

Integrated Science 20

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Mind, Body, and Digital Brains

 Springer

Integrated Science

Volume 20

Editor-in-Chief

Nima Rezaei, Tehran University of Medical Sciences, Tehran, Iran

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Flavia Santoianni · Gianluca Giannini ·
Alessandro Ciasullo
Editors


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ISSN 2662-9461

ISSN 2662-947X (electronic)

Integrated Science

ISBN 978-3-031-58362-9

ISBN 978-3-031-58363-6 (eBook)

<https://doi.org/10.1007/978-3-031-58363-6>

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Preface

An unprecedented systemic revolution in all fields of humans is being generated by the transformations introduced and induced by artificial intelligence and neurotechnology. These transformative tensions have a profound effect on the complex and adaptive nature of actual society. Many questions arise, concerning which opportunities and risks are associated with new scenarios, what idea of humanity is emerging from the increasingly widespread use of artificial intelligence technologies, and what idea of integrated science we should promote to accompany these ongoing transformations.

This volume focuses on both theoretical and empirical issues and joins contributions from different disciplines, concepts, and sensibilities, bringing together scholars from fields that at first glance may appear different—neuroscience and cognitive neuroscience; robotics, informatics, human-computer interaction, artificial intelligence, and information processing systems; education, philosophy, law, psychobiology, and psychology.

All these research fields are held together by the very object to be discussed: a broad, articulate, and polyphonic reflection on the status of theories and fields of application of digital technologies and artificial intelligence, seen from the perspective of the digital mind, digital body, and digital brain. Scientific and humanistic issues are considered through an interdisciplinary point of view, with the purpose of deepening emerging trends in various disciplines.

In the introductory part *Digital Humanism*, the authors show how new scenarios have been raising from the ever-increasing interaction between sapiens, digital technologies, and artificial intelligence systems, in a loop that imposes a reconsideration of themes, issues, and interpretative categories related to the artificial era and the incoming digital humanism.

What idea of humanity is emerging from the increasingly widespread use of artificial intelligence technologies? The fragility of society's structure makes it susceptible to naive attitudes which often lead to polarizing and irrational views. On the other hand, technological advances can let us foresee multiple situations, which requires ethical considerations.

Adaptive texture which substantiates the biological matrix of humans becomes even more significant when it leverages biomimetic approaches to education. Mind, body, and brain relation in the digital era is seen as the new digital humanism,

where an anthropocentric approach is reaffirmed in a future scenario in which humans and machines will be integrated.

In the future scenario, generative artificial intelligence introduces a paradigm shift in the artificial intelligence field of research, whose emerging frontiers encompass quantum-inspired generative models, human and artificial intelligence collaboration, and ethical generative artificial intelligence.

The focus revolves around adaptability, online learning, and meta-learning, which augment generative artificial intelligence real-world relevance and introduce the part *Digital Mind* that explores consciousness, self-identity, and self-regulated learning supported by technologies, examining the role of artificial intelligence and extended reality to understand these processes.

Augmented reality is considered through learners' beliefs to encourage personalized learning, whose features are implemented by adaptive instructional systems. Operational strategies for artificial intelligence integration and democratization in education encompass cognitive, biometric, physical, and spatial dimensions. Natural and artificial, human and machine, real and virtual interweave, expanding boundaries and providing new tools to improve intelligent adaptive systems.

The interplay and overlapping in digital evolution between artificial intelligence, body, and brain, and the intertwining of digital brains' activities are analyzed in the part *Digital Body and Digital Brains*, where digital brains—brains in relation with digital technologies—and brain activity are studied through brain-computer interfaces and non-invasive brain stimulation techniques.

The brain structure is shaped by environmental enrichment, which can be implemented through digital technologies reproducing complex virtual environments. There is a close evolutionary link between brains and the practices of the living body: the dynamic landscape of systems designed for the learning of motor skills and sensor-based technologies contribute to integrate technology with human-centered elements.

Digital brains live in digital worlds and digital societies. Will our moral agency be compromised by the ever more widespread diffusion of artificial agents and digital technologies? It is not a question of assuming optimistic or pessimistic postures, nor of supporting an instrumentalist, determinist, or constructivist view of technology, but rather of preparing and developing strategies to govern the processes underway and avoid becoming passive spectators of a transformation that is already driving us in the direction of an overall redefinition of the human being and its prerogatives.

What governance tools should be promoted to prevent our collective forms of living from being compromised? What opportunities and risks are associated with the new revolution? The final part *Digital Revolution* raises several intriguing questions, as cyberwarfare, which emerges as a new and pivotal front in global conflict scenarios into the digital era. Artificial intelligence systems are demonstrating their full development in legal systems, expanding technical possibilities, and making possible new forms of conflict treatment.

The widespread diffusion of artificial intelligence and the use of algorithms in decision-making processes related to rights and citizenship status introduce

the theme of algorithmic citizenship, shaped by digital interactions mediated by algorithms. The public narrative about artificial intelligence concerns some critical points and involves implications of it which require philosophical aspects as human and artificial intelligence collaboration, societal impact assessment, and intergenerational responsibility. Education is indeed responsible for designing and leveraging meaningful strategies to cope with digital systemic revolution, to identify what change means and can mean.

This volume offers a framework of different perspectives and, at the same time, a platform for discussion aimed not only at experts, but also at a non-specialist public interested in the topics.

Naples, Italy

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Part I

**Digital Humanism: Technologies, Artificial
Intelligence, and Sapiens**



Sapiens' Future in the Age of Artificial World Picture

1

Gianluca Giannini 

How can one control what cannot be controlled? Perhaps one should create “antagonistic” machines that would control one another (i.e., control the outcomes of their actions)? But what should we do if they present contradictory results at output?

