

# THE ENTROPIC EFFECT OF GLOBALIZATION AND THE SUSTAINABILITY CHALLENGE: TOWARDS A BIFURCATION

CHIARA GIACCARDI  
*Catholic University of Milan (Italy)*  
*chiara.giaccardi@unicatt.it*

MAURO MAGATTI  
*Catholic University of Milan (Italy)*  
*mauro.magatti@unicatt.it*

*Abstract:* The entropic effect of globalisation and the challenge of sustainability provide an opportunity for a critical exploration of the interplay between life, order and social change. Drawing on the principles of self-organisation observed in living beings, we delve into the continuous exchange of energy and resources, the general connectedness of all that is alive. Organisms, through their interaction with the environment, renew themselves by dissipating entropy, a process essential to maintaining internal order. Life (physical, biological, psychic or social) is a (dynamic) balance between entropic and neghentropic forces and tends towards greater complexity and organisation. Conversely, when entropy grows and prevails, life moves towards disorganisation, fragmentation, de-differentiation, chaos and death. Human beings are able to extend their reach through technology and socio-political institutions. These exosomatic extensions redefine their relationship with the environment, expanding the possibilities of life. Industrialisation has further catalysed this process, liberating individual desire and increasing productive capacity. As a result, billions of people have witnessed unprecedented improvements in their life possibilities. But all this has greatly increased entropy. To improve negentropy beyond the individualisation/totalisation model favoured by digitisation, towards true sustainability, a paradigm shift from individualism to interdependence (based on scientific, rather than ethical, evidence) is required. In sum, our exploration reveals how the inherent interconnectedness of life can be a starting point for addressing the unexpected consequences of globalisation, challenging entropy and promoting resilience in the face of new global challenges.

*Keywords:* crisis, sustainability, entropy, bifurcation, Covid-19.

## ENTROPY AND ANTHROPY

According to the order of the self-organising living beings, life is produced in an incessant process of exchange: through interaction with the environment, organisms continuously are renewed, drawing energy and resources that are then returned in the form of waste, refuse, heat. To maintain their internal order, they adapt by “dissipating their entropy” at the expense of the environment. In this way, organisms are able to maintain their structure and even grow and evolve into even more complex systems by adapting their structures. Thus, contrary to the second law of thermodynamics (which implies the entropic decay of the universe), life, starting from disorder, tends towards an ever greater order.

In the case of the human beings, this relational process takes place in a particular way. The reason lies in the fact that humans are capable of living in large groups, which are constituted around socio-political institutions, thanks to the creation of exosomatic (extra-corporeal) extensions of their organs. In this way, the human species builds social organisations capable of redefining the relationship with the (social and natural) environment and thus increasing the life possibilities available to their members. In the case of social life, therefore, there are not only organisms (the bodies of living humans) but also organisations, which can be regarded as a kind of social “organs”.

With industrialisation, the development of social life – its “organisation” – took a quantum leap: by freeing individual desire and, at the same time, increasing the capacity for production, the last two centuries have seen a spectacular increase in life chances for billions of people. This increase is manifested first and foremost in population growth (we have gone from just under 1 billion to 8 billion since the beginning of the 20th century), longer life expectancy (which in the most developed countries now exceeds 80 years, while in the more backward regions of Africa it remains around 50), diet improvements (with per capita consumption in the USA reaching 3.900 Kcal, i.e. 200 per cent of the energy requirement for a healthy life) and increase in the variety of daily activities that each individual



is able to perform (in the form of mobility, consumption, experiences, knowledge, etc.). Concretely, the economic growth of the last two centuries has translated into “more life” for an increasing number of human beings worldwide.

This was made possible by the leap in complexity associated with globalisation, thanks to a techno-economic system capable of sustaining a much higher level of interconnectedness (Giaccardi, Magatti 2022). The success has been of such proportions as to upset the existing entropic balance between organised human life and the natural environment. This was not considered until very few years ago, simply because we did not have a scientific theory capable of understanding and explaining it.

