

# THE EMPEROR WITH NO CLOTHES: Chomsky Against ChatGPT

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**Abstract:** Artificial Intelligence (AI) is all the rage these days. The coming to grips with this new development is now in full swing. The main questions that we seek to answer in relation to AI pivot on one fundamental problem: Can we create AI that will match human intelligence? This contribution addresses this question. It centers on the recent article published by Noam Chomsky and his two co-authors. After a brief overview of the development of AI and its capabilities, the article presents the perspective on AI presented by Chomsky and his colleagues. It also offers a criticism of this perspective. The last sections of the contribution discuss the relationship between humans and machines. They outline the parameters that AI should satisfy to achieve the professed objective of its creators. Most importantly, the article argues, AI should embody the process of creation that can only be possible if we embrace this process and make it the central organizing principle of our theory and practice.

**Key words:** Artificial Intelligence, ChatGPT, Chomsky, Gödel, process of creation, and paradoxes.

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## Introduction

True innovations always create controversies, which hardly surprises anyone. We take such controversies as given. After all, innovations disturb status quo in multiple ways. Their impact produces numerous and broad effects that powerfully reverberate throughout our entire society. The more radical an innovation is, the more profound is its impact, and the more acute controversies it begets.

Among relatively recent innovations, few can compare with Artificial Intelligence, or AI in its popular abbreviation. Born in 1956 as the offshoot of the general interests in cognitive theory and its philosophical progenitors—functionalism and positivism—AI took some twenty years to produce its own theoretical outillage and practical results. It also acquired its loyal following in a variety of fields.<sup>1</sup> Today AI stands out as the most significant development that many compare to the revolutionary advances of the past on par with the invention of automobiles or the construction interstate highways that transformed the economy.

The rapid development of AI over the last quarter century has not only been the source of hope and admiration, but has also caused much doubt and concern. Even though AI is several decades old, we are still far from unanimous about its future possibilities, advantages, and dangers. Numerous contributions by prominent intellectuals and public figures try to help formulate a realistic assessment of AI's potential.

Noam Chomsky is one of the major intellectual figures in the United States. He has written extensively on a variety of subjects, including linguistics, cognitive sciences, philosophy, and even politics. His turn to the subject of AI deserves attention for reasons of the importance of this topic, as well as the significance of Chomsky's intellectual stature. His most recent contribution on the subject of AI that he co-wrote with Ian Roberts and Jeffrey Watumull—figures of considerable intellectual magnitude in their own right—appeared in *The New York Times* only a couple of weeks ago.<sup>2</sup> Chomsky and his colleagues intended this article for broad audience. They have written it in a popular and accessible style devoid of shop jargon and technicalities. The article focuses on general issues and themes related to AI.

Chomsky is a noticeable figure. His contributions on any subject never fail to provoke and challenge audiences. The article Chomsky and his co-authors published in *The New York Times* has inspired this contribution that follows it into the complexity of the subject. In an effort to offer an objective assessment of the new development this article touches on a variety of themes and issues related to AI. Chomsky's article covers many of them. Although the current contribution has been in many ways conceived as a critical response to Chomsky and his co-authors, given the richness of the subject, it has to transcend the relatively narrow scope of critical response to somebody else's writing and venture into areas and themes that the original article does not include.

Although Chomsky wrote his article with co-authors, the current contribution frequently use Chomsky's name alone without using the co-authors' names. This fact should not be construed as an indication that the co-authors are less important or less irrelevant; they most certainly are not. The motivation for the omissions is simple: this article tries avoid frequent repetitions that add little to the content while adding redundancies that may tire readers. Also, the article that appeared in *The New York Times* fully represents the richness and nuances of Chomsky's ideas and views. He is undoubtedly the most noticeable name among the three co-authors. For this reason, using only the name of Chomsky with full understanding of the importance of all contributors is not meant as an offense to or a slight to other contributors, but merely is done only in the interests of economy and efficiency.

## **AI: Hype and Skepticism**

### *The Progress of AI*

In 2018, Sundar Pichai, the chief executive of Google, made a bold statement. Artificial Intelligence (AI), he said, “. . . is probably the most important thing humanity has ever worked on.” “I think of it,” he also added, “as something more profound than electricity or fire.”<sup>3</sup> Back in 2018 few people thought of this assessment as an overstatement. Many believed what Pichai said but they also thought that the realization of this prophecy would take years or even decades. Only four years later, Paul Christiano, one of the principal figures in Open Air--a leading company in the field of AI—made an even bolder prediction. “The broader intellectual world,” he said, “seems to wildly overestimate how long it will take AI systems to go from ‘large impact on the

world’ to ‘unrecognizably transformed world.’” The impact, he added, “is more likely to be years than decades, and there’s a real chance that it’s months.”<sup>4</sup>

The popularity of AI has grown considerably over the last couple of years. AI is the subject of numerous scholarly studies, as well as newspaper and magazine articles.<sup>5</sup> More and more politicians and pundits chose to cover the hot topic. Discussions of AI are now taking place in classrooms, social media, and around dinner tables in ordinary American homes. Even Hollywood has jumped on the AI bandwagon with its mega-dollar movies like *Westworld*, *Blade Runner*, *The Terminator*, *The Matrix*, *Transcendence*, *Ex Machina*, and the list goes on and on.<sup>6</sup>

The growing popularity of AI inspires numerous new ventures and start-up companies. The growth is nothing short of phenomenal. AI expertise attracts a lot of money. Investors are rushing these days to throw unbelievable sums even on relatively unknown companies and the pace is only increasing. If some investors slow down, others step in to pick up the slack. The business world is convinced about the inevitability of the AI domination in the world of big capital; and the result is an even greater acceleration of investments.<sup>7</sup> AI moves forward by making gigantic strides.<sup>8</sup> In a very short time, the gold rush into AI has become a veritable mania. When four AI researchers left Google to create their own start-up company they called Mobius AI, they did not even know what their product was going to be. Yet a week after they announced their new venture, Andreessen Horowitz and Index Ventures--two major venture capital firms in Silicon Valley--came to them with funding offers. At the blink of an eye the value of Mobius that was little more than four guys with laptops jumped to about \$100 million.<sup>9</sup> Despite its more than modest size of about 375 employees, OpenAI—the company that shook Silicon Valley with its ChatGPT and only four months later unveiled its new product GPT-4—has the financial backing in billions of dollars.<sup>10</sup> The company’s management has repeatedly stated that for humanity to do well in the future, we should race ahead as fast as possible.<sup>11</sup>

The soaring interest in AI is not limited to venture companies and start-ups. The bug of AI has infected tech giants like Google and Meta. The current unstable economy and the desperate search for the next big thing that will end our economic woes enhance the spread of the contagion. Many big players in the business world are ready to offer AI entrepreneurs nine-figure valuation “for little more than an idea and a résumé.”<sup>12</sup>

AI inspires expectations that can only be described as exuberant. There is no shortage of prophecies that may appear wild to a casual observer. They predict nothing short of another major transformation comparable to the rise of agriculture or the industrialization.<sup>13</sup> Kelsey Piper who is a senior writer at *Vox*, where she has been covering modern technological advances, as well as related economic, cultural, and safety issues, offers the following paean describing our future with AI:

We are going to be able to automate any work that can be done remotely . . . We are going to be able to bring us the next 100 years of drug discovery and development in the space of maybe a couple of months, maybe a single research project. We have this extremely powerful thing we’re on the brink of. And in 2019, when you heard that, I think you had to be a little skeptical. Like, this is Silicon Valley. We’re not new to the hype cycle. Sure you’re going to change the world . . . You can make an AI

system that is as good at writing as you . . . then the idea that you would have an AI that codes AI, that's not a giant leap . . . there are people right now trying to develop AI systems that can develop AI systems, because there's people trying to develop AI systems that can do every human job.<sup>14</sup>

The exuberance breaks into full blast utopian, if not apocalyptic visions of what the future of AI may bring:

No one needs to work. No one has to work. And all of the goods of all of this AI work they've done are distributed to all humankind.<sup>15</sup>

Not everyone is as gaga about AI as its enthusiasts. There are also skeptical, if not critical or even cynical voices in the chorus;<sup>16</sup> and voices that are just plain negative.<sup>17</sup> Even the enthusiasts express occasional caution. Ezra Klein who covers technology for *The New York Times* offers an ambiguous reflection:

I think that gets to one of the things that I actually find the most unnerving, which is that the more inhuman the statistical correlation process happening at the center of these [AI] systems becomes, the more human the experience of interacting with the system becomes.<sup>18</sup>

There are other and more straightforward reservations. Luciano Floridi finds it difficult to predict where AI is going. He sees its future to be full of unknowns and difficult to predict “which grain will grow and which will not.”<sup>19</sup> Discussing the future of applications such as ChatGPT and similar technologies, Cade Metz notes, for example, that the deployment of these technologies is shifting the behavior of students and educators “who are trying to understand whether the tools should be embraced or banned.”<sup>20</sup>

Many skeptics categorically deny any possibility that AI can match human intelligence—the avowed goal of AI enthusiasts and industry. Such criticisms go back to the early history of AI. In 1972 Hubert Dreyfus, a well-known philosopher, published a book entitled *What Computers Can't Do: A Critique of Artificial Reason* in which he disparaged claims that computers can replicate human intelligence.<sup>21</sup> He famously wrote, for example, that computers could not successfully compete with humans playing chess. He subsequently offered a revised and somewhat muted version of his critique in another book *Mind Over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*.<sup>22</sup>

Much time has passed since Dreyfus's headline catching publication. There is hardly anyone today who will dispute the claim that a computer can play a decent game of chess and even beat world champions. In 2017, Google DeepMind created a program called AlphaZero that could win at chess by studying the game without human intervention and developing a not-quite-human strategy.<sup>23</sup> However, despite these indisputable successes, Dreyfus's general critique still commands attention and support among many researchers. In his article “Why General Artificial Intelligence Will Not Be Realized,” Ragnar Fjelland focuses on Dreyfus's thesis. His conclusion is that “Hubert Dreyfus' arguments against general AI are still valid.”<sup>24</sup>

## *What AI Systems Can Do*

The conflicting opinions about AI certainly warrant a careful assessment of this innovative development. The examination of AI should probably begin with definitions. A good definition often helps to avoid confusion.

There are many ways in which researchers define AI. They are very different and vary in length, detail, focus, and terminology. The definition provided by Jody Glidden is concise and clear. In her view,

AI is a collection of continually developing interactions with data. AI spans data integrity and prediction, data science, machine learning and more. It can be seen as both an application of technology and a school of thought--much like physics.<sup>25</sup>

Ezra Klein sees the definitive feature of AI in operating on probabilistic algorithms. These algorithms are designed to assess digital information and make predictions on the basis of these assessments.<sup>26</sup> Siw Grinaker focuses on the term “intelligence” as a pivot for her definition. She sees intelligence as the “faculty of reasoning and integration of knowledge,” or, as she puts it, the capacity “to connect the dots” and make sense. For her, “‘artificial intelligence’ must mean a human-made interface with the power to reason and integrate knowledge.”<sup>27</sup>

Artificial intelligence is a loose term. It is not so much about human intelligence as it is about the universe populated by programs like ChatGPT. When we run such programs, they give an impression as if they display features that appear similar to observable features we find in human intelligence. Researchers do not seem to agree as to what AI really involves. All they do is identifying, as Siw Grinaker does, at least some of the behaviors associated with human intelligence that AI must demonstrate. These behaviors include “planning, learning, reasoning, problem solving, knowledge representation, perception, motion, manipulation and, to a lesser extent, social intelligence, and creativity.”<sup>28</sup>

Although AI systems are already available and their application is on the rise,<sup>29</sup> even AI aficionados and promoters do not see them as truly intelligent, certainly not in the same sense that humans are deemed intelligent. Perhaps one reason why we experience difficulties in defining AI is a relative novelty of this development. By universal admission it has not achieved its full potential. The term “artificial intelligence” applies primarily to what these systems may become in the future, rather than what they are today; and this future is very hard to envision since the trajectory of the improvement curve of AI devices is very hard to predict and estimate. Therefore, the term “artificial intelligence” refers primarily to the future, not so much the current AI devices.<sup>30</sup> The “thinking” that AI systems display is, by general admission, utterly inhuman. Its operation involves billions upon billions of connections that constitute layers upon layers of parameters and nodes of computing power; in other words, these systems have little to do with what we know about human intelligence and, in this sense, are not human. However, as Ezra Klein points out, the more we add to these layers,

parameters, and nodes, the more strange their operation appears to us humans, “the more human they seem to us;”<sup>31</sup> and that is what many find to be the “weirdest” thing about AI.

There are still many aspects of AI that fall far short of human intelligence. One of them is creativity. Despite advances in AI systems, they still are nowhere near human capacity to create. Since many expect AI to take over many jobs performed by humans in the future, they feel that creative occupations are not safe from machine intervention. Attempts to use AI in creative fields have been going on for quite some time with some positive results. The goal that AI developers set for themselves is to make human life easier in all spheres, including the sphere of imagination and innovation. Many promoters feel that AI is likely to emulate eventually human intelligence and creativity.<sup>32</sup>

Observers emphasize, for example, that AI systems can write at least as well as humans<sup>33</sup> and can even give text editors run for their money.<sup>34</sup> AI is developing its own sense of humor (sort of) and can write a joke. Here are some examples: “Question: Why did Madonna go to the bank? Answer: To get a Material Loan;” “Question: Why did Madonna study geometry? Answer: Because she wanted to learn how to strike a pose in every angle.” Yet, there is still little evidence that the machine understands what actually makes people laugh. Oren Etzioni—the founding chief executive of the Allen Institute for AI, a prominent lab in Seattle—observes: “It [the machine] doesn’t grasp the nuance of what is funny.”<sup>35</sup> Even those who accept the idea that AI will eventually match the human capacity to create recognize that there is still a long way to go before this happens. Many doubt that it ever will.<sup>36</sup>

Consciousness is yet another feature that AI is still lacking. Many critics and observers of AI emphasize that a machine that matches human intelligence should have something similar to human consciousness and the capacity for moral thinking. At this point there is little practical discussion of either of these issues among practitioners of AI, to say nothing of practical applications. Elisabeth Hildt considers that without consciousness AI will never achieve the potential of the human intellect. Consciousness, she writes,

. . . plays an important role in debates around the mind-body problem, the controversy over strong vs. weak artificial intelligence (AI), and bioethics. Strikingly, however, it is not prominent in current debates on ethical aspects of AI and robotics. This text explores this lack and makes two claims: We need to talk more about artificial consciousness and we need to talk more about the lack of consciousness in current robots and AI.<sup>37</sup>

Again, there are detractors who think that AI can never be conscious in the human sense. Subhash Kak, for example, confidently predicts that a computer will never be truly conscious.<sup>38</sup> Christof Koch, a neuroscientist studying consciousness, is ambivalent about the possibility of machine consciousness. He cautiously observes that he does not know of any fundamental laws or principles operating in our universe that would outright forbid “the existence of subjective feelings in artifacts designed or evolved by humans.”<sup>39</sup> In her well-received book *Artificial You: AI and the Future of Your Mind* Susan Schneider offers a broad discussion of such themes as artificial general intelligence, consciousness and AI, singularity, and post-human intelligence. The discussion of AI consciousness certainly stands out in Schneider’s book.<sup>40</sup>

