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Democracy is Complexity. Social Transformation from Below

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Abstract. The temptation to find a working formula for transforming society into a highly regulated, sustainable world-system does not take into account two extremely relevant and interwoven aspects of reality, which can be understood by probing the deeper meaning of these two words: democracy and complexity. Beginning with what is arguably the most mysterious term of the two, complexity, the first point that must be clarified is that "complex" and "complicated" systems are diametrically different: complicated systems are man-made mechanical/artificial systems and as such are controllable, predictable, and possible to break down into their smaller parts. All living systems, instead, are complex, thus the exact opposite: uncontrollable, unpredictable, and impossible to break down into their highly dynamic, interconnected, and interdependent parts. If this sounds familiar, it may be because this is also a passable description of democracy. Complex systems, including democracies, therefore, are made up of an exceedingly large number of smaller, interactive subsystems, or subunits, arranged hierarchically, where the changes "from below" among smaller sub-units trigger changes in higher levels of units, changes which will affect the entire system and its interactions with other systems and with the environment, giving rise to self-organization and emergence. Social transformation is no exception: it must also begin from bottom-up events, from single individuals or grassroots communities, never from a top-down, hetero-directed imposition, even when this is attempted with the noblest of intentions.

Keywords: complex vs complicated systems, simulation of participation, elimination of error, self-organization, emergence.

Riassunto. La tentazione di trovare una formula funzionante per trasformare la società in un sistema-mondo altamente regolamentato e sostenibile non tiene conto di due aspetti estremamente rilevanti e intrecciati della realtà, che possono essere compresi sondando il significato più profondo di queste due parole: democrazia e complessità. Partendo da quello che è, probabilmente, il termine, per certi versi, più misterioso tra i due, quello di "complessità", il primo punto da chiarire è che "sistemi complessi" e "sistemi complicati" sono sistemi diametralmente opposti: i sistemi complicati sono sistemi meccanici/artificiali costruiti dall'uomo e come tali controllabili, prevedibili e scomponibili nelle loro parti più piccole. Tutti i sistemi viventi, invece, sono complessi, quindi l'esatto contrario: incontrollabili, imprevedibili e impossibili da scomporre nelle loro parti altamente dinamiche, interconnesse e interdipendenti. I sistemi complessi, comprese le democrazie, sono quindi costituiti da un numero estremamente elevato di sottosistemi, o sottounità, più piccoli e interattivi, disposti gerarchicamente, dove i cambiamenti "dal basso" tra le sottounità più piccole innescano cambiamenti nei livelli più alti delle unità, cambiamenti che influenzeranno l'intero sistema e le sue interazioni con altri sistemi e con l'ambiente, dando origine all'auto-organizzazione e all'emer-

genza. La trasformazione sociale non fa eccezione: per essere profonda, dev'essere sistemica, cioè partire 'dal basso', dai singoli individui o dalle comunità di base, e mai imposta dall'alto: altrimenti, sarà una trasformazione sociale etero-diretta, anche quando questa viene tentata con le più nobili intenzioni.

Parole chiave: sistemi complessi vs sistemi complicati; simulazione della partecipazione; eliminazione dell'errore; auto-organizzazione; emergenza

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1. COMPLEX SYSTEMS

This is due to the fact that complex systems, a category which encompasses all living systems, are instead completely uncontrollable, unpredictable, and impossible to break down into their highly dynamic, interconnected, and interdependent parts (Weaver 1948; Heisenberg 1958; Simon 1962; Feynman 1963; Hayek von 1964; Neumann von 1958, 1966; Emery 1969; Anderson 1972; Bateson 1972; Morin 1973, 2004 [1977]; Holland 1975; Capra 1975; Le Moigne 1977; Mandelbrot 1977; Prigogine and Stengers 1979; Maturana and Varela 1980, 1985; Foerster von 1981; Kauffman 1993; Luhmann 1984, 1990; Gell and Mann 1995; Krugman 1996; Prigogine 1996; Laszlo 1996; Bar and Yam 1997; Diamond 1997, 2005; Mathews *et al.* 1999; Barabási 2002; Israel 2005; Dominici 2005, 2021; Nicolis and Nicolis 2007; Montuori 2014; Turner and Baker 2019). If this sounds familiar, it may be because this is also a passable description of democracy. Before moving on to this second term, however, the implications and intrinsic properties of complex systems require some further clarification. This is a necessary step owing to the linguistic confusion between the words complex and complicated, which are commonly used as synonyms, as well as to an excessive techno-zeal among those who dream of controlling the uncontrollable and predicting the unpredictable. But this is still beyond our capabilities; indeed, according to the characteristics of complex (human) systems, the very idea of "managing" or controlling complexity is a contradiction in terms.