Precisely because of this unawareness, the relationship with the ecosystem has always been relegated to the background, within a perspective in which the very idea of society has been thought of as the set of economic, political and social relations completely independent of the constraints posed by the natural habitat. It is only in the last few decades, and in particular since the advent of thermodynamic studies, that this assumption has been challenged. In particular, it is Nicholas Georgescu-Roegen (1976), a mathematician and economist, pupil of Joseph Schumpeter, who is credited with the first highlighting of the link between the development of modern economies and the production of entropy. Drawing on the terminology and concepts of thermodynamics, Georgescu-Roegen observed that, from a purely physical point of view, the economic process merely utilizes matter-energy in a state of low entropy and returns it to a state of high entropy. This means that the development of social organization – that is, the growth of life possibilities – brings with it entropic effects: increasing amounts of Co<sub>2</sub>, waste, refuse; reduction of biodiversity, destruction of raw materials, atmospheric imbalances.

Today we know that the intensive exploitation of the planet’s resources, associated with the extraordinary increase in the possibilities of human life, is seriously damaging the habitat of many living species: not only endangering their survival, but increasing the risk of the extinction of life itself on the planet earth. Bernard Stiegler (2016) suggests the term “anthropy” to indicate the variety of entropic effects that, on different levels,



take place in the age of the anthropocene, i.e. when the consequences of social organisation become so significant as to change the conditions of life on earth. These effects develop on three different levels.

First, the exosomatic nature of growth means that the increase in the availability of energy and labour produces physical and biological consequences that have very serious effects on the ecosystem. Although very belatedly (the work of Georgescu Roegen, as well as the first report of the Club of Rome, dates back to the early 1970s), awareness of these effects is growing. Yet we are still a long way from acting accordingly. A second anthropogenic effect occurs at the informational level. As we know, growth (i.e. the increase in the possibilities of life) increases the interdependence between the different actors and the technical apparatuses that make their action possible; this, in turn, results in a greater complexity of the social system. The latter tries to cope with the pressure from the growing demand for mobility and possibilities for action with the exponential increase in communication and connections. The growth of life chances has the effect of increasing information flows, which in turn produce accidentality, redundancy, chaos, loss of plurality and undifferentiation, simplification and polarisation. As complexity increases, so do ambiguities, contradictions and conflicts. Messages become less and less capable of producing meaning, increasing uncertainty and the inability to help grasp connections and hierarchize issues.

The problem is that while the increase in interrelationships, and thus in information, increases the capacity for knowledge, but, at the same time, it also brings with it problems in terms of disorder, disorientation and uncertainty. The circulation of a growing mass of information – what is more, generated by a plurality of often unverified sources – disorients social actors (individuals, organizations, institutions), increasing the probability of error and conflict. With consequences on the regulatory-institutional apparatus, whose ineffectiveness tend to increase. The overall outcome is bewilderment in the face of a reality that is no longer legible, with individual and collective behavior struggling to establish a meaningful relationship with the surrounding world. As “beached whales”, many individuals



and entire social groups are no longer able to understand where they have ended up in life.

The third anthropic dimension has to do with the social disorganisation and psycho-social disorder associated with growth: strong inequalities, demographic and territorial imbalances, migratory upheavals, geopolitical tensions, the loss of human biodiversity and social intelligence, i.e. of difference, creativity, sociality. At the psychic level, on the other hand, the problems concern the spread of anxiety and depression, the implosion of desire and motivation, the return of ethnic and racial hatred, the standardisation of behaviour, concentration and attention reduction and the continuous formation of polar opposing groups within closed “bubbles” of signification. It is the link between growth (of life possibilities) and anthropy that still seems to elude our social reflexivity.

## COVID AS ACCELERATOR: TOWARDS A NEW BIFURCATION

In this framework, Covid-19 has been a powerful accelerator: the increased awareness that everything is connected, remote work imposed from one day to the next, the release of states’ budgetary constraints. With surprising discontinuities. Like the fast-track introduction of the new RNA technology behind vaccines, or the EU’s decision to go beyond the Maastricht agreements by approving the Next Generation EU. And again, the agreement reached by the G20 to introduce a 15 per cent tax on multinationals. And finally, the Russian invasion of Ukraine.