Sam Altman, chief executive for OpenAI, points to some types of behavior of AI systems that resemble human reasoning. He acknowledges, however, that machine's reasoning skills "break down in many situations" and produce misinterpretations. One example he gives is the word "gracias" that machine interprets as "grassy ass." The technology, Altman concludes, simply "cannot duplicate human reasoning." There are numerous issues with moral reasoning and emotional intelligence that come up in discussions of AI. Some researchers, particularly those who are philosophically inclined, insist that human-like AI must be capable of moral reasoning and emotional experiences.<sup>41</sup>

There is also a problem of hallucination that haunts even the most advanced bots. They cannot differentiate between true and false and may generate information that is completely false. For example, when asked to identify addresses of websites on the newest cancer research, the machine may generate a list of addresses that quite simply do not exist.<sup>42</sup> Last but not least, AI systems are not cheap. Building and providing service for chatbots is enormously expensive. As companies train their new AI systems on increasingly large amounts of data, new chatbots increase companies' costs. As a result of increased costs, companies have to restrict access. Mira Murati, OpenAI's chief technology officer, has said that the company may have to curtail access to the service if traffic becomes too heavy.<sup>43</sup>

The assessment of the current state of AI, both its positives and negatives, offers a general picture that is ambiguous and conflicted. There is no doubt that AI is an important development but there are questions as to whether it will play such crucial role in transforming our civilization as its supporters claim. Also, this assessment does not give clear answers to critical questions as to how much we should commit ourselves to AI and how much we should invest in the field, particularly in view of the fact that the overall performance AI is so far uneven: AI is good at some things and totally inept at others. Many aspects of human intelligence still remain inaccessible to AI systems. Cade Metz observes:

It [AI] is an expert on some subjects and a dilettante on others. It can do better on standardized tests than most people and offer precise medical advice to doctors, but it can also mess up basic arithmetic.<sup>44</sup>

At the present time even the most impressive AI systems can only complement skilled workers rather than replace them. Such systems cannot serve in lieu of doctors, lawyers, or accountants; their performance in these fields needs an oversight by experts to prevent mistakes. They are useful in some paralegal applications but only with trained lawyers by their side. With some limitations, they can moderate the content on the Internet.<sup>45</sup> As to the full potential of AI, it is still in the future. Yet, as has been indicated, the trajectory of its improvement is still indeterminable. For Jody Glidden, "AI is only as powerful as the date you give it."<sup>46</sup> Siw Grinaker speaks for many who are involved in AI research when she writes:

AI is not some magic that will solve anything for you and your digital experiences—just forget the notion. AI is not remotely close to human

intelligence or concept-formation as we speak. AI can only do what is instructed within a given field. AI will not conquer the world.<sup>47</sup>

There are many nagging concerns that plague the field of AI. The most common concern is that humans may lose control of this technology and may even become enslaved by it.<sup>48</sup> A survey conducted in 2022 asked AI experts what probability they would put on AI systems causing human extinction or some other permanent and severe infringement on human freedom. The median reply was 10 percent.<sup>49</sup> The number is low, but then the application of these systems in our society is still very limited. This concern may grow as the application of AI systems becomes widespread. There are also fears of widespread unemployment that AI may generate and problems that applying AI in education may cause.<sup>50</sup>

Due to unpredictability of technological change in the field of AI, any prognoses and predictions are merely speculations that are more or less wild. We have no clear answer as to what extent we should commit ourselves to AI technology and how much we as a civilization should invest in its development. The management of OpenAI thinks that the way for humanity to do well on A.I. is to race ahead as fast as possible,<sup>51</sup> others are more cautious. These issues become even more critical in the current economic conditions of limited resources—both material and human. By overinvesting in the field of AI we may very well under-invest into other fields that are also important for our civilization. We may very well be building a skewed and weird world.<sup>52</sup> Some principal questions about AI remain unanswered: Do we need to try to develop AI systems that would fully match human intelligence? Are such efforts utopian and have no practical significance? How far do we want to take the AI project? There is no doubt that even a narrow application of AI will require humans to adapt to the world in which such devices are extensively used.<sup>53</sup> We are still not sure what such adaptation would involve.

Technology alone does not provide objective and comprehensive answers to questions related to AI's future--what it can be and what it absolutely cannot be. The impact of AI is broad. As many point out, AI entails multiple effects in many and very different aspects of our civilization: from technology to economy, to social relations, culture and general intellectual matters, education and much, much else.<sup>54</sup> Many feel that such comprehensive and assessment will require bringing in philosophy and humanities more generally, not just computer science and technology. Numerous contributions emphasize the need for a broad and philosophical approach in discussing AI.<sup>55</sup> Susan Schneider has made such approach the main focus of her recent and very successful book entitled *Artificial You: AI and the Future of Your Mind*. She writes: "The science of emerging technologies can challenge and expand our philosophical understanding of the mind, self, and person."<sup>56</sup>

In this respect, the recent article by Noam Chomsky and his co-authors is a welcome contribution to the discussion of AI. As a linguist with extensive interests in cognitive science and philosophy, as a public intellectual who occupies a very high rank in our culture, Chomsky has much to offer in this discussion. Moreover, he combines his impressive qualifications with two other co-authors who also have much to say on the subject. The contribution that all three make deserves attention and very careful consideration.



As has already been indicated in the introduction, the subsequent discussion will use primarily Chomsky's name as the main referent. Again, this is not in disrespect to the other two co-authors, but merely for consideration of space, economy, efficiency, and convenience. The following two sections will rely primarily on the article by Chomsky and his co-authors. Since most of the material comes from this article, these two sections will use fewer references, which will help readers to navigate the text more efficiently.

## **The Perspective on AI by Chomsky and His Co-Authors**

### *Contra AI*

The central point of the article by Chomsky and his co-authors is that machine "thinking" is very different from the way humans think. In Chomsky's view, machines basically process huge amounts of data and then draw conclusions on the basis of statistical frequency of patterns that they detect. In his own words,

Roughly speaking, they [machines] take huge amounts of data, search for patterns in it and become increasingly proficient at generating statistically probable outputs—such as seemingly humanlike language and thought.<sup>57</sup>

According to Chomsky, AI devices operate very differently from the way that the human mind operates. Unlike ChatGPT and its ilk, the human mind "is not a lumbering statistical engine for pattern matching, gorging on hundreds of terabytes of data and extrapolating the most likely conversational response or most probable answer to a scientific question."<sup>58</sup> This process follows an algorithm embedded in the program. The machine determines what and to what degree corresponds to the algorithm in use. Such operation is a form of equilibration that establishes one-to-one correspondence between algorithm and data. Using the algorithm the machine comes up with an answer that is based on statistical frequency.

Chomsky admiringly quotes Wilhelm von Humboldt to bring up what appears, in his view, to be another important difference between the operation of the human mind and the operation of the machine. In his much quoted remark about extraordinary capacities of the human mind, Humboldt emphasizes that the human mind makes "infinite use of finite means," thus "creating ideas and theories with universal reach."

Chomsky finds the human mind, in contrast to AI, to be surprisingly efficient. When compare with the way that AI operates, Chomsky writes, the human mind "is a surprisingly efficient and even elegant system that operates with small amounts of information; it [the mind] seeks not to infer brute correlations among data points but to create explanations." Chomsky refers to the development of a child as an illustration. He writes:

For instance, a young child acquiring a language is developing *unconsciously, automatically and speedily* from *minuscule data* a grammar, a stupendously sophisticated system of logical principles and parameters.<sup>59</sup>

The grammar to which Chomsky refers, or what he also often calls “universal grammar,” is vastly superior to humanly engineered codes and programs. It is “an expression of the innate, genetically installed ‘operating system’ that endows humans with the capacity to generate complex sentences and long trains of thought.”

