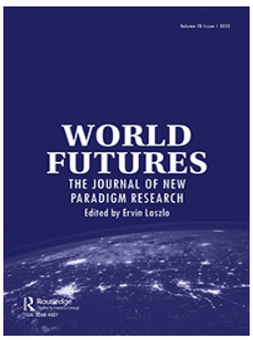

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The Digital Mockingbird: *Anthropological Transformation and the "New" Nature*

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ABSTRACT

Within a world-system characterized by processes and dynamics whose interconnections and interdependencies increase exponentially each day, we are passing through an extremely delicate and complex phase of global mutation. What we are witnessing is a radical overturn of the complex interaction between natural (biological) and cultural evolution. The ongoing paradigm shift and profound *anthropological transformation* create new dimensions, openings, *epistemological implications* that require *new thinking* and new thought, as well as different approaches and methods. We are the constitutive elements of a "new" Nature, from a structural, ontological and substantial point of view, in need of a New Humanism that must re-define certain categories (humanity, identity, dignity, Person, values, rights, etc.) in order to succeed in rethinking "being human" within a renewed and complex relationship with the ecosystems. The grand illusions of the hypertechnological civilization: *rationality, control, measurability, predictability, and elimination of error*; are reinforced systematically by the *carte blanche* delegated to technique/technology, reintroducing reductionist and deterministic approaches, analyses and explanations, exclusively based on technical knowledge and skills: that is, those which are guaranteed to best support precisely these very illusions. It is precisely this attitude which prevents us from being prepared, which dooms us to an eternal apprehension of *black swans,* little aware that *our very lives are emergency*; that they are infinite sequences of black swans. The present-day obsession with doing, designing, studying, and funding

KEYWORDS

Black swans; false dichotomies; grand illusions of the hypertechnological civilization; new Nature; paradigm shift; recognize and inhabit complexity; the overturn

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only what is "useful," the insistent search for control and certainty in order to cling onto an illusory sensation of familiarity and reassurance in the face of the radical unpredictability and variability inherent to life and reality ("tyranny of concreteness"). With the advent of artificial intelligence, it has become of the utmost importance to reflect upon the relationship/interaction between man and machine, and the dangers posed by pursuing the simulation of human thought.

> "What we observe is not nature itself, but nature exposed to our method of questioning". (Heisenberg, 1958)
>
> – Werner Heisenberg

The Overturn: Anthropological Transformation and the "New" Nature

Within a world-system characterized by processes and dynamics whose interconnections and interdependencies increase exponentially each day, we are passing through an extremely delicate and complex phase of global mutation, and find ourselves in the midst of an overwhelming process of anthropological transformation (Dominici, 1995–2021; Ferrarotti, 1997; Gell-Mann, 1994, 1995; Morin, 1973, 1977–2004; Prigogine & Stengers, 1979, 1984, 1997; Simon, 1962; Tegmark, 2017). What we are witnessing is a radical overturn of the complex interaction between natural and cultural evolution. The extraordinary scientific discoveries and technological innovation of the last decades, aside from having provided opportunities (as yet, however, exclusively for an elite few), incalculable possibilities and unimaginable scenarios, have definitely led us into the age of maximum unpredictability, obsolescence—in fields of knowledge and skills as well as elsewhere—and uncertainty. This unprecedented paradigmatic change, in which biological evolution is now being conditioned, as never before, by cultural evolution—which includes technique and technologies—has also, however. reinforced an illusion on our part of unlimited power and potential, which risks separating humanity from its own nature and from "Nature" itself. One need only consider the developments in the fields of genetic manipulation, robotics and artificial intelligence: human beings are—(or appear to be?)—now capable of (pre)determining sequences of life-events, even from the very beginning: the reproduction and the ending of a life, and in any case deeply modifying every aspect of that life. Consequently, in the age-old but eternally

renewed illusion of total control over the environment and the surrounding ecosystems, the crucial theme of a paradigm shift, beyond its impact as a mere slogan, takes priority, becoming absolutely urgent, seeing that we are now forced to rethink all of our concepts, working definitions, frameworks and categories. On the other hand, from the perspective of theoretical models, we no longer find ourselves capable of defining or producing an adequate thought system for this hypercomplex reality, in continuous evolution, which, among other implications, is accelerating the rapid obsolescence of our knowledge, skills, theories, hypotheses and instruments.

The furthering of knowledge has always been accompanied by new risks and uncertainties, just as the processes of social production of knowledge implicate and determine the social production of risks and anomalies (Bauman, 1998, 1999; Beck, 1986, 2007; Benkler, 2006; Rifkin, 2000; Stiglitz, 2002). Systemic and interdependent dynamics, no longer exclusively related to or derived from productive mechanisms, which have even become existential. Technique, technology, technologies, AI systems (Boden, 2018; Bostrom, 2014), and in particular, the invasiveness and pervasiveness of the digital (in all of its reticular demonstrations and determinations), transforming not only our surroundings and ecosystems—intensifying their connections and interactions—but also and above all, transforming our identities, our subjectivities, our relationships, our landscapes and our way(s) of understanding, adapting to and/or attempting to transform phenomenal reality. Transforming *People* themselves. We are the constitutive elements of a "new" Nature, from a structural, ontological, substantial point of view, not only in terms of the knowledge, theories, research, paradigms, social and media representations that have been produced, but also by the systemic relationship, no longer merely dialectic, between knowledge, risk and trust, which has been fortified even further, in a totally interdependent framework. The settings and ecosystems have been radically changed and transformed, becoming more and more artificial and increasingly molded by human intervention. Yet human beings have not proved capable of building a systemic or advantageous relationship with this sort of "new nature," much less one which favors objectives of general interest and for the common good. Beyond the traditional distinctions between *natural* and *artificial*, between natural and cultural, we are forced—today far more than in the past—to muse over questions regarding *what life is* (Bertalanffy von, 1968; Canguilhem, 1966; Capra, 1996; Capra & Luisi, 2014; Dominici, 2005–2019; Haken, 1977; Kauffman 1971, 1993; Laszlo, 1996; Lovelock, 1979; Maturana & Varela, 1980; Panikkar, 1989), and what constitutes intelligence, thinking, thought and *conscience* (hypercomplex dimension that cannot be simplified or reproduced) (Dreyfus, 1972; Minsky, 1989; Turing, 1950, 1994),

but also over questions about what it means today to be *People* and/or citizens.