As much in international order as in everyday life, there has been a real “anomic declassification”, i.e. the sudden collapse of a whole series of certainties, habits, ways of doing things that until before the pandemic were taken for granted. At bottom, what has emerged is the ambivalence of the structural relationship that binds one another and to the ecosystem: the absolute independence of the self – and consequently the idea of growth viewed as a substantial increase in individual life chances – has suddenly proved unrealistic and therefore unsustainable, making clear all



the implications and risks of interdependence. The acceleration of change, driven by a multi-year emergency, is clearly visible. But the outcomes of the processes remain uncertain.

Discontinuity is a characteristic of capitalism, an extraordinarily adaptive formation capable of encompassing criticism and crises, making them functional to its own reproduction and revival. When a given economic, social, technological and institutional set-up begins to fail, capitalism has the capacity to set in motion a process of internal transformation, going so far as to modify its internal functional logic. This was the case in the 1980s with flexibility and liberalisation. And so it is today, work sustainability. Sustainability redefines the terms within which capitalism is going to be re-legitimised and relaunched, incorporating some of the criticisms of its current configuration.

While defining the general terms of the next development cycle, this direction leaves some crucial aspects undetermined, while obscuring others. If we do not think carefully about what is happening, the outcomes could be very different, if not opposite, to those desired. This is because the bifurcation opening today concerns the way in which the I-society relationship will be redesigned in the coming years: a new season may open, more aware of the constitutive relationality of life; but this same matrice may favour a dystopian evolution in the direction of an increasingly controlled and vertical world.

## SUSTAINABILITY

Inherited from the previous historical phase, the “sustainability question” grows in parallel with the increasing awareness of the entropy produced by our development model. Although it has been introduced since at least the 1970s, the issue was long denied, and only after the third global shock did it finally seem to find its way onto the agenda of governments and companies. The implicit dream is that, thanks to scientific research and technological innovation, it is possible to undo the entropy generated by the development model without touching the very idea of growth in terms of individual life chances. It is clear that technical innovation is crucial. Without a powerful scientific



and technological effort, it is not even imaginable, at the point we are at, to address the issue of sustainability. But not only are things more complicated than they are usually told. It is also a grave mistake to reduce sustainability to the technical dimension alone. The G20 in October 2020 and the subsequent Cop26 in Glasgow recognised the need to contain the planetary temperature increase to 1.5 centigrade. A goal that is far from easy given that the earth's temperature has already risen by 1.1 centigrade since 1850-1900. Without immediate, rapid and large-scale reductions in greenhouse gas emissions, such a goal is unattainable.

Fortunately, especially in recent months, initiatives aimed at accelerating the transition are multiplying. But it will not be a walk in the park. According to the International Energy Agency's World Energy Outlook 2020, an articulated strategy is needed to cut CO<sub>2</sub>: improving carbon capture, utilisation, and sequestration; enhancing hydrogen; spreading renewable sources; and introducing the latest generation of nuclear power plants. Experts argue – heatedly – about the most effective mix. But all recognise that none of these avenues can be, by themselves, decisive. They all take years to fully develop, and each presents unresolved issues. For example, renewables – surely the most promising solution – still have a number of problems to solve (such as intermittency) with the consequent need to store electricity in batteries using rare materials such as lithium, cobalt, nickel. What it would take to power Italy at night (400 gigawatt hours) exceeds the entire world production of ion batteries. And the price of lithium has risen by 80 per cent in recent years, while new metal-air batteries can reach 8 per cent of total consumption, according to the IEA. On the other hand, CO<sub>2</sub> capture is certainly a technology already available. But there is no space to store the sequestered carbon, and furthermore, the operation done in the atmosphere requires huge amounts of energy. Still, major steps forward on modular nuclear power plants are announced. But the costs are very high and the lead time, assuming no other difficulties arise, very long. The planet is therefore exposed to a problem that, at least in the time frame we need, has no solution. Especially if we do not change our habits in the meantime. We have realised that we must achieve



a goal. But we do not yet know exactly how, and above all we are not willing to change our lifestyles. In the meantime, the damage to the ecosystem worsens. Well beyond any apocalyptic scenario, the list of problems grows longer by the day: rising temperatures lead to problems of aridification of entire areas of Africa, South Asia, Central and South America; rising seas force the resettlement of hundreds of thousands, if not millions, of people; extreme weather events produce enormous damages; the reduction in the biodiversity and the deforestation cause severe imbalances in the planetary ecosystem; chronic problems in the supply of raw materials, especially rare ones, expose people to sudden crises; water scarcity is a critical factor destined to trigger major conflicts; the threat of new pandemics and health crises remains high.