(Stanisław Lem, Doubts and Antinomies)

Abstract

AI, in its various forms and articulations, represents a range of new opportunities and strategies that our species can use to improve its condition. Often the scenarios presented in association with AI speak of a humanity threatened by machines or, conversely, of a utopian future in which man and machine will be fully hybridized harmoniously. In this article, I try to put into shape some of the key questions emerging in the field of Artificial Intelligence, avoiding sensationalist exaggerations on the one hand and, on the other, pointing out that the real challenge posed by intelligent machines lies in the new ways in which humans will be able to rethink and reinvent themselves and, therefore, their own possibilities for existence in what, even now, connotes itself as an Artificial World.

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Joanna Joy Bryson recently noted that:

For many decades, artificial intelligence (AI) has been a schizophrenic field pursuing two different goals: an improved understanding of computer science through the use of the psychological sciences; and an improved understanding of the psychological sciences through the use of computer science. Although apparently orthogonal, these goals have been seen as complementary since progress on one often informs or even advances the other [1]: 3.

And still:

Intelligence is the capacity to do the right thing at the right time. It is the ability to respond to the opportunities and challenges presented by a context. This simple definition is important because it demystifies intelligence, and through it AI. It clarifies both intelligence's limits and our own social responsibilities in two ways. First, note that intelligence is a process, one that operates at a place and in a moment. It is a special case of *computation*, which is the physical transformation of information. Information is not an abstraction. It is physically manifested in energy (light or sound), or materials. Computation and intelligence are therefore also not abstractions. They require time, space, and energy. This is why—when you get down to it—no one is ever that smart [1]: 4.

From here, from these premises, perhaps it's time to pause and be cautious about the cheap use of all-encompassing labels such as Artificial Intelligence and begin to make two brief context considerations: 1. Our generations are experiencing a profound, in some ways radical, shift. It is a real revolution already entailing the reshaping of every aspect of our lives, opening great new perspectives but raising disturbing questions. 2. We are in a *New Era*, and all of us are critical players in a cultural, technological, value, political, legal, economic, and health transformation of society. We are living in a time in history in which culture and change appear to be genuinely synonymous and in which, for the first time in human history, technologies of our civilization are, perhaps, getting out of hand or, at any rate, totally transfiguring our anthropic horizons.

The label that accompanies it now everywhere, Artificial Intelligence, is itself a kind of oxymoron: intelligence (something natural) conjugated to artificial (which is literally non-natural). It's therefore propaedeutic and fundamental to ask what we mean by AI and, more importantly, based on this, what use I will make of it in the following pages.

In fact, if we refer to the beginnings of *making a machine act in ways that would be called intelligent if a human behaved similarly* [2], we are already in a problematic recess. Artificial Intelligence is a counterfactual expression because it first has nothing to do with thought but with behavior. Suppose the human being behaved—it would be called intelligent. It does not mean that the machine is intelligent or that it is even thinking therefore... (the eventual judgment on intelligence pertains to action) that is: behavior as the way an individual acts, especially in certain situations, about the environment and with the people with whom he is in contact.

We have yet to say a great deal relative to AI. Let us start with a minimal data set, and it is worth stating, still preliminarily, several things. Every new technology since the days of Galileo Galilei's Telescope raises doubts, concerns, resistance, disbelief, and projections of all kinds.

Often, instead of shaping and addressing the issues that might discern them, we have been (and still are) swayed by a kind of natural distrust, especially for changes that might appear too rapid. There is no doubt that, especially those that have been underway for more than a quarter of a century (but in fact, we could pre-date by a few decades even if we think of *Bios-Technologies*), technical and technological revolutions have complex and controversial implications, foreshadowing forthcoming, and not-too-distant scenarios of radical changes. However, one must be stressed: technical and technological revolutions are always related to the anthropic context in which they are determined and developed. They are not only the result of it but even interact with it profoundly and redetermine it because, in some capacity, they respond to a demand for redetermination.

At this first level of consideration, it can be said that technical and technological revolutions/evolutions are never neutral, indifferent, and impartial. Why is there so much interest in these new technologies that fall in the groove of Artificial Intelligence? Indeed, they have the potential for interaction, transformation, and context redetermination that may be unique in Sapiens' history. So, and again, what do we mean by Artificial Intelligence? According to Kate Crawford:

Each way of defining artificial intelligence is doing work, setting a frame for how it will be understood, measured, valued, and governed. [...] I argue that AI is neither *artificial* nor intelligent. Rather, artificial intelligence is both embodied and material, made from natural resources, fuel, human labor, infrastructures, logistics, histories, and classifications. AI systems are not autonomous, rational, or able to discern anything without extensive, computationally intensive training with large datasets or predefined rules and rewards. In fact, artificial intelligence as we know it depends entirely on a much wider set of political and social structures. [...] Once we connect AI within these broader structures and social systems, we can escape the notion that artificial intelligence is a purely technical domain. At a fundamental level, AI is technical and social practices, institutions and infrastructures, politics and culture. Computational reason and embodied work are deeply interlinked: AI systems both reflect and produce social relations and understandings of the world [3]: 7, 8.

Precisely because all of this is to be kept in mind as well, my proposal, first and foremost, is that when we talk about Artificial Intelligence, we must assume not a specific technical-application datum and/or a separate discipline but rather identify a (moving) perimeter that holds it all together. It would be preferable to assume AI as a synthetic 'locution' account for all of this. In other words, when we use the term 'Artificial Intelligence,' we are talking about a very heterogeneous set of things that affects, by now, the most disparate areas of human doing and acting. We are primarily talking about a specific historical era (ours) that realizes a specific and articulated *World Picture*.

