more precisely the question of whether we can ever accomplish to automate the *esprit de finesse*. The point is whether we can ever design intelligent machines capable of applying symmetrical logic.

4.7 Data and Totality

In the previous chapters, I have extensively argued that capacities for intuition largely coincide with a particular feature of human intelligence, say, the capacity for operating through indeterminate concepts such as infinity, eternity, totality, instantaneity, and so on. I called such a capacity the capacity for "*thinking the unthinkable,*" say, the *indivisible,* the whole. Following Matte Blanco, I argued that this capacity can be comprised under the wider category of symmetrical logic. With Matte Blanco, I argued that symmetrical logic is not a marginal aspect of the human mind, rather it is the basic and primordial mental skill that makes us humans. Most creations of the human spirit—such as arts, music, poetry, mystics as well as sense of humor, comic timing, perception of the kairos, the coup d'oeil, and so on—are the result of symmetrical logic.

It is thus understandable why computer scientists and AI researchers have been investigating for several years nonclassical logic systems with the aim to create machines capable for "*thinking like human beings.*" Logic systems can be categorized under two main headings: (1) explosive and (2) nonexplosive. Explosive systems are systems based on the principle *ex falso (sequitur) quodlibet* (EFQ), "from falsehood, anything (follows)"; they affirm that from a contradictory statement one can infer any conclusion; i.e., if one accepts paradoxes and antinomies, it is impossible to reach any truth. "*Classical logic, and most standard 'non-classical' logics too such as intuitionist logic, are explosive. Inconsistency, according to received wisdom, cannot be coherently reasoned about*" [33]. On the contrary, nonexplosive (paraconsistent) systems admit contradictions; paraconsistent logic does not deny the notion of truth, rather it claims that one can reach true conclusions even from contradictory premises. It is out of the scope of this chapter to describe the various paraconsistent systems and the techniques that they use, it is, however, important to stress that they do not truly accept antinomies and paradoxes (as one could erroneously suppose) rather they try to neutralize contradictions by including—instead of excluding—them [34, 35]. "*Paraconsistent logic accommodates inconsistency in a controlled way that treats inconsistent information as potentially informative*" [33].

Next-generation AI is increasingly applying algorithms based on nonclassical logic systems; e.g., fuzzy set theory, computability logic, interactive computation, and so on [36, 37]. This approach is producing some results and machines are starting to simulate human capacity for intuitive thinking. On the basis of the past experience, one can foresee that AI will become more and more skilled in imitating human intuition, and it is likely that next generation AI will become eventually able to replicate human intuitive capacities almost perfectly. Yet, algorithms using paraconsistent logic are not based on actual symmetrical processes. Paraconsistent algorithms deal with inconsistent information by turning it into binary, dichotomic information. At the end of the day, paraconsistent algorithms are a tool to incorporate antinomies within classical logic systems, allowing machines to handle contradictory concepts [38]. When symmetrical notions—such as infinity, eternity, totality, and instantaneity—are handled by AI, they are eventually included into binary, dichotomic processes.

Next-generation AI can put up with *A(x)* ⇔ *non-A(x)* notions, only provided that they are incorporated into *A* ≠ *non-A* terms. One could argue that this is due to the still limited development of AI, it would be thus conceivable a future in which new, more advanced algorithms will be able to operate through actual symmetrical operations, say, only with indivisible and indeterminate notions. I disagree with this hypothesis, as computational machines capable of doing completely without computing are an oxymoron, a *contradictio in adiecto*. One could still argue that there is a threshold above which quantity may turn into quality; a myriad of details may become the whole picture; and the *esprit de géométrie* may become *esprit de finesse*. I answer that this is not possible because of data. What is data?

Data is a difference. According to Floridi "*a datum is reducible to just a lack of uniformity (*diaphora *is the Greek word for "difference"), so a general definition of a datum is* The Diaphoric Definition of Data (DDD)*: A datum is a putative fact regarding some difference or lack of uniformity within some context. Depending on philosophical inclinations, DDD can be applied at three levels: (1) data as* diaphora de re*, that is, as lacks of uniformity in the real world out there (...) As "fractures in the fabric of being" they can only be posited as an external anchor of our information (...); (2) data as* diaphora de signo*, that is, lacks of uniformity between (the perception of) at least two physical states, such as a higher or lower charge in a battery, a variable electrical signal in a telephone conversation, or the dot and the line in the Morse alphabet; and (3) data as* diaphora de dicto*, that is, lacks of uniformity between two symbols, for example the letters A and B in the Latin alphabet*" [39]. The DDD thus implies that one can never represent indeterminate concepts (e.g., infinity, eternity, totality, and instantaneity) by using data. On the one hand, data is an asymmetry, a fracture, a lack of uniformity, a difference; on the other hand, infinity, eternity, totality, and instantaneity—the whole and the now—cannot admit dichotomic divisions and internal fractures. One can, of course, operate though discrete operators which symbolize indeterminate concepts (as it happens in mathematics), but in so doing one turns them into determinate quantities. Taken rigorously, indeterminate concepts cannot be handled by using data, because the very notion of data denies the existence of indivisible, indeterminate realities. If an item can be expressed in terms of data, it cannot be simultaneously, from the same account, expressed also in terms of totality. The indefinite cannot be generated by a finite collection of particularities as well as an infinite set—even a countable infinite set—is not made up of finite elements: by summing up all singularities, you will never generate the whole. Eventually, infinite sets cannot be reduced entirely to data; there is an unbridgeable gap between these two dimensions[14]. This is also the reason we cannot solve the metastability problem by the roots. Intelligent machines—even quantum computers—are devices which operate through data, more and more data as they become more and more intelligent. To think of a computational machine provided with symmetrical logic (i.e., a machine which can do without data) is therefore an inherent contradiction, no matter how sophisticated the machine is[15].