These entropic effects cannot but have consequences for people, political communities, entire populations in vast areas of the world. In the original idea of sustainability, the reference was to future generations. But we are now at the point where ecosystem problems have immediate repercussions on social life. This is why today it is no longer possible to separate the environmental issue from the social, economic and political ones. If we want to be realistic, we must admit that a long, (very) difficult and (very) costly period of adjustment lies ahead. A path along which it will be necessary to change the very foundations of our development model, while at the same time having to govern the more or less serious and widespread emergencies that may be unleashed. And all this while digitisation transforms the very environment of our social life in a hyper-technological direction. But to acknowledge this, is it not to say that we are already in another world compared to the euphoric and linear season of “globalisation”? Things have finally started to move, but the world is moving forward in short order.

According to the UN Global Outlook Report 2019, 112 nations have made firm commitments on ecological transition, against 85 (mainly from less developed areas) that remain reluctant. And with Cop26 in Glasgow, the situation has not changed. China, India, Russia – not exactly three minor countries – have made it known that 2050 is not a realistic date for zero C02. Even in the economic and financial world, it is now





recognised that the problem of entropy can no longer be bracketed. It is being brought about by economic forecasts that force even those who have hitherto ignored the problem to come to terms with reality. The result is that, at the end of 2021, of the \$3 trillion invested by international funds, more than a third will meet the ESGs criteria set by the UN for 2030. But we know that resistance remains strong - especially among “losing” interests – while many observers fear a colossal green washing operation. Being exposed to the market, some companies are championing changes earlier than other social actors, trying to adopt new business strategies. But entrusting the energy transition to market forces alone by no means ensures either effectiveness or timeliness of the process.

To think that interest can be the driver of the changes we need is a pious illusion. This is clearly seen in the automotive market where, after much hesitation, the colossal transition to electric has now begun. Good news, with its ambivalences. The entire industry now has a clear objective: to start a new production cycle around the electric car. If the operation succeeds, the industry will be able to secure a market of billions of cars for the next 20 to 30 years, since it is a question of converting the entire global car fleet to this more efficient and less polluting technology. And patience if the experts tell us that the step forward of the electric car does not eliminate all the critical issues: in addition to the problems related to the infrastructure for the production and distribution of electricity – which are still problematic aspects and not unrelated to sustainability issues (how is electricity produced?) – on the horizon there is the question of the disposal of the millions of batteries that will become un-serviceable in a few years. Not to mention the issue of the raw materials that will still need to be extracted. And although there is no doubt that electric power is less polluting than oil, the ambivalence lies in wanting to promote a solution that continues to focus on the private market without adequate investment in public collective mobility, and more generally without any real change in individual habits. No one is talking about this. The fact remains that the production of billions of new cars and the electricity required to meet the new needs will fuel, albeit with



less intensity (which is of course a good thing), the entropic circuit that they claim to combat.

Apparently, everyone today is for sustainability. Just take a look at the advertisements that circulate daily on the main communication channels: the competition is to be accredited as more “sustainable” than others. But the meaning of this term – and the commitments that go with it – remains vague. There is, firstly, a problem of timing. The 2050 target for zero emissions remains a mirage. We have already mentioned that China, India and Russia have declared unrealistic that deadline. It remains to be seen whether the speed of actual change will be commensurate with the urgency of the issues at stake. The doubts are all there. What we do know from the UN’s Sustainable Development Goals Report 2021 is that the situation on a planetary level has worsened further because of the Covid-19 and the war, which have also exacerbated the problems of poverty and inequality everywhere. The report also states that “concentrations of key greenhouse gases continue to rise despite temporary emission reductions in 2020 linked to blockades and other Covid-19 response measures”. The world remains woefully off track in meeting the evolution outlined by the Paris Agreement. Biodiversity is declining and terrestrial ecosystems are degrading at an alarming rate. Beyond declarations, forecasts for the coming years say that CO<sub>2</sub> emissions will rise at least until 2030 (according to the UN, the increase of greenhouse gases in 2030 will still be 15.9 per cent). Only with the next decade (!) should there be a turnaround in oil consumption worldwide, provided that we really invest in the direction of alternative energy sources.