And when we talk about the *World Picture*, especially if we move within a reflection meant to be primarily philosophical, it is impossible not to start again from the meaning given by a philosopher like Martin Heidegger to *World Picture*.

And this, as will be seen below, to disassociate and, therefore, also distance from several contemporary philosophical discourses in Digital Philosophy and Ethics. We shall see, including Heidegger and all those still inspired by him today.

In the famous lecture delivered on June 9, 1938, in Freiburg, *The Foundation of the Modern Picture of the World by Metaphysics*, later published in *Off the Beaten Track* in 1950 under the title *The Age of the World Picture*, Heidegger is of a solar clarity unfolding, in a few passages, a very complex architecture and one on which he had been working immediately after the publication of *Being and Time*, that is, once he had ascertained the risks of anthropomorphism and the investigative limits inherent in that type of approach specifically to *Seinsfrage* pivoting on *Da-Sein*:

One of the essential phenomena of the modern age is its science. A phenomenon of no less importance is machine technology. We must not, however, misinterpret that technology as the mere application of modern mathematical physical science to praxis. Machine technology is itself an autonomous transformation of praxis, a type of transformation wherein praxis first demands the employment of mathematical physical science. Machine technology remains up to now the most visible outgrowth of the essence of modern technology, which is identical with the essence of modern metaphysics [4]: 57.

Having posited the incipit by virtue of which the load-bearing manifestation of the Modern lies in the flowering of the sciences, somehow it becomes necessary to grasp its essential load-bearing factor. For Heidegger, the prerogative of modern science is that by reason of which investigation moves within a fundamental *plan of nature*, the reason why

To set up an experiment means to represent or conceive the conditions under which a specific series of motions can be made susceptible of being followed in its necessary progression, i.e., of being controlled in advance by calculation [4]: 61.

Given this premise and specified that here World is saying about the totality of being, immediately it's interesting to note what is the way in which the approach to taking place in the groove of scientific research since Heidegger makes it clear that research requires or instead demands that the World has been opened and that is, designed already in a certain way so that it—as research, as scientific research precisely—can confirm *a posteriori* this *plan of nature*, pre-arranged, pre-established, *a priori*.

It is the *plan of nature*, its overall representation, and its picture, therefore, that makes a natural phenomenon visible: one sees, in fact, what is presented as visible. And that phenomenon is not seen randomly, but in how *a priori* that *plan of nature* is pre-disposed, which is configured here as a *picture*. Essentially, modern science expresses, in the most extreme form, the absorption of being in subjectivity. Thought based on such a representation understands, therefore, Being as something stable, unchanging, and ever-present, that is, as a fact, not as an event, as something that the subject itself can dispose of, thus ignoring its eventual and

never-final character, its multiplicity and mutability. The *thing* stands as we (pre-) view it:

the matter itself stands in the way it stands to us, before us. To “put oneself in the picture” about something means: to place the being itself before one just as things are with it, and, as so placed, to keep it permanently before one [4]: 67.

Therefore, the World Picture does not depict or place anything in a picture. It is the placing that man operates on the world; it is the placing of the world before man as the object of his *rap-presentation*. And this happens only because there is something like a vision of the world that requires, even claims for itself, something to be seen: a picture, precisely. The picture that thus rises to the figure of the domain of the calculating and pre-disposing *logos*; *logos* that therefore puts such a World-Picture before itself to exploit and dominate it.

The peculiarity of the modern world is thus to inaugurate an unprecedented form of subjectivism: the World Picture derives from the activity of a subject who imagines, that is, who represents. This means that this specific genesis that of the modern subject imposes a reduction of entities to objects and, more generally, of the world to *rap-presentation*. In turn, this reduction cannot but accompany and imply, in a kind of seamless circularity, something like the permanent leavening of the modern subject as the *dominus* of the entity in its totality.

Beings as a whole are now taken in such a way that a being is first and only in being insofar as it is set in place by representing-producing humanity. [...] Man sets himself forth as the scene in which, henceforth, beings must set-themselves-before, present themselves—be, that is to say, in the picture. Man becomes the representative of beings in the sense of the objective [4]: 67–68, 69.

However, far from being an act of freedom, man's self-positioning as subject (and the consequent reduction of entities to objects) is the essential destiny of historical humanity in its relating to and approaching a Being that it now perceives as absent. Undoubtedly, modern man produces his position and poses himself as subject, but this is done in the wake of the original forgetfulness of Being. The decision on the fate of modern man thus springs from the forgetting of Being and its truth. It is the renunciation of the possibility of discovering and thinking it in its inaugural-inaugural trait as an event. This peculiar interpretive device, amended by the now outdated (since it is in turn metaphysical) dispute concerning Being, has animated and continues to animate much philosophy of technology and philosophy of (alleged) science, as well as ethical strands that try to extricate themselves from the mortally ineffective grip of contemporary pragmatism, all engaged with the problematic of the multilevel understanding—and thus, epistemological, contemplative, interpretive and, precisely, ethical-normative—of the digital—or, better yet, of the *Digital Era*.

Then, this is the scenario on which I would like to propose some brief considerations. Starting with a kind of direct question that in principle might sound as follows: in the *Digital Era*, absolute artificial world, does this subject-object

dynamic work that sees Sapiens establish itself as the only syntagmatic actor however much, according to Heidegger, necessitated by the epochal mode of unveiling Being, if ever there is a Being?