4.8 The Death of the Pythia

In 1976, Friedrich Dürrenmatt wrote the short novel *Das Sterben der Pythia* (The Death of the Pythia). The story unfolds as a dialogue between two characters, Pannychis XI, an elderly Delphic priestess at the end of her life, and Tiresias, the clairvoyant. Both cynic and unbelievers, nevertheless they are genuinely different, Pannychis "*wanted to use her oracles to mock those who believed them*"; Tiresias had a hidden political agenda instead to achieve. Their conversation was about the story of Oedipus. Although in different moments, they were both asked three times to unravel to Oedipus his fate. Three times they invented. Pannychis "*with imagination, with whimsicality, with high spirits, even with a virtually irreverent insolence, in short: with blasphemous jocularity*"; Tiresias "*with cool reflection . . . , with incorruptible logic, again in short: with reason*." Ironically enough, all of Pannychis's implausible oracles turned out to become a reality; Tiresias' manipulative and intelligent predictions had the opposite of the intended effect. In the end, Tiresias says to Pannychis: "*Both of us faced the same monstrous reality, which is as opaque as man, who creates it*." Pannychis does not answer; she fades away.

Dürrenmatt's short novel is almost a parable of AI research. No computational machine can truly duplicate the human mind in its entirety. Computer scientists and AI researchers who are using their "*incorruptible logic*" to develop AI capable for human intuitive skills are going only to imitate these capacities, creating soulless replicas rather than novel Adams.

[14]My conclusions are not that far from those of Dreyfuss, but my argument is quite different. I don't argue that machines will be never able to experience the world as a gestalt, I only contend that a computational machine provided with symmetrical logic is a nonsense.

[15]I don't exclude that in the future we could create biological computers using biomolecules; these artificial devices might be able eventually to reproduce symmetrical logic processes, yet they would not be any longer "machines," say mechanical devices, rather they would be "artificial biological organisms."

Machines replicating human intuition are not *super humans* but, so to say, counterfeit humans. Practically speaking, however, I will admit that they might work well enough to meet the main needs of the digital society, which basically consist in providing increasing interchangeability between humans and machines. Already today, bots can interact online with customers in an acceptable way, sometimes also challenging the Turing test. Eventually, even if machines will not become actual intelligent agents, their condition of "philosophical zombies" will be still workable for doing business. What is certain is that the debate on whether AI will ever surpass and substitute human intelligence is without merit. AI can do many things better than humans, but to use symmetrical logic, developing an *esprit de finesse.*

We are in the midst of an epochal transition only comparable to the transition from orality to literacy [40, 17]. AI is heralding this revolution, making it possible. I am convinced that AI will transform the labor market and overturn many current standards [41], and it will become more and more capable for miming some human intuitive skills. Yet, AI is great as far as it is used as a tool to amplify and enhance human analytic, dichotomic skills; this is its core mission.

AI is not for understanding the love for stage of a bunch of Sorrento counterfeiters, the paintings of the *Bamboccianti*, Sergio Leone's movies, and Morricone's music (not even to detect emotions in humans or to perceive the kairos in a critical decision). These things belong to a different register which is destined to remain forever extraneous to intelligent machines. Human reality is much more complex and richer than any computational device can grasp. Rationality is wider than we are used to think, there are forms of rationality—as Pascal teaches—that are understood by using intellectual finesse rather than computational capacities. The "*unthinkable*" and the "*unspeakable*" are not irrational, rather they express different—maybe higher—forms of rationality. It is not within the scope of this chapter to discuss whether this is good or bad; it is a fact and that's enough. "*There are, indeed, things that cannot be put into words. They make themselves manifest*" [25, 6.522]. Pannychis XI faded away, "*the rest is silence.*"

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