All complex systems, including democracies, therefore, are made up of an exceedingly large number of smaller, interactive subsystems, or subunits, arranged hierarchically (Simon 1962), in which the changes "from below" among smaller sub-units trigger changes in higher levels of units, changes which will affect the entire system and its interactions with other systems and with the environment, giving rise to self-organization and emergence, phenomena that have no need of any kind of external regulation. Social transformation is no exception: it must also begin from bottom-up events,

from single individuals or grassroots communities and groups, never from a top-down, hetero-directed imposition, even when this is attempted with the noblest of intentions. It is a well-known attribute of both complex and chaotic systems – and chaotic "sloppiness" is indeed an intrinsic feature of democracies – that a very small change in conditions at the beginning of any given process, often called "bifurcation" (Poincaré 1908) can have an enormous impact on the entire system. This is known as the "butterfly effect" (Lorenz 1963; Stewart 1989), and it is one of the properties that fill our lives with what I call the «inevitability of unexpectedness» (Dominici 2017, 2021).

What does this tell us? It tells us that, although every complex system has a history in which certain paths may tend to be repeated, nonetheless events will unfold differently each time. Whereas in strictly biological terms, emergence may depend on whether there is a more or less spatially dense distribution of the interacting sub-units, in social systems, made up of human beings, emergence can occur even at large distances and across long periods of time, so that the occurrence of emergence and self-organization is not limited to spatial or even temporal proximity, but rather depends on intensity. Thus, it is easy to see that owing to the ongoing increase in variables, along with the shifting parameters of today's hypertechnological and digitally hyperconnected civilization, in which communication goes instantly viral and processes continue to undergo unprecedented levels of acceleration, social complexity has been heightened into 'hypercomplexity' (Dominici: 1996), a hypercomplexity we must all begin to learn to inhabit.

That is why we have to focus our attention, not on the separate parts of complex systems, but on the manifold interconnections, interdependencies, and interactions among them, if we wish to even begin to understand how a complex system functions (Canguilhem 1966; Bertalanffy von 1968; Kauffman 1993; Haken 1977; Lovelock 1979; Maturana and Varela 1980; Panikkar 1989; Capra 1996; Laszlo 1996; Capra and Luisi 2014; Dominici 2005, 2019). Even so, we will never be able to fully comprehend the characteristics of these systems, or of their constituent parts, be they cells, leaves, stars, animals, or human beings; the elusive quality and the sheer quantity of the connections will always make the difference: "more is different", in the words of Anderson (Anderson 1972).

In (complex) social systems, whose sub-units are individuals, entities and relations, which are constantly changing the fabric of the system itself, it is these human sub-units, that co-create and co-construct the condi-

tions of the interactions, of the framework of reference, of the social environment and of the *ecosystem* (Dominici 1996, 2005). Furthermore, again as in any complex system, the scientific ideal of objective "observation" is effectively banished: human systems cannot be observed from outside, as each and every observer is part of the system that is being observed. Complexity theory establishes that the very act of observing has an effect on what is being observed, and the reverse is also true: the observer is in turn affected. The term used in sociology is "observer-participant", which describes this condition quite effectively.