This time, furthermore, the *paradigm shift* (Bateson, 1979; Dominici, 1995–1996; Heisenberg, 1959; Morin, 1973, 1973–2004, 2015) is revealing itself to be so deep and irreversible as to oblige us to also rethink/redefine the very idea and the concept of "Science" itself. What *is* science? In urging us to learn from science by doubting, one the last century's most renowned physicists, Richard Feynman, tells us that: "Science is the belief in the ignorance of experts." (Feynman, 2000, p. 187). Experience, not "science" itself, is what gives a scientist the judgment to decide what to focus on, and to: "pass on the accumulated wisdom, plus the wisdom that it might not be wisdom … Science alone of all the subjects contains within itself the lesson of the danger of belief in the infallibility of the greatest teachers … " (Feynman, 2000, p. 188). And once we have succeeded in reconsidering the concept and the working definition of "Science," we cannot shirk from also attempting to redefine/rethink the very concept of "Nature," going beyond that rather "romantic" idea/vision/conception of a simple, empirical, objective, group of phenomena, governed by simple laws, expressed using the exact (?) language of mathematics, which need only be revealed and subsequently acquired by human beings. And speaking of the concepts of "Science" and "Nature," what it comes down to, in other words, is the need to question certain epistemological and methodological foundations (Bachelard, 1934; Feyerabend, 1975; Feynman, 1963, 2000; Lakatos & Musgrave, 1970; Piaget, 1970; Popper, 1934, 1994), in particular the principle for which all variable and phenomena are "observable" (Blastland, 2019; Dominici, 1995–1996, 2003–2005, 2008–2021), as well as the conviction/belief/axiom that all that makes up reality, including social and human reality, is reducible and attributable to objective measurements, and can be expressed by quantitative data and translated into statistic and mathematical models.

The Need for a New Humanism

What we are in need of is a "new epistemology"* (1995–1996), whose fundamental "lever" is to be found in the urgent necessity of redefining (or breaking down at last!) the borders and barriers between nature and culture, between *natural* and *artificial*, between human and non-human, between mind (individual or collective) and environment, between systems and new ecosystems, between the "inside" and "outside" of every type of ecosystem, and so on. In the *hypercomplex society* (2003), faced with the increasing complexity of phenomenal reality and with an intensification of the interdependency and interconnection of processes and dynamics, we (almost paradoxically) continue to witness a cultural

hegemony consisting of new forms of reductionism and determinism, unfolding into an obsessive quest to translate *all that is qualitative into quantitative "data,"* (defined data, considered self-evident, that is, "taken for granted") (Dominici, 2003–2005, 2009, 2014a; Hammersley, 2013): which then leads to an ever more misleading and riskier combination of reduction and simplification, not limited to the milieu of scientific research and comprehensive observation of Nature. It would certainly not hurt to insist, clearly and staunchly, on a basic yet eloquent concept: *not everything can be explained by "causal" thought, not everything is observable* ("emergent properties") and thus *measurable; not everything can be described/represented by the scientific languages of certainty* (producers of *reductionism* and *determinism*); not all can be explained by simple, universal scientific laws inscribed/present in Nature and in the phenomenal world (quite the contrary!); not everything can be *simplified and/or reduced* and, above all, not everything can be *managed* (quite the contrary!), despite our connection technologies and an infinite, inexhaustible availability of data, which are providing us with extremely risky, and at times illusory, certainties and securities, linked to the atavistic aspiration/ambition of controlling and dominating Nature itself. And we have been able to verify this during the recent global and systemic emergency: a virus, aided and abetted by the scientific and organizational disorganization of the nation-states, other than by cultural and social factors (individualism), which has thrown the entire *hyperconnected and technologically hyper-controlled/surveilled world-system* into crisis.

Amidst these global and systemic crises of the entire world-system, *homo sapiens* himself, I repeat, is convinced of being the dominator and *unchallenged lord* of nature and of the ecosystems he inhabits. At this point, it is necessary to reformulate our hypotheses and questions—in a phase, moreover, in which all that is being proposed are simple answers and simple solutions to problems which are instead, obviously, complex—including those on the possibility of a New Humanism for this hypertechnological civilization—the *risk civilization* (Beck)—a New Humanism, which, as I have long been arguing, must begin precisely from a complete rethinking of thought, of knowledge (as *shared knowledge*, Dominici, 2003–2005) of the borders between fields of knowledge (and among skills), and above all, of the relational spaces (freedom and responsibility*—the centrality of educative processes)—a New Humanism that actually puts the People at the core, not only the person/human being but also, and above all—this is the crucial point—the (new) "Nature," in the framework of a systemic and symbiotic inhabitation. *New Humanism*, placing the Person and Nature, rather than Technique/Technology or Law, at the heart of the ongoing complex process of change, to avoid falling back into the classic errors that have always been made, from the original period of the first "Humanism" up through today,

those of continuing to perceive the ecosystems and the environment (such as, in particular, ecological issues and climate change), merely in terms of resources to be exploited and systems on which to exercise full dominion. Hence, a New Humanism that does not merely consist of the stale and, in certain terms, anti-historical, return of certain (arguably, fundamental) principles, imposed top-down in a completely different global historical context, characterized by a worrisome "*anomia*" (Durkheim) by an "*ethical void*" (Jonas, 1979), by indifference and moral numbness, by uncertainty and precariousness, which have by now become existential conditions. A world-system dominated by market-logics that, in a Weberian sense, are familiar with the *dignity of things* only, and not of people; a market left to its own "self-regulation," which highlights even more clearly the triumph of individualism, of the new asymmetries and of the consequent *weakening of social bonds* (Elias, 1987; Granovetter, 1973). A New Humanism that must necessarily redefine certain categories (humanity, identity, dignity, Person, values, rights, etc.) in order to succeed in rethinking "being human" in the world, within a renewed, other than complex, relationship with the ecosystems of our world (I will come back to the concept of "adaptive complex systems" later), as well as with its technological innovations: revolutionary, but also, more often than not, invasive.