But, even with the experience behind us, how realistic are these changes? The problem is that governments’ commitments are not binding, which makes them inconsistent in many cases. According to predictions, unless deep and rapid adjustments are made, temperatures are set to rise by more than 3 °C between now and 2050. An unsustainable threshold for life in many areas of the planet. At the current rate of change, we are heading for a disaster foretold. Only the acceleration of the energy transition process can avoid the impact. But acceleration means touching interests, questioning jobs, upgrading the skills of workers, managers, entrepreneurs, public administrators.



One cannot pretend not to know that resistance will be strong, and that it will in any case be difficult to change production modes and consumption styles.

There is, secondly, a problem with the cost of transition. Unsustainability is indeed environmental. But also social, demographic and, not least, economic. The world is on fire and the transition to sustainability risks exploding an already very strong anger. Moving decisively in the direction of a more sustainable model is very difficult, because the impact of the transition is asymmetrical: at international and individual country level. Simply because it is the poorest who bear the greatest burden of the adjustment. And in a world already marked by deep inequalities, this is not good news. The strongest groups and countries have the resources to cope with the energy transition, while those lagging behind risk having even more stringent and burdensome constraints thrust upon them. It is therefore understandable that they refuse, or at least try to delay, the transition. As the protest of the yellow waistcoats in France, caused by the ecologically unexceptionable decision to raise the price of diesel, has shown: one cannot think of advancing on the road to ecological transition without decisive action to safeguard social justice. But to say this is to complicate the problem enormously, perhaps even make it insoluble.

The same thing applies to business. Where there are those who lose out and those who gain: some sectors and thousands of businesses at risk of closure will understandably do everything to stave off their demise. In a paradox, it can be said that the scale of the necessary investments and compensation that will have to be put in place is too high: making the world “sustainable” risks being “unsustainable”. It is clear that the game is intertwined with the redefinition of power relations and the distribution of costs. For example, advancing along the needed change means questioning the interests of shareholders and their financial agencies (mutual funds, banks, etc.) that look to short-term returns, incompatible with the necessary transition. Very concretely: are these groups willing to see their profits reduced in the name of the value of sustainability? And do they have the courage to make a dent in the current unfair concentration of wealth to pay for the



ecological transition? The medium to long-term results that sustainability promises can hardly satisfy the hunger of speculators.

Thirdly, there is a cultural issue. On one hand, the new technological environment requires deep changes in the ways of working, moving, communicating that are not easy to achieve. On the other, sustainability cannot be addressed without reviewing the consumerist culture on which the end-of-century growth was based. A sustainable world cannot be based on the unlimited increase of individual possibilities, on the systematic and intensive exploitation of natural resources, on waste associated with the circuit of permanent substitution.

Sustainability in fact demands to go beyond a pure instrumental rationality: it is by incorporating the constraints (and benefits) coming from the logic of life, in its ecosystemic complexity, that a more qualitative and relational idea of growth can be imagined. Dimensions which are systematically concealed, because they would entail radical changes in the existing power structures and dominant narratives. Sustainability calls for a new interweaving of economy and society. The modern capitalist economy – and neo-liberalism in particular – has been focussed on the multiplication of means, deeming ends to be solely subjective. This has led to a weakening of the role of politics and other forms of collective thinking, such as art or religion. But sustainability – being a collective end – now poses a question concerning a common good. The challenge is agreeing on this priority. This means, for example, agreeing that the immediate level of well-being cannot threaten the future preservation of life. In turn, this implies coming to terms with divergent perceptions, interests, fears, worldviews, in order to try to fix the timing and modes of the transition. Anyone with a sense of the complexity of our social worlds realises how arduous this task is.