2. THE COMPLEXITY OF DEMOCRACY

Considering the properties that have been described regarding complex systems in general and human/social systems in particular, it takes no great effort to understand the profound connection between complexity and democracy. All democracies share the most uncontrollable and unpredictable features of complex systems, with their infinite combinations of dynamic interactions, interdependencies, and interconnections. In fact, democracy is complexity, and this must form the basis of our understanding for any initiatives we wish to take in attempting to transform the social systems and mechanisms that guide our lives (Weber 1922; Parsons 1951; Habermas 1962, 1981, 2013; Granovetter 1973; Coleman 1990; Sorokin 1937-1941; Luhmann 1984, 1990; Luhmann and De Giorgi 1991; Putnam 2000; Dominici 2005, Touraine 2008). Certainly, what passes for democracy today is a far cry from a genuine democracy consisting of active, participatory citizens capable of critical thinking. On the contrary, in the hypertechnological "knowledge" society, inequality and asymmetry are paradoxically increasing. We find ourselves in the throes of an ongoing "anthropological transformation" (Dominici 1996, 2022), brought about by the extraordinary scientific discoveries and technological inventions of the last decades, in dire need of maintaining the human factor, of reinforcing rather than weakening social bonds, and of preserving democracy in the face of what could easily become a Panopticon of surveillance, in an effort on the part of political and/or corporate leaders to control what nature has ordained uncontrollable. It cannot be overly emphasized that the endeavors to control humanity or humanity's future are doomed to failure. Some of the most significant errors of our time are the illusions entertained by society's experts and authorities, which can be called the «grand illusions of the hypertechnological civilization» (Dominici 2005, 2009, 2019b, 2019c,

2019d): the illusions of rationality, of control, of measurability, of predictability, and of the elimination of error from our societies and from our lives.

Having seen that the definition and description of complexity, including interdependency, unpredictability, and spontaneous emergence, can be appropriately applied to the concept of democracy and to the citizens who make up a democracy, we must insist on correcting the aim of those digital engineers and experts who are paradoxically proposing strategies today that fall back on obsolete linear and deterministic principles, which are not applicable to complex adaptive systems. Our approach to any initiative for understanding, fostering and/or improving the conditions of our democracies must necessarily take into account the concept that "managing" democracy is as futile a goal as "managing" complexity, and that, as we must learn instead to inhabit (hyper)complexity, we must also create and support citizens who are capable of inhabiting democracy. Because genuine democracy, which requires the active participation of citizens capable of critical and independent thinking, depends on an educated citizenry. A formula that this author has presented in past occasions is as follows: education is citizenship. Education is democracy. "Democracy is complexity" (Dominici 1996, 2016, 2017).

This brings us to the strategic relevance of educational processes in rethinking and rebuilding citizenship within a culture of responsibility and transparency, two instruments which are often either taken for granted or simply neglected, yet are indispensable for fostering awareness, which is the opposite of hetero-direction (Riesman 1948), and for creating truly democratic systems. Unfortunately, teaching a systemic approach is not something that can be carried out within the kind of brief time window contemplated by political leaders and by a growing population of digital natives, whose screen-swiping impatience tends to hinder them from engaging in the slower rhythms of reflection. From the perspective of governance, the construction of cultural change requires long-term actions, while the majority of nation states, which have been thrown into a profound crisis by globalization (Beck 1986, 2007; Bauman 1998, 1999, 2000), continue to proffer policies and politics based on short-term rationales and instruments. What schools and educational institutions must strive to provide is the preparation of citizens capable of thinking with their own heads, who will not limit themselves to knowing their rights, but will participate in actions for the common good, based on a culture of legality and responsibility, and who will demand nothing less than a fully mature, symmetrical and transparent relationship between themselves and the state.

To put it very simply: there is/there can be – no such thing as global citizenship or so-called digital citizenship unless the minimum essential conditions of "plain citizenship" are guaranteed. At the same time, there is/there can be no such thing as "real" innovation (meaning social and cultural innovation) without guaranteeing conditions of inclusion. Thus, we find ourselves obliged to make a choice between inclusivity or exclusivity, realising that citizenship is a social and cultural issue, and no longer a legal one (Dewey 1916; Marshall 1950; Arendt 1951; Banfield 1958; Freire 1968; Piaget 1970; Rawls 1971; Veca 1990; Dominici 2005; Bellamy 2008; Nussbaum 2010; Norris 2011; Balibar 2012). If we are to choose the former, we once again need to underline that inclusivity requires systemic change coming from the roots of society, rather than benevolent concessions or stewardship from above. Inclusivity, naturally, is also a pre-requisite of freedom, which entails responsibility. The sense of responsibility is not something that can be taught but must be made available for students to absorb throughout the years of school from the examples of responsibility and mutual respect set by the behavior of their teachers, as the real-take home message we give to our students is through practice rather than predication.