Within the hypertechnological civilization of automation and simulation, we humans keep striving to eliminate/uproot all unpredictability, any possibility of error, to physically control and connect everything, delegating every strategic function and action to intelligent (?) machines, to artificial intelligence, to robots, including the function/action of *thought* itself, with very little awareness that it is precisely (although not exclusively) thought—so complex, so non-observable—that is impossible to simulate, emulate, reproduce or replicate. Even the extraordinary opportunities offered by Artificial Intelligence—which I define and understand to be a "new epistemological fracture" (Dominici, 2003–2005, 2009–2021)—aim more and more, both in terms of research and of application—at the crucial objective of emulating/simulating intelligence (which, as I always repeat, continues to be confused with the capacity for calculation and so-called "problem solving), of emulating and simulating the human mind, and its replicable, but not reproducible "complex product:" thought. Opportunities and risks, therefore, as pursuing the simulation of human thought is not without danger.

Rethinking Thought: The Grand Illusions of the Hypertechnological Civilization

Thought: it's something we haven't thought about enough, perhaps: thought, thinking, thinking about thought, thoughts on thinking, the search for

thought, and then thinking about *Nature*… notwithstanding the attempts, destined to fail, to reproduce, emulate, simulate thought in all of its complex and *indeterminate dimensions*, which have always been essential, of vital importance; dimensions nonetheless often deliberately ignored, underestimated, devalued, considered useless, of so little relevance to the civilization of "no-error" automation, which prefers to rely on sophisticated mechanical, artificial and complicated systems, which, if not downright "infallible," can at least be easily maintained, updated and modified, proffering complete *carte blanche* to technology → technological "solutionism"*). And, in doing so, they are following the hegemonic paradigm of contemporary society, founded on precise "logics" functional to the system, constructed on what I have in the past called the "*grand illusions of the hypertechnological and hyperconnected civilization*" (Dominici, 1995, 2014a, 2019a, 2019b, 2019c, 2019d): the illusions of *rationality, control, measurability, predictability, and elimination of error*; (the aspiration is to "manage" and/or predetermine all mechanisms, including social ones). A series of illusions, reinforced systematically by the license delegated to technique/technology, reintroducing reductionist and deterministic approaches, analyses and explanations, exclusively based on technical knowledge and skills: that is, those which are guaranteed to best support precisely these very illusions. At this point, considering the accelerations and the exponential expansion of the interdependencies/interconnections/interactions/conditioning that form the local and global neural network of phenomena and processes, we have, paradoxically, returned to the dominion of a neo-positivistic vision/conception of reality. Above all, what I have so often warned against, apart from the constant simulation(s), is the progressive marginalization of "the Human," considered "bearer" and potential creator/producer/executor of error (*ibidem*), of errors, which cannot be "reset" by the system(s); error, which, rather than being perceived as a "source of knowledge and learning" has always been considered an element to be removed and eliminated, even from educational and formative processes. A disastrous prospect, as I have been saying for over twenty years. Of the five *grand illusions* in which the hypertechnological civilization is indulging, it is this last illusion—the elimination of error—that is both the most deceptive and misleading, and therefore the most dangerous; the illusion of succeeding in eliminating error (and thus unpredictability) from our organizations and from our lives means eliminating what truly makes us "human beings,"—indeed, what makes us "free human beings" (Figure 1).

A Human is the only "possessor" of the possibility of making mistakes, of committing "errors," even consciously and deliberately; a Human "factor" and "complex variable" featuring such continual, systemic and emergent unpredictability, which, apart from all else, implicates/involves/requires—necessarily—taking on responsibility (ibidem).