In the face of growing difficulties, an unsuspected voice like John Lovelock – the ecological scientist known for having first argued that the earth is Gaia, i.e. a living organism capable of regulating itself – has recently gone so far as to speak of the need for an “eco-authoritarianism” as the only way to achieve the goals that are becoming ever more urgent. And it is not an isolated voice. David Runciman (2018), professor of political



science at Oxford, also reflected on the same issue in a provocative article in the authoritative “Foreign Policy”. This is, after all, the raw nerve of sustainability: is it realistic to think that we can get there by relying only on widespread intelligence, responsibility, and the willingness of everyone to give up a short-term advantage for a future good? Or is the preservation of life on the planet so important to justify a restriction of democracy, perhaps with scientific legitimisation and through technocratic regulations? And finally, what will be the impact of the path towards sustainability on the relationship between democracy and autocracy at the international level? The Covid-19 experience should serve as a warning: if there have been so many problems and difficulties in combating the effects of a single virus, how will it be possible to manage the complexity associated with the gigantic environmental issues? And what articulation can be imagined between personal freedom and common bond?

As Michel Foucault noted (1991: 213), in the course of the 20th century, power veered towards the management of life in order to ensure not so much discipline as regulation: “Sovereignty used to make people die and let them live. Now there appears instead a power that I would call a power of regulation, which consists, on the contrary, precisely in making live and letting die”. And it is exactly in this direction, with the possibility of making live (bio-power) and letting die (tanato-politics), that power tends to move in an advanced society. The direct link with sustainability is evident, where it is interpreted as the capacity of power to take charge of life, through the regulation (technical and or institutional) of the biological by means of norms applied both to the individual body (which one wants to discipline) and the population (which one wants to subject to regulation).

The recognition of the issue of sustainability, prompted (not without forcing it) by shocks and related emergencies, undoubtedly constitutes a great opportunity to improve our development model. Provided that we are capable of a leap in epistemological plan, which entails the acquisition of a relational idea of life. And because this leap of plan is difficult, sus-



tainability is at risk of procedural reductionism, ending up producing very strong tensions in social life. Behind the apparent general consensus, there are in fact different, and in some cases even opposing, positions and interests: the utopians, who want radical change immediately and at all costs; the profiteers, who see in sustainability new business opportunities without changing the status quo; the marginals who oppose change for fear of having to pay excessive costs; the regulators, who imagine that they will solve the problem by introducing ever more extensive controls on every single human activity; the technocrats, who entrust every solution to technology; the resigned, who think that there is nothing left to do except preparing for the worst.

It is not said, but sustainability brings to light a fundamental problem of our development model: with its extraordinary capacity to increase the life chances of billions of people, capitalism is an entropic process that raises enormous questions of social and environmental ecology. It is precisely because of the growth achieved over the last two centuries that we now have to deal with its (enormous) side effects. The point is that the ever-closer intertwining of the organisation of social life, the planetary ecosystem and the processes of anthropogenesis requires to think the entire reality in a relational perspective: nothing can be thought of as an “independent variable” any more. Concretely, this means that, in the present situation, we are forced to agree on an end that is a common good, beyond any individuality and sovereignty. But to say this is to recognise that the assumptions on which modernity was founded – on the macro level Hobbes’ idea of political sovereignty and on the micro level Adam Smith’s idea of the invisible hand (whereby pursuing one’s own interest generates collective welfare) – no longer hold.

The complex interaction between the social system and the ecosphere constitutes a novelty that is destined to change profoundly the underlying dynamics of social life. It can be understood that there is no desire to tackle this thorny issue. But the longer we delay starting the adjustment processes, the higher the costs we will have to pay. As things stand, everything suggests that the goal of sustainability will require a long and ardu-



ous journey, punctuated by tensions and conflicts, driven forward by shocks and disasters rather than by the ability of human society to preemptively change what needs to be changed. Beyond the many attempts at domestication, the question of sustainability arises out of the rebellion of reality against the claims of the individualistic ideology that underpins modernity. What is at stake is much higher than a mere technical adjustment to a development model that thinks it will remain identical to itself: at stake are the processes of trans-individuation (i.e. the set of shared meanings that allow for the balance between self and society) within the framework of the constraints posed by the anthropocene in relation to the processes of energy transition, digitalisation and the socio-institutional changes of recent years (new cultural orientations, economic and social forms, institutional regulations, etc.). To “sustain” does not simply mean to remedy the unsustainable, but to nourish, to provide, to keep alive, to feed. That is, to recognise the obligations that, as living humans on planet earth, constitute us.