Because the issue of democracy in general – and citizenship in particular – regards both freedom and responsibility (Gramsci 1948, 1951; Foucault 1975; Bobbio 1984; Dahl 1998; Dahrendorf 2001; Canfora 2004; Dominici 2016a), it is a cultural issue that calls for a kind of education which will provide the younger generations with the capacity for learning, living, practicing and applying "logic"; by the time the university years are reached, it is truly difficult to teach students to use logic to develop/verify arguments, modifying the structure of a too-rigid forma mentis. Our young students are in dire need of a method for thinking, reasoning, synthesizing, and acquiring a systemic approach which will allow them to sift through the excessive quantities of information surrounding them, using the tools provided by philosophy. Long before students reach the end of secondary school, they should have been introduced to complexity and to critical and systemic thinking. The kind of education that is urgently needed is one that teaches and trains them to identify the connections between phenomena and processes, between knowledge and life-experience, that allows them to see diversity, debate and pluralism of opinion as an asset rather than a risk, that enables them to critically evaluate the socio-historical origins of norms and cultural models and to reflect on the relationship between nature and culture (one of the above-mentioned false dichotomies that should be left behind once and for all).

Consequentially, a reformulation of thinking and of the fields of knowledge along open and multidisciplinary lines, doing away with false dichotomies, becomes even more urgent, which must, then, develop into concrete proposals and educational strategies working toward the social construction of change.

3. EDUCATION = INCLUSION = CITIZENSHIP = DEMOCRACY

Let us therefore confirm that there is a close correlation between school/education and a truly active and participatory citizenry (Dominici 2005, 2017), one which can guarantee a less asymmetrical relationship between power and populations, even in those social systems that are characterized by little or no vertical social mobility. Historically, schools, education and training have always represented the main possibility for advancing socially or improving one's starting conditions in advanced societies, and are arguably the sole possibility in less developed, more rigidly structured ones. In other words, educational institutions are substantially our only "social elevators". Unfortunately, the rules of engagement are increasingly being dictated by social media and digital platform giants. Paradoxically, on an ever more interconnected planet, inequality and asymmetry have been drastically increasing across the entire world, while the social elevators represented by schools, vocational institutions and universities have almost completely broken down. They are therefore no longer carrying out their vital function, a phenomenon which can be observed, for example, by the crisis of the welfare system, which is just one of the aspects of an increasingly troubled social framework that has transformed insecurity and precariousness into an existential condition, weakening social bonds and the undermining the very mechanisms of solidarity. The result is a system that is progressively casting doubts on the rights of the people (citizens) that had hitherto been taken for granted, not only, for example, the right to self-determination, but even the right to knowledge.

Speaking of schools, which have always played a vital role in democratic regimes, I would like to share these words from one of the spiritual fathers of the Italian constitution, Pietro Calamandrei, in a historical speech made in 1950, in which he did not hesitate to speak in of schools in terms of "constitutional organs":

as you know […] in the second part of the Constitution, the part entitled 'the branches of the state', there is a description of the bodies through which the people express their will. These are bodies through which politics is transformed

into rights, and our healthy and vital political battles are transformed into law. Now, when you are asked what these constitutional bodies are, the answers that will naturally come to mind to all of you are: the Houses, the House of Representatives, the Senate, the President of the Republic, the Judicial Authorities: but it will never occur to you to consider school among these bodies, which is, instead, a vital organ of democracy as we conceive of it. If we were to compare the constitutional organism to the human organism, we could say that school corresponds to those organs in the human body that have the function of creating blood […] School, central organ of democracy, because it solves what, in our opinion, is the central issue of democracy: forming a ruling class […] this is democracy's problem: to create this class, which must not be a hereditary caste, closed off, an oligarchy, a church, a clergy, an order. No. In our idea of democracy, the ruling class must be open and continually renewed by the upward flow of the best elements from all classes, from all categories.

The relevance and pertinence of these words will resonate with all of those interested in democracy and the citizenry that makes it up. Naturally, since these words were spoken, society and educational systems have undergone (are undergoing) profound transformations. We are facing a social complexity which eludes the traditional systems of control and requires a reformulation of thinking and a redefinition of the fields of knowledge. It is in this sense that Edgar Morin speaks about "thought reform" and the reorganization of knowledge outside of the borders of the disciplines (Morin and Kern 1993).