As stated of *Seinsfrage* itself, if it is true as much philosophy of technology and philosophy of (alleged) science, as well as ethical strands that try to extricate themselves from the deathly ineffective grip of contemporary pragmatism hold, namely, that the peculiarity of the modern and contemporary world has been and still is to focus on a form of extreme subjectivism so much so that the accurate picture of the world derives from the activity of this same imagining subject and which imposes a reduction of entities to objects and, more generally, of the world to representation, are we sure that we have identified the true interpretive key to access the specific of the *Digital Era* as an absolute artificial world? To be specific—is it useless to go around too much—of the *AI Era*? That is, of that *artificium*, which somehow constitutes the maximum fall point of mechanical technology as an autonomous transformation of praxis, such as to import the use of the mathematical science of nature, in the supreme assumption of computational thinking, binary language. A falling point that implies, to the extreme, that

Only that which becomes object in. this way is—is considered to be in being. We first arrive at science as research when the Being of whatever is, is sought in such objectiveness. This objectifying of whatever is, is accomplished in a setting-before, a representing, that aims at bringing each particular being before it in such a way that man who calculates can be sure, and that means be certain, of that being [4]: 66.

It is quite clear that our generations are experiencing, in an extremely rapid manner, profound turning points that are not simply *destined to...* but are already totally reconfiguring not only patterns of life but, in a way, identity structures. The extraordinary advances in technology in recent times have made the relationship between the digital and the human increasingly imperative, and, in addition to the certainties these raise, there are not a few open questions about managing the transition to increasingly complex forms of interaction and integration between human and non-human. We live in a new era in which we are all protagonists, consciously or unconsciously, of a radical mutation in terms of culture, values, politics, economics, health etc. We live in a time in which *Culture* and *Change* now seem to have become synonymous and in which, in a completely unprecedented way, technologies seem to constitute irreversibly and, in the round, our new *habitat*, internal and external.

Not simply within this framework, but as a driver so that this framework has been and is being determined there is no doubt that Artificial Intelligence is at the heart of these very transformations. Exposure to new forms of Artificial Intelligence is already changing at its roots the experience of individuals in reciprocity with increasingly technological objects and contexts. In the now almost present future, humans will in essence be subjected to a decisive pressure that will propel them toward their own ultimate transcendence. An overall transfiguration that enjoins as of now to think about what the future human condition will be.

If indeed this is the horizon not simply speculative but theoretical-practical, it is quite clear that at least two contextual considerations are necessary. One is apparently more comprehensive and starts with a basic question: *why so much interest in AI?* Better yet: *are we certain of this centrality of AI?* The answer, even for the use of skeptics and the distracted, is there for all to see: the term-umbrella AI literally conceals a pluriverse.

AI indeed has a potential for interaction, transformation, and context redetermination that may be, maybe, unique in Sapiens' history. In fact, AI programs are already mutating and transforming broad fields of human endeavor, from the economy to the more mundane of everyday life. One thinks of voice assistants (increasingly prevalent in electronic devices) of ANNs (Artificial Neural Networks) or artificial neural networks that sift Big Data in search of patterns that will serve to predict trends, tastes, and desires; of the large-scale explosion of chatbots; and of the imminent invasion of the Metaverse. Indeed, perhaps it can be said, with a good deal of certainty, that the all-encompassing umbrella underlying the acronym AI, at present and in principle, concerns application forms of automatic intelligence limited to well-defined tasks in well-defined domains that proceed, however, in multiple directions to the point of investing the entire sphere of human action. But at least two contextual considerations were mentioned.

The second pertains to the very terms in question. AI, Artificial Intelligence, is a kind of oxymoron. Intelligence is, that is, something natural conjugated to artificial, which is literally non-natural. What, then, is meant by AI? Already, if one refers to the Thuringian beginnings, namely the possibility of conceiving an *artificium* capable of acting in ways that would be called intelligent if a human behaved the same way, one finds oneself in a decidedly problematic recess. One runs into, in fact, a counterfactual expression.

Moreover, it is clear that what is being aimed at has nothing to do with thought but, instead, with behavior and, therefore, with action. If the human being behaved ... it would be called intelligent: it does not mean that the machine is intelligent or even thinking. In this, a few definitions help narrow it down. It is possible to refer to two defining guidelines and then arrive at a third one that might act as a glue somehow. And so, drawing from the now official one proposed years ago by Marco Somalvico, a first theoretical-disciplinary definition, whereby AI is that

discipline, belonging to computer science, that studies the theoretical foundations, methodologies and techniques that enable the design of digital systems (hardware) and systems of programs (software) capable of providing the electronic processor with performances that, to a common observer, would appear to be the exclusive domain of human intelligence [5]:
12,

hence, the key term for resolving the behavior is reassuring (?) *performance*.

Then, secondly, a possibility of *application definition*, whereby "the goal is not to simulate human intelligence" but rather "to *emulate* human intelligence, since there is no a priori reason why certain performances of human intelligence cannot

also be provided by a machine” [5]: 13. It is pretty clear that in the case of emulation, intelligent performance is achieved by using the machine’s mechanisms, different from those conceivable for humans, but precisely such as to provide *functions/outcomes* qualitatively equivalent and quantitatively superior to those of humans. Here, in the interweaving of reproduction-performance, emulation-functions-results, the spillover of application order is played out since the goal of AI, as knowledge and discipline first and foremost, is to build *intelligent entities capable-of*. That is machines that can compute/compute how to act effectively and safely in various situations from a potentially unlimited experiential background—obviously, acting effectively and safely, directly and/or indirectly, having humans as the goal. However, here, it is possible to insert what could be considered a third definition—a *philosophical* definition of AI. If what we can circumscribe as the standard model of AI is about rational acting, in other words, the goal is to set up an entity, an intelligent agent subject that undertakes in every situation the best (the adjective is merely descriptive) of possible actions; we have already laid the groundwork for something unprecedented.