Chomsky, who is no expert in AI, characterizes machine programs as being “stuck in a pre-human or nonhuman phase of cognitive evolution.” By far the most serious flaw that Chomsky sees in the machine is the total absence of “critical capacity” that Chomsky considers to be an important attribute of human intelligence. In Chomsky’s words:

Their [AI] deepest flaw is the absence of the most critical capacity of any intelligence: to say not only what is the case, what was the case and what will be the case--that’s description and prediction--but also what is not the case and what could and could not be the case. Those are the ingredients of explanation, the mark of true intelligence.<sup>60</sup>

For Chomsky, these various descriptions “are the ingredients of explanation, the mark of true intelligence.” The machine is incapable of generating explanations that Chomsky considers to be the exclusive prerogative of the human mind. “The crux of machine learning,” Chomsky maintains, “is description and prediction; it does not posit any causal mechanisms or physical laws.”

“Human-style thought,” according to Chomsky “is based on possible explanations and error correction, a process that gradually limits what possibilities can be rationally considered.” In this view, human intelligence involves an examination of all possible explanations and error corrections; it is the process of gradually limiting the number of possibilities. Chomsky also recognizes that

While scientists certainly seek theories that have a high degree of empirical corroboration, as the philosopher Karl Popper noted, “we do not seek highly probable theories but explanations; that is to say, powerful and highly improbable theories.”

To offer an explanation in a simplified form, Chomsky quotes Sherlock Holmes who gives the following explanation to Dr. Watson: “When you have eliminated the impossible, whatever remains, however improbable, must be the truth.” It is precisely in this respect that Chomsky sees a crucial difference between the mind and AI. A machine like ChatGPT is simply “incapable of distinguishing the possible from the impossible.” This capacity, according to Chomsky, is part of what it means to think: “To be right, it must be possible to be wrong. Intelligence consists not only of creative conjectures but also of creative criticism.”

Thus, the process of knowledge production is, in Chomsky’s view, one in which creative conjectures are restricted and limited—something that the machine simply cannot do on its own; it cannot differentiate between what is possible and what is impossible. This incapacity to discriminate contributes to another major flaw that Chomsky identifies in the machine: the machine is, in his view, incapable of moral

reasoning that is a distinct mark of human intelligence. Moral reasoning, according to Chomsky, constrains “the otherwise limitless creativity of our mind with a set of ethical principles that determines what ought and ought not to be (and of course subjecting those principles themselves to creative criticism).”<sup>61</sup>

With respect to moral reasoning, Chomsky finds that AI “exhibits something like the banality of evil: plagiarism and apathy and obviation.” The article uses excerpts from the exchange in which Dr. Watumull, one of the co-authors, discussed problems related to morality with ChatGPT. Based on this exchange, the article draws the conclusion that all that machines like ChatGPT can do is to summarize “the standard arguments in the literature by a kind of super-autocomplete, refuses to take a stand on anything, pleads not merely ignorance but lack of intelligence and ultimately offers a ‘just following orders’ defense, shifting responsibility to its creators.” Chomsky writes:

True intelligence is also capable of moral thinking. This means constraining the otherwise limitless creativity of our minds with a set of ethical principles that determines what ought and ought not to be (and of course subjecting those principles themselves to creative criticism) . . . To be useful, ChatGPT must be empowered to generate novel-looking output; to be acceptable to most of its users, it must steer clear of morally objectionable content. But the programmers of ChatGPT and other machine learning marvels have struggled — and will continue to struggle—to achieve this kind of balance.<sup>62</sup>

In 2016, for example, Microsoft’s Tay chatbot (a precursor to ChatGPT) flooded the Internet with misogynistic and racist content, having been polluted by online trolls who filled it with offensive training data. How can we avoid such episodes in the future? According to Chomsky, in the absence of a capacity to reason from moral principles, ChatGPT was crudely restricted by its programmers from contributing anything novel to controversial — that is, important — discussions. It sacrificed creativity for a kind of amorality.<sup>63</sup> “For all the seemingly sophisticated thought and language,” Chomsky stresses, the machine exhibits “the moral indifference born of unintelligence.” He further explains:

Here, ChatGPT exhibits something like the banality of evil: plagiarism and apathy and obviation. It summarizes the standard arguments in the literature by a kind of super-autocomplete, refuses to take a stand on anything, pleads not merely ignorance but lack of intelligence and ultimately offers a “just following orders” defense, shifting responsibility to its creators.<sup>64</sup>

In short, ChatGPT and its brethren are constitutionally unable to balance creativity with constraint. Either they over-generate, i.e., produce both truths and falsehoods, endorsing ethical and unethical decisions alike, or they under-generate, i.e., exhibit non-commitment to any decisions and indifference to consequences. “Given the amorality, faux science and linguistic incompetence of these systems,” Chomsky concludes his analysis, “we can only laugh or cry at their popularity.”<sup>65</sup>

### *Critique of the Article's Perspective*

The brief overview of the perspective on AI presented by Chomsky and his co-authors certainly cannot do justice to complex issues raised in the article. They merit a close and critical examination. Such examination may help advance toward a solution of the main problem raised by Chomsky and his co-authors, or, as they put it, toward a new, deeper, and revelatory “understanding of ourselves and the world.”

The main thesis of their article is that the way the human mind operates is very different from the way that machine “thinking” functions. This thesis is not new. There are many arguments and much evidence that challenge this thesis that is a subject of controversy.

The article argues that the human mind operates “with small amounts of information.” The available evidence contradicts this statement. The amount of data available to the human mind is certainly not small. In fact, it is larger, and one could say even much larger, than the amount of information that machines use. The human brain contains approximately 100 billion neurons and ten times more glial cells. These numbers represent an enormous amount of data. Considering the fact that individual neurons have multiple connections to other neurons that constitute neural networks, the data available to the human mind is astronomical.<sup>66</sup> One should also add that this amount of information represents only a portion of all information available to the brain. The brain is a part of human organism. The organism consists of 100 trillion cells that constitute multiple networks. They all also carry information that is involved in processing that occurs in the brain since the latter supervenes on these structures. Finally, social interactions of individual intelligences generate additional information in social networks. All these different levels of organization do not function in isolation from each other. The combined amount of information contained in all these levels and their combinations is beyond anything we can imagine. One can only describe this enormous amount of information available to the human brain as infinite. Certainly, in this respect the human brain is not inferior to the machine. If anything, the amount of information that the human brain processes is by far larger than anything that modern computers can process.

Another distinction that the article makes between the mind and the machine is that the machine’s mode of operation is different. According to the article, the machine generates “statistically probable outputs” that appear as “humanlike language and thought” but in reality are not.<sup>67</sup> In other words, the article claims that statistics is not about understanding and explanations; it is merely about probability and that is different from the way that humans process information. However, one should point out that statistical approach is currently, and has been for many decades, a standard approach in our sciences. We use statistical approaches to formulate new interpretations of reality and even new laws.

But there is an even deeper affinity. A statistical approach establishes one-to-one correspondences between the machine’s algorithm and the supplied data. Patterns that emerge are a result of equilibration between the observable data and the observer (in this case, the machine and the algorithm it uses). Consequently, the search for statistically significant patterns is a form of equilibration.

Human thinking also involves establishing one-to-one correspondences, or equilibration, as an operational mode. The mind, in this respect, is no different from the machine.<sup>68</sup> Jerry Fodor—a well-known authority in the field of cognitive science and an author of numerous studies on how the brain works<sup>69</sup>--has repeatedly and convincingly made the argument that “the mind works computationally.” In his article “How the Mind Works: What We Still Do Not Know,” Fodor writes: “. . . computation is the only notion of a mental process that we have.” In describing the shift that occurred in cognitive sciences, Fodor offers the following observation: “. . . by far the most important difference between the traditional theories of mind and the ones those of us who aren’t connectionists endorse is the shift from an associationist to a constituent, or computational, view of cognition.”<sup>70</sup> Chomsky and Fodor have cooperated on numerous joint projects. Chomsky is intimately familiar with Fodor’s view and theories. The fact that Chomsky has chosen to pass in silence Fodor’s contributions into the science of the brain, to say nothing of considering them, certainly diminishes the value of Chomsky’s argument.