4. FALSE DICHOTOMIES

This idea entails the liberation of thinking from its cognitive cages, an overflowing from within the narrow borders of the false dichotomies that dominate our view of civilization and of education itself, an age-old view unfortunately shared by too many educators and policymakers, who are as yet unable to perceive this fracture and the need to heal it. I am speaking of the fracture between culture and technology/technologies, directly triggered by the split between studies in the humanities and scientific studies, which has determined yet others for which we are paying a very high price, with repercussions, not only on every kind of scientific research but also on the entire universe of creative and intellectual production, which in turn can only impoverish our capacities for becoming thinking, aware and participatory citizens in democratic states. That we are facing a hypercomplexity due to an overturn in the complex interaction between culture and nature, in that cultural

FALSE	DICHOTOMIES
Nature	Culture
Natural	Artificial
Human	Technological
Mind	Environment
Culture	Technology
Humanistic Studies	Scientific Studies
Art	Science
Complexity	Specialization
Interdisciplinarity	Specialization
Imagination	Rationality
Emotion	Rationality
Creativity	Rationality
Theory	Practice/Research
Thinking/Thought	Action
Knowledge	Competences
Soft Skills	Hard Skills
Form	Content/Substance
Real	Virtual
Healing the Fracture	*P. Dominici 1995-2018*

Figure 1. False Dichotomies. *Source:* Dominici 1996 and sgg.

evolution is now capable of conditioning biological evolution, should make us aware of our crucial need for a paradigm shift, whose fundamental "lever" (in an Archimedean sense) is the urgency for redefining – or, at last, eliminating, the borders between the natural and artificial, between rationality and creativity, soft skills and hard skills, theory and practice, as well as between mind (individual and collective) and environment, between systems and new ecosystem, etc. I hold this line of reasoning to be essential: complexity and specialization, multidisciplinarity and specialization are by no means antithetic, but are simply false dichotomies (Dominici 1996) that we have never really tried to unite.

Overall, we are not only dealing with complex social conditions, but also with the necessity of working within a systemic perspective, surrounded by the opportunities/risks of a living, unforeseeable network of events, toward the objective of defining and constructing a culture of citizenship and inclusion that will allow social transformation while protecting democracy from erosion. The growth of any nation-state, which is a crucial issue that cannot be explained or governed utilizing solely economic paradigms (globalization has widely provided sufficient demonstration on this point), would derive great advantages from this. The cultural question that invokes freedom and thus responsibility (related concepts) on the part of individual and collective social actors goes well beyond a normative, judiciary and deontological/professional framework. Democracy requires a foundation of ethic and morals that cannot be imposed. The process

of non-simulated participation among citizens sharing an ethical basis, a cultural model and a strong identity is fundamental for the very survival of social and organizational systems, which involve multiple variables and require profiles and skills developed through real-life experiences, activated and reinforced in schools through long-term policies.

5. MODELS FOR THE FUTURE

These are the prerequisites for moving toward a positive future, for constructing genuine democracies based on the genuine participation of citizens, rather than simulation of participation, simulation of democracy, and simulation of citizenship, be it on local, national or global levels. Whatever models we choose to follow, whatever societal transformations we are moving towards, what must not be lost is the complexity of the human dimension, which is the pivotal point of all social communities, no matter how brilliantly they are conceived, designed or planned, no matter how much progress we have made along our digital timelines.

Speaking of social transformation and more specifically, of the societal models for the future, let us look more specifically at what is currently being proposed.

In considering the future of human communities, in particular of urban communities, both on a localized and on a global plane, much emphasis has been put on potential models consisting of helix formations conceived to illustrate the overlapping functions and decisional planning of intensely digital societies in the future, for example the so-called "smart cities". A triple helix originally calling for interaction between government, business, and academia was later modified to include a fourth participant (low man on the totem pole, it is to be feared), consisting of the "public", specifically in the form of "media and culture-based civil society"; consisting, therefore, of a highly mediated participation, rather than the spontaneous self-organization of grassroots individuals and groups that has been described above (Van Waart *et al.* 2015). This kind of proposal falls into the time-worn pattern of holding that systemic change should be entrusted to the upper layers of society ("the best of the best"), forgetting that true systemic change begins from below, among the smallest and most modest elements in the system. In this manner, we continue to invoke "excellence", calling for the most brilliant minds hailing from the most prestigious institutions to lead the way, to trigger the transformation of society – and to sustain (global?) democracy. But what social and political leaders and authorities, experts,

intellectuals and above all economists, fail to realize is that systemic change regards complex dynamic systems, open to the environment, whose changes and interactions are initiated among sub-units, not from the top down. Only in this way can emergence "emerge".