That is, we have set our hand to a peculiar and different *artificium* that bases its singularity, somewhat emulative of that of man, in a kind of autonomous creativity supported by a constitutive *engagement-experience-learning-doing* paradigm typical of the living and, nevertheless, different from the living.

In all respects, this peculiar *artificium* would be an otherness that, escaping past interpretative dynamics concerning the traditional canons of machine and automation, would stand out for man as a true *interlocutor-other*. And this should be made clear without giving in to the temptations of technophobes and/or, on the contrary, techno enthusiasts.

First, one must start from an assumption unwelcome to most: if one decides in any way to understand the universe of AI, it is necessary to start from the observation of a kind of separation, even conceptual, between the historical and every time historicized concept of intelligence and that of the capacity of acting. In this sense, AI qualifies as a new capacity to act and not, as common sense would have it, as a mere reproduction of human intelligence. In this sense, the category of *Absolute Other* has been introduced. The capacity to act is indefectibly the prerogative of the *artificial that is designed and implemented as the drop point of a set of computational techniques inspired by humans use their nervous systems and bodies to feel, learn, reason, and act*. It is quite evident, and precisely through the use of computational models, that the *artificium*, starting from its own specific constitutive language-which, it may have initially had to do with a pre-written design of nature-and from its own material dissimilarity, will operate—and it is not by chance that I use this verb to emphasize once again that this is a matter related to *agĕre* and not to *intellegĕre*—in a manner quite different from humans.

What is surprising is that with AI tools, delegation takes on completely new degrees, because a novel feature comes into play, one that other tools lack: functional autonomy. Functional autonomy refers to the inherent ability of a system to perform a task or perform a function without requiring constant human user intervention or supervision. [...] Thanks

to the possibility of designing systems capable not only of processing structured representations of both the data and the purpose to be achieved, but also of modifying their operation according to analyses of the processes they perform, we can now count on tools capable of functioning on their own; freeing us from the inconvenience of devoting all our energy and attention to the task delegated to them [6]: 78, 79.

It is this that, in an entirely a-evaluative way, prompts one to say that the space of a correlational other opens up here. And even in an abstractly unprecedented way, such as to clothe an order of absoluteness that configures an apposition of *an Other* not among many, but a syntagmatic *other* actor at the top of the operational chain. The eventual appeal—which is then a game of hide-and-seek—to the distinction between *Strong AI*, which envisions an automaton conscious of its intelligence and thus capable of being able to act independently, and *Weak AI*, which instead envisions an automaton limited to a specific task for which it is designed with no possibility of autonomous expansion—and we know that nowadays because of the difficulty of building true *Strong AIs*, with total autonomy and adaptability, more credence has been given to the *Weak* approach, which accounts for most of the AI we deal with on a day-to-day basis—it is not decisive notably to this aspect highlighted above.

So much so that probing is, it would be, another type of question: what expectation undergirded and underlies this other Sapiens enterprise that led to such an extreme form of delegation as to configure such a type of functional autonomy? One thing must be noted and emphasized. Otherwise, every discourse, already from its premises, falls into a common-sense chatter that one tries to ennoble with some Heidegger-like tutelary deity: technical and technological revolutions are always familiar to the anthropic context in which they determine and develop. Not only are they the result of it, even they interact with it profoundly, to the point of transfiguring and redetermining the context itself and, therefore, as always and as always, the human itself, which not only has never been something given once and for all but, on the contrary, has found its most proper persistent possibility in the constant transfiguration of itself. In fact, it can be said that technical and technological revolutions/evolutions are never neutral, indifferent, or impartial precisely because each time, they precipitate the true point of fall of the redetermined historical inflection within the persistent strategy of Sapiens.

There is no doubt that the *artificium* that goes under the label umbrella of AI represents, in all respects, concerning the topography of this situational historical inflection of Sapiens' persistent strategy, a third-level manipulation, i.e., a technology that succeeds, in an autonomous, functionally autonomous manner, in bringing into communication artifacts produced by Sapiens himself, without the latter having to be involved, to any extent, in their operation and, even, in their management and coordination. This is already bringing about a marginalization of Sapiens and its refluxing within a dimension of artificial agents that no longer have Sapiens himself as *terminus ad quem*, precisely in the literal sense, as the boundary, first and last, at which something is determined. After all, it should be clear to everyone, at least those from other regions of knowledge approach the question, that:

We call ourselves *Homo sapiens*—man the wise—because our intelligence is so important to us. For thousands of years, we have tried to understand *how we think*; that is, how a mere handful of matter can perceive, understand, predict, and manipulate a world far larger and more complicated than itself. The field of artificial intelligence, or AI, goes further still: it attempts not just to understand but also to *build* intelligent entities [7].

So, if the goal of AI is to build intelligent entities, that is, machines that can calculate how to act effectively and safely in a wide variety of situations, we must also take note that:

AI currently encompasses a huge variety of subfields, ranging from general (learning and protection) to the specific, such as playing chess, proving mathematical theorems, writing poetry, driving a car on a crowded street, and diagnosing diseases. AI is relevant to any intellectual task; it is truly a universal field [7]: 1.