Chomsky also points to another important distinction he makes between the human mind and the machine. Unlike the machine, Chomsky maintain, the human mind is capable of creation; moreover, the human capacity to create is infinite. In support of his claim, Chomsky quotes von Humboldt’s remark to the effect that the human mind is capable of “infinite use of finite means . . . creating ideas and theories with universal reach.” In fact, Chomsky makes two claims here: one is that human capacity to create is infinite and another that machine can never acquire such capacity. Both claims are unsupported, which makes them questionable. They both lack rational justification and empirical verification that are essential to make them credible. As the process of creation is central to both claims, one would expect that Chomsky would provide a discussion of this process that would convince readers that, indeed, humans are capable of infinite creation and that yes, indeed, machines are not. Yet Chomsky fails to provide such discussion, without which both claims are unconvincing. He recognizes that in order to match human intelligence, “ChatGPT must be empowered to generate novel-looking output,” which, in his view, it cannot do. Indeed, the capacity of contemporary AI systems to create radical innovation is limited, perhaps even non-existent. But we are still at the beginning of the development of AI. What is true today of AI may not be true in the future. Since currently there is no empirical information to prove that machines can have an infinite capacity to create, Chomsky should have provided some philosophical or other general consideration to support his claim. Yet he fails to do so.

In his explanation of the superiority of the human mind, Chomsky points to what he sees as the mind’s unique form of efficiency. Using as his example the acquisition of language by a child, Chomsky writes: “For instance, a young child acquiring a language is developing unconsciously, automatically and speedily from minuscule data a grammar, a stupendously sophisticated system of logical principles and parameters.” This description suggests that, for Chomsky, the instinctive and automatic operation of the child’s mind is superior to consciousness. This suggestion raises questions. By universal recognition, consciousness represents the most powerful level of organization that exists in our universe. One has a hard time accepting the argument that consciousness is inferior to instinct. If consciousness is the most powerful level of organization in our universe, how can it be inferior to instinct that operates at a much weaker level of

organization? Consciousness certainly offers more possibilities and degrees of freedom than instinct and, consequently, cannot possibly be inferior to the latter.<sup>71</sup> Chomsky also contradicts his argument when he writes that linguists can also build “consciously and laboriously an explicit version of this [universal] grammar.” One wonders why Chomsky considers this explicit version of the grammar inferior to the one instinctively produced by the child. One can sense in Chomsky’s admiration of the work of instinct and his denigration of consciousness and the machine as a conscious human creation echoes of neo-Luddite and technocide attitudes that go back to the early stages of industrialization.<sup>72</sup> Freud, a figure no less significant than Chomsky, has clearly stressed the superiority of consciousness when he used conscious realization in his patients to treat unconscious psychological disorders.

Chomsky includes into his extensive catalog of differences another confusing discussion. He claims that the machine cannot make a distinction between what is possible and what is impossible. According to Chomsky, the human mind is capable of distinguishing between what is possible and what is impossible. This claim blatantly contradicts what we know about the human mind and its capacities. Human imagination can run wild. We can create mental constructs and theories in our mind that prove to be impossible in the real world and yet in many cases we deem them as real. We are capable of constructing paradoxes that in the real world do not exist. In the example cited earlier, Chomsky cites Sherlock Holmes when he explains to Dr. Watson his method of finding truth. This method involves, first, the elimination of those explanations that are impossible. Holmes instructs his friend: “When you have eliminated the impossible, whatever remains, however improbable, must be the truth.” In other words, for Chomsky, truth is a highly improbable possibility. One finds this definition hard to accept. We do have a term that corresponds a highly improbable possibility; we call such possibility a chance. But very few of us would consider chance to represent the ultimate truth.

Chomsky includes in his inventory of the flaws in machine thinking the lack of critical capacity. He writes:

Indeed, such programs are stuck in a pre-human or nonhuman phase of cognitive evolution. Their deepest flaw is the absence of the most critical capacity of any intelligence: to say not only what is the case, what was the case and what will be the case — that’s description and prediction — but also what is not the case and what could and could not be the case. These are the ingredients of explanation, the mark of true intelligence.<sup>73</sup>

Critical capacity is reflective in its nature. The question whether the machine is capable of reflection remains open. As Christof Koch, a neuroscientist studying consciousness has aptly remarked that he does not know of any fundamental law or principle operating in this universe that forbids the existence of subjective reflections in artifacts designed or evolved by humans.<sup>74</sup> Chomsky’s denial of critical capacity—a property that requires reflection—to AI, just as his claims that AI is incapable of creative conjecture and creative criticism, seem to be very premature and unwarranted. He offers no rational justification or empirical verification to support these claims.

In his article Chomsky also articulates an epistemological theory that many may find questionable. He claims that production of knowledge involves restriction and limitation of human creative capacity and thus disempowerment. According to Chomsky, restrictions, particularly of radically new knowledge is necessary. The notion that we have to restrict knowledge for any kind of considerations strikes one as contradictory and controversial. Usually people associate knowledge acquisition with the enhancement of human powers, not their restriction. We tend to see knowledge as liberating and empowering. The claim that knowledge production is necessarily restrictive and limiting contradicts Chomsky's own passages in the article where he attributes to humans an infinite capacity to create.<sup>75</sup>

The theme of the necessity to subject human knowledge to restrictions appears in Chomsky's discussion of moral reasoning. As has been mentioned, Chomsky, along with many others, thinks that machine is incapable of moral reasoning. The idea that underlies such view is that moral thinking has no relation to scientific reason. The idea is popular. Its foundation is the lingering dualism that presupposes the separation separates the sphere of "is" from the sphere of "ought." The acceptance of this relict dualism has not been subjected to critical examination. It is simply considered self-evident, or what Kant called a synthetic a priori judgment that does not require justification.

Chomsky sees a fundamental contradiction in what is expected from AI. On one hand, the expectation is that AI should create radical novelty, but at the same time, there is fear that such novel solutions may be morally objectionable and will have to be censored, which the machine cannot do. According to Chomsky: "To be useful, ChatGPT must be empowered to generate novel-looking output; to be acceptable to most of its users, it must steer clear of morally objectionable content." In Chomsky's view, only humans can provide such steering. In support of this argument, the article cites one episode that occurred in 2016 when Microsoft's Tay chatbot (a precursor to ChatGPT) was polluted by trolls who filled it with offensive data. As a result Tay flooded the Internet with misogynistic and racist content. In order to prevent such episodes in the future, ChatGPT has to be crudely restricted by its programmers from contributing novelty to controversial discussions, thus sacrificing "creativity for a kind of amorality."

The relationship between morality and scientific reason presents a problem. There is no clear explanation of the relationship between the two spheres. Scientists, philosophers, and moral thinkers have not yet solved this problem. The currently popular view is that the two spheres are equal and separate, or as Stephen J. Gould called it non-overlapping magisteria, or NOMA).<sup>76</sup> There are, however, many thinkers who believe and argue that reconciliation between moral and scientific knowledge is possible. Chomsky appears to reject the NOMA principle. His argument that moral reasoning is to be used for censoring our knowledge implies that the moral sphere is more powerful than and consequently superior to rationality. However, he offers no explanation for this claim. The claim also rests on a dualist assumption and implies that the two spheres are in conflict. Chomsky offers no explanation for assuming that they are in conflict. Our morality and knowledge are our creations. Both have roots in the process of creation. The fact that they have a common source suggests that their conflict is not inevitable and that harmony between them is possible and, therefore, the conflict between the two and censorship may be entirely avoidable. Chomsky does not even consider this possibility.

There is a host of miscellaneous and questionable claims made in the article. For example, the article claims that a possibility to be wrong is essential in the acquisition of true knowledge. “Of course, any human-style explanation is not necessarily correct,” Chomsky argues, “we are fallible.” Being wrong, for Chomsky, is “part of what it means to think.” “To be right,” he continues, “it must be possible to be wrong. Intelligence consists not only of creative conjectures but also of creative criticism.” This claim is also questionable. One can certainly accept a possibility that we may go wrong in our search for truth, but acknowledging this possibility is a far cry from thinking it is necessary.