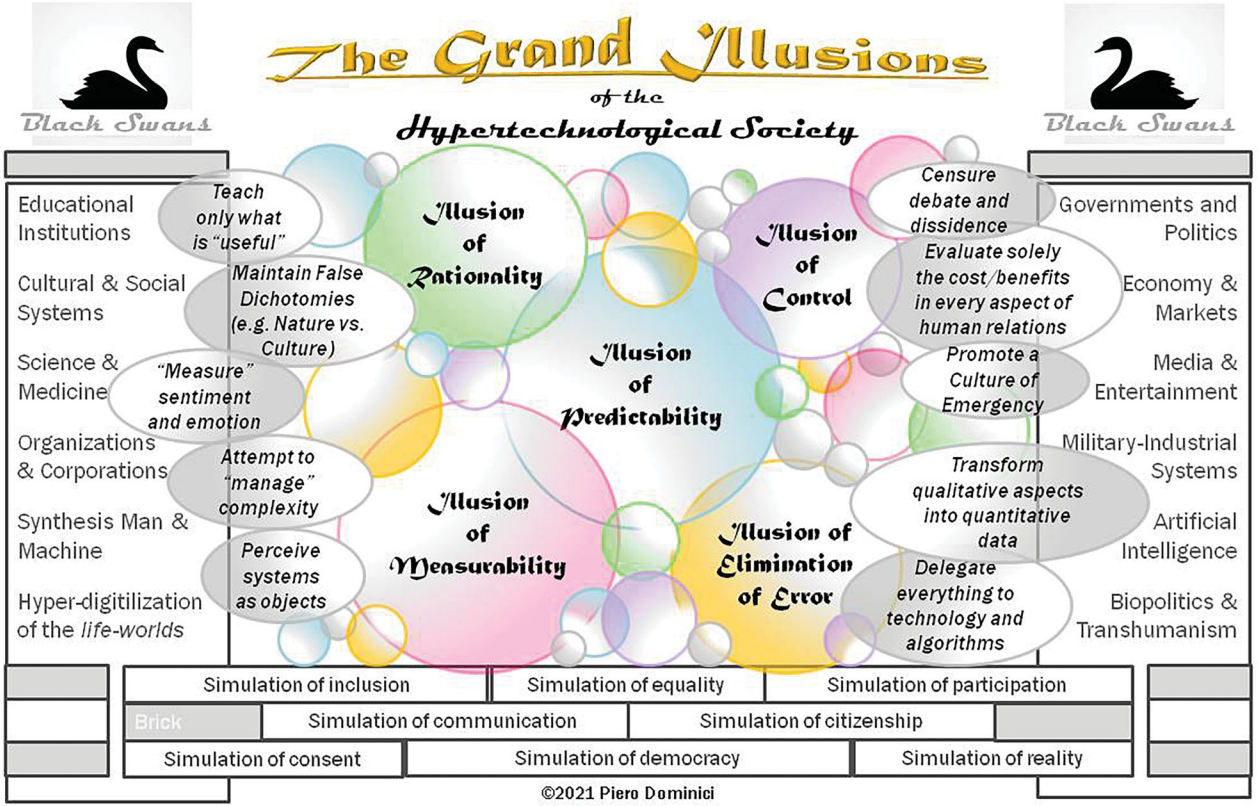

Figure 1. The grand illusions of the Hypertechnological Society.

It is precisely these elements—according to the aforementioned paradigm—that must be eliminated/removed in order to allow the construction of social systems that are perfectly functional, efficient, predictable, manageable and pre-determinable, even regarding social behavior, both individual and collective. Societies that have been designed and imagined (?) as perfect "machines" (thus neither intelligent nor capable of adapting to life's perpetual disruptions and *black swans*) rather than as the "organisms" and hypercomplex systems that they actually are. Which is to say, the "new Nature" of complex human ecosystems. If we picture the global ecosystem as an immense tissue of neural networks, the goals and functions of artificial intelligence and automation processes, designed and assembled by human beings, are to gradually substitute our human and relational networks and mechanisms. The ambiguity and the ambivalence, the multidimensionality and the unpredictability of human beings, the extreme variability and diversity of all living things, are wildly incompatible with the axioms of this civilization of automation and algorithms (Domingos, 2015). These very algorithms that allow no ambivalence or ambiguity. I have spoken, in the past, of a "new epistemological fracture," regarding the profound impact of artificial intelligence on the architecture of knowledge, praxis and life experiences, similar in significance to the groundbreaking *introduction of chaos theory* and its implications. The "nature" we are now confronting is the intrinsically problematic, hypercomplex nature of our social systems, which is no longer attributable solely to the (albeit very significant) categories of risk, uncertainty, vulnerability, liquidity and so forth.

In the meantime, however, we humans keep endeavoring to control and cage the immense complexity of the human and the social, of the *vitality of spirit* and the "non-observable," within models and mathematical formulas, in infinite sequences of data and numbers, in molecules, synapses, hormones, chemical reactions. In doing so, we also try to *visualize* what cannot be visualized; the very idea that something can escape our "sight" or our control terrifies us. And it is precisely this attitude which prevents us from being prepared, which dooms us to an eternal apprehension of *black swans* (Taleb, 2007) (a metaphor that goes back to very ancient times—and a classical example of *post-rationalization*), little aware that *emergency* is a connotative element of complex systems.

Black Swans and Other Inadequate Paradigms

Our very lives are emergency, infinite, *non-linear* sequences of dynamic processes involving both *emergency* and *the emergent*, which are manifested in every possible imaginable and non-imaginable, unpredictable manner. I will go further: our lives are an "infinite sequence of black

swans" (Dominici, 1995–2020) of various shades and hues, featuring a primordial ambivalence and apparently irresoluble contradictions. Speaking of which, I have the impression that quite often, in many different instances of social and organizational praxes, those who insist on this concept/metaphor of "black swans," when faced with situations/dynamics that have escaped their control, are simply attempting to utilize/construct *post-rationalizations* in order to reassure themselves and those around them that, despite a few unexpected episodes, everything else is totally under control and neatly foreseeable. In this way, once again the "illusion of control"—of *becoming the master of chance* and of one's own *destiny*—continues to maintain its hegemony, not only in terms of a social and organizational "collective unconscious," but very tangibly, despite the evidence of its complete inconsistency and inadequacy. Because, as said above, all social and human life is characterized by these endless, non-linear series of black swans, whose constitutive elements are unpredictability, complexity and systemic dynamism. The complexity of living things, not to mention that of social groups, is never completely intelligible or comprehensible; it is never reducible/ascribable to mathematical formulas or to more or less infinite strings of data. It is obvious that this characteristic has profound implications with respect to the feasibility of representing, visualizing, modeling or even communicating this same complexity. In fact, any analysis, praxis, representation, model or communication of a complex system inevitably becomes integral and fundamental part of this system, both in terms of observation and of perception (individual and collective), hence cannot reduce—or simplify—the very complexity of which it is part. And our awareness of this is still quite feeble.

Speaking of "simplification," this has become a buzz word used to perpetuate the digitalization of life, an effort which does not result in "clarifying" complexity or guiding society to a harmonious cohabitation—it should be kept in mind that the opposite of complexity is *not* simplification, but reductionism—on the contrary, these dynamics and processes often lead to an obsessive search for *simplification at all costs,* even when it is actually dangerous to simplify, for example in education (Dewey, 1916, 1929, 1933; Dominici, 2005–2021, Nussbaum, 2010; Robinson, 2015), communication and democracy.