AI can be applied to every sphere of human thought; it is a universal field... Undoubtedly, the ethical macro-question underlying any kind of reflection (even and primarily philosophical) revolves precisely around this. That is, around the question: could such powerful, intelligent, and functionally autonomous entities, in turn, design machines even more intelligent than themselves and Sapiens, reasoning that Sapiens would find themselves sharing the planet, its old anthropic space such as *One World*, with a new (artificial) species that to such a degree would be dominant that it would redefine the margins of its *World-Owner* as the actual *World-Artificium*?

Now, beyond more or less science-fiction retro-thoughts, the question is not trivial, so much so that numerous personalities from the worlds of science, technology and all-round research have expressed caution and championed an open letter, *Research Priorities for Robust and Beneficial Artificial Intelligence: an Open Letter* [8], in which, among other things, AI research is supported and strongly warned, however and contextually, about the non-negotiable need for AI to do what we ask it to do. That is, “because of the great potential of AI, it is important to research how to harness its benefits while avoiding potential pitfalls”. Essentially, and as relaunched in the EU, AI research and development must still be human-centric, such that AI’s power is put at the service of human progress [9]. Put this way, the problem seems to be solved, and after all, the ethical color patch seems to serve as a good palliative.

The question, which, among other things, revolves around man’s place not so much only in the Loop with AI but on what is and will be man’s place in the World, here and now but also and especially tomorrow, even if it is the World understood as the totality of being, seems to me to present itself as epochal, to the point of deflating traditional approaches: both speculative (as precisely mentioned concerning Heidegger) and ethical. So much so that the human-centrism formula seems to solve everything but is absolutely empty.

Let us start again from the problem that is raised repeatedly and which, precisely, the supposedly ethically absolute goal of human-centrism only solves in premise if it is filled with content. The question that, as such, is capital is to

reach an agreement between our actual preferences and the goal posed to/by the machine, knowing full well at this point that

Artificial Intelligence, in practice, does not behave ethically. It doesn't even behave unethically. It really has no idea what ethics is. But we who observe its predictions can evaluate whether the results are aligned or conflicting with our ethical principles. [...] Can we let predictions be made that a human would judge to be wrong? Would that be ethical behavior? Or should we correct the data or the algorithms that make use of the statistical models generated from the data? The ethics of Artificial Intelligence lurks in the folds of statistical models [6]: 74, 75.

It's clear: the problem facing us is not trivially means-ends but, more radically, the alignment of values. Therefore, the values and goals entrusted to the machine must be aligned with those of man. And this is, fundamentally, a philosophical question because Sapiens' values and goals are at stake. Present and near venturous. The problem is that even before we fantasize about the potential of the *artificium*, we should be aware that the values are historical and not absolute and metaphysical. Where is the point, then? Finding a solution in the face of nonlinear issues is genuine dilemmas—a decision problem between two moral imperatives, neither of which is entirely preferable—specifically to the conjugation of practice and value.

Concerning this, in addition to the encompassing epistemological, contemplative, and interpretive order put up by much philosophy of technique and philosophy of (alleged) science, even the approach of certain ethical strands that try to extricate themselves from the deadly ineffective grip of contemporary pragmatism, and therefore traditional solutions, literally no longer hold up, because they are outdated and utterly unequal to the scope of the challenge.

On the one hand, the vertical approach—out of space-time since about five centuries, that is, since, as Heidegger himself ascertained, it becomes “Through this, whatever is comes to a stand as object and in that way alone receives the seal of Being. That the world becomes picture is the same event with the event of man's becoming *subiecturn* in the midst of that which is” [4]: 69—refers to metaphysically grounded, thus prescriptive and unquestionable codes of values, in which value finds its legitimacy in an extra-physical instance (God, the world of ideas and so on), on the other hand, the horizontal one, seems to present aspects of greater effectiveness and efficiency only in appearance. Indeed, it does not aim to impose eternal values and is usually attentive to human needs considering historical conditions and transformations. This includes, for example, so-called Engineering Ethics, or the Ethics of New Technologies, and, in any case, any reflexive platform that accompanies a specification complement to the word ‘Ethics.’ This is the recess where the most severe and problematic debate is played out, as well as mentioned, and Bentham and Kant are the two reference champions. That is, consequentialism/utilitarianism is on the grounds that what is useful is that which results in the greatest happiness of the most significant number of people and tends to make ethics even an exact science on a par with mathematics. On the other hand, precisely, de-ontologism is regarding which moral act would be suitable for any person under circumstances similar to those in which a subject finds himself at the

moment of performing it. If then all this is even undergirded by the formulations of the categorical imperative, namely, from operating in such a way that the maxim of the will can always hold at all times as the principle of universal legislation to acting in such a way as to treat humanity both in your person and in the person of every other person always as an end and never as a means, it seems that we have given content to the human-centrism mentioned earlier.

However, even in the wake of what was said earlier about AI as an *Absolute Other*, there are several complications and difficulties that cause even the most generous speculative endeavors to overflow into the realm of triviality every time. Hence, first problem: no philosophy, or ethical theory, is assumable in all circumstances; at best we can speak of guiding criteria. Second problem: values are historical. Value is the activity of valuation that is always in a spatiotemporal location. It's a tension to *do-value*, but value is what here and now is worth through the action from which and for which it *actually* is, worth in terms of the packaging/orientation of a specific form of concrete acting. What is value for us today may be disvalue tomorrow and, more importantly, disjointed from the action of its actual exercise, may rise to nothing more than rhetorical statements of intent. Third problem: ethics is always an ethics of the situation. Fourth problem (the one framed earlier): the AI is an *Other*, another *Syntagmatic Actor*.