### *Concluding Remarks*

The article by Chomsky and his co-authors is unambiguous with regard to the possibilities that AI has to offer. In their view, AI cannot possibly match the human intellect. According to them, the expectation that it ever will is totally unjustified. “Given the amorality, faux science, and linguistic incompetence” of systems like ChatGPT, Chomsky and his co-authors can only “laugh or cry at their popularity.” The conclusion that follows is that our civilization should be very cautious in committing our resources to this development. At the beginning of the article the authors indicate that one of their goals is the resolution of the paradoxes that they see as the essential condition for attaining “‘the imminence of a revelation’ in understanding of ourselves and the world.” The fact that many contradictions in the article remain unresolved leads one to believe that the authors have not accomplished their professed goal.

## **The Resolution of the Mind-versus-Machine Paradox**

### *The Paradox of Paradoxes*

Chomsky is no stranger to paradoxes and contradictions. In fact, he has always welcomed them. He and many others believe that contradictions and paradoxes mark the path to new knowledge. The article by Chomsky and his co-authors is no exception. As has already been mentioned, the opening paragraph of this article makes a reference to Jorge Luis Borges remark to the effect that “. . . to live in a time of great peril and promise is to experience both tragedy and comedy, with ‘the imminence of a revelation’ in understanding ourselves and the world.”<sup>77</sup>

These words set the tone for the entire article. They refer to contradictions and paradoxes—peril and promise, tragedy and comedy—that offer a possibility of “imminent revelation” in understanding the world and ourselves. This unusual opening indicates the intention to confront the paradox between the human mind and AI. By addressing this paradox they hope to shed new light on humanity and attain a new understanding of ourselves and the world.

The connection between paradoxes and advances in knowledge is nothing new. There have been many people who have pointed to this connection even if they rarely, if at all, explained it.<sup>78</sup> Since Chomsky and his co-authors also refer to this connection, it may be a good starting point in addressing the paradox that is the main focus of Chomsky’s article.



Paradoxes have always been and remain a source of fascination and anxiety. Their enigmatic nature challenges our mind and excites our imagination. Yet despite much attention devoted to paradoxes, their source has been and still remains an enigma. Paradoxes appear to have deep roots that we have so far failed to grasp and explain. Many who have written of the subject of paradoxes see this failure as a possible indication of some fundamental limitations to our mental capacity of knowing.<sup>79</sup>

Definitions of paradox are numerous and diverse. They range from simple to complex, from descriptive to analytical, from intuitive to formal. In his book on the history of paradoxes, Ray Sorensen, who traces paradoxes to the riddles of Greek folklore, describes them as “questions . . . that suspend us between too many good answers.”<sup>80</sup> R. M. Sainsbury defines paradox as “an apparently unacceptable conclusion derived by apparently acceptable reasoning from apparently acceptable premises.”<sup>81</sup> In her exploration of paradoxes, Marianne Lewis writes: “‘Paradox’ denotes contradictory yet interrelated elements—elements that seem logical in isolation but absurd and irrational when appearing simultaneously.”<sup>82</sup>

According to these and many other definitions, paradoxes include two mutually exclusive components that appear to be true on their own but when used together constitute a totally impossible statement. One of the most famous paradoxes, the Liar Paradox, is a good illustration of this point.<sup>83</sup> The analysis of this paradox leads to the conclusion that the liar lies when he tells the truth and tells the truth when he lies. In other words, the liar is telling something that cannot possibly make any sense.

For reasons that are not well understood, our knowledge, including our scientific knowledge, is full of paradoxes. Paradoxes constitute the basis of quantum mechanics—our main theory for explaining the behavior of matter. Quantum descriptions offer a paradoxical picture of physical reality. In this picture, a particle is matter and wave at the same time. Quantum particles can be simultaneously in different locations and in different states. Other fields of knowledge display paradoxes of their own. All paradoxes have one feature in common: they appear to be true but their truth is impossible to prove.<sup>84</sup>

Kurt Gödel, the renowned Austrian logician and mathematician, has made perhaps the most important contribution to our understanding of paradoxes in his famous proof of the theorem on consistency and completeness. In this proof Gödel has demonstrated that any axiomatic system is bound to contain statements that are true—in the sense that they exist—but at the same time their truth is formally indemonstrable within this system. If truth is indemonstrable, it cannot be verified; and if truth cannot be verified, it might as well be false.

Gödel does not suggest that the paradox he discusses is irresolvable. On the contrary, he makes a convincing argument that we can resolve the paradox if we tease and modify the system’s axioms. However, he also argues that a modified system will still contain some other true statements that will be indemonstrable. No matter how many times we change axioms, new indemonstrable truths will appear ad infinitum. We can never escape this paradox.<sup>85</sup>

Gödel’s contribution still generates heated debates. Some draw utterly pessimistic conclusions from it. To them, Gödel’s proof shows that there exist limitations to human knowledge. In other words, there are limits beyond which the power of human reason fails. However, one can also derive an optimistic conclusion

from the contribution by the great logician. We can resolve paradoxes, but such resolution requires transcendence: one should construct a new system of knowledge based on new axioms that is more powerful than the current one in use. Indeed, although we can resolve each individual paradox, our resolution does not make paradoxes disappear. We are in an eternal race against paradoxes that we cannot possibly win. But the race is not pointless and it does bring benefits. It leads to a constant and infinite creation of new systems that represent new levels of organization that are more powerful than those from which they have emerged. Such systems will give offer new possibilities that will give rise to new ideas, new approaches, and new truths. In this perspective, paradoxes are an invitation to expand knowledge and gain new mental powers. One can hear echoes of Gödel's proof in Borges' "imminence of revelation" cited by Chomsky.

### *Paradoxes and Knowledge Creation*

Paradoxes represent a high degree of equilibration. Levels of organization that sustain system of knowledge, or cognitive structure,<sup>86</sup> capable of including diametrical mutually exclusive opposites as totally equal possibilities are fully equilibrated. Only a very high degree of equilibration can support mutually exclusive entities—a statement and its negation—as two equally real and true possibilities. Such level of organization is a result of equilibration and, as such, is an emergent phenomenon. It emerges as a result of the equilibration of the level of organization from which it emerges. Since the new level of organization is capable of sustaining maximum number of possibilities—each possibility and its opposite—it is more powerful than the one from which it has emerged.

The equilibration of differences, particularly such radical differences as those that are mutually exclusive, creates a new level of organization that offers maximum possibilities and is, for this reason, more powerful than the level from which it has emerged. This level has sufficient power to sustain mutually exclusive opposites, as its particular cases—i.e., cases that are true under specific conditions or assumptions. While the new and more powerful level of organization reconciles radical differences at the level of organization from which it has emerged, it also gives rise to disequilibrium between the two levels. The source of this disequilibrium in the system is the power differential between the two levels of organization. This disequilibrium requires re-equilibration that will coordinate both levels, conserve them, and stabilize the entire system constituted by the two levels, thus conserving this entire system. Without such stabilization, the entire system cannot be conserved. Thus, the problem of disequilibrium requires a solution.

The equilibration of the two levels of unequal power requires the establishment of one-to-one correspondence between operations sustained by both levels. Obviously, the main obstacle to establishing such one-to-one correspondences is the power differential. While the more powerful level of organization includes (or, one could say, "sees") the less powerful one, the reverse is not true. The difficulty is in establishing one-to-one correspondences between operations of different power. Equilibration involves adaptation. In this case, the less powerful level should adapt to the more powerful one. But the difficulty is that the more powerful level of organization contains operations that are beyond the grasp of the less powerful level. To put it simply, operations at the less powerful level cannot "see" the operations sustained by the more powerful level.

The establishment of one-to-one correspondences between the two levels requires access the weaker level operations to more powerful operations; it requires devising a way that offers such access. There is only one way that provides such access: enrichment and increase in power of the operations at the weaker level of organization. In other words, the power of the two levels should be equalized.