Our attempt to *inhabit* the hypercomplexity of this global civilization—*an ecosystem of ecosystems* (1996)—must take into account its intrinsically structural fragility and vulnerability, correlated with those factors that have always made it seem (seem, not be!) perfectly functional, efficient, hyper-modern, rational, super-accelerated, suitable for a "civilization without error or anomalies"—perfectly (apparently) controllable and predictable in every aspect and dimension, or if not, with the ambition of becoming so in the shortest time possible. The dominating

themes are "know-how," automatisms, facts and figures, and the exaltation of velocity. In the meantime, we continue to neglect thinking about the social and cultural construction of the Person or the citizen, we continue to avoid "caring about and taking care of ourselves, of others, of our community and of society," in other words, we continue to not to think of the *long-term period*; one could say that we continue not to think at all, whilst standing on the brink of a quantum leap into a "new nature" that indubitably calls for a radically new system of thought.

The Observable and Non-Observable: Complex *vs.* Complicated Systems

The ongoing paradigm shift and profound anthropological transformation (1996)—only in part "technological"—not only (re)define, but actually create new dimensions, openings, *epistemological implications* that require *new thinking* and new thought, as well as different approaches and methods (and their integration), other than new instruments for collection and analysis. In all fields of research and action, and with subtle variations, throughout the diverse disciplines and sectors, no longer are universal laws and rules on nature being sought, through reductionist and deterministic approaches; but it has been acknowledged, on the basis of studies, theories and fundamental scientific discoveries (not only among what are called the "hard sciences") that the analysis and explanation/interpretation of a phenomenon, of a process, of a system's complexity, can no longer come down to/be reduced to empirical observation and to the knowledge of *simple* properties (evident and *measurable* in quantitative terms), characterizing the components/parts making up the system that is being observed. Awareness of the ever more strategic and relevant role of the *observer,* as both a conditioning and *conditioned* element, has spread more and more widely, awareness that an empirical "scientific" observation can no longer be considered "neutral," "external," or totally "objective" with respect to the system referred to and to the object-system being observed; awareness that an observer is inevitably a participant in what he/she is observing, affecting and at the same time being affected, changing and being changed. Awareness and acknowledgement that we cannot observe isolated "objects," even objects isolated from their context under "ideal conditions," but rather "systems," "relations," dynamics," characterized by levels of interconnection and interdependency that call urgently for a systemic and multi/inter/trans-disciplinary approach to complexity. Since this awareness has taken hold, therefore, the objective has no longer been (will no longer be) that of identifying and recognizing analogies and common structural elements within more or less complex phenomena, but of bringing to light the fact that phenomena and

dynamics that are apparently similar or identical display non-linear, irregular and unpredictable behaviors and reactions. Order, balance, simplicity, linearity, causality, dichotomies, dialectical relations—just to name a few—are accompanied, if not substituted, by newer "key" concepts, such as complexity, chaos, non-linearity, disorder, entropy, irregularity, dynamicity, variety, etc.—which open and reveal extraordinarily intriguing scenarios and trajectories, fascinating but at the same time difficult to interpret; above all, which open and reveal new pathways for study and research, to which we cannot shirk from accompanying corresponding new epistemologies and, it goes without saying, *epistemological transformations*.

It might be useful at this point to consider the difference between two terms which are often—and erroneously—used as synonyms. We need to understand that *complex systems*—since I am speaking about human and social systems, the term used to describe these (and all living systems) is generally "complex adaptive systems"–are by no means equivalent to "*complicated systems*": the latter term refers to the world of objects, things and machines: complicated systems are mechanical and artificial, and can be described using mathematical formulas and quantitative measurements. These systems are "observable" in all their parts and dimension, their actions are predictable and can be modified or corrected; furthermore, it is possible to break down their parts in order to understand their behavior and functions. The totality of a complicated system, in fact, is equal to its number of parts, whereas, on the contrary, in a complex system, the whole is *greater* than the sum of its parts. Complicated systems, of course, cannot create themselves, but are created by living (human) beings, while *complexity*, instead, is an essential characteristic of all living beings, in other words of biological, human, social and relational systems, characterized by non-linear dynamics and by numerous intersecting levels of interconnection, interdependency, feedback, self-generation and *self-organization,* giving rise to *emergent* properties, processes, dynamics, characteristics, events and actions (Ashby, 1956; Anderson, 1972; Barabási, 2002; Bar-Yam, 1997; Bateson, 1972, 1979; Bocchi & Ceruti, 1985; Calvino, 1968; Capra, 1975, 1996; Diamond, 1997, 2005; Dominici, 2005–2021; Emery, 1969; Feynman, 1963; Foerster von, 1981; Gallino, 1992; Gell-Mann, 1994, 1995; Gentili, 2018; Haken, 1977; Hayek von, 1964; Heisenberg, 1958, 1959, 1976, 1999, 2002; Heisenberg et al., 1980; Holland, 1975; Israel, 2005; Kauffman, 1971, 1993; Krugman, 1996; Kuhlmann, 2013; Laszlo, 1996; Le Moigne, 1977; Luhmann, 1984, 1986, 1990; Mandelbrot, 1977; Mathews et al., 1999; Maturana & Varela, 1980, 1985; Montuori, 2014; Morin, 1973–2004; Neumann von, 1958, 1966; Nicolis & Nicolis, 2007; Poincaré, 1885; Prigogine & Stengers, 1979, 1984; Prigogine, 1980; Prigogine, 1996; Simon, 1962; Turner & Baker, 2019;

Weaver, 1948). Each part (arranged in a hierarchy of interconnected subsystems) and each process is capable of conditioning and changing the behavior and the (non-linear and non-deterministic) evolution of the entire system. These complex adaptive systems, which are "open" systems, subject, that is, to external stimulation and influences from the surrounding environment/ecosystems, follow an irreversible arrow of time, and are thus described as "dissipative" systems. It is an oxymoron, therefore, to speak about "managing," "governing," "programming," or "controlling" complex systems, and endeavoring to predict their evolution, simplify their dynamics or reduce their complexity is equally futile. In particular, complex systems, especially social and human systems, may not share the same space-time: consequently their interactions can take place even at extremely significant distances in time and space. As an afterthought, it may well be, that in describing the properties and peculiarities of complex systems, a more accurate definition of "Nature" itself can be inferred.