Moreover, apart from a certain hesitation in applauding such a top-heavy alliance between the original three members of the helix, namely, government, corporations and academia, who have (not only in the past) subjected us to some unequivocally iniquitous historical events, it does not seem plausible that this kind of structure would do much to confront the enormous problems of inequality and asymmetry that are paradoxically increasing day after day in the hypertechnological "knowledge society". Rather than a genuine knowledge society, however, it would seem that what we currently have is merely an "information society", in which access to information is (appropriately) considered a right, a right that is not currently available to all and that must be extended to all layers of society. However, delving deeper into this problem, it becomes further necessary to ascertain from what sources the information itself derives: are we once again looking at a "top-down" derivation? And how much weight do platform giants carry in "hetero-directing" the search for this information? Perhaps it would be better to take a step back and question how access to information can be guaranteed, without overriding the egalitarian premises of freedom of information, thought and expression, if the sources of information and knowledge derive solely from prestigious and powerful international institutions, from the most highly educated elites, from our intellectual intelligentsia.

We should therefore ask ourselves, once we have legislated and acted on the criteria for guaranteeing freedom of access to information, whether the source of this information is only to be found in the upper echelons of a transnational body, or whether, on the other hand, information deriving from the individual actors and communities at the base of this human system will be equally available and equally free to circulate. We should never forget the wisdom of folklore, the wealth of cultural heritage and the value of diversity we can learn from the customs and beliefs of the inhabitants of the many cultural ecosystems of this planet.

Recently, we have heard the word "stewardship" pronounced as a means of protecting against violent propositions, racism, and armed conflict, a word whose very meaning denotes guidance from above. No matter how lofty the ideals, no matter how humane the intentions of this guidance, it is implicitly limiting to freedom of thought, opinion, and expression, an unalienable right

won by those who came before us through centuries of sacrifice and struggle. Furthermore, as history has so often demonstrated, the transition from an enlightened guidance led by humanitarian ideals to a virtual dictatorship has never been easy to prevent, and with today's digital acceleration, it could come about in the blink of an eye.

Further thought should also be given to the role of the media, (in particular social media) and their increasingly invasive, manipulative and homogenizing impact on cultural, social and psychological dimensions.

Several alternative helical structures are currently being put forward; for example, another variation on the quadruple helix suggests a different foursome, between legislation, demography, technology and development, in relation to strategies for sustainable development in the near future, to be formulated from a (complex) systemic approach. However, under the lens of a probable translation of this proposal into practical reality, this approach would most likely be activated by political leaders hastily seeking "simple solutions to complex problems" (Dominici 2005, 2009), without considering the human dimension. Today, in fact, most blueprints for a sustainable future rarely deviate from compulsory collocation within a "smart" framework based on the "Internet of Things" (IoT) paradigm, despite the clear contradiction of the latter with the essential properties of complex – living – adaptive systems. Therefore, while these four aspects of the helix may provide a robust working list of essential categories, what they are missing is a way to ensure the full inclusion of (a more imperfect) human dimension to round out the spheres of action. Each of these might benefit by identifying the "missing dimension" which would be needed to make them beneficial to, or at least compatible with the human factor, which too often has been artificially separated from its natural "technical/rational" counterpart through the ubiquitous practice of dividing what should be a unified whole into the "false dichotomies" mentioned above. The suggestions that follow could provide some ideas for integrating this missing dimension.

6. LEGISLATION: THE LAW IS NOT ENOUGH.

Paradoxically, in today's hyperconnected, hypertechnological civilization, where rationality is treasured above all else, we are, on the contrary, living in a state of «limited rationality» (Simon 1997), to the point of becoming an asymmetric society, where only legal rights are taken into consideration. But the law is not enough! One of the crises common to modern democracies, in fact, is that in many societies, only apparently open and inclusive, opportunities are nominally guaranteed along purely theoretical lines, based exclusively on legal or judicial norms, that is, within a purely legal frame of reference. For this reason, democracy is fast becoming mere procedure, or better, a mere set of procedures, a phenomenon that when transferred onto a "smart" digital platform would represent even more clearly the loss of the human dimension, meaning the person, the people, the system of relations, the educational and cultural contexts: the "life-worlds". Further exasperated by the accelerations of the new digital velocity, which leave very little time for reflection, once again the danger is that of focusing merely on the technological and bureaucratic dimensions of social and political issues. Real inclusion is impossible under these conditions.