Equalizing the power of the two levels requires the adaptation of the weaker level to the more powerful level, and thus its enrichment. In other words, it requires the creation of a new frame that would have sufficient power to include both levels of unequal power as its particular cases. Such equalization is possible only by expressing the operations sustained by the more powerful level of organization in terms of operations at the less powerful level. In other words, such adaptation requires the encoding of the more powerful operations in terms of the less powerful ones. The encoding is not given; it must be devised, or created since creation is the emergence of something new that has not existed prior to its emergence. That is precisely what Gödel does in his famous proof: he expresses the more powerful operations that regulate the relations among numerals (such as signs +, -, =, ( ), and others) in terms of these numerals. The result of this procedure is the emergence of the so-called Gödel numbers that play the key role in Gödel's proof.<sup>87</sup>

The encoding of the more powerful level of organization in terms of the less powerful one requires the capacity to reflect on both levels of organization. Obviously, the level of organization that makes such reflection, or observation, possible should have power greater than the level that is observed.<sup>88</sup> Since the creation of new and increasingly more powerful levels of organization is an infinite process, the capacity for such reflection must be infinite.

There is only one level of organization in our entire universe that is capable of infinite reflection. This level of organization sustains human consciousness. The infinite power of human consciousness is due to the fact that our consciousness performs symbolic operations. The creation of new levels of mental organization takes the form of constructing new combinations of neurons and neural networks; in other words, it involves recombination. The process of creating such new combinations operates in symbols and symbolic operations have no physical limitation in their combinatorial capacity. One can always construct another superseding level of organization. In fact, conservation requires the establishment of the regulatory level of organization.<sup>89</sup> Creative possibilities are infinite since the equilibration (and conservation) of operations at any level of organization inevitably leads to the emergence of another and more powerful one. The procedure that Gödel invents to equilibrate the two levels of organization of unequal power through encoding leads to the emergence of a new and broader frame that includes the level that sustains numerals and the level that governs their relations. Thus Gödel has been able to resolve the paradox by integrating the two levels of axiomatic system—one that sustains numbers and the other that regulates their relations.

Gödel's creative maneuver resolves a particular paradox. It does not resolve all possible paradoxes. It merely points out the direction for the resolution of future paradoxes. In fact, Gödel predicts with absolute certainty that the emergence of new paradoxes is inevitable and necessary. It is essential for conservation that can only result from equilibration and the rise of new and increasingly more powerful levels of

organization that conserve the levels from which they emerge. His proof shows that the rise of paradoxes is the essential part of the process of advancing our knowledge.

Our capacity to create new levels of organization is a product of the evolution. After all, what is the evolution if not a succession of new and increasingly more powerful levels of organization--from organic molecules to life, cells, multicellular organisms, humans and civilization? We inherited this process and its features in the course of the evolution. This process is a creative process that originates in conservation, as conservation requires equilibration that produces new and increasingly more powerful levels of organization and, thus, disequilibrium. This process creates paradoxes that are resolved by the rise of new levels of organization of superior power. Such newly created levels of organization offer new possibilities that increase our power and makes possible advances in our knowledge.

Chomsky and his co-authors have not constructed such new and more powerful level of organization. They have not performed a creative act of transcendence. Consequently, they do not resolve the paradox that they have made the main focus of their article; they have not thus accomplished the main task they set for themselves. Their “resolution” is no resolution at all. They do not transcend the paradox that they have promised to resolve. They have merely chosen one side of this paradox over the other. Their article contains no “imminent revelation” that is supposed to bring an advance in understanding of ourselves and the world. In other words, the article fails to fulfill the promise that the authors make at the beginning of the article. They do not solve the problem of mind vs. machine.

### *Human Thinking and Machine Thinking: The Imminence of a Revelation*

There is one issue that the article by Chomsky and his colleagues has left unnoticed. Their entire discussion rests on an assumption that they have not subjected to critical examination. They accept the notion that there is a fundamental and unbridgeable gap that separates the human and the machine. This omission is not an accident. They accept this assumption as self-evident and have never even bothered to subject it to the test of rational justification or empirical verification. This assumption shapes the conclusion that they draw: AI cannot and will not ever match human intelligence. It also lurks behind the apprehension they share with many others that AI poses a threat to human civilization.

The tendency of setting humans and machines against each other goes back a long way. It was very prominent, for example, during the early stages of the industrialization when technological innovations provoked bitter and violent protests that gave vent to anger and frustration caused by the introduction of machines. These protests led to the rise of the powerful movement known as the Luddite movement that became a serious challenge to the existing social order that brought machines into wide use. Technological innovations, as beneficial as they were, caused dramatic social and cultural transformations that marked a new stage in modern history.<sup>90</sup>

One can hear distant echoes of the Luddite movement in Chomsky’s view of AI systems. Chomsky certainly does not advocate the destruction of these systems. He simply thinks that investing heavily in their production is a waste because machines will

never attain the goal professed by their creators: to match human intelligence. This view permeates the entire article written by Chomsky and his co-authors.

The authors of the article are not alone in holding this assumption about the unbridgeable gap between humans and machines. In fact, the overwhelming majority, if not all contributors to discussions related to AI, see human intelligence and machine intelligence in some fundamental sense very different from each other. Even those who believe that machines can match and even become superior to human intelligence accept the notion of the gap between the two. Most contributors have either an optimistic or a pessimistic view on the future co-existence between machines and civilization. While the optimists envision the prospect of “civilizing” machines,” the pessimists complain that we are “machining our civilization.”<sup>91</sup>

Few things are more deceptive than self-evident truths. More than anything such truths require questioning; and there are many questions that this assumption of the gap raises. The machine is a human creation. It is an embodiment of human knowledge, skills, and mental powers. Why then do we see AI as a threat to human existence? Why do we feel that we should treat AI systems with great caution and even fear them? The idea that we have to fear our own creation seems absurd, even insulting, and certainly begs for examination.

Humans have a natural capacity to create that has produced AI and other marvels of our civilization that are universally admired. Our capacity to create is a product of the evolution that also involves the creation of new and increasingly more powerful levels of organization. The evolution is about the process of creation.

As has been argued elsewhere,<sup>92</sup> the process of creation originates in the very nature of our universe. The universe is all that is there. Nothing can come into it from outside because there is no outside; nothing can disappear from it because there is nowhere to disappear. Consequently, everything must be conserved.

Conservation requires resources; and resources are always limited. The resources required for conservation, including the conservation of our universe, cannot come into our universe from outside. They have to be created inside the universe. Therefore, conservation requires creation of new and increasingly more powerful levels of organization that offer new possibilities that have not existed prior to their creation. These new possibilities offer access to new resources; they represent such new resources. Thus, the universe is impossible without the creation of new and increasingly more powerful levels of organization;<sup>93</sup> and the creation of such levels of organization is what the evolution is all about.

Since humans are products of the evolution, they inherited the process of creation. Just like the rest of our universe, humans also rely on this process to sustain their life. We must create new and increasingly more powerful levels of organization that provide access to new resources. Thus our capacity to create is not a luxury. It is the essential condition of our existence. It is what makes our existence and survival possible. The process creation sustains our universe and all that is in it, including humans and machines

The process of creation connects us to our creations. It is the continuum with the subject and the object at its poles. If we understand the process of creation, we will also understand the nature of our relationship with our creations. When we do not see and understand the centrality of this process, we do not understand the role it plays in our life and in our relationship with reality. If we do not understand this process, we cannot

comprehend the vital link that connects us with our creation. In its stead we see an abyss, a gaping unfathomable hole that separates us from our creation. As a result, the object that is our creation appears to us as alien. Fear is a common response to what is unknown. When we do not understand the process of creation, we fear our own creation. We do not understand that the level of organization that sustains our creation conserves the mental constructs that constitute our self. It conserves our mental operations that led to the creation. Our creations cannot pose any threat to us. They are not and cannot be the source of our disempowerment. On the contrary, they are the essential condition of our survival, evolution, prosperity, happiness, and increased power.