Thus, "reality" and "what is real" unveil themselves to be increasingly more complex and unpredictable than the scientific paradigms that have observed and investigated them up to this moment. In the emblematic words of the renowned mathematician and physicist of the late 1800s, Henri Poincaré, "If we knew exactly the laws of nature and the situation of the universe at the initial moment, we could predict exactly the situation of that same universe at a succeeding moment. But, even if it were the case that the natural laws had no longer any secret for us, we could still only know the initial situation *approximately*. If that enabled us to predict the succeeding situation *with the same approximation*, that is all we require, and we should say that the phenomenon had been predicted, that it is governed by laws. But it is not always so; it may happen that small differences in the initial conditions produce very great ones in the final phenomena. A small error in the former will produce an enormous error in the latter. Prediction becomes impossible, and we have the fortuitous phenomenon." (Poincaré, 1908, p. 68). Order and disorder, order and *chaos* (Gleick, 1987; Kiel, 1994; Lorenz, 1963; McCall & Burge, 2016; Stewart, 1989; Taleb, 2012), linearity and non-linearity, predictability and unpredictability, equilibrium and dynamicity/entropy, not only mix and blend, but they also coexist. In other words, complexity and chaos have been recognized (albeit rather belatedly) as integral dimensions of the Vital, the Human and the Social (Habermas, 1981; Mead, 1934; Morin, 1977–2004; Parsons, 1951; Todorov, 1995; Watzlawick et al., 1967; Weber, 1922a, 1922b; Weick, 1993); a complexity whose dynamics of transformation and non-linear, complex evolution never cease. The relationships, even the dialectical rapports, between norms/regularity and chance/exception are completely overturned, with profound implications, not only for disciplinary fields but also, and above all, for common sense

knowledge, for scientific knowledge, for people's lives, for social systems, for democracies.

False Dichotomies and the Tyranny of Concreteness

And yet, somehow, we continue to approach the complexity of life with a reductionist/deterministic mentality, we continue to make the "Great Mistake"(Dominici, 1995–1996, 2009, 2014a) of believing that education today is a question of a purely technical or technological nature, merely a matter of teaching skills and know-how—and nothing more (which instead is the exact opposite of what we so desperately need); we continue to insist on separating, dividing, isolating what is, in reality, not only correlated and interdependent, but intrinsically and profoundly united, widening the fracture between what I have called "false dichotomies" (1995–1996), not only between nature and culture, culture and technology, between the natural and the artificial, but also between fields of knowledge, such as the humanities and the hard sciences, between interdisciplinarity and specialization, even between creativity and rationality. Breaking down, isolating, simplifying (including what is impossible to simplify), these have always been our (simple) answers, our simple solutions to complex problems, our illusory "devices" of reassurance that everything is under control and that what we cannot control is simply a freak occurrence, an occasional black swan, a momentary breach in our perfect techniques for monitoring, determining, predicting—and for measuring, since all that is not measurable, of course, is of no use to anyone. And indeed, with respect to a certain absence of thought and/or the incapacity to think, we have all but deemed "*useless*" theory itself. Certainly, when compared to practice and research, theory cuts a fairly futile figure, according to the current mindset: yet another example of the ever-present *false dichotomies*, that of theory *vs.* research and practice.

The present-day obsession with doing, designing, studying, and funding (!) only what is "useful," the attempts to observe, describe, explain, recognize and control complexity, human life, spirit, and vitality by dividing, charting and cataloguing, forgetting that the "essential is invisible to the eye" (Saint-Exupery, 1943), the insistent search for control and certainty in order to cling onto an illusory sensation of familiarity and reassurance in the face of the radical unpredictability and variability inherent to life and reality, apart from impoverishing our minds and imagination, apart from weakening the bonds of belonging—bonds of solidarity, community and identity—end up bringing us back again and again to a sterile search for quantitative data, numbers, facts, figures, results, statistics and solutions, to all that can be measured, which is what I have in the past called the "tyranny of concreteness:" (2009–2019). This

tyranny of concreteness is, quite literally, a cognitive and cultural dictatorship, supported by a ubiquitous architecture of fields of knowledge and skills, which has come to dominate every aspect of contemporary social and cultural organization and life, establishing a totally inadequate "culture of evaluation" that is incapable of grasping the complex and *qualitative* (!) dimensions, the subtleties, the ambiguities, the contradictions, conflicts, ambivalence, coexistence, typical of the human, the social and the vital.

And how could it be otherwise? In the civilization of automation and concreteness, it is the "facts" which must prevail—or what we label as such—it is the data which, according to certain deceptive and misleading narratives, would seem to no longer need any intervention, epistemological or methodological, from human beings. All that is needed, apparently, is the software and, of course, the know-how for using it. And these same data, admittedly essential and fundamental, are often, however, presented (erroneously) as though they were "facts of life," while, as used to be taught in our classical epistemology and research methodology courses, the data "can never speak for themselves." Today, consequently, they reign unchallenged, considering that, according to the hegemonic paradigm, the only things that count are skills, digital skills … .which are undoubtedly necessary, but as I never tire of saying, quite insufficient, especially as a method or approach for evaluating facts or data.

Compatible with the dictates of the tyranny of concreteness is the concept—I for one, at least, have the distinct impression, that a similar concept regarding "thinking" (but also thought, thoughts, and thought system(s)) is prevalent nowadays: thinking, as is known, requires a great deal of "time," as well as a good capacity for abstraction (among many other capabilities), therefore it tends to slow us down. It follows that, in sacrificing a certain degree of speed, we become much less "efficient," according to the tenets and well-established legends of organizational cultures. Legends, which, despite the latest narratives, and albeit contrary to the majority of expert opinions, have never quite died out, quite the opposite! What else can be said, other than to point out once again, that these are, and have always been, educational and cultural issues?