Furthermore, the virtual space formed by the hyperconnected economic ecosystem, where money and information flow at breakneck speeds, has deprived politics and democratic regimes of the control of their own electoral "bodies". The so-called process of disintermediation is separating the political systems from their citizenry, thus from each single social actor, who becomes burdened with the impossible task of maintaining some kind of individual freedom without the help of a community. Today, in fact, citizenship is only partially linked to rights and duties deriving from the recognition of an individual as belonging to a community (local, national or international). The global context, furthermore, is one in which the political systems of the nation states have become less and less relevant, with many modern democracies at risk of becoming "handmaidens" to the economic power system (Dominici 2003). Future citizens of the digitally hyper-connected 'global village' are thus facing two tangible dangers: namely, simulation of participation and the illusion of having a less asymmetrical relationship to power (*ibidem*). The rules of engagement are no longer being written by legislators, but by those agencies that produce, distribute and share knowledge – once the nearly exclusive domain of educational institutions. In any case, the dimension of citizenship, global or otherwise, is intimately correlated to the access to, and the quality of, education and training. In our hyperconnected and interdependent society, we need to remember that connection will not suffice; what is needed are not merely connected citizens, but citizens who have become capable of independent, critical thinking (Dewey 1916, 1929, 1933; Nussbaum 2010). Citizens who have not learned systemic thinking, who are not capable of thinking with their own heads, are the "weak link" of democracy (Dominici 2003, 2022, 2022b).

7. DEMOGRAPHY: QUALITATIVE VS. QUANTITATIVE FACTORS

The word demography implies a series of statistical data and measurements of the population(s): figures and facts which are undoubtedly important for organizing and improving the lives and lifestyles of the world's inhabitants; however, it has primarily quantitative connotations, whereas, in this author's opinion, it is the qualitative factors which are more important. Qualitative factors have a rather fickle feature of changing constantly, according to the specific moment, place and emotional background in which they are considered. It is the variety of the life-worlds which constitute the qualitative factors of human civilization. Even more important are the experiences that each single and unique individual goes through during his or her lifetime, which must necessarily in fact, be "experienced" by a living being and not simply calculated, recorded or processed by artificial intelligence, no matter how sophisticated it has become.

However, in today's world, we find ourselves living under the «tyranny of concreteness» (Dominici 2005, 2017, 2019; see also Hammersley 2013) – a veritable dictatorship where only what is measurable is deemed valid, and only what is "useful" is considered worthwhile. Certainly, the prospect of "measuring" quality is somewhat of an oxymoron, especially when considering something like the quality of critical thinking, or the "quality" of social/human systems, taken not just as a demographic group of people, but as a self-organizing, interacting and interdependent phenomena from which the unexpected often emerges.

This is the reason why the grand illusions of the hypertechnological civilization are so deleterious to the construction of our future(s): we are not only caught up in the illusion that everything must be measurable, but we also delude ourselves that everything can be predicted and controlled, whereas unpredictability is the very essence of existence. We are, however, so entrenched in our hubristic illusion of rationality that we are unable to see that none of these concepts are compatible with the complexity of life, not to mention the hypercomplexity of social life. The hegemony of instrumental rationality – and of the self-regulated market economy – in fact, has allowed the logics of dominion to triumph and to spread to the totality of social life, undermining the very foundations of democracy, while the obsession with quantity and measurement has overridden our concerns with the rights of our workforce; indeed, labor has become more a case of robots than of rights.

Furthermore, lest our youth become caught up in this web of "limited rationality", let us allow our students to pursue their interests and passions rather than forcing them to choose the most "useful" subjects, or the ones they believe will guarantee them a job in the future (a guarantee which holds less and less validity, considering the speed with which professions and activities are becoming obsolete). Above all, let us cease to consider error as something that can be eliminated from our lives, as error is an irreplaceable instrument in the learning process. Consequently, we need to construct a culture of error, an «epistemology of error» (Dominici 1996) in order to cast a different glance over complex systems and phenomena (Mead 1932; Popper 1934; Wiener 1948, 1950; Arendt 1958; Ashby 1956; Simon 1962; Kuhn 1964; Bertalanffy von 1968; Bateson 1972; Lakatos and Musgrave 1970; Feyerabend 1975; Prigogine and Stengers 1979; Foerster von 1981; Gleick 1987; Gallino 1992; Gell-Mann 1994, 1995; Prigogine 1996; Emery 2001; Israel 2005; Dominici 1996, 2022; Taleb 2012; De Toni and De Zan 2015; Tegmark 2017; Faggin 2022). The possibility of making errors, moreover, is what keeps us human.