Obviously, Chomsky and his co-authors do not see the centrality of the process of creation. They know little about it. As a result, they see humans and machines opposed to each other. They see machines as a danger that poses threat to our existence.

Chomsky and his co-authors are not alone in failing to recognize and understand the process of creation. Despite the fact that we all know about creation and that we even discuss it, we know pitifully little about it and understand even less. There is certainly no shortage of theoretical perspectives that try to explain creativity and the process of creation. Yet the sad fact remains that our understanding of the process of creation remains very rudimentary; we have not mastered this process and have no control over it.<sup>94</sup> Margaret Boden, one of the pre-eminent researchers in artificial intelligence, draws the following conclusion in her very influential book on creativity:

Our ignorance of our own creativity is very great. We are not aware of all the structural constraints involved in particular domains, still less of the ways in which they can be creatively transformed. We use creative heuristics, but know very little about what they are or how they work. If we do have any sense of these matters, it is very likely tacit rather than explicit: many people can be surprised by a novel harmony, but relatively few can explicitly predict even a plagal cadence.<sup>95</sup>

The process of creation is a powerful tool that we inherited from nature. It sustains our universe and all that is in it. It is the source of all our creations. It is the source of our moral and aesthetic values. Using this process requires the universal recognition of autonomy because only by recognizing autonomy we can establish links with entities different from us. By including differences we can create new and increasingly more powerful levels of organization. The recognition of autonomy is the source of moral values. Performing the process of creation gratifies our most important function—the function of creating new levels of organization; and gratification is the source of enjoyment, aesthetic values, and happiness.

There are no known laws of nature that forbids the creation of machines that embody the process of creation. On the contrary, the realization of the process of creation is a must. We can create machines that embody the process of creation and all its features. Such machines will match human intelligence and the capacity to create. They will also embrace our moral and aesthetic values that arise from the process of creation.

In order to achieve this goal, we must embrace the process of creation and make it the main organizing principle of our theory and practice. When we embody this process

in AI systems, there cannot possibly be any conflicts between humans and their intelligent machines. The two will become full collaborators in creating new and increasingly more powerful levels of organization. They will be partners in building a better future for all of us as individuals and for our civilization as a whole.

## **Conclusion**

The title of this contribution may puzzle some readers who may find it misleading. They will not be entirely wrong. The title may create an impression that the article is a critique of the contribution by Noam Chomsky and his co-authors on the subject of AI. In reality, the article offers a broad discussion of AI--one of the most important, if not the most important development of our time. In addition to the critique of Chomsky, the article examines a number of issues related to intelligent systems and their promise. It discusses the importance of this development for our civilization and the relationship between AI and humans. It also talks about the connection between machine intelligence and the process of creation.

There is a reason why the title may turn out for some to be misleading. The article by Chomsky and his co-authors is multi-faceted. It covers many aspects of the development that has a profound impact on our society. The article has to engage critical issues related AI. Chomsky's article is certainly a central focus of the current contribution. However, this contribution could not avoid dealing with multiple and different ancillary issues related to AI, both those covered and not covered in Chomsky's piece. Chomsky also brings up relevant philosophical issues that have to do with contradictions and paradoxes. Obviously, this contribution has to respond to challenges articulated by Chomsky and his co-authors.

Chomsky's article indicates the intention to resolve the paradox of human intelligence vs. machine intelligence and even to offer a new understanding ("imminent revelation") of ourselves and the world. All these aspects of Chomsky's article are relevant and tantalizing. They transcend the relatively narrow technical side of AI and invite reflections that reach beyond what the title may suggest. The contribution by Chomsky and his co-authors is in many ways central to this article and the title of this article has to reflect the centrality of Chomsky's piece.

The central question that this study claims to answer is whether we humans can create machine intelligence that will equal human intelligence. Since the development of AI is still in many respects in its initial stages, this question is critical. Answering this question may help our society to decide how much commitment we should make to AI and how much of our resources we should invest in it. At this point, the technical possibilities of AI systems do not offer a clear view of what they may become in the future. For this reason, we have to make decisions that will not be based solely on technical details but also on a general philosophical understanding of what is possible.

The article does not answer specific and technical questions. A detailed technical discussion of what AI will be like in its advanced stages will be at this point an idle speculation. For this reason, rather than engage in specifics and technicalities, this contribution outlines the parameters that AI must satisfy to match human intelligence. The article stresses that in order to have AI that is fully equivalent to human intelligence

it must embody the universal process of creation; it must have a capacity for infinite reflection and consciousness. Again, there are no known laws of nature that prohibit the creation of AI that embodies these parameters. However, since AI is still in its initial stages and the realization of this goal may and most likely will encounter hidden obstacles and unexpected problems. That is why this contribution takes a cautious approach that talks about parameters and general viability of the project, leaving room for inevitable contingencies.

The second important issue brought up by Chomsky and discussed in the current article is the relationship between humans and machines. A common wisdom, both among supporters and detractors of AI, today is that this development represents a certain danger to human civilization: we may lose control over AI, which may lead to the enslavement of human beings by intelligent machines. What is in store for us? Can we civilize machines or will machines subdue our civilization?<sup>96</sup> Current proposals recommend restrictions and regulations as a way to avoid the dangerous turn. In other words, we must limit and regulate the companies that build AI systems.<sup>97</sup> In effect these proposals amount to limiting our creative power.

This contribution offers a different approach. As this article argues, AI is human creation. It represents an extension of human powers and skills. Intelligent machines should pose no danger to human existence. The current perception that AI poses a threat is largely due to the fact that we do not understand our connection to AI. The creation of AI increases human power and cannot be a source of our disempowerment. The perception of a threat comes from the fact that we do not embrace the process of creation and do not understand the connection between AI and humans. As a result, we see AI as opposed to humans. In a way, our fear of machines is a fear of our own creativity and our own power. We should not restrict our creative powers; on the contrary, we must enhance them.

There is only one way to enhance our creative powers: by embracing the process of creation and by making it the central organizing principle of our theory and practice. When we achieve this goal and embrace the process of creation, when we understand the process that connects us to our machines, the perception that humans and machines stand opposed to each other will disappear. Humans and machines will enter into partnership in advancing the process of creation that sustains the universe and will sustain our civilization into an indefinite future. The paradox between humans and machines will simply disappear in the broader frame that has sufficient power to include both sides of what we see as the paradox between humans and machines as its particular cases—i.e., cases that are true under specific conditions or assumptions.

At the beginning of their article, Chomsky and his co-authors make a promise that they will resolve the paradox involving humans and machines. Moreover, they also indicate that the result of their effort will be a new understanding of ourselves and the world; they promise nothing less that “the imminence of a revelation.”

As this article has argued they have failed to resolve the paradox by transcending its dichotomy. They have not delivered on their promise. They have failed to transcend the paradox but merely chose one side of it over the other. Since they have not transcended the paradox, they, consequently, have not produced any revelations and have added nothing to our understanding of ourselves and the world. The result should not surprise anyone. Chomsky and his colleagues use an old and tired approach. Just like the



mainstream approach toward understanding humans and their relationship with reality, Chomsky's approach does not recognize the centrality of the process of creation for the universe and for our existence.

The failure of recognizing the centrality of the process of creation has characterized human civilization since the time of its emergence. This approach does not embrace the centrality of the process of creation in our universe, in our own existence, and in our relationship with reality. This old approach cannot produce a new understanding of ourselves and the world; it cannot generate a "revelation." It can only regurgitate a familiar picture. The attempt by Chomsky and his colleagues to convince us otherwise does not succeed. The result of their effort merely reveals that their promise is empty. Despite their regalia and widespread admiration, they emerge in stark nakedness before their puzzled and utterly befuddled audiences.

## ENDNOTES

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