Therefore, if relative to the AI macro-question, one seeks a closed and even universal answer, as is quite evident, not only is the expectation placed in the question wrong but, also and above all, one derogates and fails to understand the situation in its absolute specificity and singularity. The question itself always remains open, and it could not be otherwise, even more so when at stake is, as in the case of AI, an *Absolute Other*. The closed and even universal answer, which is what is often sought in view of a pre-programming of the *artificium*, falls miserably in the presence of the imponderable that the Other is by its mere fact of being.

It has been said that the expectation reposed in the question that is out of focus; in the end it all flows back only into a problem of an Ethical Instruction Manual, into a label ethics, which will always attempt to move, woefully inconclusively, on the variable arrangements of the two criteria mentioned earlier within the horizontal approach. That is: either ethics precedes, or we run for cover later in the terms of the cost-benefit device. Or, again: the computable cost-benefit device is even prodrome in such a way as to give ethics a syncretistic foundation between consequentialism/utilitarianism and de-ontologism.

The issue, as we tried to hint already in the opening, is different and is played out on this side of good and evil: today, in the age of AI, man is under a decisive pressure that propels him toward his own, further (and perhaps final) transcendence. Because of the biotechnological and information technology revolutions, it's required that man project himself beyond himself, toward something else. An overall transfiguration that enjoins a rethinking of what is the past, present and future human condition.

The problem of choice, of ethical choice, if there is one, is afterwards, as always. Contrary to what is commonly thought, the question about AI is not a question about the specific form of unveiling of Being and therefore about what

makes this historical juncture epochal. Nor is the question about AI not and simply a technical and technological question, easily filled by a first-hand acquisition of knowledge even by philosophy, which, among other things, delights in third- and fourth-hand arrangements. Nor, finally, is it the disguise behind an epistemological screen that is evidently a necessary and yet never sufficient condition for fully understanding the situation, this time-here in all its infinite conjunctural combinations. The question about AI is first and foremost a question about man. On the man who has put his hand to AI; on the man who enjoys and will enjoy it; and, above all, on the man of tomorrow who in the disorienting and disoriented terms of mere use risks rediscovering himself even used.

As has been tried to be said from the very first lines, there is no doubt that Artificial Intelligence is one of the greatest promises of humanity; thanks to its developments, current and around the corner, we will probably be able to do things that would be unthinkable today: just think of quantum AI and therefore quantum computers. We will live better, and perhaps longer and happier lives. And yet it is also not possible not to grasp to the end what could be, but *in nuce* already are, the implications associated with this kind of technology that will reach and then greatly exceed the finesse and pliability of what we consider the best of human traits.

Talking about AI, under these conditions and according to these coordinates, implies talking about technology and philosophy, about machines and humans, about natural and artificial, in entirely new terms. It means increasingly developing the ability to know the human being with his needs and developing the ability to integrate with technological innovation without getting lost in it. And in this the co-participation in a unified project of philosophers and scientists is decisive. We must get our hands on a flexible and multifunctional *Lògos* and structure a common language as a basis for comparison that comes out of both the jargons of scientific language and some of the complexities of philosophical language.

This constitutes the heuristic scaffolding for the building of a New Humanism, a new condition of the human that restarts from a newfound scientific-philosophical intimacy that is now inescapable and vital precisely for the human to come. After all, we must start again from the awareness that, every time, our stories begin from an end. From the end of an idea of ourselves about ourselves that has accompanied us productively even for centuries: the Nietzschean vital metaphors, even in the terms of our self-narratives that re-insert us in our relationship with the outside world, even to make sense of it. Since we have taken to constructing and telling them, however, the theme has always been the desire to emancipate ourselves from ourselves to become something different and something else to continue being.

As human beings we live in the ruins of an imagined splendor, never attained and never attainable. We have always had a much higher idea of our destiny. We are and continue to be, no more and no less than in the same way as other living things, starting with the connotations of our peculiar persistent strategy as a species. Certainly complex, very complex, and AI is a figure of that. But this is not that it makes us a special living being and/or one that enjoys a privileged ontological status.

It simply tells of the fact that, in a seamless circularity, in making ourselves in relation to the entity, even the artificial entity created by us and which becomes an autonomous syntagmatic actor, we find ways to continue to be and, therefore, to redo ourselves, in the terms also of self-narrative hypotheses that constantly surpass themselves. And in the end, with respect to AI, with respect to the *Age of Artificial World Picture*, if the real question might be: *is it worth it?*, to assume in full that to some degree an answer has already been given. So much so that it would at most be a matter of redefining the question further and, just as an example, begin to consider that:

the most notable thing about AI is not AI itself, let alone its “intelligence,” but its capacity for reshaping how we live, particularly through its ability to exacerbate certain human behaviors, turning them into undesirable or problematic tendencies [10]: 27.

But it is only the beginning. Just the beginning, especially if you understand, once and for all, that what is at stake here is not Hardware and/or Software, but *Humansware*.

Humansware capital issue that we can thus condense into the following question: “how is AI redefining the key forms in which we express our humanity?” [10]: 2.


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Biomimetic Learning Design in the Artificial Era

2

Flavia Santoianni 

HCI is a strange and wonderful field.