To wrap up this theme, I would like to repeat these unforgettable words of Hannah Arendt: "If it should turn out to be true that knowledge (in the modern sense of know-how) and thought have parted company for good, then we would indeed become the helpless slaves, not so much of our machines as of our know-how, thoughtless creatures at the mercy of every gadget which is technically possible, no matter how murderous it is." (Arendt, 1958, p. 3).

Man and Machine: Artificial Intelligence and Algorithms

At this point I would like to reintroduce a theme mentioned in the initial pages of this article, namely, the advent of artificial intelligence and the ever more widespread use of algorithms in every sector of social life. Among the various fields of study, research and action, it has become of the utmost importance to reflect upon the relationship/interaction between man and machine (Foucault, 1988; McLuhan, 1964; Mumford, 1934, 1967; Wiener, 1948, 1950). The objective, in my opinion, should be to focus on a "complex synthesis" (1995–1996) capable of at last overcoming the devastating separation (false dichotomy) between culture and technology, with the prospect of "healing the fracture between the Human and the Technological."

As I have said before, the growing capacity of our species to gradually take hold of the levers of its own evolution leaves us with the need to rethink the somewhat ambivalent interaction between technique/technology and human beings, along with the necessity to reformulate our thinking about what it means to be human. In particular, we are obliged to reexamine our (once again) ambiguous and complex interaction with intelligent(?) machines and robots, because the "complex synthesis" triggered by this interaction is one whose prospects, developments and implications we are as yet unable to evaluate. My own reflections on this convergence run along two parallel lines: on the one hand, the possibility, or more likely, the probability that machines or robots will come to resemble human beings more and more closely does not worry me in the least; as a matter of fact I see this change in dynamics as a positive move which will facilitate the abovementioned synthesis and interaction. I am, however, *extremely* concerned at the mere idea/aspiration/vision/narrative that humans might/should become more and more similar to machines, which could, arguably, add unlimited potential to our capacities/abilities but, inevitably, in aiming to eliminate error, in aiming to eliminate the possibility of making difficult (even the wrong) choices, and even more so, in aiming to eliminate the unpredictability of their own actions and decisions, would be tantamount to eliminating precisely what makes us "human beings."

In the framework of certain recurring, dystopian Utopias, the idea of designing and realizing logical machines/technological androids/intelligent machines (Turing, 1950, 1994), capable of imitating and behaving like human beings and/or subsequently, to create hypertechnological automated environments/ecosystems (even, "perfect societies" … perhaps we could define them as "algorithmic societies"), perfectly devised by perfect devices, incapable of making mistakes … is an age-old—ancient—idea/ambition/vision spanning many historical

eras, which has touched and tainted all areas of human and social praxis; from myth to religion, from the sciences to the arts, from literature to technique/technology itself, permeating all forms of social and cultural production. In the future, no doubt, we will be dealing more and more often with more or less intelligent (smart?) materials and machines—with ever more massive intensification and extension of the networks and levels of connection with the human race—and with new android/robots that, as anticipated, will become better and better at imitating us and replicating certain kinds of human behavior. Running the enormously potentiated risk of being unable to evaluate in-depth the consequences of our choices, destined to reveal themselves in all their power, immense and irreversible.

But what are all these efforts aiming toward? In what direction are we heading? At times, my impression is that we are simply "playing things by ear," in a condition of limited rationality (Simon, 1959, 1997), drifting through the great paradoxes of the hypertechnological and hyperconnected civilization, a civilization that feeds—and feeds upon—a multitude of risks and illusions. In short, rather than healing the fracture between the natural and the artificial, should we choose instead to make a lopsided dash toward "transhumanism," the outcome, I fear, might turn out to confirm the wisdom of the famous proverb: "fools rush in where angels fear to tread." I must confess that I have always considered the term artificial "intelligence" to be a bit of an oxymoron, as I believe that intelligence is a connotative feature of living beings, involving an *emergent* property of the (complex) human mind that we call "thought," while artificial intelligence may merely correspond to a greatly heightened capacity for calculation and problem-solving. I cannot deny, however, that we must be ready to cope with the *epistemological fracture* represented by the advent and exponential progress of AI systems, which may end up blurring or, in the near future, even completely doing away with the traditional distinction between complicated and complex systems. In this case, the non-linear and unpredictable dynamics that I believe will ensue, are those of a progressive transformation and evolution, again through non-linear differentiation, of all of these "complicated systems" into "complex systems," with a resulting and somewhat paradoxical return to the centrality of error and unpredictability: the Human, in other words, will once more take his/her place at the very core of the world-system(s), with unprecedented novel powers and new responsibilities, never before seen in human history. It must be hoped that all of this can unfold in the framework of a renewed systemic relationship with the *machines*, with the "nature" of the *natural and the artificial*, with the *world outside of us* (inside and outside, another false dichotomy that, someday perhaps, we may succeed in pondering).

A World of Artificiality

Faced with this literal explosion of the artificial, in a world where technique is no longer subordinate to nature, in a *world of artificiality*, all that communication and the *social production of knowledge* can do, despite the importance, especially today, of their strategic functions, is to accompany it, render it visible and pull it into the public debate, where it takes form, to all effects, as "nature," as a nature whose manageability presents considerable difficulties. In other words, within the hypercomplex society (2003), socially and culturally marked by fragile social bonds and by the hegemony of individualistic values, the dimensions of what is technically/technologically controlled has become hypertrophic with respect to what is controlled non-technologically, but—and this is the crucial point of the question—these processes and dynamics have *not* contributed to reactivate the fundamental social mechanisms of trust and cooperation, but have rendered the "life-worlds" much more uncertain, fragmented and precarious for the Subject.