## BIFURCATION

The evolutionary shift that took place with globalisation can be understood as a leap in the complexity of social organisation, which is now, however, encountering new difficulties: the increase in life possibilities is now facing the growth of entropy and anarchy (i.e. the increase in disorder, fragmentation and reduction in diversity both in the ecosphere and in the social organisation). The conditions are thus created for a succession of more or less severe shocks of various origins (environmental, health, economic, technological, political, cultural, etc.) that, in addition to throwing the system into crisis, may threaten in the long run its survival. From systems theory we know, in fact, that there is a threshold beyond which the system is no longer able to adapt, i.e. to dissipate entropy in order to maintain its equilibrium and growth. Faced with strong and prolonged shocks, systems experiencing great instability enter into a state of high fluctuation. This means that liquid modernity has now brought social organ-



isation to a new bifurcation: in recent years, the increase in entropy and anthropy have reached such a level as to “metastabilise” (i.e. definitively undermine and thus dynamize) the structural arrangements outlined since the 1980s. In the language of Ilya Prigogine (2003), a bifurcation means a point of instability at which new forms of order can emerge that cannot be deduced from given premises. Mathematically, such a point represents a quantum leap, a profound and unexpected change in the system’s trajectory, with strong fluctuations that may exacerbate its instability, moving it away from its state of equilibrium; or it may foster the emergence of a new order. The system is metastable and can transform itself along several possible lines. The outcome depends on the history of the system, the particular conditions under which the change occurs and, in the case of social systems, the choices of the actors. In principle, the outcome cannot be predicted, since at each bifurcation point there is an element of randomness (and freedom) that cannot be eliminated and that can make a deviation from the starting situation.

What is clear is that the drive that fuelled the enormous development that took place at the end of the 20th century is now exhausted. The idea of infinite growth on a finite planet has now revealed all its incongruity. But recognising that the increase in life chances cannot be achieved without considering its entropic compatibility – which is what sustainability is all about – has far-reaching consequences that our societies are struggling to metabolize. The problem is that liquid modernity has systematically removed certain dimensions of reality that, as irreducible otherness with respect to the actions of technicalised human beings, eventually rebels by triggering shocks, accidents, emergencies that upset the existing order. This calls for a new adaptive response from our social organisation, i.e. a new leap in complexity. Which, however, we do not yet know what form it will take.

Hence the questions we must try to answer: what kind of relationship is going to be formed between our infragilitated subjectivities, often confused and incapable of managing the surrounding complexity and the increasingly powerful economic, technical and institutional infrastructures that organise our social life (states, platforms, large companies, banks, universities, research centres, etc.)? How can such a recomposition take place





at a time when advanced societies are no longer able to elaborate sufficiently stable and shared collective meanings, while techno-economic infrastructures become ever denser and penetrating? And finally, after having let the genie of desire get out of the bottle, and assuming that it is impossible to let it back in, how can the increase in life chances be differently thought from the quantitative and individualistic idea of liquid modernity?

## REFERENCES

- M. Foucault (1991), *Discipline and Punish: The Birth of the Prison* (New York: Penguin).  
N. Georgescu Rogen (1976), *Energy and Economic Myths* (New York: Pergamon Press).  
C. Giaccardi, M. Magatti (2022), *Supersocietà. Ha ancora senso scommettere sulla libertà?* (Bologna: il Mulino).  
I. Prigogine (2003), *Is Future Given?* (Singapore: World scientific publishing).  
D. Runciman (2018), *How Democracy Ends* (London: Profile Books Ltd).  
B. Stiegler (2016), *The Automatic Society* (London: Polity press).