8. TECHNOLOGY: TECHNOLOGY "IS" CULTURE

Speaking of the "tyranny of concreteness", the false dichotomy between technology and culture is one that has been wreaking great havoc in our institutions. The misleading idea that technology is progressing much faster than culture reinforces this damaging concept by failing to take into account that technology can never be considered separate from culture, because it is simply a part of culture. True innovation, as said above, must guarantee conditions of inclusion: technological innovation bereft of culture is but a would-be innovation. By failing to develop humanistic values and insight, we are dooming ourselves to chasing after a target of technological progress that will remain eternally beyond our grasp.

Unfortunately, it is not only among engineers and policy-makers that technology has overreached its proper place in our society, but even in educational institutions, which continue to make the "great mistake" (Dominici 1996): that of staking everything on speed and simulation, believing that technology, in particular digital technology, can provide the solution for every kind of problem, and therefore of giving priority exclusively to teaching technical skills and "know-how". In other words, in education today, knowing "how" is presented as the only goal that matters, whereas what we so desperately are minds that want to know "why" as well, minds that can see and make connections, follow intersecting trajectories, and engage in creative thinking.

9. DEVELOPMENT: A STRAIGH PATH OR A PHASE OF A NATURAL CYCLE?

In the last two or three centuries, society, in particular western society, has focused primarily on development, to the detriment of the well-being of our environment and, perhaps, of a more spiritual form of evolution. The technological progress made in recent decades is nothing short of astounding, although it remains to be seen whether it will serve to bring us an increase in happiness or serenity. Today, although what is called "sustainable development" is the talk of the town, it is not clear how and if this objective can be effectively realized. For this reason, many voices are invoking a slowing-down or even a halt to development, although countries which had formerly been left behind by the third and fourth industrial revolutions understandably claim their right to an equal share of development.

Development, as such, seems to be portrayed as an ascending arrow. However, there is a very different pattern to be found in nature, where forms rather tend to be fractal rather than geometric, and spiral rather than symmetrical. Apart from this discrepancy, perhaps the concept of development needs to include a phase of disengagement, or to use a lunar expression, a waning phase. If we look at nature, at complex bio-physical systems, one of the phenomena that is most easily noted is that of cycles. Most of nature, in fact, runs in cycles, where two or more opposing forces or circumstances alternate. Cycles are all around us, and within us as well, if we but observe.

Perhaps development vs. cyclic movement is yet another false dichotomy. It may be that we need to incorporate the idea of cyclic waxing and waning in our plans for the future, rather than insisting on development and growth, albeit so-called sustainable development and growth. While the arrow of time appears to be irreversible for us (Prigogine and Stengers 1997), it may be that the path of development should be circular or spiral, and include periods of deceleration, slackening, or inactivity. Instead of striving against natural cycles of growth and decline, we should figure out how we can best adapt to these rhythms and follow them to our advantage and benefit. However, this does not appear to be the path that we are currently taking.

10. EPILOGUE: AGAINST SIMULATION & FOR AN EPISTEMOLOGY OF ERROR

Overall, along with the accelerations brought on by digital technology, the process of prioritizing economic factors over human needs has further weakened those bonds that transform individual choices into collective projects and actions, so vital for democracy. Our answer today seems to be to search for even more technology, entrusting all solutions to artificial intelligence or algorithms, through which we hope to replace our human fallacies. Far from rendering us "smart" citizens surrounded by the Internet of (smart) Things, the results will simply be more simulation. Simulation of participation, responsibility and thought, which can only lead to an (albeit global) citizenship without citizens, and to governments and organizations run along illusory lines: illusions of control, rationality, predictability, measurement and the most pernicious illusion of all: the idea that error can be eliminated from our lives and world-systems. Perhaps what is needed is to set forth a new epistemology of error and unpredictability.

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