Despite the hegemonic "narratives" which continue incessantly to be spun, what is in fact happening is that the advent of the hypertechnological civilization has expanded, as never before, the dimensions of dynamicity, variability, but also of precariousness, uncertainty, insecurity and vulnerability within—and without—the social systems, rendering the functions of social communication even more strategic in terms of an (unattainable, as should be clear by now) *"reduction of complexity"* (Luhmann), of the management of risk and uncertainty, and of mediation of conflict (Dominici, 1995–1996). It would perhaps be useful to recall that we find ourselves at a crossing point, an insidious passage—in the midst of yet another, very inflated *age of transition*—a process which should deeply concern us, toward multidimensional, global modernity, marked by an even greater accumulation of *anomalies* and knowledge illusions (Kuhn, 1962; see also: Lakatos & Musgrave, 1970; Merton, 1965; Sloman & Fernbach, 2017), which have debilitated the certainties of our once-consolidated cognitive paradigms. The hegemony of instrumental rationality and of the self-regulated market economy has allowed the *logics of dominion* to triumph and to spread to the totality of social life. This process has further weakened those bonds that transform individual choices into collective projects and actions. Regarding the theme of social cohabitation, what has been generated is a strongly individualized global society, which shifts the burden of greater responsibility onto the shoulders of each single social actor, called on to bear alone the weight of *responsible freedom*. From this perspective, the development of *forms of mediated communication* (Thompson, 1995), for example the expansion of connection technology and of *networked social systems* (Byung-Chul,

2012, 2013; Castells, 1996–1998, 2009; Floridi, 2010; Hess & Ostrom, 2007; Himanen, 2001; Rainie & Wellman, 2012; Toffler, 1980), besides the opportunities created, may well contribute to further weaken and cool off the mechanisms of the production and intensification of social bonds (Coleman, 1990; Putnam, 2000) (or what is commonly termed *production of social capital* in scientific literature). Moreover, the belief, fostered by *technological solutionism and acritical neophilia,* that technology (in particular, digital technology, the internet and other networks), can solve any problem, including a return to a more trusting rapport between politics and citizens, could well turn out to be yet another fatal error. Considering that political and social praxis, despite finding/having found new virtual *arenas* of construction and organization of consent and/or opinions, require a crucial passage from theoretical processing to practical, concrete action, which must impact the political deciders. And in order to do this, what is needed are informed and critically educated social actors *in flesh and blood*, active and aware within their networks of cooperation.

For some time, globalization has constituted the empirical condition of the modern world (Sassen, 1998), condition that is associated with the concept of complex connectivity, meaning a "densening network of interconnections and interdependencies that characterize modern life" (Tomlinson, 1999, p. 14). This is a process that can also be viewed as the triumph of an omni-comprehensive, totalizing ideology that absorbs, envelops, incorporates and molds all spheres of praxis and of real life. And any criticism of globalization (Gallino, 2000; Stiglitz, 2002) as producer of a ferociously disruptive individualism (Touraine, 2004), is in reality a criticism of the global capitalistic system, guilty of having broken the age-old alliance between capitalism and democracy (Dahl, 1998) and of having staked everything exclusively on a technological and economic development without considering the implications on single individuals and on social groups and citizenship (Bellamy, 2008; Marshall, 1950; Norris, 2011; Rawls, 1971). The world economy (Wallenstein) is progressively de-potentiating the mechanisms and *apparatus* appertaining to democratic regimes, with profound repercussions, not only on the structures and hierarchies of the systems of global production, but also, and above all, on the *entire architecture of rights and protection* regarding people, citizens and workers. The undeniable outcome is the passage from a working society to a *risk society* (Beck, 1986, 1999, 2007), with the victorious establishment of a perpetual *political economy of insecurity*. This always brings to mind a formula I am fond of repeating: we are trying to manage a *sharing economy* without having the least idea of the true meaning of a *sharing society*.

Every process of technological innovation or change necessarily determines elements of stress and vulnerability in the system, but technological progress bereft of culture becomes a merely "would-be innovation," creating less equality and fewer opportunities. It is only through long-term educational processes involving true interdisciplinary, multidisciplinary and transdisciplinary programs designed to stimulate critical thinking, to teach students to recognize complexity and to see objects as systems rather than vice versa, that we will be able to form *hybrid figures* (1995–1996), capable of uniting the false dichotomies that keep our narrow fields of discipline separate, so that innovation and inclusion can walk hand in hand to create a truly participative and democratic society. Only by radically rethinking education, educational processes and our educational institutions, which entails first of all breaking the chains of tradition and upsetting the governance of our schools and universities—*innovation means destabilizing* (2005)—can we hope to overcome the "great mistake," the false dichotomies and the cultural backwardness and tardiness which puts us in the position of forever chasing after the accelerations of technology. Thought and theory must no longer be considered "useless," while error must be recognized for what it truly is: a source of knowledge and vitality. Above all, it is time we stopped teaching and training our students to be "*mere executors of functions and rules*."(Dominici, 1995–1996, 2009–2021).

We are currently experiencing and attempting to *inhabit* an era marked by drastic changes and by processes of *complex synthesis*, whose epistemological and ethical implications have exposed us to completely novel trajectories and prospects. The last word, however, belongs to *Mother Nature* and to that *vitality of spirit,* that spiritual vitality that no technological device, no hyperconnected and hypercomplex ecosystem will ever be able to capture, cage or re/disconnect, least of all by means of the logics of control and/or reclusion.

The Digital Mockingbird

In the mid-19th century, Danish author Hans Christian Andersen wrote an admonitory fairy tale called "The Nightingale" (Andersen, 1843), about an emperor who substitutes the artificial song of a golden wind-up nightingale for the natural singing of a real bird he used to love, encouraged to do so by the words of the court music-master: "For you must perceive, my chief lord and emperor, that with a real nightingale we can never tell what is going to be sung, but with this bird everything is settled. It can be opened and explained, so that people may understand how … and why one note follows upon another."

But at the end of the tale, only the song of the living bird will be able to succeed in restoring the health of the emperor, who has fallen deathly ill.

In speaking of humanity's ongoing anthropological transformation, in speaking of the need for learning to *inhabit complexity*, in speaking of the advent of a "new" Nature, we must take care not stake everything on the digital simulation of human thought and sentiment, lest we be once again taken in by a mechanical bird, this time, more aptly, a *(digital) mockingbird*.

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