Chignell et al. 2023

Abstract

The development of brain-based digital technology is being driven by technology innovation and neuroscience, with potential applications in education. The fields of educational neuroscience, neuro-education, and brain-based education have emerged to explore the role of the brain in teaching and learning. This collaboration between education and neuroscience has been further enhanced by the emergence of Critical Neuroscience, which examines the sociocultural and contextual aspects of scientific research. Technology is seen as a related discipline that can contribute to the exploration of brain-based learning. The collaboration between neuroscience and education is being reshaped by the emergence of bio-educational technology field of research. The integration of technology into education needs to be carefully regulated to ensure it is student-centered and guided by educational strategies. The principles of biomimetic learning design, which include personal differentiation, adaptive modifiability, developmental discontinuity, interaction and integration, and implicit support, can be applied to digital and artificial learning environments. This approach aims to personalize and adapt learning experiences, support self-regulation, and integrate explicit and implicit learning.

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1 Human Computer Interaction and Digital Generations

At the beginning of human computer interaction in the 1960s, human operators collaborated with computers to perform tasks, involving the concept of human augmentation and human machine symbiosis in a non-discretionary way in the task-oriented human–machine interface, focusing on guidelines, standards, and training. In the 1980s, after the introduction of personal computing—and later of personal devices—the spreading to the mass market has led to the concept of usability and user experience, and to technology-driven and design-oriented approaches, which have substituted the idea of efficiency. Humans became users with more discretion over computers, e.g. through social media and gaming; at the same time, the actual trend towards inclusive design and Human-Artificial Intelligence automation is getting back into the game human factors. Human augmentation nowadays means to distinguish diverse kind of augmentation, such as the diversity of levels of interaction emerging from the diversity of age, skills, and personal preferences. Inclusive, social, and collaborative aspects of computing are now considered [1].

Since 1950s, there has been a continuous transformation of computers' interfaces from an initial starting as hardware, only usable by engineers, passing through interface as software designed by programmers in the 1960s and 1970s, up to 1990s, when interfaces were reconsidered as terminal for end users and human factors began to play again a role in the human computer interaction. Interfaces became more dialogic and gradually converged toward computer supported cooperative work in the 1980s and 1990s, first involving end users and later end users' social groups [2].

The Digital Natives or Millennials and Generation Y—born between 1981 and 1996—have grown up with social media, while Generation Z or Zoomers—born between 1997 and 2012—have grown up as an already net generation and share with the previous generation the technological adaptation, and the skills to be interactive, team-oriented, and participatory in social contexts. The incoming Generation Alpha or Screenagers—born between the beginning of 2010 and the middle of 2020—are used to live with and “inside” devices' screens of personal computers, tablets, and cell phones.¹

Generation Z digital behavior has been studied to evaluate their psychological well-being. Results showed high levels of stress, increased anxiety, depression, and perceived loneliness [3]. From a cognitive point of view, heavy use of social media is leading to decreased attention, hyperactivity, and lack of empathy [4].

¹ According to recent global statistics, nowadays the average person spends 2 h and 24 min on social media every day. In 2021, the daily average time spent by 16–23 users on social media was 3 h, while all age groups have a consume of 2 h and 25 min. This range overcomes the average time spent by social media users to eat, to drink, and to socialize [3]. In 2022, 95% of USA teenagers use smartphone, while only 23% in 2011. In UK, under 14 spend more time with their devices than in conversation with their families [4].

Their *teen brain* is still plastic and can be heavily influenced by passive or active use of technology.²

According to the technology adoption debate [5], if cognitive system is supported by external devices which can substitute it, digital generations' development lies in the interaction with various devices, e.g. mobile devices, which may deeply influence its growth. On the other hand, brain-based technologies are now coming into the classroom [6] promoting cognitive enhancement.

Over the past twenty years, cognitive enhancement has been the focus of an interdisciplinary debate concerning its individual, social, and ethical implications [7]. Cognitive enhancement refers to the increase of cognitive functions, such as attention, perception, learning, and memory, but also reasoning, planning, and problem solving. Even if discussed in its implication, the core meaning of cognitive enhancement is the improvement of mind capacities through internal or external processing systems.³

In cognitive enhancement debate, any *artificial* aid given to the support of the cognitive system may be seen as potentially problematic. Artificial Intelligence (AI) is a research field implemented in the digital age, which is quickly developing, and sometimes it may appear as an autonomous agent—not under control—and, for this reason, potentially *problematic*. Like rapidly evolving complex phenomena, it is still lacking an overall interpretative framework which could analyze its dynamics with the temporal distance needed to objectively look at historically relevant phenomena.

Another phenomenon is converging with the contingency of relentless technology development of Artificial Intelligence, which is the emotion of nostalgia. Nostalgia is considered to promote resistance and skepticism of users toward future-directed technology, but some models interpret it as a dual property emotion, because it encourages social connectedness and, on this basis, it could also sustain technological innovation [8].

During phylogenetic evolution, humans—with personal and social connected intelligence, but *natural* intelligence—have often coped with environmental needs. Environment itself has represented a sort of alternative intelligence, just because nature is not always a controllable agent and, although it isn't an intentional agent, it can behave as an autonomous agent, whose causality is not always predictable and may be indeed opposite to the adaptive attempts of humans. Humans adapt to nature, in a positive way, when it's possible to manage and transform it; at the same time, when it becomes risky, disruptive, or devastating, when it gets out of hand, adaptation requires a greater effort.

² Active or passive use of technology is supposed to be the shift between a positive use of technology or not. For instance, social media active users comment posts, share information, and participate to the virtual community. Passive users instead do not directly communicate or interact with others. Active or passive use of social media, if associated with social media intensity of use, can influence social life and well-being [3].

³ Mind is aided by neurotechnological and pharmacological strategies or non-pharmacological ones as mnemonic rules or meditation [7].